Background

The following deliverable details two suggested *Indoor Residential Leak Detection & Repair Training* frameworks for consideration by the Bay Area Water Conservation and Supply Agency (BAWSCA) and Santa Clara Valley Water District (Valley Water), referred to herein as "Partner Agencies". The framework elements provided are intended to serve as a reference when developing formal contract solicitation(s) for the development of the training curriculum as well as training facilitation. The following suggested frameworks have been informed by extensive research activities performed by the California Water Efficiency Partnership (CalWEP), including water agency surveys, industry and trade organization interviews, expert roundtables and focus groups targeting landscape professionals and plumbers, as detailed in the contract with the Partner Agencies.

Please note that the following training framework suggestions are simply that, suggestions, and are not intended to be directives. Therefore, CalWEP recommends that the Partner Agencies conduct further internal review and evaluation of the recommended training frameworks and adjust where needed to arrive at a training approach that best achieves their objectives, staffing capacity, and long-term budgets.

Training Objectives

The following training objectives, as requested by the Partner Agencies, were considered in development of the recommended training frameworks:

1.) Target professionals that service residential and multi-family accounts, including Homeowners Associations (HOAs)[1].
2.) Target professionals looking to set themselves apart from their colleagues.
3.) Maintain a directory of trained professionals accessible by water customers that can be updated at least annually and maintained regionally.
4.) Sustain a minimum of 20 professionals on the directory.
5.) Allow for regional partners to collaborate, continually improve, and administer the training program over at least a 5-year period.
6.) Balance cost effectiveness (longevity) and overall impact measured by training participation.

General Training Framework Considerations

Trainings that offer **assessment-based certificates** versus **professional certification** require different degrees of investment and have several perceived "Pros" and "Cons". The latter are summarized below in Table 2. Further, the Institute for Credentialing Excellence (ICE) provides a more detailed breakdown

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[1] Training that addresses Commercial, Industrial, and Institutional (CII) leaks is outside of the scope for this framework, particularly due to the unique nature of CII properties. For example, leak types are specific to the services and operations conducted at the CII property (e.g., manufacturing and industrial processing, hospitality, etc.), whereas leaks across residential properties are somewhat standardized (e.g., leaking toilets, broken irrigation systems, etc.).

of differences between the two training approaches, a comparison document is included under Appendix A. The purpose, goal and assessment affiliated with each type of training is provided in Table 1, as defined by ICE:

Table 1: Comparison of "Assessment-based Certificate" and "Professional Certification" training programs (Source: Institute for Credentialing Excellence)

Training Type	Purpose	Goal	Assessment
Assessment-based certificate	Build capacity and recognition of a specialty area of practice or set of skills	Participants to acquire specific knowledge, skills, and/or competencies	Evaluate mastery of the intended learning outcomes; linked directly to the learning event, where assessment content may be narrower in scope
Professional certification	Recognize professionals who meet established knowledge, skills, or competencies	Validate the participant's competency through a conformity assessment system	Assure baseline competencies and to differentiate professionals; independent of a specific learning event, where assessment content is usually broad in scope

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Table 2: Perceived "Pros" and "Cons" per Certificate and Certification training programs

	Assessment-based *Certificate* Program	Professional *Certification* Program
Pros	1- Lower start-up and maintenance costs. 2- No need for continuing education units, where the certificate does not lapse or expire. 3- Fewer requirements (i.e., No comprehensive exam, shorter instruction) could attract more attendees and help maintain minimum directory quota. 4- Fewer incentives needed to drive enrollment. 5- Fewer legal considerations compared to certification programs. 6- Lower registration fees and no renewal fees.	1- Attracts a higher caliber student looking to set themselves apart from the status quo, ultimately establishing a higher level of trust between client, professional and the water agency. 2- Continuing education units could equate to better skill retention and greater curriculum recall. 3- Because the certification can lapse, those professionals who do not retain their skill-set will be automatically purged from the directory.
Cons	1- Lower skill retention and curriculum recall if CEUs are not required. 2- Lower skill retention if participants are less committed to the work, a result of a "low bar of entry" to enroll and complete the training.	1- Higher start-up and maintenance costs and requires hiring consulting services to help develop and accredit training. 2- Bigger investment for participants (e.g., time, cost, must pass a comprehensive exam, more curriculum to master) could limit enrollment and in turn make it more challenging to achieve a minimum quota of professionals on the directory. 3- Requires continuing education, which can be perceived as an extra burden to certified professionals. 4- Potentially greater incentives to drive enrollment (Solution: pare with a customer coupon or voucher for services). 5- The certification is retained for a specific period and can lapse, reducing the number of professionals listed on the directory long-term. 6- Lack of renewal fee payment could result in certification lapse and removal from the directory. 7- More legal considerations compared to certificate programs: Ex.: Challenges related to fairness of obtaining certification

Model Training Frameworks

Based on extensive review of existing plumbing industry trainings and feedback received during our research efforts, CalWEP recommends that the Partner Agencies consider two frameworks for developing Indoor Residential Leak Detection and Repair Training. Both recommended frameworks are based off existing training models: Framework A builds upon Southern Nevada Water Authority's Water Smart Plumbers *certificate* training program, whereas Framework B calls for an adaptation of the Green Plumbers *certification* training program. Tables 3 and 4 provide a high-level summary of the distinguishing training elements for each of the two recommended frameworks. Continue reading for a more detailed description of each training framework.

Table 3: Key Element of Framework A – SNWA Water Smart Plumbers Training (certificate program)

Assessment-based *Certificate* Training	
Estimated Development Costs	$20,000 - $30,000*
Estimated Training Costs	Negotiated – unit cost per training
Estimated Participant Costs	$150 (with partial refund after training completion)
Training Duration	4-8 hours
Qualified Organizations	IAPMO
Additional investments	Refresher Course; Micro-website; Directory of Professionals

*Estimated costs are roughly based on training development costs provided by SNWA

Table 4: Key Element of Framework B – IAPMO Green Plumbers (certification program)

Professional *Certification* Training	
Estimated Development Costs	Significant investments exceeding $100,000
Estimated Training Costs	Negotiated – unit cost per training
Estimated Participant Costs	NTE $300 + annual renew fee
Training Duration	Approx. 8 hours + time for certification exam
Qualified Organizations	IAPMO + Certification & Accreditation Services + Psychometric Services[2]
Additional investments	Refresher Course/CEUs; Micro-website; Directory of Professionals

Separate from any contracted services for training development, the Partner Agencies shall develop a contractor agreement for all training participants to ensure participants:

1. Are licensed and insured, and will sustain these requirements for at least two-years following training;
2. Work within the required service area;
3. Agree to a maximum customer-response time of 72-hours;
4. Agree to either a flat fee for house calls and/or a not-to-exceed billable hourly rate;

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[2] Psychometrics is the science of measuring mental capacities and processes. According to one definition provided by the Psychometric Society (Denny Borsboom, University of Amsterdam): *psychometrics is a scientific discipline concerned with the construction of assessment tools, measurement instruments, and formalized models that may serve to connect observable phenomena (e.g., response to items in an IQ-test) to theoretical attributes (e.g., intelligence)*. The science is applied to develop exams for accredited certifications, for example. See also: https://www.psychometricsociety.org/what-psychometrics.

5. Attend the entirety of the course and complete the assessment activities (e.g., quizzes, exam) to be listed on the directory; and
6. Agree to a refresher course every two-years and/or maintain required continuing education units to be listed on the directory.

In addition to the contractor agreement, the Partner Agencies shall develop a participant waiver of liability that indemnifies the water agency and the training facilitator from any medical or legal claims resulting from services rendered by trained professionals listed on the directory. Both must be signed by all enrollees prior to commencing training.

Framework A: SNWA Water Smart Plumbers Training (certificate program)

A comprehensive description of Southern Nevada Water Authority's (SNWA) Water Smart Plumbers (WSP) Training Program developed in partnership with the International Association of Plumbing and Mechanical Officials (IAPMO) can be found in the CalWEP report summarizing our initial phase of research findings[3]. Note that because the training does not result in formal "certification", no certifying exam will need to be developed, continuing education units shall not be required of those who complete training, and no annual renewal fees shall be levied. To help maintain learned skills it is recommended that a "refresher" course also be developed and offered to professionals that earn their certificate. Where a refresher course offers a brief review of core concepts from the original curriculum.

