

**ACADEMIC SENATE PROPOSAL TRACKING SHEET**  
**(Document To Be Originated By the Academic Senate Secretary On Canary Color Paper)**

<b>Proposal #</b> 15.17	<b>Title:</b> Water Quality Technology – Water Treatment Certificate
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(Proposal explanation, submitter and college dean signatures on attached program/degree or course revision form.)

**All proposals MUST have their originating college faculty body (Ex: Arts & Sciences, Education and Nursing; Technical Sciences) approval and must be signed by the submitter and the college dean before being submitted to the Academic Senate Secretary.**

1. Submit all proposals (using the appropriate Academic Senate program/degree and/or course revision forms or General Education Inclusion form) to the Academic Senate Secretary. **NOTE: Level 1 or Level 2 forms must be submitted concurrent with this proposal where applicable. For Education proposals, PEU approval must be received prior to forwarding the proposal to the Senate.**
2. The Academic Senate Secretary logs and numbers items and forwards them to the appropriate Academic Senate subcommittee(s): General Education (if applicable), or Curriculum. A transmittal e-mail will be sent to the Recording Secretary of the receiving committee, cc Provost's Administrative Assistant, by the Academic Senate Secretary. A digital copy of the proposal will be linked on the Academic Senate Proposal page by the Academic Senate Secretary.
3. The Academic Senate subcommittee(s) consider(s) the proposal. If approved, the proposal is returned to the Academic Senate Secretary for forwarding to the next committee. If a committee disapproves the proposal, the originator may request that the item be forwarded to the next body for consideration. The committee will provide written rationale to the originator, via the Academic Senate, when a proposal is disapproved and the proposal is returned to the originator. Upon completion of committee action, the proposal will be returned to the Academic Senate Secretary, and a transmittal e-mail sent by the Committee Recorder to the Senate Secretary, cc Provost's Administrative Assistant.
4. The Academic Senate considers the proposal and recommends approval or disapproval. If approved, the proposal is forwarded to the Provost for consideration. If the Academic Senate disapproves the proposal, the originator may request that the item be forwarded to the Full Faculty for consideration, utilizing the procedures set forth in the Senate Bylaws. The Academic Senate will provide written rationale to the originator when proposals are disapproved and the proposal is returned to the originator.
5. Approved proposals will be forwarded to the Provost. The Provost approves or disapproves the proposal. If approved, the proposal is then forwarded to the Chancellor. From this point forward, the Provost's Administrative Assistant will update the Proposal page on the website by contacting the webmaster.
7. The Chancellor approves or disapproves the proposal.
8. The proposal will then either be implemented or referred to MSU for further action. The tracking page on the Provost site will be updated as required.

Subcommittee and Academic Senate college representatives will notify their respective colleges' of the progress of submitted proposals or the proposal may be tracked via the web page -- <http://www.msun.edu/admin/provost/senate/proposals.htm>

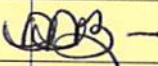
Documentation and forms for the curriculum process is also available on the web page:  
<http://www.msun.edu/admin/provost/forms.htm>

\*\*\*\*\* (If a proposal is disapproved at any level, it is returned through the Academic Senate secretary and the Senate President, to the Dean of the submitting college who then notifies the originator.



See back for tracking form



	Date	Action Taken	Signature	Date	Comments/Reason for Disapproval	Sent to	Date	Transmittal E-mail sent
*Abstract received by Senate Secretary		Copy to Senate President. Forward to Provost.						
*Provost		<input type="checkbox"/> Abstract Approved <input type="checkbox"/> Disapproved						
Received by Senate Secretary	11/19/15	Tracking form initiated						
General Education Committee (if applicable)	11/30/15	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved	Gary L. Surman	11/30/15		Senate Sec.	12/1/15	
Curriculum Committee (if applicable)	1-26-16	<input checked="" type="checkbox"/> Approved w/ correction <input type="checkbox"/> Disapproved	Byron C. ...	1-26-16	SHOULD BE: CERTIFICATE OF APPLIED SCIENCE	Senate Sec.	2/2/15	wanted over to Loren
Academic Senate	2-9-16	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved	Liam ...			Senate Sec.	2/9/16	interfere to Provost office
Full Faculty (if necessary)		<input type="checkbox"/> Approved <input type="checkbox"/> Disapproved						
Provost		<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved	Wm. J. Rugg	3-15-16				
Chancellor		<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved	Gregory D. Kugel	3-17-2016				
MSU		<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved	approved					
BOR		<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved	July 2016					
NWCCU		<input type="checkbox"/> Disapproved <input type="checkbox"/> Approved <input type="checkbox"/> Disapproved	approved Sept 2016		BOR moving onto NWCCU			
Provost		Advise originating college and Academic Senate of status. Update Web page.						
Registrar		Catalog/Policy Manual Update						

**NOTE:** The secretary of the Academic Senate will update the Academic Senate Proposal web page from initial receipt until the proposal reaches the Provost. The Provost's Administrative Assistant will ensure that the current status of each proposal is maintained on the Academic Senate Proposal web page from that point forward.

\*Abstract and pre-approval required for new programs ONLY.

Academic Senate Form 1 (Revised 3/21/2012)



May 19-20 2016

**171-2807-R0516****ITEM****Request for authorization to offer Water Treatment Certificate**

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**THAT**

The Montana Board of Regents grants Montana State University Northern approval to offer Water Treatment Certificate to our students.

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**EXPLANATION**

The purpose of this curriculum proposal is to add a departmental certificate program to MSU Northern's Water Quality Technology: Environmental Health Associate of Applied Science (AAS) degree program. This proposal is unique and innovative in that it utilizes; courses that are already a part of the AAS Water Quality Technology program as well as; courses that are already a part of the Montana Environmental Training Center's (METC) programs, which are housed at MSU Northern, to recertify licensed wastewater treatment operators in the state of Montana.

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**ATTACHMENTS**

Academic Proposal Request Form  
Curriculum Proposal Form  
MSU Northern paperwork in PDF

**Montana Board of Regents  
ACADEMIC PROPOSAL REQUEST FORM**

Item Number: 171-2807-R0516Meeting Date: May 19-20 2016Institution: Montana State University NorthernCIP Code: 15.0506Program Title: Water Treatment Certificate

Please mark the appropriate type of request and submit with an Item Template and any additional materials, including those listed in parentheses following the type of request. For more information pertaining to the types of requests listed below, how to complete an item request, or additional forms please visit the Academic Affairs Handbook.

   **A. Notifications:**

Notifications are announcements conveyed to the Board of Regents at the next regular meeting.

   **1a. Placing a program into moratorium** (Document steps taken to notify students, faculty, and other constituents and include this information on checklist at time of termination if not reinstated)

   **1b. Withdrawing a program from moratorium**

   **2. Intent to terminate an existing major, minor, option or certificate – Step 1** (Phase I Program Termination Checklist)

   **3. Campus Certificates- Adding, re-titling, terminating or revising a campus certificate of 29 credits or less**

   **4. BAS/AA/AS Area of Study**

   **B. Level I:**

Level I proposals are those that may be approved by the Commissioner of Higher Education. The approval of such proposals will be conveyed to the Board of Regents at the next regular meeting of the Board.

   **1. Re-titling an existing major, minor, option or certificate**

   **2. Adding a new minor or certificate where there is a major or an option in a major** (Curriculum Proposal Form)

   **3. Revising a program** (Curriculum Proposal Form)

   **4. Distance or online delivery of an existing degree or certificate program**

   **5. Terminating an existing major, minor, option or certificate – Step 2** (Completed Program Termination Checklist)

   **Temporary Certificate or AAS Degree Program**

Approval for programs under this provision will be limited to two years. Continuation of a program beyond the two years will require the proposal to go through the normal Level II Proposal approval process.

**Montana Board of Regents  
ACADEMIC PROPOSAL REQUEST FORM**

     **C. Level I with Level II Documentation:**

This type of proposal may go to the Board as a Level I item if all Chief Academic Officers are in agreement. If consensus among the Chief Academic Officers is not reached, however, the item will go to the Board as a Level II request.

     **1. Consolidating existing programs and/or degrees (Curriculum Proposal Form)**

  X **D. Level II:**

Level II proposals require approval of the Board of Regents. These requests will go to the Board in a two-meeting format, the first being as informational and the second as action.

     **1. Re-titling a degree (ex. From B.A. to B.F.A)**

  X **2. Adding a new minor or certificate where there is no major or option in a major (Curriculum Proposal Form)**

     **3. Establishing a new degree or adding a major or option to an existing degree (Curriculum Proposal Form)**

     **4. Forming, eliminating or consolidating a college, division, school, department, institute, bureau, center, station, laboratory or similar unit (Curriculum Proposal Form or Center Proposal Form, except when eliminating or consolidating)**

     **5. Re-titling a college, division, school, department, institute, bureau, center, station, laboratory or similar unit**

**Specify Request:**

This proposal is unique and innovative in that it utilizes; courses that are already a part of the AAS Water Quality Technology program as well as; courses that are already a part of the Montana Environmental Training Center's (METC) programs, which is housed at MSU Northern, to recertify licensed water treatment, water distribution system, wastewater treatment, industrial wastewater and on-site waste water operators in the state of Montana.

