ACKNOWLEDGEMENTS

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# TABLE OF CONTENTS

OVERVIEW .......................................................................................................................1
  Background.....................................................................................................................1
  Description of Work .....................................................................................................2
  Definitions .....................................................................................................................2
  IACET Standards ..........................................................................................................2
    Learning Category Definitions ....................................................................................3
    Category 10 Criteria ....................................................................................................3
    Kirkpatrick’s Learning and Training Evaluation Theory ..............................................3

ASSESSMENT GOALS ......................................................................................................4

TRAINING NEEDS ASSESSMENT CYCLE .....................................................................5

LEVEL I ASSESSMENT .....................................................................................................5
  Approach ......................................................................................................................5
  Assessment Content ....................................................................................................6
  Assessment Methods, Documentation and Reporting ..................................................6
  Assessment Updates ....................................................................................................7

LEVEL II ASSESSMENT ...................................................................................................7
  Level II Assessment Guidance ....................................................................................7
  Concerns/Limitations ....................................................................................................7

LEVEL III AND IV ASSESSMENT .....................................................................................8
TABLE OF TABLES

TABLE 1: SAMPLE LEARNING OBJECTIVES AND TESTING APPROACHES ..........................7

TABLE OF FIGURES

FIGURE 1: KIRKPATRICK’S FOUR LEVELS OF EVALUATION ........................................4
FIGURE 2: THE CBU TRAINING NEEDS ASSESSMENT CYCLE ..................................5
OVERVIEW

Background

The Capacity Building Unit (CBU) of the Colorado Safe Drinking Water Program provides training, technical assistance, and management support services to public water systems so they can strengthen their ability to supply safe drinking water to the public. In July 2010, CBU prepared the 2015 Colorado Public Water System Training Strategy to guide the CBU’s annual work planning and priority setting and to serve as a resource and reference for training partners and other external agencies. Important components of implementing the 2015 Training Strategy include promoting awareness of and collaboration around the Strategy among trainers and building trainer support services to the various trainers in the state.

In winter 2011, the CBU announced a new partnership with the Rocky Mountain Section of the American Water Works Association (RMSAWWA) to facilitate developing an Administrative Framework for the CBU’s 2015 Training Strategy. The Administrative Framework will define the processes, guidelines, and expected outcomes for training activities supported by the CBU. It is intended to assist in making decisions regarding the allocation of funds and resources for public water system training services in the future. Several reports, including this one, are being prepared by work groups that have been formed to create the deliverables and provide input into all aspects of the project. The Training Assessment Work Group was charged with preparing this report.

The CBU has always required its training partners to ask their learners to evaluate training sessions. However, because there is no consistent approach to training assessment, it is difficult to compare training or evaluate the overall effectiveness of the Colorado training program. “You can't manage what you don't measure” was posited by the management expert Dr. Edwards Deming. This adage, when applied to training, means that to more effectively manage training, there should be an effective measurement program. The measurement program will help reveal whether training event in Colorado are accomplishing the desired results.

Assessing training programs is difficult and often neglected due to a lack of: time, budget, expertise, or appropriate evaluation tools. However, it is important to find a way to conduct these measurements. The results will not only allow Colorado to assess the training, but will also allow trainers to use the results of the assessments to improve training materials. Training assessment may reveal issues related to poor transfer of information or inadequate learning outcomes. When training programs – materials and approaches – are revised, Colorado can be better assured that training will match the current goals of the program, which may have changed due to changes in regulations or certification requirements.

The CBU is responsible for expending public funds for training programs. It would like to be assured that the training produces adequate learning that leads to behavioral changes. The CBU wants to establish and implement a routine system to evaluate the training it delivers and sponsors. This includes revisiting the relevance of training material based on analysis of public water system failure data and stakeholder input and potentially other data sources such as operator certification exam pass rates. The CBU would like to require all performance partners providing training services to report on trainee feedback. The tools contained in this document will help the CBU and its training partners identify training achievements.
Description of Work

The Administrative Framework Task Force (AFTF) has designed an outcome-based training assessment system the CBU and its partners can use to evaluate the effectiveness of content and delivery methods. Based on solid education industry standards and the needs of the CBU, the AFTF has developed the proposed Training Assessment Plan that outlines how learning outcomes may be measured. The Training Assessment Work Group has reviewed the established training assessment standards from the International Association of Continuing Education and Training (IACET). They also investigated what the Colorado Water and Wastewater Facility Operator Certification Board (CWWFOCB) requires of trainers as part of the Training Unit approval process.