The benefits of procuring IAPMO to develop the leak detection and repair trainings include:
- Cost savings from adapting an existing training program with established curriculum (WSP training).
- Lessons learned from launch of WSP training in April of 2023.
- In-house experts with decades of experience educating plumbing professionals and the necessary technical expertise and field experience to develop relevant and impactful curriculum.
- A network of qualified instructors.
- Collaboration with a reputable organization, recognized by the target workforce.
- Turn-key training services.

General Description and Approach

Based on the SNWA Water Smart Plumbers model, Partner Agencies would employ IAPMO to develop and facilitate the leak detection and repair *certificate* training program under two separate contracts as described below. The **Fixed-fee Training Development Contract** is estimated to cost approximately $20 - $30K[4], whereas the **Bi-annual Training Contract** costs could be negotiated based on a per training unit cost. The latter contract costs will vary depending on preferred class format (e.g., in-person, hybrid, or virtual). Additionally, under the bi-annual contract, Partner Agencies would cover the entire expense of the training. To recover a portion of the costs and limit participant attrition, a registration fee of $150

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[3] CalWEP report, December 2022: "Design Considerations For A Residential Leak Detection & Repair Certification Training"

[4] Development costs are an estimate based on information provided by SNWA regarding their contract with IAPMO. Cost estimates are subject to increase based on the finalized scope of work. In order to maintain this relatively low price range, IAPMO would own the curriculum and the Partner Agencies would enter into a licensing agreement to utilize the curriculum.

shall be paid directly to the Partner Agencies by registrants. A portion of the registration fee could be refunded upon completion of the course to help ensure sustained participation.

Two-Phased Contract Approach:

1. **Fixed-fee training development contract agreement with IAPMO to:**
    a. Adapt existing Water Smart Plumber curriculum, including quizzes and other related content (e.g., CA green code, local conservation efforts, CA-specific water loss estimates, etc.).
    b. Tailor program administration approach as needed (e.g., qualifying criteria, participant policies, learning objectives, in-person or hybrid in-person with hands-on components).
    c. Work collaboratively with Partner Agencies' public affairs and/or marketing and communication departments to develop branding elements.
    d. Build a web-based directory of trained professionals.
    e. Develop refresher course materials.

2. ***Bi-annual training contract* with IAPMO to:**
    a. Deliver turn-key trainings over 24-months, with option to renew. Includes procuring qualified instructors and locating appropriate training facilities within agency service areas, amongst other responsibilities necessary to deliver a successful course.
    b. Manage registration, including establishment of a web-based registration page and handling or registration fees, refunds, and partial refunds.
    c. Manage the web-based directory including spot-checking 25% of listed contractors for current licensure and insurance on an annual basis and beginning the second year of training.

The following are suggested training framework elements that can be folded into a contract Scope of Work with IAPMO or can be modified for inclusion in a formal Request for Proposal (RFP) issued by the Partner Agencies if seeking a broader public solicitation. If the latter, replace the term IAMPO with a general contract definition (e.g., Contractor). IAPMO shall be responsible for the following tasks as described below. Note that Tasks #1-2 are associated with the *Fixed-fee Training Development Contract*, and Tasks #3-4 are associated with the *Bi-annual Training Contract*. The tasks address in-person trainings.

Task #1 – Training Design & Curriculum Development

a. *Establish learning objectives jointly with the Partner Agencies.*
b. *IAPMO shall work with the Partner Agencies to establish training duration, format, and schedules. Trainings shall be no shorter than 4-hours and should be limited to a single-day to increase participation. *Note that class lengths can be adjusted based on feedback from training participants.*
c. *Establish qualification criteria for participants and related policies jointly with the Partner Agencies.*
d. *Establish a registration fee structure jointly with the Partner Agencies.*
e. *Develop Instructor qualifications jointly with the Partner Agencies. Instructors shall possess at least 5 years of field experience working as a licensed plumber. If instructors*

are recruited from outside of California, they must get up to speed with relevant state and local codes prior to training instruction.

f. *Adapted curriculum from Water Smart Plumbers (WSP) program created for the Southern Nevada Water Authority (*See Appendices D and E for WSP scope of work, and CalWEP's suggested curriculum topics).*

g. *Develop all training resources, this shall include but is not limited to: Leak detection checklists, leak repair checklists, worksheets and handouts, reference materials such as plumbing hardware, fixture efficiency standards by fixture type, determining native pressure and using Pressure Reducing Valves (PRVs), equipment catalogs and specifications, and any other materials and resources needed for conducting hands-on lessons.*

h. *Develop a "refresher course" and associated materials.*

i. *A participant feedback form shall be developed jointly between the Participating Agencies and IAPMO. (*See Appendix F for Qualified Water Efficient Landscaper Training feedback form)*

j. *Develop a "micro website" that shall host online training registration, the for-hire directory and a training resource repository. Embed a customer survey that allows water agency customers to provide anonymous feedback about their experience utilizing a professional listed on the directory. [Note: Alternatively, the Partner Agencies could hire a web-developer to produce a micro website to host the directory of professionals. Licensing and maintenance fees could approach $20,000 a year.]*

Task #2 - Marketing and Branding:

a. *IAPMO shall work in collaboration with Partner Agencies' public affairs and/or marketing and communication departments to develop branding elements including: The training name, logos, and certificates.*

b. *IAPMO shall work in collaboration with Partner Agencies' public affairs and/or marketing and communication departments to develop promotional language to include in outreach materials (e.g., emails and flyers).*

c. *Where feasible, IAPMO will assist in the promotion of trainings to their wider membership and network of contacts.*

Task #3 - Administrative:

IAPMO shall be responsible for all administrative tasks in order to deliver turn-key trainings, this shall include be is not limited to:

a. *Manage training registration and payment including refunds.*

b. *Manage the for-hire directory and update the training resource repository, as needed.*

c. *Recruit qualified instructors and seek pre-approval from the Partner Agencies.*

d. *Recruit a minimum of one guest instructor that specializes in leak detection (e.g., leak detection equipment manufacturers and vendors) to supplement training curriculum.*

e. *Locate a training venue or facility that allows for effective hands-on training demonstrations. The hands-on training could be facilitated at a location separate from the primary location of instruction. Venue costs shall be accounted for within the Bi-annual training contract.*

f. *Procure demonstration equipment such as plumbing hardware and tools for leak repair to supplement training concepts and ensure skill development.*

g. *Optional (virtual trainings): Onboard with a Learning Management System (LMS) for hosting training materials, as needed. Note that registration and training resources would likely be integrated into the LMS rather than a "micro website" as described under Task #1. Facilitate at least one round of beta testing of the LMS system prior to public launch. It shall also be the responsibility of IAPMO to cover the cost of any annual LMS licensing fees.*

Task #4 - Training:

a. *Facilitate a pilot training with a smaller cohort of participants, prior to rolling training out to a larger region or service area, where pilot participation shall be capped between 15 and 20 participants.*

b. *Deliver turn-key training services.*

c. *Distribute the participant feedback form to participants in hard-copy form at the end of class. Once collected the feedback forms shall be provided directly to Participating Agencies' project manager for review and evaluation.*

d. *Delivering refresher courses for students who earn their certificates and beginning year two.*

e. *Submit a summary of training cohort demographics and training metrics to Partner Agencies upon completion of each training, including but not limited to: enrollment, attrition rate, pass rate, business affiliation, employment title, and business service area.*

Framework B: IAPMO's Green Plumbers Training (certification program)

In 2011, IAPMO acquired the North American rights to the GreenPlumbers® USA Training and Accreditation program. The training was rebranded as "Green Plumbers Training". Originally the training was offered as a 5-course, 32-hour in-person training, where each class was set to run for either 4 or 8 hours, consisting of lecture, demonstrations, and testing. IAPMO now offers the training as a webinar series and the certification exam is self-administered. To request in-person training a minimum of 20 participants is required. The Green Plumbers Training National Directory has a searchable database of certified professionals. In 2018, annual dues were $400.