**Montana Board of Regents**  
**CURRICULUM PROPOSAL FORM**

**1. Overview**

The purpose of this curriculum proposal is to add a departmental certificate program to MSU Northern's Water Quality Technology: Environmental Health Associate of Applied Science (AAS) degree program. This proposal is unique and innovative in that it utilizes; courses that are already a part of the AAS Water Quality Technology program as well as; courses that are already a part of the Montana Environmental Training Center's (METC) programs, which is housed at MSU Northern, to recertify licensed water treatment operators in the state of Montana.

**2. Provide a one paragraph description of the proposed program. Be specific about what degree, major, minor or option is sought.**

To obtain a departmental certificate in Water Treatment, the program requires completion of all classes specifically designed for the certificate program. The curriculum is multi-entry and can be completed in one year. Classes are offered using various delivery methods such as on-line classes (Desire2Learn), classroom, and short courses. Students can begin a certificate program with any of the required classes at any time. After completing the certificate program students will have the basic knowledge needed for entry level employment in the area water treatment. Students will be ready to sit for the Montana State Certification Examination and become certified as an "Operator-in-Training" in their chosen field. Students will also have specific knowledge of drinking water and/or wastewater systems that employers have identified as pertinent for job applicants to have prior to employment. Or students can roll their one year certificate into their first year of the AAS degree in Water Quality Technology and only have one year left to complete the AAS Water Quality Technology degree.

**3. Need**

**A. To what specific need is the institution responding in developing the proposed program?**

The need for water and wastewater operators in municipal and private water and wastewater systems is nearing critical mass, not only nationally but right here in Montana, with the average age of certified operators being 45. Many more operators are retiring from systems than are entering systems especially in small systems, of which Montana has many. This proposal aims to bring students interested in working in both large and small municipalities and small municipalities into the field. Then provide them with enough information in one year that they can sit for the state certification exam and successfully pass the exam the first time. Hopefully by completing the certificate program they will see the value in the Water quality program and how close they are to having the AAS degree and continue on and complete the Water Quality Technology AAS degree thus making them even more valuable to an employer.

**Montana Board of Regents**  
**CURRICULUM PROPOSAL FORM**

**B. How will students and any other affected constituencies be served by the proposed program?**

Those students looking to get into the work force quickly can complete the certificate within one year, sit for a state exam and apply for a job. Or they can be working on a certificate, apply for a job and get a job, complete the certificate and then sit for the exam.

This program will provide graduates of MSU Northern's Civil Engineering Technology Bachelor of Science degree program, Plumbing Technology Associate of Applied Science Technology program, and Water Quality Associate of Applied Science Technology Program more avenues of employment. By completing one of the four certificates in the water quality program not only will they be earning a departmental certificate from MSU Northern but by completing the required Backflow Prevention Assembly Testers core course they will be nationally certified as a backflow prevention assembly tester and by sitting for a state of Montana operator certification exam they will be certified by the state of Montana as an Operator-in-Training as either a Water Operator, Wastewater Operator, Water Distribution Operator, Industrial Wastewater operator or On-site Wastewater Operator.

Other constituencies (water and wastewater operators, sanitarians, engineers, plumbers, and industry representatives) already utilizing the Montana Environmental Training Center's programs that may benefit from the certificate program are those water and wastewater operators already working in municipalities and other systems who would like to further their education and would see these certificate programs as a way to do so by being able to take online courses and get college credit for taking some of METC's courses.

**C. What is the anticipated demand for the program? How was this determined?**

Anticipated demand for this program is high, if as many courses as possible are offered as online courses by MSU Northern and short three to five day courses by METC. This format is highly desirable for those already working in the industry and for those that are place bound across the state wishing to get into the industry. In addition, some of Montana's larger municipalities are voicing interest in this program format to the METC Interim Director as a possible method for personnel training. In 2009 the Interim Director also had a list of 126 potential students whom could still possibly be potential students.

Demand for the MSU Northern's AAS Water Quality Technology program first surfaced in 2009; when the Montana Environmental Training Center began conducting surveys for the need of the program to return and; when then MSU Northern Provost Joe Callahan began receiving letters from those in the water and wastewater industry including municipalities large and small, state agencies, engineering firms and even the Environmental Protection Agency. This prompted the Provost to encourage the Board of Regents to lift the moratorium. Since this time, the Montana Department of Environmental Quality (DEQ) has noted an increase in the lack of trained operators for systems in Montana. In addition, the US EPA has identified the water and wastewater industry as an area for returning military veterans to find employment.

In March of 2009 the DEQ's Water and Wastewater Operator Certification program provided METC the following data: 224 (14%) active operators in Montana were 62 years of age or older. And, another 82 active operators were between the ages of 60 and 62 (5.1%). Thus, 19.1% of the 1,602 certified water and wastewater operators in Montana in 2009 were over the age of 60 and closing in on retirement.

The January/February 2011 edition of Water Efficiency stated that "In the study done by the American Water Works Association (AWWA) and the Water Environment Federation (WEF) the highest level of need for non-administrative employees was in the area of certified plant operators in both drinking and wastewater plants." AWWA also identified in its 2010 State of the Industry report workforce issues as one of the top five



**Montana Board of Regents**  
**CURRICULUM PROPOSAL FORM**

topics of concern. This problem has been increasing in intensity since AWWA first brought its concern to the attention of the industry in 2005. It is now estimated that 40% of the workforce will retire in the next 10 years.

Every public community, which is defined as 15 hook-ups or having a population of 25 full-time residents, requires a certified water treatment operator and wastewater treatment operator to monitor, report data, operate and maintain its water and wastewater treatment systems. The demand for students from the water quality program has increased by at least 100 percent. Salaries for water quality technicians range from \$20,000 up to \$50,000 per year.

**4. Institutional and System Fit**

**A. What is the connection between the proposed program and existing programs at the institution?**

Currently, MSU Northern is the only institution in Montana that provides an AAS degree for students seeking employment as water and wastewater operators. Most of the core courses for the proposed program are courses that are part of MSU Northern's AAS Water Quality Technology degree or METC's recertifying programs.

**B. Will approval of the proposed program require changes to any existing programs at the institution? If so, please describe.**

It will add some courses to the curriculum and require that METC attached assignments and a grading system to those courses which will become a part of the certificate program.

**C. Describe what differentiates this program from other, closely related programs at the institution (if appropriate).**

Not appropriate, no closely related programs at MSU Northern.

**D. How does the proposed program serve to advance the strategic goals of the institution?**

The proposed program serves to provide education that can be used directly and immediately in the water and wastewater industry. Completion of the program prepares students to sit for the state certification exams. This is a tenant of the mission of MSU Northern.

**E. Describe the relationship between the proposed program and any similar programs within the Montana University System. In cases of substantial duplication, explain the need for the proposed program at an additional institution. Describe any efforts that were made to collaborate with these similar programs; and if no efforts were made, explain why. If articulation or transfer agreements have been developed for the substantially duplicated programs, please include the agreement(s) as part of the documentation.**

No other similar programs exist within the Montana University System.

**Montana Board of Regents  
CURRICULUM PROPOSAL FORM**

## 5. Program Details

- A. Provide a detailed description of the proposed curriculum. Where possible, present the information in the form intended to appear in the catalog or other publications. NOTE: In the case of two-year degree programs and certificates of applied science, the curriculum should include enough detail to determine if the characteristics set out in Regents' Policy 301.12 have been met.**

Water Treatment Option – Total Credits Required = 31

Core Courses (19 credits) required for each certificate would be:

TSCI 110	Intro to Water & Wastewater	online	4 credits
METC	Environmental Health & Safety for W/WW Operators	online	1 credit
MATH 111	Technical Math	online	3 credits
AGTE 206	Applied Water Hydraulics	online	3 credits
WRIT 108	Elementary Technical Writing	online	3 credits
COMX 115	Intro to Interpersonal Communications	online	3 credits
METC	Backflow Assembly Testers Course	traditional	3 credits
METC	Spring, Summer or Fall Water Schools	traditional	<u>2 credits</u>
			22 credits

Required Courses (9 credits)

TSCI 230	Intro to Groundwater Concepts	online	3 credits
TSCI 233	Water Treatment Processes	online	3 credits
TSCI 234	Water Treatment Processes Lab	traditional	2 credits
MDEQ	Operator Basics	CD-ROM	<u>1 credit</u>
			9 credits

Elective Courses (none required)

- B. Describe the planned implementation of the proposed program, including estimates of numbers of students at each stage.**

Anticipated demand for this program is high, if as many courses as possible are offered online by MSU Northern and as short three to five day courses by METC. This format is highly desirable for those already working in the industry and for those that are place bound across the state wishing to get into the industry. In addition, some of Montana's larger municipalities are voicing interest in this program format as a possible method for personnel training and advancement. In 2009 METC's Director has a list of 126 potential students whom could still be potential students.

