Ohio Water Environment Association
Preserving & Enhancing Ohio's Water Environment

OWEA OPERATIONS CHALLENGE 2010

WELCOME!!

On behalf of the Operations Challenge OWEA Plant Operations Committee supporting Operations Challenge 2010, we welcome your interest in the *Rules and Regulations* governing our competition to be held on May 18, 2010, at the Allen County Sanitary Engineering Facility in Lima, Ohio.

These evolving *Rules and Regulations* have been a cornerstone for the conduct of the Challenge at the Federations annual conference. They are also cited by many MAs as their major point of reference for developing other state-level runoff competitions. We have endeavored to distribute this booklet early enough to allow preparation time for all involved participants.

This edition of the *Rules and Regulations* again reflects strong competitor and membership input into developing events that truly demonstrate excellence in wastewater operations.

Again this year, the Operations Challenge will have two divisions. In 1993, the WEF Operations Challenge Committee established divisional competition. Please see page 2 of this packet to determine which division your team is eligible to compete in. Please be sure to indicate your preferred division on your application.

The success of equal time weighing for all events will continue again this year. We plan to enhance the display of scores with the best time score in each division continuously posted and upgraded during the competition. We are continuing to improve our scoring process.

Again this year, after the competition is completed, we will adjourn from the competition area after event clean-up to an Awards Celebration which will be held right at the Allen County facility.

Kim Riddell, Co-Chair
Plant Operations and Maintenance Committee
April 2010

OPERATIONS CHALLENGE 2010
Team Entry Application Form

Instructions

Thank you for your interest in Operations Challenge 2010.

Part 1. TEAM MEMBERS. It is suggested that ALL TEAM MEMBERS **MUST BE EITHER** a Water Environment Federation Active or PWO Member. Any changes to the team member designations must be made in writing to OWEA at the address below.

Part 2. RELEASE FORMS. The release form is required for each team member participating in the competition.

PLEASE MAKE CHECKS PAYABLE TO: **OWEA Operations Challenge**

RETURN THE FORMS TO:

OWEA
1890 Northwest Blvd, Suite 210
Columbus, OH 43212

APPLICATION DEADLINE IS MAY 1, 2010

OWEA TEAM ENTRY APPLICATION FORM
OPERATIONS CHALLENGE 2010

(Please type or print neatly!) **DIVISION I OR II (circle one)**

Sponsoring MA/OA _____

Team Name _____

PART I. TEAM MEMBERS

Team Member/Captain _____
Address _____
City/State Zip _____
Phone _____
Team Member _____
Address _____
City/State Zip _____
Phone _____
Team Member _____
Address _____
City/State Zip _____
Phone _____
Team Member _____
Address _____
City/State Zip _____
Phone _____
Team Member/Captain _____
Address _____
City/State Zip _____
Phone _____

Please include the $250.00 registration fee, Payable to the OWEA Ops Challenge.

APPLICATION DEADLINE MAY 1, 2010

OPERATIONS CHALLENGE 2010

RELEASE FORM

This form is required for each team member competing in the Operations Challenge 2009 event:

I, _____, will participate in Operations Challenge 2010. I acknowledge that while participating in any and all events which make up Operations Challenge 2010, I will encounter the risk of injury or accident. I hereby accept and assume all such risks and danger incidental to my participation in Operations Challenge 2010. I agree that the Ohio Water Environment Association, the Operations Challenge 2010 Committee, and any and all suppliers of products and equipment for Operations Challenge 2010 are not responsible for claims and demands of whatever nature, actions and causes of action, damages, costs, loss of service, expenses, and compensation on account of or in any way growing out of personal injuries and/or property damage having already resulted at any time in the future as a result and by reason of my participation in Operations Challenge 2010.

_____

Signature

Name (please print) _____

Date _____

Please return each completed form, with your Team Entry Application Form to:

OWEA
1890 Northwest Blvd, Suite 210
Columbus, OH 43212

EVENTS SCHEDULE
OPERATIONS CHALLENGE 2010
Allen County Sanitary Engineering Facility
May 18, 2010

8:00 – 8:30 **Team Registration**
8:30 – 9:00 **Coach, Captain and Head Judges Meeting**

Schedule

			Team Practice			
			Lab	Safety	Maint.	Collect
9:00	9:30		1	2	3	4
9:30	10:00		2	1	4	3
10:00	10:30		3	4	1	2
10:30	11:00		4	3	2	1

11:00 11:45 All Competing Teams - Process Control Event

11:30 12:30 LUNCH

			Competition / Op. Education Hands-on				
			P.C.	Lab	Safety	Maint.	Collect
12:30	1:00			IIID	IIIB	1	IIIA
1:00	1:30			4	IIIC	IIIB	2
1:30	2:00		IIIA	2	IIID	IIIC	3
2:00	2:30			IIIA	4	IIID	IIIB
2:30	3:00			3	1	4	IIIC
3:00	3:30		IIIB	1	IIIA	2	IIID
3:30	4:00		IIIC	IIIB	3	IIIA	4
4:00	4:30		IIID	IIIC	2	3	1

4:30 6:00 Teardown and clean-up
6:00 Awards Ceremony immediately following clean-up

Every team member must have all the proper safety equipment to be able to participate in any event.

Teams are to be at their event site and ready to go at the above stated times. Your team number will be drawn at the event site after your team is registered. **Times may be adjusted depending on the number of teams registered.**

Help with event cleanup would be appreciated as Awards Banquet will follow at the plant when the work is done!!

DRAFT

TABLE OF CONTENTS

I. Date 2

II. Location 2

III. Purpose 2

IV. Divisions 2

V. Nature of the Competition 3

VI. Eligibility 3

VII. Competition Registration 4

VIII. Judging 4

IX. Equipment and Supplies 5

X. Questions 5

XI. The Events

Process Control Event 5

Collection System Event 10

Safety Event 17

Laboratory Event 28

Maintenance 43

I. DATE

Tuesday, May 18, 2010 - Competition

II. LOCATION

Allen County Sanitary Engineering Facilities
3230 N. Cole Street
Lima, Ohio 45801

Phone: 419-331-6080

III. PURPOSE

To recognize excellence in wastewater treatment operations, maintenance, laboratory, safety, and collection systems personnel.

IV. DIVISIONS

The two divisions function as follows: Both divisions compete head to head in all five events. There are no apparent differences in the competition. At the completion of the competition, teams are sorted according to division and then ranked based on a score. Team division status will be announced or posted.

Division I consists of the following teams:

1.) Any *returning team* (a returning team is defined as any team that includes more than two members of the team that competed in the previous year's OWEA Operations Challenge), which placed in the top first place position in any individual event, and

2.) Any *returning team* (as defined above), which competed in the previous year's Division II competition and placed first overall or,

3.) Any team that chooses to compete at the Division I level.