Green Plumbers Training was designed to assist plumbers in understanding their role in relation to environmental and public health, and to provide their customers with up-to-date information and advice on:

- latest technology and energy saving appliances;
- practical appliances and installation knowledge;
- environmental impacts of plumbing services, appliances and household practices
- consumer information; and
- energy/water/cost savings (short-term and long-term cost comparisons and environmental benefits).

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A 457-page reference manual includes 5 chapters on the following topics:

1. Climate Care
     - Hot Water Heating
     - Energy Consumption
     - Heating Appliances
     - Cooling Appliances
     - Greenhouse Gas Abatement

2. Caring For Our Water
     - Water Efficient Products
     - New Technology
     - Household Water Audits
     - Reducing Household Water Consumption
     - Storm water
     - Sewage

3. Solar Hot Water
     - Solar Hot Water Technology
     - State Rebate Information
     - Sizing and Installation Requirements
     - Retro Fitting
     - New Technology

Image: IAPMO Green Plumbers Reference Manual Cover. Available on Amazon.

4. Water Efficiency Technology
     - Reuse/Recycled Water
     - Rainwater
     - Greywater
     - Septic Tanks and Aerated Wastewater Treatment Systems
     - Environmental and public health and safety regulations

5. Inspection Report Service
     - Water and Energy Audits
     - Commercial / Industrial and Residential Buildings
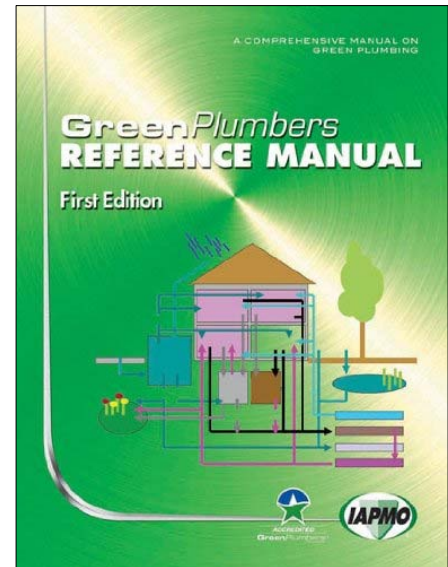   - Creating a Master Plan for Future Improvements

Note that Green Plumbers Training has lost significant momentum over the last several years. One of the training instructors claimed that a building boom following the last economic recession (around 2008) kept plumbers over-employed and they simply did not have the bandwidth to undertake a comprehensive training that took significant time away from the job. Thus, a more truncated version of the training with a sole focus on leak detection and repair might strike a balance with professionals who cannot commit to 30-plus hours of training. Further, while the Green Plumbers Training covers topic areas that are not relevant to leak-specific training (e.g., solar hot water, energy audits, rainwater etc.), the format/ architecture of the certification program could be adapted to meet the training objectives laid out by BAWSCA and Valley Water. Again, this could translate to a much more abbreviated training.

The benefits of working with IAPMO to develop the leak detection and repair *certification* training include:

- Decades of experience developing and administering certification trainings.
- Previous certification partners include United Association (UA) and Plumbing-Heating-Cooling Contractors Association (PHCC). These established relationships make future engagement to assist with curriculum development, etc. more streamlined.
- Lessons learned from pervious launch.
- Existing professional directory thus eliminating development costs and can be managed outside of the Partner Agencies.
- Attracts professionals looking to set themselves apart from the status quo and who value career development opportunities. IAPMO has connections to this target demographic via its network of members.

General Description and Approach

The development of a certification training program will require both a greater monetary and time investment than adapting the SNWA Water Smart Plumbers certificate program as outlined above. Development costs are likely to land well above $100,000. This is because in addition to developing the curriculum, the training must meet accreditation requirements[5] and include a certification exam, both of which will require specialized consultants (e.g., Psychometric Consulting). Additionally, a registration fee not to exceed $300 (as recommended during our industry interviews) shall be paid directly to the Partner Agencies by registrants. A portion of the registration fee could be refunded upon completion of the course to help ensure sustained participation. Note that a registration fee of $300 will not cover all training expenses. Further, any amount above this price point will likely deter professionals from smaller owner/operator businesses. Certification training program expenses could be partially offset by annual certification renewal fees, however this is likely to be unpopular with plumbing professionals and could further deter participation in the training.

It is suggested that the Partner Agencies approach certification training program development under three separate contracts: 1) *Training Development Contract*, 2) *Certification Exam Development Contract*, and 3) *Training Facilitation Contract*. While IAPMO's services can be procured to both develop and teach the training, an independent consultant must be retained to develop the exam for certification. This will prevent IAPMO from "teaching to the exam" and is standard practice for the development of certification courses. Estimated cost for each contract are undetermined, as consulting fees for accreditation and exam development can vary significantly.

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[5] In order for a certification training to earn accreditation it must comply with the National Commission for Certifying Agencies (NCCA) Standards for Accreditation of Certification Programs and follows the NCCA application procedures.

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Three-Phased Contract Approach:
1. *Training development contract* **agreement with IAPMO to:**
   a. Develop curriculum format and content.
   b. Procure accreditation consultants to ensure conformance with standard certification program requirements.
   c. Work with accreditation consultants and Partner Agencies to develop program administration approach as needed (e.g., qualifying criteria, participant policies, learning objectives, in-person or hybrid virtual with hands-on components);
   d. Work collaboratively with Partner Agencies' public affairs and/or marketing and communication departments to develop branding elements.
   e. Build a web-based directory of trained professionals.
   f. Develop refresher course materials.

2. *Certification Exam Development Contract*:
   a. Work with a psychometric consulting firm to develop the certification exam.

3. *Training contract* **with IAPMO to:**
   a. Deliver turn-key trainings. Includes procuring qualified instructors and locating appropriate training facilities within agency service areas, amongst other responsibilities necessary to deliver a successful course.
   b. Manage registration, including establishment of a web-based registration page and handling of registration fees, refunds, and partial refunds.
   c. Manage the web-based directory including spot-checking 25% of listed contractors for current licensure and insurance on an annual basis and beginning the second year of training.

Note that the Partner Agencies should seek out consulting services from organizations that assist with certification training program development and accreditation, such as the Institute of Credentialing Excellence (ICE), to ensure that curriculum is developed in accordance with standard practices. Further, it is suggested that prior to issuing an RFP for training development services, the Partner Agencies should seek additional input from trade organizations that have developed certification trainings for additional recommendations on outside consulting services and to better understand the overall process. Specifically, representatives from IAPMO and the California Landscape Contractor's Associations (CLCA) were helpful in providing insights into certification development. Refer to the list of attendees from the expert roundtables for suggested contacts (*See Appendix B). CalWEP suggests that the Partner Agencies utilize the following professional services outlined in Table 5 for each of the contract types listed above.

As suggested with the SNWA's WSP adaptation approach, the Partner Agencies should develop both a contractor agreement form with the same provisions outlined above, as well as a participant waiver of liability that indemnifies the water agency and the training facilitator from any medical or legal claims resulting from services rendered by trained professionals listed on the directory. Both must be signed by all enrollees prior to commencing the certification training.

Table 5: Suggested prime consultants per contract type for the development of a certification training program

Contract	Contract Prime
Training Development (Tasks #1-2)	IAPMO + Accreditation Consulting Services (e.g., ICE)
Certification Exam Development (Task #3)	Psychometric Consultant
Training Facilitation (Tasks #4-5)	IAPMO (or similar organization)

The following training framework elements are similar to those outlined in the tasks above for the adaptation of SNWA's Water Smart Plumbers program and recommended to be included in a contract Scope of Work for in-person indoor residential leak detection and repair *certification* training. One additional task, Task #3: Certification Exam Development, has been included. It remains separate from curriculum development to prevent structuring lessons that "teach to the exam" as explained above.