The need for water and wastewater operators in municipal and private water and wastewater systems is nearing critical mass, not only nationally but right here in Montana, with the average age of certified operators being 52 in Montana. Many more operators are retiring from systems than are entering systems especially in small systems, of which Montana has many.

**Montana Board of Regents  
CURRICULUM PROPOSAL FORM**

**6. Resources**

- A. Will additional faculty resources be required to implement this program? If yes, please describe the need and indicate the plan for meeting this need.**

Most likely not as the plan is to use the current faculty to teach Northern's courses and to use METC's staff and instructors to teach the METC courses.

- B. Are other, additional resources required to ensure the success of the proposed program? If yes, please describe the need and indicate the plan for meeting this need.**

No.

**7. Assessment**

**How will the success of the program be measured?**

In four ways.

- 1) By enrollment in the certificate programs and graduates from the certificate programs.
- 2) By increased enrollment in the AAS program and graduates from the AAS program.
- 3) By increased number of certified water and wastewater operators in Montana.
- 4) By graduates employed as operators and technicians in-state and out-of-state.

**8. Process Leading to Submission**

**Describe the process of developing and approving the proposed program. Indicate, where appropriate, involvement by faculty, students, community members, potential employers, accrediting agencies, etc.**

MSU Northern's Faculty approved the program. MSU Northern students in the BS Civil Engineering, AAS Plumbing and AAS Water Quality Technology degree programs were reviewed and provided input as to the value of the certificate program to students. An advisory committee was made up of managers and operators as well as other professionals in the field. The committee advised MSU Northern on the curriculum content and made suggestions on how to deliver the certificate programs from a distance and possible on-site workshops.





DATE: \_\_\_\_\_ DROPPED \_\_\_\_\_ MAJOR REVISION \_\_\_\_\_ FOR INFORMATION ONLY \_\_\_\_\_

College (Title) \_\_\_\_\_ Program Area (Major/Minor/Technical) \_\_\_\_\_  
Submitter (Name) \_\_\_\_\_ Date \_\_\_\_\_

Please provide a brief explanation of rationale for the proposed revision(s).

These proposed revision(s) are being submitted for review and approval by the appropriate authority. In addition, courses that are offered as part of the continuing education program offered through the institution or a community college should be included. These revision(s) can be completed in one year and should be included in the program manual. The appropriate authority should be notified for approval.

Please provide in the space below a "before and after" picture of the program with the changes to the program noted. Attach appropriate course revision forms. Please indicate changes by shading the appropriate cells.

PROPOSED TITLE: \_\_\_\_\_ YEAR: \_\_\_\_\_

Proposed Program  
for 17-18 Course

Current Program listed  
in 14-15 Course

Table with multiple columns and rows for proposed program details.

Table with multiple columns and rows for current program details.

Please note that this form does not indicate approval for any revision(s) to the program manual. It is the responsibility of the appropriate authority to ensure that the program manual is updated accordingly.

## COURSE REVISION FORM

NEW  DROPPED  MAJOR REVISION  FOR INFORMATION ONLY

College CEASN Program Area Environmental Health & Safety for Water & Wastewater Personnel Date \_\_\_\_\_

Submitter Carol A. Reifmeyer Dean Carol A. Reifmeyer Date \_\_\_\_\_

Signature Signature (indicates "College" level approval)

Please provide a brief explanation & rationale for the proposed revision(s):  
This course is part of the proposed courses for the water quality certificate programs. It is designed to introduce health and safety techniques used in water and wastewater operations.

### Please provide the following information:

College: CEASN  
Program Area: Water Quality  
Date: 10/30/12  
Course Prefix & No.: TSCI 1xx

Course Title: Environmental Health & Safety for Water & Wastewater Personnel  
Credits: 1 credit

Required by: Water Quality – all certificates

Selective in:

Elective in:

General Education:

Lecture: XXX

Lecture/Lab:

Gradable Lab:

Contact hours lecture: 15 hours

Contact hours lab:

Current Catalog Description (include all prerequisites):

There is no current description.

### Proposed or New Catalog Description (include all prerequisites):

Provide students with fundamental knowledge of maintaining a safe, healthful work environment, as well as protecting the local community and environment from potential hazards generated by water and wastewater system activities.

### Course Outcome Objectives:

Students who successfully complete this course will have gained the knowledge to protect themselves against (1) blood borne pathogens and (2) heat and cold stress as well as the importance of (1) personal protective equipment, (2) hearing protection, (3) respiration protection, (4) hazard communication, (5) laboratory safety, and (6) chemical security and spill cleanup. Students will also understand the components of lockout/tagout, permit required confined space and trenching, shoring and excavation safety programs.

Additional instructional resources needed (including library materials, special equipment, and facilities). Please note: approval does not indicate support for new faculty or additional resources.

Possible demonstration by local utilities on lockout/tagout, confined space entry and trenching, shoring and excavation.

## COURSE REVISION FORM

NEW X DROPPED \_\_\_\_\_ MAJOR REVISION \_\_\_\_\_ FOR INFORMATION ONLY \_\_\_\_\_

College CEASN Program Area Water & Wastewater School Date \_\_\_\_\_

Submitter Cora A. Rejzmand Dean Cora A. Rejzmand Date 9-15-14  
Signature Signature (indicates "college" level approval)

**Please provide a brief explanation & rationale for the proposed revision(s):**

This course is part of the proposed courses for the water quality certificate programs. It is designed to introduce students to current topics of importance to the field of water and wastewater.

**Please provide the following information:**

College: CEASN  
Program Area: Water Quality  
Date: 10/22/12  
Course Prefix & No.: TSCI 2xx

Course Title: Water and Wastewater Schools

Credits: 2 credit

Required by: Water Quality – wastewater collection & wastewater treatment certificates

Selective in:

Elective in:

General Education:

Lecture: 30 hours

Lecture/Lab:

Gradable Lab:

Contact hours lecture: 30 hours

Contact hours lab:

**Current Catalog Description (include all prerequisites):**

There is no current description.

**Proposed or New Catalog Description (include all prerequisites):**

This course will introduce students to current topics of importance to the field of water and wastewater operations in addition to having the opportunity to review material in preparation for taking the State of Montana Certification examinations.

**Course Outcome Objectives:**

Students who successfully complete this course will:

- 1) Understand the current topics in the field of water and wastewater;
- 2) Have basic knowledge about federal, state and local wastewater regulations;
- 3) Review topics required for successful completion of the state certification exams;
- 4) Be familiar with state and federal regulations that govern water and wastewater; and
- 5) Have basic knowledge of collection systems, distribution systems, treatment system utilized in the water and wastewater profession.

**Additional instructional resources needed (including library materials, special equipment, and facilities). Please note: approval does not indicate support for new faculty or additional resources.**

## COURSE REVISION FORM

NEW X DROPPED \_\_\_\_\_ MAJOR REVISION \_\_\_\_\_ FOR INFORMATION ONLY \_\_\_\_\_

College CEASN Program Area Backflow Prevention Date \_\_\_\_\_

Submitter Carol A. Rejzner Dean Carol A. Rejzner Date \_\_\_\_\_  
Signature Signature (indicates "college" level approval)

**Please provide a brief explanation & rationale for the proposed revision(s):**

This course is part of the proposed courses for the water quality certificate programs. It is designed to introduce students to cross-connection control and backflow prevention and the testers that are used.

**Please provide the following information:**

College: CEASN  
Program Area: Water Quality  
Date: 10/27/12  
Course Prefix & No.: TSCI 2xx

Course Title: Backflow Prevention  
Credits: 3 credit

Required by: Water Quality -- wastewater collection & wastewater treatment certificates

Selective in:

Elective in:

General Education:

Lecture:

Lecture/Lab: 60 hours

Gradable Lab:

Contact hours lecture: 30 hours

Contact hours lab: 30 hours

**Current Catalog Description (include all prerequisites):**

There is no current description.

**Proposed or New Catalog Description (include all prerequisites):**

Provide students with a basic knowledge of understanding of field testing methods on 4 valves; pressure vacuum breakers, spill resistant vacuum breakers, reduced pressure principle assemblies, and double check assemblies. Students will gain knowledge in hydraulics, backflow and backsiphonage, types of cross connections, and degrees of hazard and state and federal regulations. Completion of this course and the written and practical exams will result in certification by ABPA as a backflow prevention assembly tester.