All other competitors would compete in **Division II.**

Any team in Division II who want to compete in Division I would be allowed to change to the higher division. Declaration for changing divisions must be made in writing on the application.

V. NATURE OF THE COMPETITION

All teams will compete in all events. Each event will be judged and scored separately against established criteria. The scores of all events will be totaled and the champion team

will be selected.

Five separate competitive events will be held:

1. **Maintenance.** Teams will be required to pull and perform various maintenance procedures and electrical tasks on a WILO FA10.33 pump and a WILO TR50 mixer.
2. **Collection Systems.** Teams will cut out a cracked section of eight inch (8") gravity PVC sewer pipe with water circulating (running through it). Drill a four inch (4") hole in a piece of eight inch (8") PVC pipe on a separate stand. Install a saddle connection with gaskets and two straps to represent a house connection. Cut and install the 8" PVC section with saddle and install the section with flexible repair couplings. Following completion of the physical repair activities, the water tightness of the repair will be evaluated. In addition, teams will program a Hach Sigma Model 900 Max for sampling as defined.
3. **Safety.** Teams will respond to an unconscious co-worker overcome by possible unknown chemical. The rescue team must perform confined space rescue and victim decontamination.
4. **Process Control.** Teams will solve problems including multiple choice (math and theory) and process control scenarios.
5. **Laboratory.** Team members will perform various tasks related to utilizing HACH mColiBlue 24 broth to set up a plate. Plates will also be read and calculations performed regarding this method for E-Coli testing.

Each event will be timed separately and all team members are expected to participate.

VI. ELIGIBILITY

1. Teams must be composed of no less than two and no more than four members.

2. Teams must be composed of the same two to four individuals for all five events.

3. Members of a team may come from the same employer or from multiple employers.

4. Individual team members must meet the qualifications described below, plus reside within the geographical boundaries of the pathway MA or OA.

Qualifications

Individual team members shall be actively employed by a responsible operating wastewater entity or agent. Further, they must be actively employed in the operations and maintenance of the collection, treatment, industrial pre-treatment, or laboratory facilities provided for them, and in the field on a normal basis.

The intent is that team members will be those actually involved in wastewater collection, operations, laboratories, industrial pre-treatment or maintenance functions.

VII. COMPETITION REGISTRATION

1. The Team Entry Application Fee **now covers four team members *and a coach.*** In general, the Team Entry Fee provides for awards and Challenge materials. All team members must register for the same option as follows:

   a. All five team members may register for the Operations Challenge at a fee of $250.00.

   b. Return registration by **May 1, 2010.**

VIII. JUDGING

1. Each event will be scored by the time required to perform the event, plus time penalties for errors. The final time, adjusted for penalties, will then be converted to a point score. The best time for each event is worth 100 points. Teams are ranked by total points for all five events.

2. Judges will be trained volunteers from the OWEA. Judges cannot compete or assist teams. Judges from the same employer as the team or team member will abstain from judging their home team when possible.

3. Teams will compete concurrently in each event. There will be one or more judges per team per event, with a separate head judge for each event. Team captains will be asked to initial their raw score at the conclusion of each event.

4. Team captains will be informed of each infraction their team accrues. The judge will tell them the overall penalty time only.

5. **Disagreement with a judge's ruling will be handled using the following procedure <u>only</u>:**

   The team captain will speak with the head judge/event coordinator one-on-one. A team member wanting to communicate with a judge must do so through the team captain to reduce confusion. The other team members will leave the event area and only the team captain will remain with the head judge/event coordinator. Failing resolution with the head judge/event coordinator, a team may petition the Chair of the Operations Challenge Event to arbitrate the disagreement. Any petition must be made immediately, in writing, to the Chair of the Operations Challenge Event. Attempts will be made to settle the protest as soon as practical. It is requested that throughout this process, courtesy and professionalism be extended to all parties involved. Failure to render courtesy to judges and event staff can result in the penalty time being assessed to the offending team.

IX. EQUIPMENT AND SUPPLIES

The OWEA will supply all equipment required for the competition except small calculators, tape measures, and personal items such as safety shoes, protective gloves, safety glasses, and hard hats, which must be supplied by the contestants.

X. QUESTIONS

On Housing See OWEA website for information.

On Interpretations of Rules and Regulations - In order to provide the Operations Challenge Committee members with accurate statements of all questions, please submit all questions by fax to 419-695-5102 attention to Kim Riddell, by email to kriddell@cityofdelphos.com or by mail to:

Kim Riddell
City of Delphos
608 North Canal St.
Delphos, Ohio 45833

XI. THE EVENTS

PROCESS CONTROL EVENT 2010

Be sure to read the following explanation for exact details.

Overview
The event consists of answering a number of multiple choice questions, some short math questions with multiple choice answers, and up to five operational type scenarios that have four to six questions each that may require considerable calculations. The event is timed, with a **maximum of 25 minutes allowed for competition**. The team can split up the test any way it chooses during the test. If a team completes the test before the end of the event, their actual time is recorded. The event should be viewed as an opportunity for a team to demonstrate their accumulated knowledge of wastewater treatment and skill in plant and collections process control. **This year the test will include a mandatory problem set. The topics for the operational scenarios shall include odor control, energy management, lagoon treatment, aeration, and collections systems.**

Mandatory Problem

The test will include a set of problems that must be answered. For each answer left blank there will be a 60 point penalty. Correct answers will receive 120 points. Incorrect answers will not receive any points.

The mandatory problem set topic shall be "aeration" for 2010.

The scoring for the mandatory problem will not allow for partial credit and all work must be shown to receive credit.

Teams are required to have all four members participate in this event. The newly revised MOP 11, monthly Operations Forum certification quiz, and the WEF/ABC study guide are recommended as resource study materials.

Equipment Furnished for Competition

- Scratch paper for calculation
- Answer sheet forms

Competitors Will Be Required To

- Furnish calculators without programming or printout capability.
- Furnish No. 2 lead pencils.

Grading

The tests will be graded as follows:

- multiple choice questions as: correct answer, incorrect answer, or no answer
- short math multiple choice questions as: correct, incorrect, or no answer as well as whether work is shown on test paper
- operational scenarios as: correct, incorrect, or no answer as well as whether work is shown on test paper.

Scoring

Scoring in the Process Control event consists of two components: time and correctness. The raw time is the actual time that a team requires to complete the test and return it to the judge at their table. The time allotted for the test is 25 minutes. All teams that have not finished the test before time runs out will receive a raw time of 25 minutes (1500 seconds). Raw time will be used to determine a time bonus, which is added to the correctness component of the score to calculate the final score.