Task #1 – Training Design & Curriculum Development

The following subtasks should be completed with input from a consulting firm that specializes in the development of certification programs and their accreditation:

a. *Establish learning objectives jointly with the Partner Agencies.*

b. *Establish training duration, format and schedules.*

c. *Develop training curriculum. Developers should consider topics included under the Water Smart Plumbers (WSP) training program created for the Southern Nevada Water Authority. Make sure to address CA-specific codes and standards. (e.g., CA green code, local conservation efforts, CA-specific water loss estimates, etc.).*

d. *Develop all training resources, this shall include but is not limited to: Leak detection checklists, leak repair checklists, worksheets and handouts, reference materials such as plumbing hardware, fixture efficiency standards by fixture type, determining native pressure and using Pressure Reducing Valves (PRVs), equipment catalogs and specifications, and any other materials and resources needed for conducting hands-on lessons.*

e. *Develop a "refresher course" or equivalent and associated materials that qualifies for continuing education units.*

f. *Establish qualification criteria for participants and related policies jointly with the Partner Agencies.*

g. *Establish fee structures for participants (e.g., registration, renewal fees) jointly with the Partner Agencies.*

h. *Develop Instructor qualifications.*

i. *Develop a participant feedback form.*

j. *Develop a "micro website" that shall host online training registration, the for-hire directory and a training resource repository. Embed a customer survey that allows water agency customers to provide anonymous feedback about their experience utilizing a professional listed on the directory. [Note: Alternatively, the Partner Agencies could hire a web-developer to produce a micro website to host the directory of professionals. Licensing and maintenance fees could approach $20,000 a year.]*

Task #2 - Marketing and Branding:

    a. *Contractor shall work in collaboration with Partner Agencies' public affairs and/or marketing and communication departments to develop branding elements including: The training name, logos, certificates, and marketing collateral for professionals that become certified.*

    b. *Contractor shall work in collaboration with Partner Agencies' public affairs and/or marketing and communication departments to develop promotional language to include in outreach materials (e.g., emails and flyers).*

Task #3 - Certifying Exam:

The following subtasks should be competed by a psychometric consultant or another organization that specializes in certification exam development:

    a. *Develop exam format (e.g., length, question type, answer sheet, etc.).*

    b. *Establish exam pass rates.*

    c. *Establish internal exam policies including proctoring policies, exam update procedures and frequency of updates.*

    d. *Establish external exam policies and procedures for test takers.*

    e. *Develop exam questions.*

    f. *Conduct exam beta testing prior to finalizing exam.*

Task #4 - Administrative:

Contractor shall be responsible for all administrative tasks to deliver turn-key trainings, this shall include but is not limited to:

    a. *Recruit instructors based on criteria established under Task #1.*

    b. *Recruit guest instructor(s), including those that specialize in leak detection (e.g., leak detection equipment manufacturers and vendors) based on instructor criteria established under Task #1.*

    c. *Where feasible, Contractor will assist in the promotion of the trainings to their wider membership and network of contacts.*

    d. *Manage training registration and payment including refunds.*

    e. *Manage the for-hire directory and update the training resource repository, as needed.*

    f. *Locate a training venue or facility that allows for effective hands-on training demonstrations. The hands-on training could be facilitated at a location separate from the primary location of instruction. Venue costs shall be accounted for within the Training Facilitation contract.*

    g. *Procure demonstration equipment such as plumbing hardware and tools for leak repair to supplement training concepts and ensure skill development.*

    h. *Optional (virtual trainings): Onboard with a Learning Management System (LMS) for hosting training materials, as needed. Note that registration and training resources would likely be integrated into the LMS rather than a "micro website" as described under Task #1. Facilitate at least one round of beta testing of the LMS system prior to public launch. It shall also be the responsibility of IAPMO to cover the cost of any annual LMS licensing fees.*

Task #5 - Training:

    a. *Deliver turn-key training services in accordance with established policies and procedures.*

    b. *Facilitate a pilot training with a smaller cohort of participants prior to rolling it out to a larger region or service area, where participation shall be capped between 15 and 20 participants.*

    c. *Distribute feedback forms to participants in hard-copy form at the end of class. Once collected the feedback forms shall be provided directly to Participating Agencies' project manager for review and evaluation.*

    d. *Deliver refresher courses and/or equivalent to enable students to earn CEUs towards their certification requirements.*

Other Considerations

There are a number of additional considerations, including knowledge gaps that require additional investigation beyond CalWEP's research, which could potentially impact the overall scope of work for establishing a training framework for indoor residential leak detection and repair. Some of these considerations were shared by experts during our roundtable discussion on April 10, 2023. They are summarized below. For additional context, please see the roundtable notes included under Appendix C.

1. If a flat fee for house calls and/or a not-to-exceed billable hourly rate are to be established as part of the contractor agreement, consider pursuing anti-trust legal advice. In addition, leak repairs that are subject to insurance claims would not be held to the established price- or billing-caps in the contractor agreement.

2. Potential liability issues should be vetted with in-house Partner Agencies' counsel. This includes legal issues that could arise from both detecting and repairing leaks in accordance with the training curriculum, or from a challenge related to the administration and or policies affiliated with a certification course (e.g., legal challenge to the certification exam questions and structure). Some of these legal issues could be addressed by including an indemnification clause in the contractor agreements that students will be required to sign prior to undertaking training.

3. CalWEP did not conduct a comprehensive annual operational cost analysis to run either an assessment-based certificate training or a certification training. Based on the Partner Agencies' training objectives cost should be assessed for a minimum period of 5 years. A more detailed cost analysis will help to ensure that enough fundings and staff resources are available to run either training framework.

4. If the Partner Agencies are looking to roll-out a training within the next 12-months, they should consider moving forward with an assessment-based certificate program. Eventually the certificate training framework could be adapted into a certification training. Note however, that under this scenario, certificate holders would most likely have to undergo the certification training and pass the associated exam to earn their formal certification. This could result in disgruntled professionals who are already listed on the directory, but whom would be removed if they did not fulfill the requirements of the certification training.

Recommended Frameworks & Training Objectives

The following tables summarize how Frameworks A and B compare to the overall training objectives established by the Partner Agencies.

No.	Training Objective	Framework A – Certificate Program	Framework B – Certification Program
1	Target professionals that service residential and multi-family accounts, including Homeowners Associations	Broad market appeal due to fewer training requirements, including time investment and the lack of a comprehensive certifying exam.	Likely to appeal to businesses that can absorb overhead expenses related to longer training times and higher fees, and/or those that service larger accounts with higher profit margins.
2	Target professionals looking to set themselves apart	To some extent	To a greater extent, since fewer professionals will pass a certifying exam compared to a certificate program. Professional caliber of those on the directory will likely be higher.
3	Maintain a directory of trained professionals	Likely to have more individuals on the directory since assessment criteria (e.g., quizzes) are easier to pass and there are no continuing education requirements.	Likely to have fewer individuals on the directory than a certificate program, especially if certification lapses. Can mitigate to some degree by allowing companies to join the directory. Professional caliber of those on the directory will likely be higher.
4	Sustain a minimum of 20 professionals on the directory	Relatively easy on a regional scale (See #3)	More challenging on a regional scale (See #3)
5	Administer over a 5-year period	Quicker development and launch timeline. Lower operational costs make sustaining 5 years of training relatively feasible.	Longer development and launch timeline. Higher operational costs make sustaining 5 years of training less feasible than a certificate program.
6	Balance cost effectiveness with overall impact.	Lower development and operational costs make training easier to sustain long-term. Minimal certificate requirements (shorter trainings and no certifying exam) should translate to higher directory numbers.	Higher development and operational costs could require significant agency budget allocations per year. Higher operational costs could result in steeper registration and renewal fees. Challenges could arise in sustaining enough certified professionals to help offset operational costs.

APPENDICES

A. Institute for Credentialing Excellence "Defining Features of Quality Certification and Assessment-Based Certificate Programs" (2010)
B. Expert Roundtable Roster
C. Expert Roundtable Notes (April 10, 2023)
D. Water Smart Plumbers Scope of Work
E. CalWEP's Suggested Curriculum Topics
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APPENDIX A

Institute for Credentialing Excellence "Defining Features of Quality Certification and Assessment-Based Certificate Programs" (2010)

Defining Features of Quality Certification and Assessment-Based Certificate Programs

DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Introduction

Established in 1977, the Institute for Credentialing Excellence (ICE, formerly the National Organization for Competency Assurance) is dedicated to promoting excellence in credentialing worldwide. It is the leader in setting quality standards for credentialing organizations and through its division, the National Commission for Certifying Agencies (NCCA), has provided more than 30 years of accrediting services to the credentialing industry. ICE is accredited by the American National Standards Institute (ANSI) as a developer of American National Standards.