**Course Outcome Objectives:**

Students who successfully complete this course will:

- 1) Understand the field testing methods on 4 valves;
- 2) Have basic knowledge about federal, state and local backflow regulations;
- 3) Have hands on experience with backflow testing assemblies;
- 4) Be familiar with connections, special application devices, and unapproved devices;
- 5) Understand the importance of cross-connection control and backflow prevention;
- 6) Be familiar with the maintenance and repair of devices.

**Additional instructional resources needed (including library materials, special equipment, and facilities). Please note: approval does not indicate support for new faculty or additional resources.**



## COURSE REVISION FORM

NEW X DROPPED \_\_\_\_\_ MAJOR REVISION \_\_\_\_\_ FOR INFORMATION ONLY \_\_\_\_\_  
College CEASN Program Area Basic Course for Small Public Drinking Water Systems Date 9-15-14  
Submitter \_\_\_\_\_ Dean Carek Palahner Date 9-15-14  
Signature Signature (indicates "college" level approval)

**Please provide a brief explanation & rationale for the proposed revision(s):**

This course is part of the proposed courses for the water quality certificate programs. It is designed to introduce students to water treatment systems commonly by municipalities to treat water for human consumption.

**Please provide the following information:**

College: CEASN  
Program Area: Water Quality  
Date: 10/22/12  
Course Prefix & No.: TSCI 1xx

Course Title: Basics Course for Small Public Drinking Water Systems  
Credits: 1 credit

Required by: Water Quality – water distribution and water treatment certificates

Selective in:

Elective in:

General Education:

Lecture: XXX

Lecture/Lab:

Gradable Lab:

Contact hours lecture: 15 hours

Contact hours lab:

**Current Catalog Description (include all prerequisites):**

There is no current description.

**Proposed or New Catalog Description (include all prerequisites):**

Provide students with a basic knowledge of drinking water treatment systems including: (1) the fundamentals of water; (2) science concepts related to the treatment of water; (3) water hydraulics; (4) the common components of a water distribution system; (5) safety concerns when working in water treatment and water distribution systems; (6) regulatory requirements for water systems in Montana; and (7) common math calculations used in drinking water systems.

**Course Outcome Objectives:**

Students who successfully complete this course will:

- 1) Understand the characteristics, sources and classification of water;
- 2) Have basic knowledge about federal, state water regulations;
- 3) Recognize distribution system and water treatment structure components;
- 4) Understand the chemical and biological characteristics of water as well as hydraulics related to water;
- 5) Understand the types of treatment commonly used for groundwater and the common components and operation of a distribution system;
- 6) Have basic knowledge related to safety concerns associated with small public drinking water systems as well as state and federal safety regulations;
- 7) Understand common calculations used in drinking water systems

**Additional instructional resources needed (including library materials, special equipment, and facilities). Please note: approval does not indicate support for new faculty or additional resources.**

**Computer to run training CD. Must have Windows XP or later.**

**CEASN PROPOSAL TRACKING SHEET**  
 (Document To Be Originated By CEASN Secretary)

1. Submit all proposals (using the appropriate Academic Senate program/degree and/or course revision forms) to the CEASN Administrative Assistant.
2. The CEASN Administrative Assistant forwards them to the appropriate CEASN Committee.

Proposal Number: <u>2014/2015 #6</u>	Title: <u>TSCI 1XX-Environmental Health + Safety for Water + Wastewater Personnel</u>
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Received by CEASN Administrative Assistant 8-7-14

Forwarded to CEASN College Meeting 8-20-14

Returned to CEASN Administrative Assistant 9-9-14

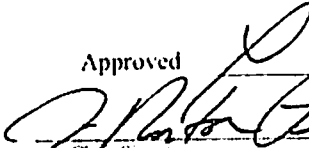
Forwarded to Dean for Signatures 9-15-14

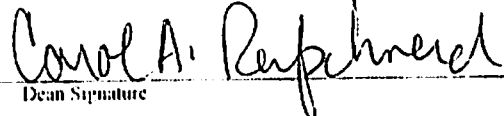
Returned to CEASN Administrative Assistant 9-15-14

~~Forwarded to Professional Education Unit~~ \_\_\_\_\_

Returned to CEASN Administrative Assistant 9-15-14

Forwarded to ACAD Senate \_\_\_\_\_

Approved \_\_\_\_\_ Disapproved \_\_\_\_\_  
  
 Chair Signature \_\_\_\_\_ Date 9/9/14

  
 Dean Signature \_\_\_\_\_

Approved \_\_\_\_\_ Disapproved \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

**CEASN PROPOSAL TRACKING SHEET**  
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Proposal Number: <u>2014/2015 #13</u>	Title: <u>TSCI 2XX - Water + Wastewater Schools</u>
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Date

Received by CEASN Administrative Assistant

8-7-14

Forwarded to CEASN College Meeting

8-20-14

Approved                     

Disapproved                     

[Signature] 9/9/14  
 Chair Signature Date

Returned to CEASN Administrative Assistant

Forwarded to Dean for Signatures

9-15-14

[Signature]  
 Dean Signature

Returned to CEASN Administrative Assistant

9-15-14

~~Forwarded to Professional Education Unit~~

Approved                     

Disapproved                     

Signature

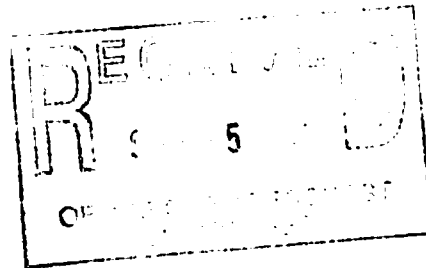
Date

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9-15-14

Forwarded to ACAD Senate

2-20-15





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Proposal Number: <u>2014/2015 # 12</u>	Title: <u>TSCI 2XX - Backflow Prevention</u>
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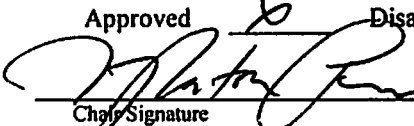

<p>Received by CEASN Administrative Assistant</p> <p>Forwarded to CEASN College Meeting</p> <p>Returned to CEASN Administrative Assistant</p> <p>Forwarded to Dean for Signatures</p> <p>Returned to CEASN Administrative Assistant</p> <p><del>Forwarded to Professional Education Unit</del></p> <p>Returned to CEASN Administrative Assistant</p> <p>Forwarded to ACAD Senate</p>	<p>Date</p> <p><u>8-7-14</u></p> <p><u>8-20-14</u></p> <p><u>9-9-14</u></p> <p><u>9-15-14</u></p> <p><u>9-15-14</u></p> <p><u>9-15-14</u></p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"> <p>Approved</p> <p><u><i>[Signature]</i></u></p> <p>Chair Signature</p> </td> <td style="width: 50%; text-align: center;"> <p>Disapproved</p> <p><u><i>[Signature]</i></u></p> <p>Date</p> </td> </tr> <tr> <td colspan="2" style="text-align: center;"> <p><u><i>Carol A. Reyschman</i></u></p> <p>Dean Signature</p> </td> </tr> <tr> <td style="text-align: center;"> <p>Approved _____</p> <p>Signature _____</p> </td> <td style="text-align: center;"> <p>Disapproved _____</p> <p>Date _____</p> </td> </tr> </table>	<p>Approved</p> <p><u><i>[Signature]</i></u></p> <p>Chair Signature</p>	<p>Disapproved</p> <p><u><i>[Signature]</i></u></p> <p>Date</p>	<p><u><i>Carol A. Reyschman</i></u></p> <p>Dean Signature</p>		<p>Approved _____</p> <p>Signature _____</p>	<p>Disapproved _____</p> <p>Date _____</p>
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2. The CEASN Administrative Assistant forwards them to the appropriate CEASN Committee.

Proposal Number: <u>2014/2015 #44</u>	Title: <u>Basic Crse for Small Public Drinking Water Systems</u>
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	Date		Approved	Disapproved	
Received by CEASN Administrative Assistant	<u>8.7.14</u>		<input checked="" type="checkbox"/>		
Forwarded to CEASN College Meeting	<u>8.20.14</u>				
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			Chair Signature		Date
Returned to CEASN Administrative Assistant	<u>9.9.14</u>				
Forwarded to Dean for Signatures	<u>9.15.14</u>				
Returned to CEASN Administrative Assistant	<u>9.15.14</u>				
<del>Forwarded to Professional Education Unit</del>	<u>          </u>		Approved	Disapproved	
					
			Dean Signature		
			Signature		Date
Returned to CEASN Administrative Assistant	<u>9.15.14</u>				
Forwarded to ACAD Senate					

**Rationale**  
**for MSU-Northern and Montana Environmental Training Center to Jointly Offer**  
**a Board of Regents Certificate in Water Quality Technology**  
**August 6, 2014**

Respectfully submitted by Dr. Carol Reifschneider and Lorren Schlotfeldt METC Steering Committee Representatives for Montana State University-Northern, Jon Dillard and Bill Bahr METC Steering Committee Representatives for the Montana Department of Environmental Quality, Keith Thaut METC Representative for Montana Water and Wastewater Operators, Barbara Coffman, METC Director and Dr. Randy Bachmeier, Dean Montana State University – Northern Extended University

**Overview**

This Rationale will provide 1) a brief history of the Water Quality program at MSU-Northern; 2) a description of the proposed program; 3) identification of the local, regional, state and national workforce needs MSU-Northern and METC will be responding to by developing this program; 4) a rationale as to why this certificate program can fill workforce needs ; 5) rationale for MSU-Northern and METC to provide post high school education to complement the Montana Department of Environmental Quality water and wastewater operator certification program updated standardized exams for operators seeking higher level certification and professional designation. 6) a description of the connection of this program to MSU-Northern and METC; 7) an outline of the commitments this program will need to be successful; and 7) a detailed description of the proposed curriculum.