If a team's raw time is greater than 20 minutes, they receive a time penalty equal to one half of the difference between their raw time and 20 minutes. As an example, if a team has a raw time of 23 minutes and 45 seconds, their time penalty is (1425 seconds – 1200 seconds)/2 = 112.5 seconds. Since this is a penalty, 112.5 will be subtracted from their score.

If a team's raw time is between 15 and 20 minutes, they receive time bonus points equal to one half of the difference between their raw time and 20 minutes. As an example, if a team has a raw time of 16 minutes and 10 seconds, their time bonus is (1200 seconds – 970 seconds)/2 = 115 seconds. Since this is a bonus, 115 will be added to their score.

There is no additional time bonus for finishing earlier than 15 minutes. If a team finishes earlier than 15 minutes their time bonus will be based on 15 minutes.

The correctness component of the score is based on the total of points awarded for correct answers and work shown. In the multiple choice and extended multiple choice sections, points are awarded only for correct answers, there are no penalties.

Points				
Test section	**Correct answer**	**No answer**	**Incorrect answer**	**Correct answer AND showing work**
Multiple choice	10	0	0	N/A
Extended multiple choice	25	0	0	N/A
Short math multiple choice	0	0	0	50/25*
Operational scenarios	0	60*	60*	120/60*

*partial credit for showing work as described below

For any math questions, there are no points for a correct answer if no work is shown.

Note that for scenario questions partial credit is possible, even if an incorrect or no answer is given.

For any math questions, there are no points for a correct answer unless at least some work is shown. Some scenerios may not require math; however, comparative evaluation of data is required. In this case, a reasonable effort to explain the data comparision is required.

If a judge determines that a team member is not attempting to help with parts of the test, a 120 second penalty will be assessed for each non-participating team member.

A team's final score will be the sum of the time bonus (or penalty) and the points awarded for correct answers. The highest score will win the event.

Partial Credit and Showing Work

For any math section question, the team must write out the numbers used and show them in an equation form. *Example*: *16 mg/l x 8.34 x 2.4 MGD = 320 lbs*

Simply putting down numbers does not count. The equation used must also be relevant to the question. i.e. there will not be credit for writing down the lbs formula when the question is about detention time.

For the math and operational scenario questions, if the grader feels that the work shown demonstrates correct and significant, but incomplete, progress towards the answer the work shown may receive the partial credit listed in the table.

Note that sometimes answers that are text rather than numbers may still require work to be shown. For example, if the correct answer for a problem is "the hydraulic loading rate is too high" then the work shown **must** include a calculation of the hydraulic loading rate. Or, if asked in a question to chose the higher value, a statement of "2 is higher than 1" would meet this criteria.

Scope

The questions will cover the following areas of wastewater treatment as well as general topics such as: pumping, maintenance, laboratory, safety, flow measurement, and metering:

Process Areas	**Example Systems**
Preliminary Treatment	Screening Grit Removal Flow Equalization
Odor Control	Wet chemical scrubbing Chemical addition Biofilters
Primary Treatment	Primary Sedimentation Flow Equalization Clarification
Secondary Treatment Suspended Media	Activated Sludge Biological Nutrient Removal Clarification Sequencing Batch Reactors
Secondary Treatment Fixed Media	Trickling Filtration Biological Nutrient Removal
Advanced Treatment	Filtration Biological Nutrient Removal
Thickening	Gravity Belt Thickener Dissolved Air Flotation Gravity Thickening
Solids Stabilization Methods	Anaerobic Digestion Aerobic Digestion
Dewatering	Belt Filter Press Drying Beds Centrifuge Dewatering
Disinfection	Chlorination \ Dechlorination Ultraviolet Disinfection
Management and Support	Process Instrumentation Treatment Plant Security

Resources

The following references will be used in creating and grading the test questions:

- Water Environment Federation Manual of Practice 11
- The monthly *Water Environment & Technology Operations Forum* certification quiz
- The WEF/ABC study guide
- California State University Sacramento Operations of WWTPs volumes 1 & 2 and Advanced Waste Treatment
- Collections Systems questions will be based on the Sacramento Manual, Operations and Maintenance of Wastewater Collections Systems.
- Manual on the Causes and Control of Activated Sludge Bulking and Foaming, Jenkins, Richards & Daigger

Questions on Operations Central Certification Quiz on the WEF website are recommended as resource study materials.

Additional general study material includes:

- EPA design manuals, which can be obtained at http://www.epa.gov/ttbnrmrl. Select *Browse* to see the full list of available documents. Only some are applicable to wastewater.
- Wastewater Engineering Treatment Disposal, and Reuse, Metcalf and Eddy, McGraw-Hill
- Note that these sources will NOT be used in creating or grading tests. They are listed for those interested in additional sources of wastewater knowledge.

Test Details

The same test is used for both Division 1 and Division 2.

The multiple choice test will consist of 42 questions with four possible answers each, 15 multiple choice questions requiring a small amount of math, and 20 questions where each answer is chosen from a list of 20 possible answers (extended multiple choice).

Five process scenarios with four to six questions each are in the test. Teams may answer as many parts of any scenario that they desire, but they must answer the mandatory question.

Formula sheets, reference books or any other material are not permitted.

Team members may talk among themselves but may not be disruptive. Teamwork in solving problems is encouraged. Also consider that other teams may overhear your discussions.

General Details

What will be supplied at the event: Answer sheet forms and scratch paper for calculations. We will also try to have a pencil sharpener available prior to the event but this is not guaranteed. Competitors must supply their own No. 2 lead pencils and calculators (calculators cannot have programming or printout capability)

All four team members must be present before the start of the event.

If a team is disqualified from the event they will receive a score based on the maximum time and every question and work shown left blank.

Notes

The exact number of questions may change slightly between now and the event. The points may also be adjusted to ensure test balance.

Collection System Event 2010

What we want you to do:

The event simulates connecting a 4-inch PVC lateral sewer to an existing 8-inch PVC sewer pipe while in service (the 'wet' pipe), and the programming of an automatic sampler.

- Drill a 4.5-inch diameter hole in the 'dry' PVC pipe.
- Cut out and remove a measured length from both the 'wet' and 'dry' PVC pipes. The section cut from the 'dry' pipe will include the 4.5-inch hole, and will be used to replace the section removed from the 'wet' pipe.
- Install a service saddle connection in the 4.5-inch hole, and secure with hose clamps.
- Install the replacement length of 8-inch PVC pipe (complete with service saddle) into the 'wet' PVC pipe, and secure with flexible repair couplings and hose clamps.
- Program the automatic sampler per the defined procedure.