The ICE Board recognized that quality assessment-based certificate programs, through the instruction and training they provide, play a valuable role in helping individuals to attain occupational/professional competence and thus, relate to ICE's mission of promoting excellence in credentialing. Furthermore, the Board noted that assessment-based certificate programs have some functions in common with professional or personnel certification, namely, identifying and evaluating the knowledge, skills, and competencies requisite to effectively performing occupational and professional roles. In January 2007, it established a Certificate Task Force, comprised of ICE members and other key parties, to:

(a) identify characteristics of quality certification and assessment-based certificate programs;
(b) outline the distinguishing features of each; and
(c) explore what ICE's future role might be with respect to assessment-based certificate programs.

The work of the Certificate Task Force was incorporated in this document, which highlights the similarities and differences between quality certification and assessment-based certificate programs.

Purpose

The purpose of this document is to aid stakeholders in gaining a better understanding of the distinctions between assessment-based certificate programs, certificates of attendance or participation, and professional or personnel certification programs. The document focuses on 12 key aspects of certification and assessment-based certificate programs:

- Primary Focus of the Program
- Content of the Program and How It Is Identified
- Program Oversight
- Provider Role in Education and Training
- Education and Training Requirements and Prerequisites
- Assessment
- Validation of Assessment Content

DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

- Standard Setting
- Evaluation of Assessments
- Credential Maintenance
- Identification of Individuals Who Have Completed Program
- Statement of Program Purpose

NOTE: The features of quality professional or personnel certification programs described in this document are derived from the National Commission for Certifying Agencies' *Standards for the Accreditation of Certification Programs* (www.credentialingexcellence.org/ncca).

Definitions

An assessment-based certificate program is a non-degree granting program that:

(a) provides instruction and training to aid participants in acquiring specific knowledge, skills, and/or competencies associated with intended learning outcomes;
(b) evaluates participants' achievement of the intended learning outcomes; and
(c) awards a certificate only to those participants who meet the performance, proficiency or passing standard for the assessment(s) (hence the term, "assessment-based certificate program").

Distinctions Between Assessment-Based Certificates and Certificates of Attendance or Participation

Certificates of attendance or participation are provided to individuals (participants) who have attended or participated in classes, courses, or other education/training programs or events. The certificate awarded at the completion of the program or event signifies that the participant was present and in some cases that the participant actively participated in the program or event. Demonstration of accomplishment of the intended learning outcomes by participants is NOT a requirement for receiving the certificate; thus, possession of a certificate of attendance or participation does not indicate that the intended learning outcomes have been accomplished by the participant. These are key distinctions between a certificate of attendance or participation and an assessment-based certificate program.

Distinctions Between Assessment-Based Certificates and Professional or Personnel Certification Programs

Professional or personnel certification is a voluntary process by which individuals are evaluated against predetermined standards for knowledge, skills, or competencies. Participants who demonstrate that they meet the standards by successfully completing the assessment process are granted

a time-limited credential. To retain the credential, certificants must maintain continued competence. The credential awarded by the certification program provider denotes that the participant possesses particular knowledge, skills, or competencies.

Whereas the focus of an assessment-based certificate program is on education/training, the focus of professional/personnel certification is on the assessment of participants. Moreover, the assessment is independent of a specific class, course or other education/training program and also independent of any provider of classes, courses, or programs. The assessments are NOT designed to evaluate mastery of the intended learning outcomes of a specific class, course or education/training program and the certification program provider is NOT the sole provider of any education or training that may be required for certification.

DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification[1]	Assessment-Based Certificate Program[2]
Primary Focus of the Program	The primary focus of a professional/personnel certification program is on providing an independent[3] assessment of the knowledge, skills, and/or competencies required for competent performance of an occupational or professional role or specific work-related tasks and responsibilities. Certification also is intended to measure or enhance continued competence through recertification or renewal requirements. The certification awarded designates that participants have demonstrated the requisite, work-related knowledge, skills, or competencies and met other requirements established by the certification program provider (e.g., academic degree, specified number of years of occupational or professional experience).	The primary focus of an assessment-based certificate program is on facilitating the accomplishment of intended learning outcomes. Although assessment is an integral part of the certificate program, the primary purpose of the program is to provide education and training which supports the accomplishment of the intended learning outcomes. The certificate awarded designates that participants have completed the required education/training and demonstrated accomplishment of the intended learning outcomes.

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[1] The features of quality professional or personnel certification programs as described in this document are derived from the National Commission for Certifying Agencies' *Standards for the Accreditation of Certification Programs*.

[2] Assessment-based certificate programs are distinct from certificates of attendance/participation in that they require successful completion of an end-of-program assessment to confirm participants' accomplishment of the intended learning outcomes.

[3] The assessment is independent of a specific class, course or other education/training program and also independent of any provider of classes, courses, or programs. The assessment is NOT designed to evaluate mastery of the intended learning outcomes of a specific class, course or education/training program and the certification program provider is NOT the sole provider of any education or training that may be required for certification.

DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification[1]	Assessment-Based Certificate Program[2]
Content of the Program and How It Is Identified	The content of a professional/personnel certification program is based on the knowledge, skills, or competencies required for competent performance of an occupational or professional role or specific work-related tasks and responsibilities. The knowledge, skills, and competencies that are the focus of the certification program are identified through a formal study (e.g., job/practice analysis, role delineation). Program content is defined by job incumbents and/or employers through the formal job/practice analysis or role delineation process. The knowledge, skills, and competencies targeted by the certification program are periodically updated, as needed, based on the findings of a formal study (e.g., job/practice analysis, role delineation) to ensure that the certification program continues to reflect current occupational or professional practice.	The content of an assessment-based certificate program may include knowledge, skills, or competencies related to: (a) an occupational or professional role or specific work-related tasks and responsibilities; or (b) general interest or leisure pursuits (e.g., first aid, sailing). The intended learning outcomes and associated knowledge, skills, and competencies that are the focus of the education/training are identified through a systematic analysis of the needs of: (a) participants; (b) industry; (c) consumers; and/or (d) other identified stakeholders. The content of the program (education/training and assessment) is reviewed periodically and updated, as needed, by subject-matter experts and qualified individuals to ensure that it remains current and accurate and consistent with generally accepted instructional design and measurement principles.
Program Oversight	A governing body with representation from relevant stakeholders[4] is charged with oversight of the certification program. This body is legally or administratively autonomous from other entities and maintains control over all essential decisions related to certification activities.	A governing body with oversight responsibilities for the assessment-based certificate program is NOT required; however, the program should function with input from subject-matter experts and qualified individuals, who assist in development, delivery, and evaluation of the program.

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[4] **Stakeholders** are the various groups with an interest in the quality, governance, and operation of a certification program, such as candidates, certificants, employers, regulators, customers/clients and the public.

DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification	Assessment-Based Certificate Program
Provider Role in Education and Training	The certification program provider conducts the certification program independently of any educational/training programs. That is, the assessment is NOT linked to a specific class, course or other education/training program or to a specific provider of classes, courses, or programs. The assessment is NOT designed to evaluate mastery of the intended learning outcomes of a specific class, course or education/training program, nor is the certification program provider the sole provider of any education or training that may be required for certification. The certification program provider also is not responsible for accreditation[5] of educational or training programs or courses of study leading to the certification.	The certificate program provider conducts or sponsors the education/training that is required for the certificate. The assessment is aligned with the education/training and is designed to evaluate accomplishment of the intended learning outcomes that the provider has identified for the class, course, or program.
Education and Training Requirements and Prerequisites	Eligibility requirements may include completion of specific education/training; however, the certification program provider is NOT the sole provider of any education/training that may be required for certification. Nor is the certification program provider responsible for accreditation of educational or training programs or courses of study leading to the certification.	The program requires completion of education/training offered or sponsored by the certificate provider. There may be other prerequisites in addition to the education/training required to attain the certificate.

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[5] **Accreditation** is the voluntary process by which a nongovernmental agency grants a time-limited recognition to an institution, organization, business, or other entity after verifying that it has met predetermined and standardized criteria.

DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification	Assessment-Based Certificate Program
Assessment	The purpose of the assessment process is to evaluate mastery of the knowledge, skills, or competencies required for certification. Any generally accepted assessment method may be utilized for this purpose. The assessment takes place *after* the participant has had the opportunity to acquire the targeted knowledge, skills, or competencies. The assessment is conducted in a standardized manner in a secure, proctored environment. Successful completion of the assessment is required to receive the certification.	Both formative and summative assessments are typically conducted. The purpose of formative assessment is to provide feedback to both participants and facilitators/instructors with the intent of enhancing the learning process. Formative assessment may include self-reflection and diagnostic components (e.g., pretest) and may be remedial (i.e., focusing on correction or improvement). Formative assessment may take place on one or more occasions throughout the learning process. Summative (end-of-program) assessment is used to evaluate participants' accomplishment of the intended learning outcomes and generally takes place at the completion of the education/training component of the program. Any generally accepted assessment method may be utilized for conducting the summative assessment. The certificate program provider ensures that the environments in which the assessment is conducted are comparable. Any additional specifications pertaining either to how the assessments should be conducted or the required level of security should be consistent with the intended purpose of the certificate program. Successful completion of the summative assessment is required to receive the certificate. *NOTE: If an assessment-based certificate program is promoted by the provider as being appropriate for regulatory purposes or for decision making related to hiring, promotion, and other key employment-related outcomes (e.g., hospital privileging for physicians), the assessment(s) should be developed and evaluated/scored in a manner that is consistent with generally accepted measurement principles and legally defensible. The assessment(s) also should be administered in a secure, proctored environment.*

DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification	Assessment-Based Certificate Program
Validation of Assessment Content	The process of validating the content of the assessment includes: (a) a formal study (e.g., job/practice analysis, role delineation) conducted in accordance with generally accepted practice; and (b) documentation of the link between the study findings and the knowledge, skills, and competencies represented on the assessment. The assessment content is periodically revised, as needed, based on the findings of a formal job/practice analysis or role delineation process to ensure that it continues to reflect current occupational or professional practice.	The process of validating the content of the assessment includes, at a minimum, documentation of the link between the intended learning outcomes and the assessment (e.g., a table listing the knowledge, skills, and/or competencies needed for participants to accomplish the intended learning outcomes and identifying how the specified knowledge, skills, and/or competencies are covered by the assessment). For high-stakes certificate programs, the validation process should include a job/practice analysis or role delineation. The assessment content is periodically revised, as needed, by subject-matter experts and qualified individuals to ensure that it continues to reflect the scope and purpose of the program and remains aligned with the education/training and the intended learning outcomes.
Standard Setting	The certification program provider uses a generally accepted method for setting the passing standard. This method, in which trained stakeholders participate, should: (a) link the passing standard to the expected performance of individuals who possess the requisite knowledge, skills, or competencies; and (b) be consistent with the nature and intended use of the assessment. The governing body for the certification program retains authority for setting/approving the passing standard.	The certificate provider uses a generally accepted method for setting the performance, proficiency, or passing standard for the summative (end-of-program) assessment. This method, in which trained subject-matter experts participate, should: (a) link the performance, proficiency, or passing standard to the expected performance of a participant who has accomplished the intended learning outcomes; and (b) be consistent with the nature and intended use of the assessment. The certificate provider retains authority for setting/approving the performance, proficiency, or passing standard.
Evaluation of Assessments	The effectiveness of the assessment is evaluated on a regular basis to ensure its ongoing utility for measuring the knowledge, skills, and competencies targeted by the certification program. The procedures and analyses performed for this purpose are consistent with generally accepted measurement principles.	The effectiveness of the assessment is evaluated on a regular basis to ensure its ongoing utility for evaluating participants' accomplishment of the intended learning outcomes. The procedures and analyses performed for this purpose are consistent with generally accepted measurement principles.

DEFINING FEATURES OF QUALITY CERTIFICATION AND ASSESSMENT-BASED CERTIFICATE PROGRAMS

Feature	Certification	Assessment-Based Certificate Program
Credential Maintenance	A certification is time limited (i.e., it will lapse or expire at the end of a predetermined time period if recertification/renewal requirements are not met). To maintain the credential, a certificant is required to engage in specified activities designed to measure or enhance continued competence. Certificants are subject to disciplinary policy.	An assessment-based certificate is generally NOT time limited (i.e., it typically does NOT lapse or expire at the end of a predetermined time period). A certificate holder is generally NOT required to engage in subsequent activities to maintain the certificate; however, in some cases, providers may require additional education, training, and/or assessments for this purpose.
Identification of Individuals Who Have Completed Program	Certificants are "Certified in XYZ" or "Certified XYZ Professionals." (*NOTE: These terms are illustrative; they are not meant to be inclusive or prescriptive*). Certificants are awarded an acronym or letters for use after their names to signify that they have obtained and maintained the credential.	Certificate holders have a "Certificate in XYZ." (*NOTE: This term is illustrative; it is not meant to be inclusive or prescriptive*). Certificate holders are NOT awarded an acronym or letters for use after their names upon completion of the certificate program.
Statement of Program Purpose	Certification program providers publish an explicit statement regarding the primary purpose of the certification program (e.g., to protect the public, to provide employers with a tool for identifying qualified individuals). They also provide guidance to candidates, certificants and other stakeholders as to what inferences can properly be made regarding those who hold the certification. Furthermore, these inferences are consistent with the stated purpose of the certification and the type of assessments, evaluation/scoring procedures, and standard-setting methodologies utilized.	Assessment-based certificate program providers publish an explicit statement regarding the primary purpose of the certificate program (e.g., to assist participants in achieving specified learning outcomes). They also provide guidance to participants, certificate holders and other stakeholders as to what inferences can properly be made regarding those who hold the certificate. Furthermore, these inferences are consistent with the stated purpose of the certificate and the type of assessments, evaluation/scoring procedures, and standard-setting methodologies utilized.

APPENDIX B

Expert Roundtable Roster

ROUNDTABLE ROSTER: Indoor Leak Detection & Repair Certification Training					
Name	**Phone**	**Email**	**City**	**Company/ Org.**	**Title**
Toby Bickmore	(702) 862-3759	toby.bickmore@snwa.com	Las Vegas, NV	Southern NV Water Authority	Conservation; Water Smart Plumbers Program Administrator
Tony Marcello	708-995-3002	tony.marcello@iapmo.org	Cook County, IL	IAPMO	Sr. VP - Training & Credentialing Services
Randy Lorge		randy.lorge@iapmo.org	Ontario, CA	IAPMO	Director of Workforce Training and Development
Ignacio Contreras	(909) 615-4565	ignacio.contreras@iapmo.org	San Bernardino County, CA	IAPMO	Field Manager, Western US
John Koeller	(714) 777-2744	jkoeller@map-testing.com	Yorba Linda, CA	MaP Testing , Green Plumbers	P.E.
Bill Gauley	(416) 677-6193	bill@gauley.ca	Acton, ON, Canada	Gauley Associates Ltd./ MaP Testing	P.E., Principal
Sana Wazit		swazit@valleywater.org	Bay Area, CA	Valley Water	Water Conservation Specialist I
Kyle Ramey	(650) 349-3000	kramey@bawsca.org	Bay Area, CA	Bay Area Water Supply & Conservation Agency	Water Resource Specialist
Lisa Cuellar*	(916) 287-9837	lisa@calwep.org	Sacramento, CA	California Water Efficiency Partnership	Director of Programs, *Roundtable Facilitator

APPENDIX C

Expert Roundtable Notes (April 10, 2023)

Roundtable: Indoor Leak Detection & Repair Certification Training

Monday, April 10, 2023

8:00 – 10:00 AM PCT

Facilitator: Lisa Cuellar, California Water Efficiency Partnership (CalWEP)

Funding Water Agencies: Bay Area Water Supply & Conservation Agency (BAWSCA); Valley Water

Attendees: *See Roster*

GOAL

To receive your **candid** and **honest feedback** regarding multiple elements of a potential *Indoor Leak Detection and Repair Certification Training* geared towards plumbers.