Specifically, the Training Assessment Work Group has developed:

- Data gathering methods and procedures, including a Training Needs Assessment Cycle
- The Level I Training Evaluation Form in hard copy format that will eventually be converted to a web-based format (training needs assessment information system)
- The Level II Learning Assessment Guidance

Definitions

- Formative Assessment: Is part of the instructional process. When incorporated into classroom practice, it provides the information needed to adjust teaching and learning while they are happening.
- Summative Assessment: Given periodically to determine at a particular point in time what students know and do not know. Examples include standardized tests.
- Educational Assessment: The process of documenting, usually in measurable terms, knowledge, skills, attitudes and beliefs. Assessment can focus on the individual learner, the learning community (class, workshop, or other organized group of learners), the institution, or the educational system as a whole.
- Level I Evaluation
- Level II Evaluation
- Level III Evaluation
- Level IV Evaluation

IACET Standards

The International IACET promotes and ensures quality in the field of continuing education and training across all disciplines and professions. IACET’s mission is to promote and enhance quality in continuing education and training (CE/T) through research, education and the development and continuous improvement of criteria, principles and standards. Its history includes development of the original Continuing Education Unit (CEU) and creation and maintenance of the American National Standards Institute (ANSI)/IACET Standard for Continuing Education and Training.

IACET has ANSI accredited standards for 10 categories of learning:
Learning Category Definitions

The following learning category definitions contain the criteria applicable to the quality learning process:

- Continuing Education and Training Organization
- Responsibility and Control
- Learning Environment and Support Systems
- Learning Event Planning
- Learning Outcomes
- Planning and Instructional Personnel
- Content and Instructional Methods
- Assessment of Learning Outcomes
- System for Awarding CEUs and Maintaining Learner Records
- Program Evaluation

Category 10 Criteria

Category 10 provides specific criteria for evaluating training programs. The goal of this category is to ensure that programs are evaluated at the end of each learning event to promote continuous improvement.

10.1 A comprehensive program evaluation is established for each learning event.

10.1.1 The Provider shall have a process for the systematic evaluation of learning events.

The program evaluation process shall be comprehensive. It shall address the total learning experience, and include data collection about the learning event. Please see the Kirkpatrick Evaluation Model, which can be found in Annex 2 of IACET standard (model included below).

10.2 Program evaluation results are incorporated into a continuous improvement process for the learning events.

10.2.1 The Provider shall conduct timely post-program reviews of the evaluations and provide evidence of results being incorporated into learning event improvements.

10.3 Program evaluation results are shared with instructors.

10.3.1 The Provider shall have a process to provide feedback to instructors on their delivery effectiveness.

Source: IACET

Kirkpatrick's Learning and Training Evaluation Theory

Donald Kirkpatrick first published his ideas on the evaluation of training programs in 1959, in a series of articles in the US Training and Development Journal. These articles were subsequently included in Kirkpatrick's book Evaluating Training Programs (1975), which was published by the American Society for Training and Development (ASTD), of which Kirkpatrick previously served as president.
Kirkpatrick’s four-level model of training evaluation — now considered an industry standard for human resources training and other training communities worldwide — was redefined and updated in his 1998 book Evaluating Training Programs: The Four Levels.

The four levels of Kirkpatrick’s evaluation model measure:

- Reaction, or what the students thought and felt about the training
- Learning, or the resulting increase in the students’ knowledge or capability
- Behavior, or the students’ ability to apply their new knowledge
- Results or the effects of the trainee’s performance on the business or environment

**Figure 1: Kirkpatrick’s Four Levels of Evaluation**

ASSESSMENT GOALS

Assessment is an important process to measure the effectiveness of training content and the instructor. This assessment also needs to include an evaluation of the effectiveness of the learning. The evaluations can be used to improve future training by using other learning techniques to improve student learning. It is recommended that the CBU implement the Training Needs Assessment Cycle and its corresponding components, which include adopting Kirkpatrick’s Level I and II Evaluation Model.

Specifically, the CBU should:

- Implement a Training Needs Assessment Cycle starting in January 1, 2013. This implementation would include all training assessments from the 2012 RFA projects. The assessments can be collected and summarized with the results provided to the Curriculum Review Advisory Board in the fall of 2014. The results can also be provided at the Annual Training Provider Seminar.
• Require that all training supported by the CBU be assessed at the Level I reactions level, which should be implemented by January 1, 2013 using the Level I Training Evaluation Form.

• Provide Guidance on Level II learning level which should be implemented by July 1, 2014 using the Level II Learning Assessment Guidance Document.

• Ask RMSAWWA to address the assessment of the 2015 Training Strategy as a component in the Final Report.