What we will provide:

- A 6-foot length of PVC pipe strapped to a steel stand, ready for cutting. Water will be flowing through this length of pipe during the event (the 'wet' pipe).
- A 6-foot length of PVC pipe strapped to another steel stand, ready for cutting (the 'dry' pipe).
- Toolbox.
- Hand drill (non-ratcheting brace) with a LENOX 4.5-inch circular cutting blade (model 72L), or equivalent.
- One 4-inch service saddle with attached gasket.
- Four flexible repair couplings.
- Two LENOX saw handles with two 18" PVC saw blades (model HS F180), or equivalent.
- Two speed wrenches with sockets.
- Hose clamps.
- Tape measure and marker.
- Hach Sigma Model 900MAX automatic sampler (a drawing of the sampler is attached to this procedure) with all required accessories.
- Automatic sampler instruction sheet.

Collection System Event

What you will be judged on:

- The time taken to complete the event.
- The tightness of your completed connections. The 'wet' pipe connections will be checked for water tightness at 3 psig.
- The accuracy of the automatic sampler programming and the drawn sample.
- Compliance with any instructions given or procedures required.
- **Safety**.

Required procedures:

- Each team must ensure that all necessary tools are provided, and that all the tools and equipment to be used in the event are in satisfactory condition prior to the start of the event. Only the "wet" pipe may be marked during the pre-event set-up period.
- Each team member is to wear all required safety equipment throughout the event, and compete in a safe manner. Gloves may be removed only when operating the control panel of the sampler.
- The straps holding the PVC pipe to the stands may not be loosened during the event.
- The PVC pipe sections strapped to the stands may not be moved laterally by the competitors.
- The team captain will start the event by signaling the judges.
- The 4.5-inch hole must be drilled in the section originating from the 'dry' PVC pipe, using the hole saw provided.
- The lengths of PVC pipe must be cut out using the LENOX saws provided. All cuts must be completed within the framework of the pipe table.
- The saddle must be mounted to the appropriate replacement PVC pipe section and properly secured in place with the hose clamps provided.
- The automatic sampler must be programmed correctly using the data provided on the attached instruction sheet. Teams 1 through 9 must remember to enter a 0 before their team number, for example; 01, 02, 03 and so on.
- All tools must be returned to the toolbox after use. The toolbox lid is to be closed and latched, and the toolbox must be replaced in its original location.
- The team captain will signal the judges when the event is over.

Collection System Event

The judges will then:

- Record the elapsed time.
- Check the sewer service replacement section for water tightness. The 'wet' PVC pipe will be allowed to fill until water flows from the outlet end. At this point, the discharge valve will be closed and the pressure increased to 3 psi. Time penalties will be added for any leakage that occurs within 30 seconds.
- Check the accuracy of the programming of the automatic sampler and verify that a proper sample was taken.
- Add any other penalties incurred during the event to the total score and pass the information on to the Event Coordinator.

What you will provide:

- Hard hat, safety glasses or goggles, safety boots or shoes, protective gloves.
- Enthusiasm!

Remember:

- While sawing activity is occurring on a stand, no other activity is permitted on the same stand. Only one person (at a time) may operate the brace and bit assembly used to drill the 4½ -inch hole, with no additional forces being transmitted to the tool in use by any other team member(s).
- No running or jumping.
- No punching of the 4.5 inch hole saw coupon.
- No team member is permitted to stand on the side of the "wet" table for safety purposes. Specifically, imaginary planes exist running from the walls of the end of the "wet" pip in both directions and shall NOT be violated.

Operations Challenge
Collections Systems Event
Hach Sigma 900MAX Sampler
SET-UP PROCEDURE

1. Press **"ON"** key	
2. Press **"MAIN MENU"** key	
3. Select **"SETUP"**	Press white soft key
4. Select **"MODIFY ALL TIMES"**	Press white soft key
5. Select **"CLEAR ENTRY"** to clear Number of Bottles	Press white soft key
6. To select the Number of Bottles, press number **"1"** key to enter one bottle	
7. Select **"ACCEPT"** to move to the next screen	Press white soft key
8. To select Bottle Volume, press number **"3"** key to enter three gallons	
9. Select **"ACCEPT"** to move to the next screen	
10. To select Intake Tube Length, press number **"6"** key to enter six feet	Press white soft key
11. Select **"ACCEPT"** to move to the next screen	Press white soft key
12. Select **"CHANGE CHOICE"** until Intake Tubing Type **3/8" Vinyl** is displayed	Press white soft key
13. Select **"ACCEPT"** to move to the next screen	Press white soft key
14. Select **"CHANGE CHOICE"** until Program Lock **DISABLED** is displayed	Press white soft key
15. Select **"ACCEPT"** to move to the next screen	Press white soft key
16. Select **"CHANGE CHOICE"** until Program Delay **DISABLED** is displayed	Press white soft key
17. Select **"ACCEPT"** to move to the next screen	Press white soft key
18. Select **"CHANGE CHOICE"** until Sample Collection **TIME-PROPORTIONAL** is displayed	Press white soft key
19. Select **"ACCEPT"** to move to the next screen	Press white soft key
20. Select **"CLEAR ENTRY"** to clear Interval	Press white soft key
21. To select one minute Interval, press number **"1"** key	

22. Select **"ACCEPT"** to move to the next screen	Press white soft key
23. Select **"CHANGE CHOICE"** until Take First Sample says **IMMEDIATELY** is displayed	Press white soft key
24. Select **"CHANGE CHOICE"** until Run Mode says **STOP AFTER LAST SAMPLE** is displayed	Press white soft key
25. Select **"CLEAR ENTRY"** to clear Samples To Collect	Press white soft key
26. To select one Sample To Collect, press number **"1"** key	
27. Select **"ACCEPT"** to move to the next screen	Press white soft key
28. Select **"CHANGE CHOICE"** until Liquid Sensors say **ENABLED** is displayed	Press white soft key
29. Select **"CLEAR ENTRY"** to clear Sample Volume	Press white soft key
30. To select 100ml Sample Volume, press number **"1"**, **"0"**, and **"0"** keys	
31. Select **"ACCEPT"** to move to the next screen	Press white soft key
32. Select **"CLEAR ENTRY"** to clear Intake Rinses	Press white soft key
33. To select zero Intake Rinses, press number **"0"** key	
34. Select **"ACCEPT"** to move to the next screen	Press white soft key
35. Select **"CLEAR ENTRY"** to clear Sample Retries	Press white soft key
36. To select one Sample Retry, press number **"1"** key	
37. Enter your **team number** by pressing the numeric keypad for Site ID (Teams 1-9 must enter 01, 02, 03 and so on.)	
38. Select **"ACCEPT"** to move to the next screen	Press white soft key

SCREEN SHOULD NOW SHOW:

Time and Date **ADVANCED SAMPLING**

DO YOU WISH TO ACCESS THE ADVANCED SAMPLING FEATURES **YES** **NO**

39. Select **"NO"** to move to the next screen	Press white soft key
SCREEN SHOULD NOW SHOW:	
Time and Date ****MAIN MENU****	
------ DISPLAY DATA **SETUP ------** **---------- OPTIONS** **STATUS ----------**	
READY TO START (Flashing)	
40. Press the **"RUN STOP"** key and **press any key** to start the program	
SCREEN SHOULD NOW SHOW:	
Time and Date ****MAIN MENU****	
****PREPURGE**** **TO HALT SAMPLING PRESS ANY KEY, TWICE**	
RUNNING	

The purpose of this procedure is to create a sampling program for a composite sample (1 bottle), with a volume of 3 gallons, with an intake tube length of **6**ft, intake tube type 3/8" Vinyl, with no Program Lock (Disabled), with no program delay, type of sampling or collection Time-Proportional, at an interval of 1 minute, taking the sample immediately, and stopping after the last sample, samples to collect 1, and a sample volume of **100**ml, 0 intake rinses, 1 sample retry, and Select Site ID by entering your team number. No Advanced options are needed.

After the sampling sequence is completed sampling history will show Sampling Complete.

OPERATIONS CHALLENGE
OHIO WATER ENVIRONMENT ASSOCIATION

COLLECTION SYSTEM EVENT

DETAILED RULES

All communication between the team and the judges will be through the Team Captain and the Head Judge.

The judges shall allow three (3) minutes for each team to become acquainted with the Collection System Event area/equipment/tools prior to that team's run-through of the event. Questions can be asked by the Team Captain and will be answered by the Head Judge.

All tools and repair materials will be located in the tool box. The team is allowed top arrange the box prior to starting the event (all items must lay flat on the bottom of the box and tool box lid closed and clasped).

The team will (before the event actually begins) mark the cut locations for only the broken pipe with a tape measure. **Note**: Cut locations should NOT allow the possibility of damaging the pipe supports of the tables with the saws

Teams may only work from the **accessible side** of the tables and tool box during the Collection System Event.

All team-supplied safety equipment and materials (i.e., hard hats, goggles/glasses, work gloves and steel-toed boots for each team member; and one marker and one tape measure) shall be on (worn in/on in the pockets of and/or in the hands of) the team members at the start of the event, during the event (the safety equipment) and at the conclusion of the event. **NOTE: True safety glasses, with side panels, are acceptable as "goggles". It is advised that safety glasses be used to insure clear visibility (i.e., no fogging of lens).**

There will be a plastic bucket available for use at each wet table to try to catch any water that may be released from the table during the event.

The PVC pipe shall be 6'0" long x 8" nominal internal diameter SDR 35 polyvinyl chloride (Green PVC) sewer pipe with "plain-ends".

The repair couplings shall be flexible without a shear ring and each with two (2) standard stainless steel (SS) straps with 5/16" hex screw heads. The couplings shall be Caulder, Fernco or approved equal.

The 8" x 4" service saddle shall be furnished with a plug in the 4" inlet and two (2) SS straps with 5/16" hex screw heads.

Two speed wrenches with 5/16" sockets will be provided.

Two (2) new 18" hand saws will be supplied, **one for each table.**

All team members are to be behind the starting line when the clock is started (the Head Judge will yell "go" at this time) for the Collection System Event.

A minimum of two (2) cuts and a circular hole are required to create the replacement piece including service saddle on the dry table. A minimum of two (2) cuts are required to cut out the broken section of pipe on the wet table.

At no time will the straps holding the pipes to the tables be loosened.

Only one cutting action will be allowed at each table at any one time. For example, if a team member is using a hand saw at the dry table, that cutting must be stopped / concluded before the drill/hole saw can be used at that table, or vice versa.

Flow will continue through the broken pipe on the wet table at all times during the event.

All team members (following the placement of all tools back into the tool box and the lid closed and clasped) are to be back behind the starting line before the Team Captain says Stop and the clock is stopped.

Safety Event – 2010

Situation:

You find a coworker at the bottom of a (confined space) lift station unconscious. You suspect he/she has been overcome with an unknown chemical gas or lack of oxygen. You immediately call for the in-plant rescue team. As you begin setting up the rescue effort another co-worker has a heart attack. This person is laying unconscious, one of the rescuer's calls 911 emergency services. An AED is available; the heart attack victim will need to have an airway established. His or her breathing and pulse is checked. There is no pulse, an AED is retrieved and administered. After one shock from the AED, the victim pulse returns and emergency services have arrived.

Directions:

Four-minute equipment check: The team will be allowed onto the platform to check all competition equipment and supplies for four minutes prior to the actual start of the event. The head judge will inform the team captain when the four minutes are completed. At this time all team members must immediately move to their starting area. If all equipment problems have not been resolved by this time, they will be addressed with the team in starting position. A delay at this point is cause for a penalty. Judges will not answer team questions during the four-minute inspection time or during the event. All questions will be answered on Monday during the pre-competition meeting. This is done to assure all teams receive the same instructions.

No equipment can be pre-assembled prior to the start. If anything has been pre-assembled, the head judge will instruct the team to disassemble the equipment prior to starting. If there is still pre-time left, then no penalty will be assessed, but if the four-minutes have been used up, a penalty of excessive pre-check will be assessed. All equipment must be placed back behind the line in the equipment storage area at the end of the four-minute equipment check.

The team captain will notify the head judge as to which team member is the designated attendant for the initial lockout tagout. All printed and signed names of the entrant and qualified person may be made on the permit at this time; names must be legible. **Fill out the lockout tag** To avoid subjectivity, the judges will verify legible handwriting at this time. The power for the gas detector and blower will be left in the off position. At the end of the four-minute time all team members must immediately move to their starting area, i.e., starting or ending in the decontamination area:

1) Team members will start behind the designated starting line
2) The team captain will start the event by yelling, "Start"
3) The entry person will put on full body harness.
4) One team member will turn on the detector and test the manhole atmosphere for 30 seconds using a gas detector and provided stopwatch.
5) One team member will place the electrical safety switch in the off or disconnected position.
6) The Designated Attendant will be the first person to lockout the disconnect switch by using the gang hasp and **their red colored lock** and tag. Each additional team member will place their lock and tag on the gang hasp. *Note: No one will enter the manhole until all four locks are locked in place on the gang hasp*. At the end of the event the disconnect will remain locked and tagged out, each team member will maintain custody of their key and have it at the end of the event to turn in to the head judge.
7) The qualified person will fill out the confined space entry permit. The only entries required on the permit during the timed event are acceptable (safe entry levels) readings for oxygen, combustible gas and hydrogen sulfide.
8) Necessary team members will assemble the non-entry rescue system not over the manhole. The Safe Approach Davit Arm will be assembled and leveled. All pins must be in place and the unit leveled before entrant is attached to the Davit arm winch and SRL. Then move the Davit Arm over the manhole. The entry person with the safety harness on will be attached to the fall protection device (SRL). This must be done before the manhole safety cover is removed.
9) Remove the manhole safety cover.