ROUNDTABLE OBJECTIVE

Your feedback will help inform a leak training *framework* that will be submitted by CalWEP to the funding water agencies. Eventually the framework will be adapted into an RFP package for the development of the training materials. *Note that the RFP solicitation date has yet to be determined.

TRAINING OBJECTIVE

Plumbers who complete the training will be placed on a directory of trained professionals. Water agencies will promote the directory amongst customers looking for leak detection and/or repair services.

****

ROUNDTABLE TOPICS

General

1. **In order to qualify, plumbers must:**
   a. **Agree to price-ceiling/cap – For or against? Flat rate or hourly?**
   Response (Toby): Credible plumbers is the goal – so maybe you get out of the wide range of pricing. Feel it out over a year or 2.

   b. **Maintain a contractor's license.**
   c. **Others?_**

2. **Who would most likely take this training? Entry level plumbers (0-5 years of experience)? Minimum years of service requirements?**
   Response (Toby): My main recruits were from PHCC. Most companies were from PHCC. Also, there should be one key rep. from each of the companies (supervisor level/owner).

3. **What do you perceive as the biggest hurdle to getting folks to attend?**
   Response (Toby): Give folks options – take the training portion only or become fully certified – but ultimately the choice is up to the student.

Response (John): Green plumbers came down to money – water utilities sponsored sessions. Plumbers wanted to come to something that's free. Once we intended to start charging, attendance plummeted.

Response (Tony): Without a mandate hard to get folks to show up. To counter resistance, sell this list as more of a business opportunity to contractors.

Response (John): Depends on how busy the company is and who pays for/ reimburses for the training. The leak needs to be significant enough and economically feasible to take corrective action by the plumber.

Response (Toby): There is a chance people won't show up if it's a free training.

4. **Could existing trainings expand to include a leak detection and repair model?**

5. **Instructors must be trained plumbers – how hard is it to secure instructors? Minimum qualifications?**
Response (Toby): Doesn't think leak detection instructors are too difficult to find – 2 other instructors in CA who can teach.

6. **What are the best marketing outlets? How would you get the word out?**
Response (Toby): How to avoid legal issues related to professionals on the directory? Promote the list with a statement of fact: "Here's who has gone through the training". To be honest – never come across a situation where someone has sued based on training they received. Also because the customer is choosing the professional this eliminated liability to the water agency.

Response (Sana): Disclaimer that these are just people that have successfully completed the program.

Response (Iggy): Reach out to plumbers and ask who they were using for leak detection. Where have you taught courses, have you gone into training centers, promote to business owners, high level management.

Leak Detection

7. **From main meter (at street) to Point of Connection (at home): Will plumbers touch this section?**
Response (group): Yes! This is a plumber's responsibility and not a landscape professional's.

Response (Toby): Water Smart Plumbers focus is outdoors: mainline or pool leaks.

Response (John): This can be the biggest hurdle and most expensive to fix. There is potential for major water loss.

8. **New Technologies -what's out there that seems promising?**
Response (Randy): Acoustic equipment has gotten better, Some infrared is new. Acoustic is $5K or more whereas infrared is about $500 - $800 investment. It's not fool proof.

Response (Toby): Everyone in Water Smart Plumbers class (April 2023) had leak detection skills.

Response (John): Bill just finished an analysis on 12 devices at different price levels for leak detection for your home. In some cases devices will tell you where leaks are – it's a customer facing investigation. Need to promote customer facing devices. Water company should promote rebates for these devices.

Response (Bill): – Most of the leaks are associated with toilets (dye test)- doesn't require special equipment. People who have done this training can identify how much it's costing and the homeowner doesn't have to worry about being sold on it.

9. **What's in your leak detection toolbox? Equipment type and manufacturer:_____**

10. **Leak detection training must be hands-on. Agree or disagree?**
    Response (Toby): Some general concepts could be virtual. Plumbers largely know how to fix the leaks – Hands on beneficial would be with equipment that they might be willing to purchase.
    Response (Bill): Teach us what you want us to do differently. Would it really take 6-hours to train someone to find leaks in a home? They all had to pass a test – they paid more attention.

Training Structure

11. **In-person or Virtual (Online) trainings – which is better?**
    Response (Toby): Big benefit to having students in a classroom for Water Smart Plumbers.
    Response (Tony): There's still a huge preference for virtual trainings. Starting to look at hybrid classes – logistics could be easier because focused on CA only. Concern with attention over Zoom. Having a testing component could help motivate people to pay attention so not just anyone could pass.
    Response (Toby): Keep the training less than a day, around 6 hours.

12. **What are the pros and cons of each of these training frameworks?**
    a. **Non-certification – Ex. Water Smart Plumbers**
    b. **Certification – Ex. Green Plumbers**
        i. **In order to offer a certification one must? _____**
        ii. **Who should be the certifying body?**
    Response (Tony): Pros and cons for both depending on funding level. Leaning towards cert. w/ CEUs or refresher. Has a lifetime – need to get recertified after a few years. If the public hears the certification term it carries some street cred. Cert. is exam, training is imparting terms and knowledge.
    Also, ANSI accreditation is cumbersome and pricey and not necessary for this training.

13. **How do you ensure legal defensible curriculum/ recommended best practices?**
    Response (Tony): For certification classes this relates to the exam - Must work with a test development committee with a variety of experts. More cost. ID what checks off legal requirements.

14. **Are there CA-specific codes and standards that must be addressed?**
15. **Should we address outdoor irrigation issues? Common failures: valve diaphragms, ruptured drip lines, broken pipes? Pressure management?**
16. **Any recommended training facilities?**

Response (John): Did supplemental training for water agency folks at "Sloan Valve" – folks loved hands on: taking apart valves, running tests, Point: if you have vendors who are willing to come in and give demos then welcome them. Plus they might pay for part of the session.

17. **Which do you recommend: CEUs or a refresher course every 2 years?**
Response (Tony): Refresher course, there might not be enough training opportunities to earn CEUs otherwise.

Curriculum – Basic Topics

<mark>*In general, what do you think about the curriculum outline below? Anything missing?</mark>

Response (John): Exclude irrigation stuff. Technical aspects are more important. Not too much time about saving water.

Response (Toby): Disagree. Need an overview/ tips on legislative news. Water Smart Plumbers got more into technologies. Need to ID other things that peak their interest. Basic leak stuff that they would know. Fine line b/w spending time on things they already know and exposing them to new material.

Response (Tony): Good content, but not for supervisor level. Supports topics that cover water conservation. You want folks to speak confidently about the issue. Sloan had a nice facility set up for training. Vendors bring in products. Permits vary among jurisdictions.

Response (Bill): Regarding Customer Communication: We did customer feedback portal for customer feedback – and if you get enough bad reviews you get taken off the list.

Response (Toby): Regarding permits - found out that one of the SNWA retail agencies had a 2-week delay process for service lines due to permits.

A. ***Water Conservation and AMI***
    a. *Lead with the "WHY": Water waste from leaks is staggering! Plumbers are the unsung heroes who can help customers save hundreds of millions of gallons collectively.*
    b. *Lead with the Benefits: Recognition and new clients/ more work. Offer marketing collateral: digital logos, brochures.*
    c. *Most common leaks found indoors and how much they waste*
    d. *WaterSense fixtures – Look for the label*
    e. *Local agency rebates*
    f. *Automated Metering Infrastructure - What is it and how does it detects leaks? Rise in leak notifications driving customer interest.*
    g. *Flume devices and other flow monitoring devices – What are they and how do they detect leaks? How smart apps are alerting customer to potential leaks.*
    h. *Codes and Standards that address leaks*
B. ***Customer Communication***
    a. *Acknowledge your training (show training badge/logo) and ID local water agency endorsement*
    b. *No upselling*
    c. *Customer feedback forms (online – sent directly to water agency)*

C. *Leak Detection*

    a. *Standardized Check-list –* what should be included?

         i. *Utilizing the main water meter*

         ii. *Isolation of plumbing system valves (main, hot water, AVB, pool fill, etc.)*

         iii. *Toilet dye test*

         iv. *Pressure decay testing*

         v. *Leak detection technologies, including acoustic devices, FLIR cameras, others _____*

         vi. *When to call a leak detection company?*

17. **Vendor demonstrations: Who should we invite?_____**
18. **Hands-on component: _____**

D. *Leak Repair*

    a. *Toolkit must haves: _____*

    b. *Leak Repair Types:*

         i. *Shower, faucet, toilet*

         ii. *How water heater*

         iii. *Under slab*

         iv. *Within walls*

         v. *Service line to house*

    c. *When to repair and when to replace?*

    d. *When to pull a permit when not to?*

    e. *How insurance claims can impede work?*

19. **Vendor demonstrations: Who should we invite?_____**
20. **Hands-on component: _____**

Testing

21. **Certification exam: Who creates? Ever heard of a Psychometric Consulting and Exam Development?**
22. **If not certifying, are quizzes enough?**
23. **Can you elaborate on your exam structure?**

    <u>Response (Tony):</u> Consider psychometric work, may not need a PhD level person depending on how robust the exam is. Would not recommend true/false questions b/c it gives folks a 50/50 chance while guessing.