This Board of Regents certificate program aims to bring students of all ages and backgrounds interested in working in both large and small municipalities into the field of water quality technology. Then provide them with enough education in one year that they can sit for state certification exams and successfully pass the exam(s).

**Brief History**

The Water Quality program at Northern began in 1976 first as a certificate program geared towards water and wastewater operators. Then an A. A.S. degree was added a little later and later a B.S. degree. The certificate program went away first as larger systems in Montana began requiring A.S. degrees. Then in the early 2000's the B.S. was put on moratorium and expired. The A.A.S. was put on moratorium in 2007 and was set to expire by the fall of 2010. Alumni from the program as well as municipalities, engineering firms, state and federal agencies wrote letters in opposition to the expiration of the A.A.S. program. This input inspired the then Provost to state to the Board of Regents that the program was going to be taken off moratorium and put back into action at MSU-Northern. Between the Fall of 2010 and Spring 2013 a minimal number of students entered the program. The program is now in the process of being put back on moratorium in 2013.

Approximately 150-200 people earned certificates, A.A.S. degrees or B.S. degrees in water quality from Northern between 1976 and 2013. Some are plant superintendents or operators, some work for DEQ,

DNRC, DOC, MAP, MRWS, METC and private companies in Montana. Three-fourths of the graduates live and work in Montana.

#### **Water Quality Certificate Program Description**

The program would provide a Board of Regents Approved Certificate in Water Quality Technology with options in Water Distribution, Wastewater Collection, Water Treatment and Wastewater Treatment. To earn a Certificate a student is required to complete all classes specifically designed for the desired Water Quality Technology Option. The curriculum would be multi-entry and can be completed in one year. Classes would be offered using various delivery methods such as on-line classes (Distance2Learn), classroom, and short courses. Students can begin the certificate program with any of the classes at any time. After completing the certificate program students will have the basic knowledge needed for entry level employment and be ready to sit for the Montana State Certification Examination and become certified as an "Operator-in-Training" in their chosen discipline. Students will also have specific knowledge of drinking water and/or wastewater systems that employers have identified as pertinent for job applicants to have prior to employment.

#### **Local, Regional, State and National Workforce Needs**

The need for water and wastewater operators in municipal and private water and wastewater systems is nearing critical mass, not only nationally but right here in Montana, with the average age of certified operators being 52 in Montana. Many more operators are retiring from systems than are entering systems especially in small systems, of which Montana has many.

**Locally**, the need for trained water and wastewater operators has been felt right here in the city of Havre. Mostly recently (in July 2013) the city of Havre hired, due to lack of more qualified applicants, one of its wastewater treatment plant operators to become the superintendent at the water treatment plant. In the past qualified water treatment operators with experience would have applied for the position from across the state and region. The city of Havre would have been able to hire someone who already had a water treatment license and experience instead of transferring one of its wastewater operators over to the surface water plant and then have them take the exam to become a class 1 water treatment plant operator with no prior experience. This is occurring more and more often across the state where systems are having to hire someone without a license and then train them and get them certified.

**Regionally**, a sizable water treatment system disaster played out for two weeks in mid-August 2013 when the town of Brady's (140 miles to the southwest of Havre) surface water treatment plant began taking in black septic smelling water. This made regional and state news on TV channel KRTV3, the Great Falls Tribune, Independent Observer of Conrad, and Choteau Acantha. (See attached Tribune Articles) The previous operator for the system had taken a job in the Bakken oil fields. His wife applied for and received a temporary water operator license from the Montana Department of Environmental Quality to operate the system. She had six months in which to take and pass the state class 1 water treatment exam. She had recently taken the exam and was awaiting the results when the disaster occurred. She had no experience of what to do other than how to operator the plant when it was



running properly. If it had not been for four of Northern's Water Quality Program alumni in key positions at the Montana Department of Environmental Quality, Montana Rural Water Systems, and the Montana Environmental Training Center and able to provide on-site assistance this disaster could have been much worse including major implications to public health. Had these professionals not had the education and experience they could have not stepped in and provided assistance with shut down of the distribution system, communication with local disaster emergency services, media, residents, organizations and agencies, determination and location of the cause of the black septic water, location of equipment to haul fresh water and other needed specialized equipment, cleanup of the water treatment process components, approval of the corrective action to take place, and final approval for the water to be turned back on and used by the residents. The wastewater operator for Brady has also taken a job in the Bakken and the town is now advertising for both a water and wastewater operator. Brady is one of the 56 systems operating without trained/certified operators. Major disasters at water and wastewater systems are occurring more and more often across the state where systems are hiring someone without a license and hope they can get them the training and certification they need before something bad does happen at their system.

**State wide**, every public community and non-transient community, which are defined as 15 hook-ups or having a population of 25 full-time residents at least 60 days per year, are required by Montana Law (MCA 37-42 Water Treatment Plant Operators) to have a certified water treatment operator and/or wastewater treatment operator to monitor, report data, operate and maintain its water and wastewater treatment systems. MCA 37-42-101 declares that "the health and welfare of Montana citizens are jeopardized by persons not properly qualified to operate the water supply systems and that Montana's state waters are endangered by persons not properly qualified to operate the wastewater treatment plants. It is declared that the public policy of this state is to protect the public health and safety by certifying persons working in these occupations".

The Montana Department of Environmental Quality (DEQ) is noting an increase in the lack of trained operators for systems in Montana. As of August, 2013 there were 56 systems operating without certified water and/or wastewater operators. In the eastern part of Montana (from the Rocky Mountain front to the North Dakota border) operators are leaving their systems for better paying jobs in the Bakken oil fields. This leaves systems both large and small, simple and complex without qualified and certified operators to provide quality drinking water and to see that wastewater is disposed of and treated properly. Salaries for water quality technicians range from \$20,000 up to \$50,000 per year.

In October 2013 the MDEQ's Water and Wastewater Operator Certification program provided METC the following data based upon fiscal year 2013: There are 1,580 certified water and wastewater operators in Montana. 248 (15.7%) are between the ages of 63 and 89. And, another 148 operators are between the ages of 60 and 62 (9.5%). Thus, 25% (396) of the 1,580 certified water and wastewater operators in Montana are over the age of 60 and closing in on retirement or have surpassed retirement age. In FY2013 230 people became certified operators, which if all the certified operators over 60 left their positions immediately there would be a deficit of 166 operators and Montana could have as many as 83

(based up on 2 operators per system) more water and wastewater systems operating without trained/certified operators putting public health at even greater risk than is already occurring.

This one year approach to training is also the type of program Montana's Office of Public Instruction Veterans Education program is looking for. They are interested in approving programs that are 10 – 12 months in duration and prepare veterans to move into positions of employment as soon as they complete the program.

**Nationally**, the two premier water and wastewater professional organizations have been voicing and publishing concern about the increasing intensity of the industry's decreasing workforce since 2005. The January/February 2011 edition of Water Efficiency stated that "In a study done by the American Water Works Association (AWWA) and the Water Environment Federation (WEF) the highest level of need for non-administrative employees was in the area of certified plant operators in both drinking and wastewater plants." AWWA also identified in its 2010 State of the Industry report workforce issues as one of the top five topics of concern. It is now estimated that 40% of the workforce will retire in the next 10 years. In addition, the US EPA has identified the water and wastewater industry as an area for returning military veterans to find employment.

In November, 2005 the AWWA Research Foundation the Water Environment Research Foundation identified the top four positions at risk in the next ten years to be engineers, plant operators (water and wastewater), management and highly skilled trades. This same report identified the average age of retirement as 56 with 37% of those currently employed eligible to retire in less than ten years. This is due to competitive retirement programs where 32% allow retirement based on age (50-65), 38% on years of service (20-30) and 36% on age plus years of service. In summary the report concluded that more 50% of utility employees will not be working in 10 years, tacit knowledge will be gone, training must take priority, utilities will compete to be an "employer of choice", utilities will have to maintain diversity, other industries will be aggressively recruiting "our" employees (Note: this already happens at the city of Billings where workers get trained while working for the city water and wastewater systems then go over to the oil refining companies for better paying jobs), workforce planning is not being adequately addressed, and a shortage of operators is already a public health crisis in some geographic areas (Note the issues presented above in Brady and across Montana with 56 systems not having certified operators).