10) Install the blower saddle vent into the manhole; attach the 90-degree fitting to the saddle. Place the blower 5-ft from the manhole and attach the blower hose to the 90-degree fitting and turn the blower on.
11) The fourth person will find that a co-worker has collapsed from a heart attack and is unconscious. The Airway Breathing and Circulation will be assessed first (A.B.C.). The victims pulse will be checked for 10 seconds. The AED Trainer unit will be used to start the victim's (half CPR mannequin) heart, 911 will arrive after the first shock is given and 30 compressions have been administered.

    a. This person will call 911 emergency services
    b. Tilt head for airway, check victim for breathing (5 seconds counted out while looking at chest to see rise and fall or not) and a pulse (place two fingers over carotid artery, 10 seconds counted out, none will be found)
    c. After the pulse is checked, The AED (trainer) cover will be opened up
    d. The electrodes will be plugged in and the two paddles be placed properly on the victim
    e. The remote will be plugged into the both the AED and Remote
    f. Using the on/off button turn the AED unit on.
    g. Once the unit prompts "Connect Electrodes"
    h. Using the remote-press the paddle button or the top right button on the remote
    i. The rescuer will administer the AED using the prompts from the AED unit
    j. One simulated shock will be given from the AED Trainer.
    k. After the one shock is administered the unit will prompt for CPR to begin.
    l. Give the victim 30 compressions. While giving the compressions count out to 30. Each compression must be deep enough to create the click noise in the mannequin.
    m. After the 30 compressions, it will be assumed the victim has recovered and emergency services have arrived.
    n. Remove the paddles from the victim.
    o. Turn the AED unit off and put away with all other equipment.

12) Entrant will be lowered into the manhole on the work seat with the Safe Approach winch. **The work seat will be raised to a height <u>above</u> the platform floor before the entrant can get on or off the work seat.**
13) When the entry person enters the manhole a third team member will continually monitor the fall protection lines until entry person is out of the manhole.
14) The entry person will put a full body harness on the victim. After the full body harness is on the victim and properly adjusted, the victim will be raised gently out of the manhole while the entrant will assist in guiding the victim from below. No lifting the victim from below.
15) The work seat is removed from the winch hook. Do not drop the work seat.
16) The winch hook is connected to the center "D" ring on the victim's harness.
17) Another team member will lift the victim using the Salalift winch.
18) Two team members will carry the victim to the chair in the designated area and begin the decontamination process. Do not drag the victim; all body parts must be off the ground (floor of the platform) while moving the victim to the chair. Activate the shower by pulling the shower handle to its furthest position downward. The body harness will remain on the victim.
19) The team member tending the fall protection system will assist in bringing up the entrant with the use of the work seat and the Salalift winch. The work seat must be lowered using the winch on the davit arm.
20) Team members will disassemble and store all equipment **behind the line in the equipment storage area.** The Davit Arm must be fully disassembled; **all pins will be placed in their proper holes. <u>The winch cable must be within the length of the weight and hook</u>.** The full body harness will remain on the entry person. Time will end when all team members cross the finish line and the team captain raises his/her hands above their heads and shouts "Stop."
21) All team members will stay in the start/finish area until released by the judges. Judges will collect the entry permit, stopwatch, harness, gas detector and lockout keys. Once the team has been released they will leave the competition area. The captain will be escorted to a waiting area for review of the event with the head judge.

Safety

The manhole opening will be protected with a safety cover before a team accesses the platform. It must not be removed until the Davit Arm is fully assembled and in place over the manhole, the entrant is completely and properly in the harness, and attached to the SRL that is fully attached to the Davit Arm. The cover must be reinstalled on the manhole opening as soon as the entrant has been removed from the manhole and before the davit arm is removed from the manhole opening.

Atmosphere Tester

Turn the meter on first; do not wait for the meter to fully start up. With one end of the hose attached to the meter place the other end of the hose into the manhole. **There will be two marks on the hose. One should be through the manhole (under the platform floor), with the other mark above the manhole rim (above the platform floor).** Once in this position the 30-second test will begin. The team member using the meter must remain with the meter and keep track of their time. Once the initial test is completed remove the hose from the manhole and from the meter. The gas meter must enter the manhole with the entrant. It must remain in the confined space until the entrant is removed from the manhole. **A stopwatch will be provided to each team; this is for the team to time the 30-second atmosphere test.**

Blower Placement

The blower must be placed 5 ft from the rim of the manhole prior to entry. There will be a square drawn around the perimeter of the manhole to allow the teams to correctly locate the blower. The blower may be placed at any point. The blower power cord will not be plugged in, but the switch **must be turned on and left on**.

Permit

The only entries required on the permit during the event are acceptable readings for oxygen, combustible gas and hydrogen sulfide. These three entries must be made after the 30 second test and before anyone breaks the plane of the manhole. Do not wait for the readings on the gas meter. Any acceptable reading (considered safe for entry by OSHA) may be entered on the permit after the 30-second test. Readings will be written to the tenth. Example oxygen of 20 PPM will be written 20.0 PPM .Only one entrant may be listed on the permit and allowed to enter the manhole. **Gloves may be removed from the hands of the person completing the permit and only while he/she is entering information on the permit.**

Victim's Harness

The full body harness on the victim must be tight enough to ensure proper care of the victim; **that is no more than a fist** under the chest strap in the center of the chest. **The harness will be adjusted for proper fit by the team**.

Decontamination Procedures

Place the victim in the armchair below the emergency shower. Activate the shower by pulling the handle to the furthest position downward.

Heart Attack Victim Revival Using AED

The victim is unconscious and there is not pulse
Use the ABC's

a. Airway- Tilt the mannequins head back
b. Breathing- look and listen for breathing (5 seconds)
c. Circulation – Check for pulse (at least 10 seconds)

Turn on the AED (trainer unit) and follow the prompts
Place the two AED paddles on the victim correctly.
When prompted, give the victim one shock.
Commence CPR (it will then be assumed the victim's pulse and breathing has returned and emergency services have arrived.)
Remove the two paddles from the victim
Turn the AED off and put away the unit with all the other equipment.
The heart attack victim (half mannequin) will stay where it was found.