TRAINING NEEDS ASSESSMENT CYCLE

Based on the Curriculum Development process outlined in Task 2, the Training Needs Assessment Cycle would come into play in Year 3 for the 2012 RFA projects. This process would be similar for any additional curriculum development or training projects the CBU implements.

Figure 2: The CBU Training Needs Assessment Cycle

LEVEL I ASSESSMENT

Approach

Level I Assessment is about measuring what participants thought and felt about the training (satisfaction and "smile sheets"). The CBU will require that all training supported by the CBU be assessed at the Level I reactions level which would be implemented by January 1, 2013, using the Level I Training Evaluation Form.
Encourage contractors to attempt to get 100% response rates on all assessments and to only provide TU certificates to students who complete all assessments.

**Assessment Content**

The standardized evaluation form contains questions in the following categories:

- General
- Operator Information
- Training-Specific
- Training-Specific (Optional for providers)

Note: Currently, all RFA contractors are asked to complete the online (Google) RFA Contractor Training Attendance Summary Tool which, for each attendee, provides:

- Attendee name
- Name of the water system or organization represented,
- Title of the training
- Public water system identification number (PWSID)

Therefore, this information does not need to be collected during the assessment process. Note: Although the Google Tool does not capture the System and Source Type, these data are collected by CBU through other queries of Safe Drinking Water Program databases using each system’s PWSID number.

It is also recommended that trainers conduct informal feedback sessions during the course of a day. This might include asking for feedback verbally from individuals or from small groups of participants. The feedback should include what’s working well, what they would change, and what they would still like to see in the course.

**Assessment Methods, Documentation and Reporting**

The Training Assessment Workgroup coordinated with CBU to identify two proposed approaches for implementing the Training Assessment Plan among CBU-funded trainers statewide. The first approach is less resource intensive for CBU and may be implemented quickly. The second approach is more resource intensive, but provides much more information for evaluating trainer performance and the overall quality and value of each training event.

**Approach 1:** Under the less resource intensive approach, CBU would require all CBU training contractors to administer the assessment immediately following the training activity via the written Level I Evaluation Form. Trainers would retain the hardcopy assessment forms, conduct a self-evaluation based on the feedback from each training event, and summarize attendee feedback and opportunities for improvement in a final training project report to CBU. When evaluating proposals for training events, CBU may preferentially select proposals that demonstrate high quality training through the inclusion of past training evaluation forms.

**Approach 2:** Under this more resource intensive approach, CBU would require all CBU training contractors to administer the assessment immediately following the training activity via the written Level I Evaluation Form. All forms will be provided to the CBU along with the contractor’s final report. The
CBU would enter data for all assessment results into a database and summarize and evaluate the data. In addition, trainers would conduct a self-evaluation based on the feedback from each training event and summarize attendee feedback and opportunities for improvement in a final training project report to CBU.

**Assessment Updates**

After each training cycle, the assessment approach and form should be evaluated:

- Which questions should be deleted or added?
- Which questions worked/didn’t work?
- Did the CBU use the information?

Subsequently, the CBU should make changes to the process and/or forms for the next cycle.

**LEVEL II ASSESSMENT**

Level II Assessment measures the resulting increase in knowledge and/or skills and change in attitudes. This evaluation occurs during the training in the form of either a knowledge demonstration or test. The CBU will encourage, but not require, Level II Assessments of their training contractors. Providers will have access to the Level II Learning Assessment Guidance Document for reference purposes only.

**Level II Assessment Guidance**

In the Level II Assessment process, providers could measure learning by evaluating if students achieved the learning objectives. All content developed and/or delivered for the CBU will be written with learning objectives at Bloom’s Taxonomy levels 2-5. Each level of learning in Bloom’s Taxonomy could be measured using the best method for the situation.

**Table 1: Sample Learning Objectives and Testing Approaches**

<table>
<thead>
<tr>
<th>Bloom’s Taxonomy Level</th>
<th>Sample Learning Objective</th>
<th>Sample Testing Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension</td>
<td>describe the four steps to chlorine disinfection.</td>
<td>Comprehension Test: Written or oral--essay, true/false, multiple choice</td>
</tr>
<tr>
<td>Application</td>
<td>compute the amount of chlorine required given a set of inputs.</td>
<td>Application Test: Written--multiple choice, other</td>
</tr>
<tr>
<td>Analysis</td>
<td>construct a graph to illustrate the pros and cons of available disinfection methods.</td>
<td>Analysis Test: Exercise, activity or team assessment</td>
</tr>
<tr>
<td>Synthesis</td>
<td>prepare a proposal for their supervisor outlining an argument to alter disinfection methods at their plant.</td>
<td>Synthesis Test: Exercise, activity, team assessment, simulation</td>
</tr>
</tbody>
</table>

**Concerns/Limitations**

Students will need to understand the expectations for performance-based and outcomes-based training prior to registering for a program. Instructors need to make the assessment process clear to all students.
The higher level of assessment, the more subjective it is potentially. The more complex the assessment, the more time and resource-intensive it will be.