#### **Rationale as to How Certificate Program can Fill Workforce Needs**

This program will exemplify MSU-Northern's vision statement of being "known for its supportive, student-centered environment in which a unique mix of academic programs are responsive to local, regional, and state workforce needs, offered in an atmosphere that promotes student success." This program will also enhance and expand learning experiences by utilizing existing and new partnerships MSU-Northern and METC have with external entities including state agencies, federal agencies, state and national professional organizations, in-state and out-of-state municipalities and industry manufacturers and suppliers.

Students looking to get into the work force quickly can complete the certificate within one year, sit for a state exam and apply for a job. Or they can be working on a certificate, apply for a job, get a job, complete the certificate and then sit for the exam.

This program will provide graduates of MSU-Northern's Civil Engineering Technology Bachelor of Science degree program, Plumbing Technology Associate of Applied Science Technology program, and Water Quality Associate of Applied Science Technology Program more avenues of employment. By completing one of the for options in the Water Quality Technology Certificate program not only will they be earning a Board of Regents certificate from MSU-Northern but by completing the required Backflow Prevention Assembly Testers core course they will be nationally certified as a backflow prevention assembly tester and by sitting for a state of Montana operator certification exam they will be certified by the state of Montana as an Operator-In-Training as either a Water Operator, Wastewater Operator, Water Distribution Operator, Industrial Wastewater Operator or On-site Wastewater Operator.

Other constituencies (water and wastewater operators, sanitarians, engineers, plumbers, well drillers and industry representatives) already utilizing the Montana Environmental Training Center's programs for continuing education credit purposes may benefit from the certificate program as well. Those already employed who would like to further their education may see the certificate program as a way to do so by being able to take online courses and get college credit.

Anticipated demand for this program is high if as many courses as possible are offered online by MSU-Northern and as short three to five day courses by METC. This format is highly desirable for those already working in the industry and for those that are place bound across the state wishing to get into the industry. In addition, some of Montana's larger municipalities are voicing interest in this program format as a possible method for personnel training and advancement. In 2009 METC's Director had a list of 126 potential students whom could still be potential students.

**Montana Department of Environmental Quality to implement new water and wastewater operator certification levels, which include post high school education by July 2015.**

In October, 2013 the Program Manager for the MDEQ's Water and Wastewater Operator Certification Program announced that MDEQ will begin implementing a new certification system and require a certain number of post-secondary education hours. The MDEQ will be fully utilizing the Association of Boards of Certification (ABC) approved by the International Organization for Standardization (ISO) exams for certifying water and wastewater operators as well as adding requirements for experience for all levels and requirements for post- high school education for two highest levels of certification in water and wastewater (levels three and four). The following chart lists ABC's requirements for each level of certification. MDEQ looks to adopt some form of all of these requirements for all operator classifications by July 2015.

# ABC Standardized Exams

## Operator Certification Requirements

	<u>Education</u>	<u>Experience</u>
<b>Class I</b>	High school diploma, GED, or equivalent	1 year of acceptable experience
<b>Class II</b>	High school diploma, GED, or equivalent	3 years of acceptable experience
<b>Class III</b>	High school diploma, GED, or equivalent; 900 contact hours of post high school education	4 years of acceptable experience including 2 years of direct responsible charge
<b>Class IV</b>	High school diploma, GED, or equivalent; 1,800 contact hours of post high school education	4 years of acceptable experience including 2 years of direct responsible charge

## Very Small Water Systems

High school diploma, GED, or equivalent, Six contact hours of very small water system education	Six months of acceptable operating experience of a very small water system or higher utility.
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ABC breaks the knowledge needed by operators into three levels. 1) Comprehension, the most basic level of understanding and remembering. Items written at the comprehension level require examinees to recognize, remember, or identify important ideas. 2) Application requires examinees to interpret, calculate, predict, use or apply information and solve problems. 3) Analysis requires examinees to compare, contrast, diagnose, examine, analyze, and relate important concepts. Application and analysis specific to water and wastewater treatment are not taught at the high school level. Thus, the requirement for post high school education. Below are charts identifying ABC's knowledge level requirements for each certification class for water and wastewater.

# Core Competencies

The essential tasks and capabilities that were identified through this process are called the core competencies. The following pages list the core competencies for water treatment operators. The core competencies are clustered into the following job duties:

- Monitor, Evaluate, and Adjust Treatment Processes
- Laboratory Analyses
- Comply with Drinking Water Regulations
- Operate and Maintain Equipment
- Perform Security, Safety, and Administrative Procedures
- Evaluate Characteristics of Source Water

## ABC Water Treatment Exam Specifications

Blueprint Area	Class I	Class II	Class III	Class IV
Monitor, Evaluate, and Adjust Treatment Processes	30%	28%	31%	31%
Laboratory Analyses	12%	13%	11%	11%
Comply with Drinking Water Regulations	12%	12%	11%	10%
Operate and Maintain Equipment	27%	26%	24%	25%
Perform Security, Safety, and Administrative Procedures	13%	16%	18%	18%
Evaluate Characteristics of Source Water	6%	5%	5%	5%

Monitor, Evaluate, and Adjust Treatment Processes	Class I	Class II	Class III	Class IV
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### Chemical Addition

Chemical pretreatment	Comprehension	Comprehension	Application	Analysis
Chlorine dioxide disinfection	Analysis	Analysis	Analysis	Analysis
Chlorine gas disinfection	Analysis	Analysis	Analysis	Analysis
Corrosion control	Comprehension	Comprehension	Application	Analysis
Fluoridation	Comprehension	Analysis	Analysis	Analysis
Ozone disinfection	Comprehension	Comprehension	Application	Application
pH adjustment	Application	Application	Analysis	Analysis
Sodium hypochlorite disinfection	Analysis	Analysis	Analysis	Analysis
Ultraviolet disinfection	Comprehension	Comprehension	Application	Application

<b>Monitor, Evaluate, &amp; Adjust Treatment Processes Continued</b>	<b>Class I</b>	<b>Class II</b>	<b>Class III</b>	<b>Class IV</b>
<b><i>Coagulation and Flocculation</i></b>				
Chemical coagulants	Comprehension	Application	Application	Analysis
Flocculation tanks	Comprehension	Application	Application	Analysis
Rapid mix units	Comprehension	Application	Application	Analysis
<b><i>Clarification and Sedimentation</i></b>				
Dissolved air flotation	Comprehension	Application	Application	Analysis
Inclined-plate sedimentation	Comprehension	Application	Application	Analysis
Sedimentation basins	Comprehension	Application	Application	Analysis
Tube sedimentation	Comprehension	Application	Application	Analysis
Up-flow solids-contact clarification	Comprehension	Application	Application	Analysis
<b><i>Filtration</i></b>				
Cartridge filters	Application	Application	Application	Application
Diatomaceous earth filters	Comprehension	Comprehension	Comprehension	Application
Direct filtration	Comprehension	Application	Application	Analysis
Gravity filtration	Comprehension	Application	Application	Analysis
Membranes (ultrafiltration, nanofiltration, reverse osmosis)	Application	Application	Application	Application
Microscreens	Comprehension	Comprehension	Application	Analysis
Pressure or greensand filtration	Application	Application	Application	Application
Slow sand filters	Comprehension	Application	Application	Analysis



### ABC Wastewater Treatment Exam Specifications

Blueprint Area	Class I	Class II	Class III	Class IV
Evaluate Physical Characteristics of Wastestream	5%	6%	5%	5%
Perform Security, Safety, & Administrative Procedures	11%	11%	10%	10%
Evaluate and Maintain Equipment	28%	28%	27%	27%
Operate Equipment	16%	16%	16%	16%
Monitor, Evaluate, & Adjust Treatment Processes	33%	32%	35%	35%
Laboratory Analysis	7%	7%	7%	7%

Evaluate Physical Characteristics of Wastestream	Class I	Class II	Class III	Class IV
Color	Analysis	Analysis	Analysis	Analysis
Flow	Analysis	Analysis	Analysis	Analysis
Foam	Analysis	Analysis	Analysis	Analysis
Mixing	Analysis	Analysis	Analysis	Analysis
Odor	Analysis	Analysis	Analysis	Analysis
Solids concentration	Analysis	Analysis	Analysis	Analysis
Temperature	Analysis	Analysis	Analysis	Analysis
Volume/loading	Analysis	Analysis	Analysis	Analysis