Personal Hygiene
Do not place any thing into your mouth, i.e., gas detector, pencils, pens, or straps. This will result in a penalty.

Equipment Provided for Competition:

- 16ft X 16ft platform (6ft height) with a 36 inch circular opening in the center of the floor.
- Full body mannequin (victim). Approx. weight 105 lbs.
- Phone to call emergency services
- One arm chair
- One clipboard
- One stopwatch
- Mounted phone
- One manhole safety cover manufactured by Safe Approach Inc.
- One General Duty Safety Switch, 100A, Square D Brand, Grainger Item 5B662
- One Gang hasp and 4 locks
- Four Lockout/tagout Tags

Safe Approach Items Description and Numbers

Item Description	Number
Safe Approach Rescue/Retrieval Davit w/ Adjustable Base & 50' Retrieval Winch	00697-2
Pulley Block w/ Carabiner for 3-Way Recovery Unit	00697-PB
60' Self Retracting Lifeline w/ Rescue Winch Built In (3-Way Recovery Unit)	2360-01-01
Mounting Bracket for 3-Way Recovery Unit	00697-WSB
Universal Fit Full Body Harness w/ Shoulder D-Rings (S,M,L,XL)	7250-02-01
2X-Large Full Body Harness w/ Shoulder D-Rings	7250-02-01XL
Work Seat W/ Belt - Large	8152
Work Seat W/ Belt - Medium	8151

USA Blue Book Item Description and Numbers

One GasAlertMax Gas Detector	
One emergency Shower – horizontal Retrofitted with a vertical pipe 7” (+ or -) ft high	42580
One Axial blower w/canister & 15 ft of 8” hose	70186
One manhole saddle vent	42890
One universal saddle vent mount	42891
One 90 degree elbow for saddle vent	42898
Padlock Red	25595
Padlock Yellow	25596
Padlock blue	25597
Padlock Green	25598
Gang Hasp	25535
Four Lockout Tags	46162

Annuvia Inc. Item Description and Numbers Contact:

Katie Demboski *Business Development* katie.demboski@**annuvia**.com | www.**annuvia**.com

Annuvia, Inc.
San Francisco Office
180 Montgomery Street, Suite 1120 | San Francisco, CA 94104
Ph 866.364.7940 or cell # 415-710-6300 | **Fax** 415.283.4856

One AED Trainer Unit Medtronic LIFEPAK	**500T**
Half CPR Mannequin (CPR Prompt)	**Adult/Child**

Equipment Provided by Teams

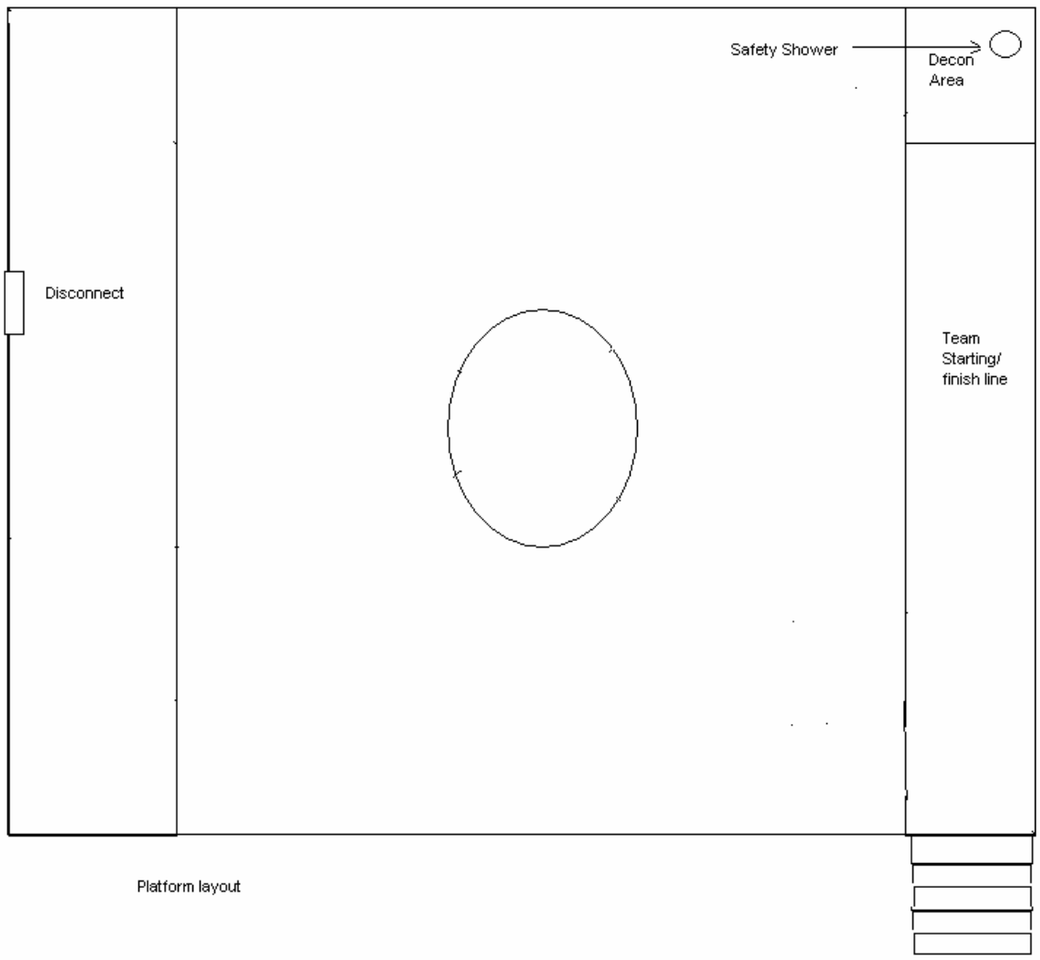
Teams will be required to supply and wear, as appropriate, the following:

1. Steel-toed shoes ANSI rating Z41-PT99
2. Hardhats Cap or full brim Style meeting ANSI standard ANSI Z89.1-2003 Type 2
3. Safety glasses/goggles ANSI rating Z87.1-2003
4. Leather gloves, mechanics gloves. Gloves with fingertips removed, or **holes in the glove are not acceptable**.
5. Pencil or pen to write on confined space permits

Each team will need two full (one for the victim) body harnesses and one work seat. You select the sizes. These will be supplied at WEFTEC.

Teams interested in acquiring their own equipment for practice prior to WEFTEC, contact *David Kozlowsky* Safe Approach, Inc. Ph: 207-345-9900, Safe Approach has agreed to a discount on the items they are providing. You will need to provide your team name, utility, and MA name.

