

**COURSE TITLE**

Advanced Stormwater Treatment: Design (RV-6379)

COURSE DURATION

3 hours

OVERVIEW

This 3-hour interactive online course leads the student through evaluation and design of stormwater treatment systems. Stormwater management is receiving increased scrutiny because of EPA Phase II regulations.

PREREQUISITES

No prior knowledge is required.

BEHAVIORAL OBJECTIVES

After successfully completing this course, you will understand:

- Regulatory driving forces behind stormwater management
- Design criteria and assumptions
- Preliminary treatment design including: identification of target constituents; identification and evaluation of potentially appropriate control technologies; suggested methodology for evaluating control technologies; selection of preferred control technologies
- Sources for more information

COURSE OUTLINE

Introduction – 5 minutes

Section 1 – 100 minutes

- Design Criteria and Assumptions
- Design Storm Event
- Design Assumptions
- Preliminary Treatment Design
- Identification of Target Constituents
- Identification and Evaluation of Potentially Appropriate Control Technologies
 - Best Management Practices
 - Traditional Treatment Technologies
 - Advanced Treatment Technologies
 - Surface (Above-Grade) Treatment Systems
 - Subsurface (Below-Grade) Treatment Systems
- Suggested Methodology

- System Hydraulics
- Media Hydraulics
 - Evaluate the specific flow rate (q) through the media.
 - Compare the design specific flow rate to specific flow rates in lab and field studies
 - Consider the thickness/head loss of the media.
 - Contact time should be calculated
 - Fouling and occlusion of media will ultimately control the specific flow rate through the media.
 - Horizontal bed vs. vertical filters.
- Media Type
 - What are the physical properties of the media for sediment removal?
 - What are the chemical properties and mechanisms used to remove stormwater pollutants?
 - Do the properties of the media change over time?
 - Proprietary media and multiple media need to be evaluated.
- Structural Considerations
 - Structural integrity is critical.
 - Water tightness is required by many agencies.
 - Buoyance measures need to be considered.
 - Constructability considerations are important.

Section 2 – 70 minutes

- Selection of Preferred Control Technologies (Design Example)
- Considerations
- Previous Data for Advanced Stormwater Treatment Technologies
- Comparison Criteria
- TSS Removal

Conclusion – 5 minutes

Method of attendance monitoring and verification

Courses are developed with interactivity as a key component in its development. Vector Solution's 'rule of thumb' is to insert an activity every 3 to 5 minutes or 500 to 800 words of text. We offer a variety of activities through the coursework to keep the user involved and requiring knowledge of the course materials being reviewed in order to move forward.

Users sign into an account with a unique User Name and Password. We request that a user agree to an affidavit stating that they are the owner of the account before proceeding to the exam. Course completion is measured by passing the exam with a minimum score of 75%.

Students are notified at the beginning of the course that they are required to spend 50 minutes per credit hour in the course in order to receive an accreditation certificate. The LMS will not allow a certificate to be issued or reflect course completion until the time requirement is met by the user.

We monitor required student participation in the course by logging and tracking the date and time a student enters a course, tracking activity during the course, and recording the date and time they

complete the exam with a required passing score. If our learning management system detects 13-minutes of inactivity, a pop-up appears alerting the student that they must verify their presence or the session times out and the course closes.



RESUME

MARK A. REINSEL

HIGHEST DEGREE:

Ph.D. Chemical Engineering, Montana State University, 1995

PROFESSIONAL EXPERIENCE:

2002 – Present President, Apex Engineering, PLLC, Helena, MT
2001 – Present Adjunct Professor, Department of Chemical Engineering, Montana State University, Bozeman, MT
1999 – 2002 Project Engineer, Hydrometrics, Inc., Helena, MT
1995 – 1999 Senior Chemical Engineer, Hydrometrics, Inc., Helena, MT
1991 – 1995 Graduate Research Assistant, Center for Biofilm Engineering, Montana State University
1989 – 1991 Senior Process Engineer, 3M Company, Hutchinson, MN
1987 – 1989 Advanced Product Engineer, 3M Company, Hutchinson, MN
1984 – 1987 Product Engineer, 3M Company, Hutchinson, MN

AREAS OF EXPERTISE:

- Analysis of treatment alternatives for industrial wastewater, storm water and drinking water
- Conceptual design and budgetary cost estimates
- Bench and pilot testing
- Innovative technology investigation and development
- Field installation and start-up
- Process analysis and trouble-shooting
- Hazardous waste treatment
- Technical writing

PATENTS:

Anoxic Biotreatment Cell – U.S. Patent #5,908,555

PROFESSIONAL LICENSES AND MEMBERSHIPS:

Registered Professional Engineer – Montana, Nevada, Arizona, Texas
Member - American Institute of Chemical Engineers (AIChE)
Member – American Water Works Association (AWWA)

TECHNICAL TRAINING:

Reverse Osmosis
Biological Nutrient Removal
Project Management
Advanced Waste Water Treatment
Design of Alternative On-Site Wastewater Systems