<b>Perform Security, Safety, &amp; Administrative Procedures</b>	<b>Class I</b>	<b>Class II</b>	<b>Class III</b>	<b>Class IV</b>
<b>Apply Safety Procedures</b>				
Bloodborne pathogens	Analysis	Analysis	Analysis	Analysis
Waterborne pathogens	Analysis	Analysis	Analysis	Analysis
<b>Chemical Hazards</b>				
Chemical hazard communication	Analysis	Analysis	Analysis	Analysis
Chemical spill response	Analysis	Analysis	Analysis	Analysis
<b>Personal Protective Equipment</b>				
Respiratory protection	Analysis	Analysis	Analysis	Analysis
Self-contained breathing apparatus	Analysis	Analysis	Analysis	Analysis
Other Personal protective equipment	Analysis	Analysis	Analysis	Analysis
<b>General Safety and Health</b>				
Confined space entry	Analysis	Analysis	Analysis	Analysis
Emergency eyewash/shower	Analysis	Analysis	Analysis	Analysis
Fire suppression	Analysis	Analysis	Analysis	Analysis
First aid	Analysis	Analysis	Analysis	Analysis
Lifting	Analysis	Analysis	Analysis	Analysis
Personal hygiene	Analysis	Analysis	Analysis	Analysis
Slips, trips, and falls	Analysis	Analysis	Analysis	Analysis

## Required Capabilities

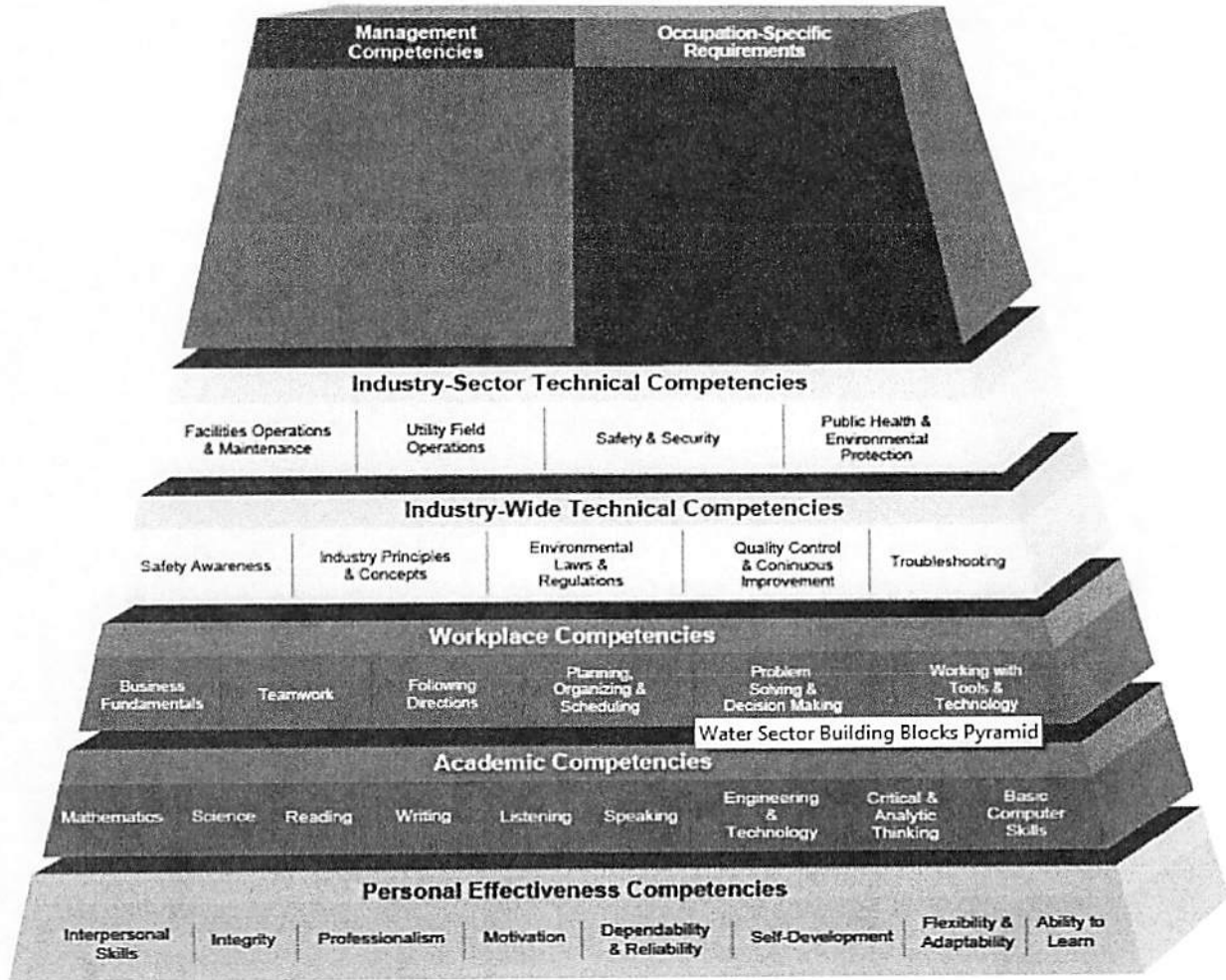
### Knowledge of:

- Basic chemistry
- Basic laboratory techniques
- Biological science
- Chemical properties
- Data collection
- Laboratory equipment
- Material Safety Data Sheet
- Monitoring requirements
- Normal characteristics of water
- Normal chemical range
- Personal protective equipment
- Pesticides

### Ability to:

- Accurately transcribe data
- Communicate in writing
- Communicate verbally
- Determine what information needs to be recorded
- Follow written procedures
- Interpret data
- Measure chemical weight/volume
- Perform basic math
- Perform laboratory calculations
- Perform physical measurements
- Prepare chemicals

These levels of core competency result in the competency model below developed by ABC for water and wastewater operators. Where you will see academic competencies are very near the foundation of the model making them so very important for operators possess and this water quality certificate program proposal so very important to put into place as soon as possible.



**Description of the Connection of this Program to MSU-Northern and METC**

The proposed program serves to provide education that can be used directly and immediately in the water and wastewater industry. Completion of the program prepares students to sit for the state certification exams. This is a tenant of the mission of MSU-Northern where as “MSU-Northern, a teaching institution, serves a diverse student population by providing liberal arts, professional and technical education programs ranging from certificates through master’s degrees.”

Since 1976 MSU-Northern has been the only institution in Montana to provide college certificates and degrees for students seeking employment as water and wastewater operators. The Montana Environmental Training Center is one of two primary water and wastewater training and technical assistance providers on Montana. METC is the only training and technical assistance provider in Montana connected directly with a unit of the Montana University System. No other program in the

Montana University System is closely related to this program at Northern. These two programs have supported each other at MSU-Northern since METC was formed in 1988.

The core courses for the proposed program are currently a part of MSU-Northern's A.A.S. Water Quality Technology degree or METC's continuing education credit programs. MSU-Northern would add one new course to its current water quality program curriculum (Wastewater Collection Systems) and METC would add one new course to its curriculum (Industrial Wastewater Treatment) to meet the course requirements for each specific option (water treatment, water distribution, wastewater collection and wastewater treatment).

**Outline of the Commitments this Program will need to be Successful**

MSU-Northern's current Water Quality faculty would teach Northern's courses as online and traditional course. METC's staff and instructors would teach the METC courses. This means that MSU-Northern and the Water Quality Faculty and student recruiting as well as Extended University, METC's staff and instructors would need to buy into this program whole heartedly and promote it ever so enthusiastically on campus, across the region, state and nation.

MSU-Northern's Faculty as a whole will show support by approving the program. MSU-Northern students in the BS Civil Engineering, AAS Plumbing and AAS Water Quality Technology degree programs will review and provide input as to the value of the certificate program to students.

Next the program will need support from the Montana Department of Environmental Quality, United States Environmental Protection Agency, other state and national agencies and cities and towns across Montana. (See attached support letters from January, 2009 and 2013)

An advisory committee will be made of up managers and operators as well as other professionals in the field. The committee will advise MSU-Northern and METC on the curriculum content and make suggestions as to how best deliver the certificate programs from a distance and regional workshops.

Then, with agreement from each organization listed below) in promoting the program MSU-Northern and METC could make a statement such as: "These Departmental Certificates in Water Quality Technology were designed and developed by the MSU-Northern, Montana Environmental Training Center (METC) and the Advisory Committee. They are endorsed by the Montana Department of Environmental Quality (MDEQ) Water and Wastewater Operator Certification Program, Montana Operator Advisory Council (appointed by the Governor), the Montana Section of the American Water Works Association (MSAWWA) and the Montana Water Environment Association (MWEA)." We would possibly be able to add the Office of Public Instruction as well.

Another statement MSU-Northern and METC could then make would be:

"These operational certificates are for those seeking employment and certification in the water treatment and distribution, wastewater treatment and collection fields. They will enhance your

professional status when applying for positions. The certificate program will provide education to help with reviewing and passing state licensure exams and becoming employed."