24. **What did I forget to ask?**

More Feedback? Contact Lisa Cuellar, CalWEP Director of Programs

lisa@calwep.org

(916) 287-9837

APPENDIX D

Water Smart Plumbers Scope of Work

EXHIBIT A

SCOPE OF SERVICES

The Southern Nevada Water Authority (SNWA) intends to develop a Water Smart Contractor Plumber partnership program focused on providing a plumbing contractor resource for customers of SNWA. To establish a list of participating plumbers, SNWA will require mandatory training for contractor participation. SNWA has enlisted the International Association of Plumbing and Mechanical Officials (IAPMO) to develop said training. IAPMO shall be responsible for, but not limited to, the following deliverables:

1) Provide class curriculum at a cost not to exceed $XX based upon a pre-agreed program outline between IAPMO and SNWA, including the major topics:
   - Proper residential plumbing design for water conservation
     o Determining native pressure and using PRVs
     o Optimizing plumbing design, materials & methods to reduce leaks
       ▪ Hot water optimization
       ▪ Condensate recovery
       ▪ IAPMO Appendix M design options
     o Identifying lead pipes for public health and safety
     o Accessibility and maintenance considerations
   - Water efficient fixtures and appliances
     o WaterSense fixtures - Toilets, Faucets, Showers, etc.
     o Dishwashers and laundering
     o Water treatment devices (softeners, RO)
     o Hot water recirculation
     o Informational websites
   - Swimming pools – water use and leaks
     o Determining size of area using aerial imagery or surface measurements
     o Estimating evaporation rate
     o Leak detection (Bucket test and dye testing)
     o Proper drainage to sanitary sewer
     o Pool covers and chemical management

- Irrigation systems and landscape basics for water conservation

  o 7 Principles of water efficient landscape design

  o Backflow Prevention – AVB required

  o Pressure management

  o Spray vs. Drip irrigation characteristics

  o Common failures – valve diaphragms, ruptured drip lines, broken pipes…

  o Smart irrigation controllers

- Leak diagnosis and repair
  - Using AMI data for diagnostic
  - Using the water meter as a leak detection device

    ▪ Isolation of plumbing systems using valves (main, hot water, AVB, pool fill, etc)

  - Pressure decay testing

  - Leak detection technologies, including acoustic devices, FLIR cameras, etc.

  - Smart leak detection devices

2) Development of a comprehensive, multi-choice test covering material from the curriculum listed in number one above.

3) Arrange for presentation of the curriculum by a qualified instructor(s). The instructor(s) may be a member of IAPMO staff, an IAPMO contractor, or any other professional appropriately qualified to provide the curriculum instruction at a cost not to exceed $XX

4) IAPMO will establish an ongoing per-usage cost for the curriculum established in number one and two above. The cost for the use of such curriculum and testing shall not exceed $XX per each usage by SNWA.

5) IAPMO will develop a modular/online training tool utilizing the materials from number one and two above and will retain licensing for such training. SNWA will be charged on a per person utilization price to be determined once the modular/online training has been finalized.

APPENDIX E

CalWEP's Suggested Curriculum Topics

Suggested Indoor Leak Detection and Repair Training Curriculum Topics

Prepared by CalWEP and reviewed by expert roundtable participants on (4/10/2023)

Note some subtopics were adapted from SNWA's Water Smart Plumber Training curriculum.

A. **Water Conservation and AMI**
   a. *Lead with the "WHY": Water waste from leaks is staggering! Plumbers are the unsung heroes who can help customers save hundreds of millions of gallons collectively.*
   b. *Lead with the Benefits: Recognition and new clients/ more work. Offer marketing collateral: digital logos, brochures*
   c. *Most common leaks found indoors and how much they waste*
   d. *WaterSense fixtures – Look for the label*
   e. *Local agency rebates*
   f. *Automated Metering Infrastructure - What is it and how does it detects leaks? Rise in leak notifications driving customer interest.*
   g. *Flume devices and other flow monitoring devices – What are they and how do they detect leaks? How smart apps are alerting customer to potential leaks.*
   h. *Codes and standards that address leaks*

B. **Customer Communication**
   a. *Acknowledge your training (show training badge/logo) and ID local water agency endorsement*
   b. *No upselling*
   c. *Customer feedback forms (online – sent directly to water agency)*

C. **Leak Detection**
   a. *Standardized Check-list*
        i. *Utilizing the main water meter*
        ii. *Isolation of plumbing system valves (main, hot water, AVB, pool fill, etc.)*
        iii. *Toilet dye test*
        iv. *Pressure decay testing*
        v. *Leak detection technologies, including acoustic devices, FLIR cameras, others*
        vi. *When to call a leak detection company?*

D. **Leak Repair**
   a. *Toolkit must haves*
   b. *Leak Repair Types:*
        i. *Shower, faucet, toilet*
        ii. *How water heater*
        iii. *Under slab*
        iv. *Within walls*
        v. *Service line to house*
   c. *When to repair and when to replace?*
   d. *When to pull a permit when not to?*
   e. *How insurance claims can impede work?*

APPENDIX F

QWEL Feedback Form Example

Qualified Water Efficient Landscaper (QWEL) Training Class and Exam Feedback

Date:_____ Location:_____

1) What were your goals for attending this training class? (check all that apply)

___ To receive a certification in landscape water efficiency.

___ To learn about landscape irrigation auditing.

___ To be able to review and certify landscapes for compliance with the State Landscape Ordinance.

___ To better my business and client services.

___ To learn about water efficient practices to protect the environment.

___ Other reason(s). Please explain:_____

2) How did you learn about the class?_____

3) The class description accurately reflected the content of the class:

___Strongly Agree   ___Agree   ___Disagree   ___Strongly Disagree

4) **The instructor demonstrated knowledge of the topic and presented it in an informative manner:** ___Strongly Agree   ___Agree   ___Disagree   ___Strongly Disagree

5) This class has stimulated your interest in the topic:

___Strongly Agree   ___Agree   ___Disagree   ___Strongly Disagree

6) The information provided in this class will help you better manage landscapes for water efficiency: ___Strongly Agree   ___Agree   ___Disagree   ___Strongly Disagree

7) The information provided in this class will help you educate your clients, managers or others involved with a landscape site about landscape and irrigation water efficiency:

___Strongly Agree   ___Agree   ___Disagree   ___Strongly Disagree

8) The class was what you expected: ___Yes   ___No   If No, Why?

_____

9) What did you find most useful about the class?_____

_____

10) Is there any other feedback you would like to provide on the class content?

_____

_____

11) Please rate the logistical aspects of the class. Circle an opinion.

Day:	Excellent	Good	Fair	Poor
Time:	Excellent	Good	Fair	Poor
Length:	Excellent	Good	Fair	Poor
Location:	Excellent	Good	Fair	Poor

12) Your overall rating of the class is: ___Excellent   ___Good   ___Fair   ___Poor

Thank you! Your feedback is very important to us.

Qualified Water Efficient Landscaper (QWEL) Training Class and Exam Feedback

Please provide feedback on any test questions that require an edit, need clarification or were difficult to understand. Be as specific as possible. Your input will assist us to improve future tests.

Question No.   Comment