**LEVEL III AND IV ASSESSMENT**

Level III Assessment measures the transfer of knowledge, skills, and/or attitudes from classroom to the job (change in job behavior due to training program). This evaluation occurs 3 to 6 months post training while the trainee is performing the job. Evaluation usually occurs through observation. Level IV assessment measures the final results that occurred because of attendance and participation in a training program (can be monetary, performance-based, etc.). Level III and IV assessment should not be implemented by the CBU. For additional information, see Appendix B.
APPENDIX A: LEVEL 1 STANDARD EVALUATION FORM

GENERAL

How did you learn about this training? (mark all that apply):

☐ CDPHE list serve
☐ Flyer in mail
☐ E-mail
☐ Other (please describe) __________

Motivation for coming (mark all that apply):

☐ Needed TUs
☐ Course Topic
☐ Prepare for exam
☐ Boss made me
☐ Other (please describe) __________

OPERATOR INFORMATION

Drinking Water Certification Information (select one):

☐ I am the Operator in Responsible Charge (ORC) for my water system
☐ I am the ORC for multiple water systems
☐ I am a certified water operator at the appropriate type and level for my system
☐ I am a certified water operator and working toward the appropriate type & level for my system
☐ I am not a certified water operator

How many years of experience do you have in water (select one)?

☐ <1 year
☐ 1-2 years
☐ 3-5 years
☐ 6-9 years
☐ 10 years or more

In what Colorado county do you work? ________________________________

TRAINING-SPECIFIC QUESTIONS

<table>
<thead>
<tr>
<th>TRAINING DESIGN</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The topics were well organized and easy to understand</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The level of training was appropriate for me</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
INSTRUCTOR(S)
The instructor performed well overall 1 2 3 4 5
The instructor answered questions effectively 1 2 3 4 5
The organization provided complete, accurate and timely information on the learning experience in advance of the training 1 2 3 4 5
Learning outcomes were clear, specific and measurable, and reflected in what I was to achieve during the training 1 2 3 4 5
The trainer was qualified to teach this course 1 2 3 4 5
The trainer remains current in the subject matter, material, and learning methods 1 2 3 4 5
The trainer demonstrated high standards of professional conduct and did not discriminate against me 1 2 3 4 5

TRAINING APPLICATIONS
I will apply what I learned in this training to my job 1 2 3 4 5
I will recommend this training to others 1 2 3 4 5
I was well engaged with what was going on during the program 1 2 3 4 5
The activities and exercises aided in my learning 1 2 3 4 5
I was given adequate opportunity to demonstrate what I was learning 1 2 3 4 5

OVERALL RATING
This training was worth attending 1 2 3 4 5

TRAINING-SPECIFIC QUESTIONS

<table>
<thead>
<tr>
<th></th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The audio-visual aids were effective</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The exercises/case studies were helpful</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The handouts were helpful</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The facilities were appropriate</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

If not, describe here: ______________________________
TRAINING-SPECIFIC QUESTIONS (OPTIONAL)

The content of this training was:
- [ ] All new
- [ ] Mostly New
- [ ] Mostly Review
- [ ] All Review

If taking an exam, do you feel that we adequately covered topics you might see on the exam?
- [ ] Yes
- [ ] No
- [ ] Not sure

What time of year are you most available to attend training? (mark all that apply):
- [ ] Spring (March – May)
- [ ] Summer (June – August)
- [ ] Winter (December – February)
- [ ] Fall (September – November)

1. What is your preferred location for training (city or town)?
2. What part of the workshop did you find the most interesting and helpful?
3. What part of the workshop did you find the least interesting and helpful?
4. What topics would you have liked to spend more or less time on?
5. What topic would you like added to this training (if any)?
6. From what you learned, what will you be able to apply on your job?
7. What would have improved the program?
8. What other topics are of interest to you?
9. Other comments:
APPENDIX B: LEVEL II ASSESSMENT

The American Society of Training and Development offers a publication called *The Four Levels of Evaluation + ROI*, which is a valuable resource for all trainers wanting to conduct higher-level training assessments. Information can be found at [http://store.astd.org/Default.aspx?tabid=167&ProductId=20417](http://store.astd.org/Default.aspx?tabid=167&ProductId=20417).