The success of the program will be measured in six ways.

- 1) By enrollment in the certificate programs and graduates from the certificate programs.
- 2) By increased enrollment in the AAS program and graduates from the AAS program.
- 3) By an increased number of certified water and wastewater operators in Montana.
- 4) By a decreased number of systems in Montana running without certified operators.
- 5) By graduates employed as operators and technicians in-state and out-of-state.
- 6) By an increase in wages as systems are able to hire trained/certified operators.

**Detailed Description of the Proposed Curriculum**

To obtain the certificate in one of the four water quality technology options, the program would require completion of all classes specifically designed for the chosen option. The curriculum is multi-entry and can be completed in one year. Classes are offered using various delivery methods such as on-line classes (Distance2Learn), classroom, and short courses. Students can enroll and begin the certificate program with any of the classes at any time. It is suggested courses be taken in the ascending order as they appear on the flow chart but it is not mandatory.

After completing any one of the options in the certificate programs students will have basic knowledge needed for entry level employment in the Water Distribution, Wastewater Collection, and Water Treatment and Wastewater Treatment industries. Students will be ready to apply for a Montana State Certification Examination to become certified as an "Operator in Training" in their chosen field. Students will also have specific knowledge of various aspects of drinking water and wastewater systems that employers have identified as pertinent for job applicants to have prior to employment. Montana Examinations are provided by the American Boards of Certification (ABC).

**Departmental Certificates are available for:**

Water Distribution	(30 Credits)	Water Treatment	(31 Credits)
Wastewater Collection	(30 Credits)	Wastewater Treatment	(30 Credits)

**Core Courses (22 Credits) required for each certificate would be:**

TSCI 110	Introduction to Water & Wastewater	(online)	4
METC	Environmental Health & Safety for W/WW Operators	(online)	1
MATH 111	Technical Math	(online)	3
AGTE 206	Applied Water Hydraulics	(online)	3
WRIT 108	Elementary Technical Writing	(online)	3
COMX 115	Introduction to Interpersonal Communications	(online)	3
METC	Spring, Summer or Fall Water Schools	(traditional)	2
METC	Backflow Assembly Testers Course	(traditional)	3
			<b>22</b>

**Water Distribution Option - Total Credits Required = 30**

**Core Courses (22 Credits)** required for each certificate would:

TSCI 110	Introduction to Water & Wastewater	(online)	4
METC	Environmental Health & Safety for W/WW Operators	(online)	1
MATH 111	Technical Math	(online)	3
AGTE 206	Applied Water Hydraulics	(online)	3
COMX 115	Introduction to Interpersonal Communications	(online)	3
WRIT 108	Elementary Technical Writing	(online)	3
METC	Backflow Assembly Testers Course	(traditional)	3
METC	Spring, Summer or Fall Water Schools	(traditional)	<u>2</u>
			<b>22</b>

**Required Courses (6 Credits)**

TSCI 205	Distribution Systems	(online)	3
MDEQ	Operator Basics	(CD-ROM)	1
METC	Pumps & Motors Operation & Maintenance	(traditional)	1
METC	Valves & Hydrants	(traditional)	<u>1</u>
			<b>6</b>

**Elective Courses (2 Credits)** (traditional type delivery - some could be put online)

(Have to take both colored courses to receive 1 credit)

N-CC	Applied Physics for Water and Wastewater		1
METC	Basic Groundwater Systems		0.5
N-CC	Introduction to Groundwater Systems		0.5
METC	Chlorine Safety, Design, Maintenance & Repair for W&WW		0.5
METC	Water and Wastewater Disinfection		0.5
METC	Confined Space Safety & Trenching & Shoring		1
METC	Cross Connections for Small Systems		0.5
METC	Small Water and Wastewater Systems		0.5
METC	Cross Connection Control Specialist Course		2
METC	Drinking Water Monitoring and Reporting		0.5
METC	Water Regulations		0.5
ELEC 101	Electrical Fundamentals I		3
METC	Emergency Preparedness		0.5
METC	Safety & Security at Water and Wastewater Systems		0.5
N-CC	Gas Chlorination for Water & Wastewater		1
N-CC	Hypochlorination for Water & Wastewater		1
PLMB 120	Introduction to Piping Systems		3
PLMB 100	Introduction to Plumbing Trades		4
WLDG 260	Repair and Maintenance Welding		3
METC	Water Audits		0.5
METC	Water System Operation & Management		0.5
WLDB 111	Welding Theory I Practical		2
WLDB 111	Welding Theory I Practical		2

**Water Treatment Option - Total Credits Required = 31**

**Core Courses (19 Credits) required for each certificate would be:**

TSCI 110	Introduction to Water & Wastewater	(online)	4
METC	Environmental Health & Safety for W/WW Operators	(online)	1
MATH 111	Technical Math	(online)	3
AGTE 206	Applied Water Hydraulics	(online)	3
WRIT 108	Elementary Technical Writing	(online)	3
COMX 115	Introduction to Interpersonal Communications	(online)	3
METC	Backflow Assembly Testers Course	(traditional)	3
METC	Spring, Summer or Fall Water Schools	(traditional)	<u>2</u>
			<b>22</b>

**Required Courses (9 Credits)**

TSCI 230	Introduction to Groundwater Concepts	(online)	3
TSCI 233	Water Treatment Processes	(online)	3
TSCI 234	Water Treatment Processes Lab	(traditional)	2
MDEQ	Operator Basics	(CD-ROM)	<u>1</u>
			<b>9</b>

**Elective Courses (None Required)**



**Wastewater Collection Option - Total Credits Required = 30**

**Core Courses (22 Credits)** required for each certificate would be:

TSCI 110	Introduction to Water & Wastewater	(online)	4
METC	Environmental Health & Safety for W/WW Operators	(online)	1
MATH 111	Technical Math	(online)	3
AGTE 206	Applied Water Hydraulics	(online)	3
WRIT 108	Elementary Technical Writing	(online)	3
COMX 115	Introduction to Interpersonal Communications	(online)	3
METC	Backflow Assembly Testers Course	(traditional)	3
METC	Spring, Summer or Fall Water Schools	(traditional)	<u>2</u>
			<b>22</b>

**Required Courses (5 Credits)**

NEW	Wastewater Collection Systems	(online)	3
METC	Pumps & Motors Operation & Maintenance	(traditional)	1
EPA	Wastewater	(CD-ROM)	<u>1</u>
			<b>5</b>

**Elective Courses (3 Credits)** (traditional type delivery - some could be put online)

(Have to take both colored courses to receive 1 credit)

N-CC	Applied Physics for Water and Wastewater		1
METC	Chlorine Safety, Design, Maintenance & Repair for W&WW		0.5
METC	Water and Wastewater Disinfection		0.5
METC	Collection Mains: Installation, Maintenance & Repair		1
METC	Confined Space Safety & Trenching & Shoring Course		1
METC	Cross Connection Control Specialist Course		2
METC	Cross Connections for Small Systems		0.5
METC	Small Water & Wastewater System Operations		0.5
ELEC 101	Electrical Fundamentals I		3
METC	Emergency Preparedness		0.5
METC	Safety & Security for Water and Wastewater Systems		0.5
METC	Flow Measurement, Sampling and Metering		0.5
METC	Wastewater Regulations		0.5
N-CC	Gas Chlorination for Water and Wastewater		1
N-CC	Hypochlorination for Water and Wastewater		1
PLMB 120	Introduction to Piping Systems		3
PLMB 100	Introduction to Plumbing Trades		4
METC	On-site Wastewater Systems		1
METC	Pumps & Motors Operation & Maintenance		1
WLDG 260	Repair and Maintenance Welding		3
WLDB 111	Welding Theory I Practical		2



**Wastewater Treatment Option - Total Credits Required = 30**

**Core Courses (22 Credits) required for each certificate would be:**

TSCI 110	Introduction to Water & Wastewater	(online)	4
METC	Environmental Health & Safety for W/WW Operators	(online)	1
MATH 111	Technical Math	(online)	3
AGTE 206	Applied Water Hydraulics	(online)	3
WRIT 108	Elementary Technical Writing	(online)	3
COMX 115	Introduction to Interpersonal Communications	(online)	3
METC	Backflow Assembly Testers Course	(traditional)	3
METC	Spring, Summer or Fall Water Schools	(traditional)	<u>2</u>
			<b>22</b>

**Required Courses (8 Credits)**

TSCI 231	Wastewater Processes	(online)	3
TSCI 232	Wastewater Process Lab	(traditional)	2
EPA	Wastewater	(CD-ROM)	1
METC	On-site Wastewater Systems		1
METC	Industrial Wastewater Treatment		<u>1</u>
			<b>8</b>

**Elective Courses (None Required)**

**METC/MSU-Northern Board of Regents Approved Water Quality Technology Certificate Program**  
Draft #6 - 8/6/14