Teams interested in acquiring their own equipment for practice prior to WEFTEC, contact Eric Pfeuffer at USA Bluebook 1-800-925-8399 Ext. 250. USA bluebook has agreed to a discount on the items they are providing. You will need to provide your team name, utility, and MA name.



Platform layout

Judging Criteria

Safety Judges will stop competitors from competing if any unsafe actions are detected until corrections are made **Time will not stop, and judges will not identify the safety issue for the team.**

Penalties

Description of Penalty
Excessive pre-check time
Second false start
Start not called out
Harness straps (leg, shoulder) not properly connected or properly adjusted
Turning on the gas Detector or the blower during the 4 minute check
Not turning on Gas Detector
Inserting gas detector hose in manhole improperly
Not performing atmosphere testing
Not performing atmosphere testing for 30 seconds
Reading recorded on permit before 30 second testing period ends
Breaking the plane of the manhole before the 30 second test is done
Gas detector leaves the confined space before all entrants exit the space
No team member monitoring the confined space
Davit Arm not assembled properly
Davit Arm not level or one or more of the four points not making connect with the platform floor
Winch not used or connected to Davit Arm incorrectly
SRL's not used or connected to Davit Arm incorrectly
Both entry persons not hooked to SLR's before manhole safety cover is removed
Manhole cover removed before tripod is over manhole
Harness not properly attached to SLR
Davit Arm not centered over manhole
Blower not used
Blower not out of the perimeter square
Blower saddle not used
Blower 90' not used
Blower switch not on
Entrant not fully in work seat before being raised/lowered
More than one Entrant in work seat being raised/lowered
Work seat not removed from winch to raise victim
All team members will start in the starting area. A penalty will be assessed to any team member who is standing outside that area, i.e., decontamination area.
Team member in the hole lifting victim
Throwing seat down to team member in the confined space
Victim harness adjusted by team
Placing the victim face down

Moving victim in a manner that would injure a person
Dragging the victim
Throwing the victim
Victim not in decontamination area
Attendant not monitoring entrants
Safety shower not Actived
Both entry persons not hooked to SLR's before safety cover is removed
Safe Approach cover not on manhole before Davit Arm is moved
Improper lifting technique used
Equipment not disassemble at end of event
Equipment not properly stored at end of event
Equipment on or beyond the line
Cable not completely wound or over tight on winch
Jumping into the manhole
Throwing/dropping/ abusing tools or equipment
Team members PPE not on during the event (except for Writing on permit)
Hard hat not on head any time during the event (5 second rule exceeded)
Injuring a Judge
Injuring a team member
Lockout tag not signed/dated
Designated attended was not the first person to place lock on gang hasp
Team did not notify the head judge who is the designated attendant
Entry member did not lock out gang hasp
Entry was made without all four locks, locked on gang hasp
Rescuer did not call 911 Emergency Services
Not tilting the victims head back to open airway
Not checking for breathing or chest to rise and fall for 5 seconds or longer
Failure to check pulse
Not counting out the to 10 while taking the heart attack victims pulse
Failure to check pulse properly by placing two fingers over the carotid artery
Not placing the AED paddles in the correct position on the victim
Not shocking victim
Not turning off the AED Unit before storing it
Not giving full depth chest compression
Not counting out to 30 while giving compressions or not giving at least 30 compressions

WEFTEC 2010 Safety Event	
Confined Space Entry Work Permit	
A. Site Information: PLEASE PRINT	
Confined Space Id. Number:	
Team name:	
Designated Entry Team Leader:	
Designated Entry Team person:	
Designated Team Attendant:	
Description of work to be performed:	
B. Protective And Emergency Equipment Needed	
Yes	No
Gloves X	
Boots X	
Harness/Tripod/Hoist X	
Atmospheric Tester X	
Blower X	
Hard Hat/Coveralls X	
Ventilated/Purged X	
C. Atmospheric Tests	
Explosive Gases	LFL
Oxygen	%
H_2S (Hydrogen Sulfide)	PPM
CO (Carbon Monoxide)	PPM
(Note: if alarm sounds vent space for 15 minutes with power ventilator and retest. If alarm sounds again continue to ventilate and retest until atmosphere meets allowable limits)	
Test accomplished by:	
D. Sign Off	
Entrant Signature:	
Entrant Signature:	
Attendant's Signature:	

Note: This list and instructions are subject to change. Changes if any will be noted at the pre-competition meeting.

Safety Event FAQ's

1. **Can the Safe Approach safety cover be removed from the manhole before the Davit Arm is over the manhole?**
   No - It must be removed after the Davit Arm is fully assembled and leveled before it is over the manhole and must be back over the manhole before removing the Davit Arm system form above the manhole opening.

2. **When can the permits be signed?**
   During the 4-minute equipment check.

3. **Who can remove PPE during the event?**
   The only person allowed to remove PPE during the event is the person writing the gas reading on the permit. Anyone else will be penalized except for the 5-second rule on hard hats. Definition of the 5-second rule is when a hardhat falls off the head, that person must stop working immediately, pickup the hardhat and place it back on their head. If this is not completed in 5 seconds a penalty will be assets.

4. **What are approved gloves?**
   Leather gloves, mechanics' gloves. Gloves with fingertips removed or hole(s) in the glove are not acceptable.

5. **Who is timing the 30-second air check and how?**
   The Team will do the 30 second time for the air check. A judge will be checking the marks on the hose for proper placement. This judge will also observe the 30-second timing for accuracy. The judge will not comment to any team member, it is the team's responsibility to do the test of a full 30 seconds.

6. **Can the air sampling tube be placed through or under the manhole safety guard?** Yes

7. **When can the blower adapter be placed in the opening?** After the safety cover has been removed. The blower must be completely assembled with the diffuser inserted into the manhole and turned on before a team member enters the confined space.

8. **Can one or more safety appliance be mounted on the Davit Arm prior to placement over the opening?**
   The complete fall protection system, Davit Arm, SRL, one Safe Approach winch must be completely setup before it is placed over the manhole. This includes mounting all safety appliances. - Per the directions Step number 8

9. **Is the Davit Arm disassembled at the completion of the event?** Yes
   Are ALL of the safety appliances removed from the Davit Arm upon completion of the event? Yes, SRL and the Safe Approach winch must be removed from the Davit Arm at the end of the event. The way the equipment is at the start of the four-minute check is the way you end the event. Every piece of equipment will be behind the equipment line, with the exception of the harnesses they may remain on the entry persons and the victim.

10. **Can a team member "physically handle" the cable and lift a person or victim out of the confined space without using the winch?** No - Should the cable slip this would injure the person. The penalties for injuring anyone are very high.

11. **Who determines what is “legible” for the printed names?** The printed names must be able to be read by the judges. This will be done during the 4-minute equipment check.

12. **Can a team go under the platform to check the harness on the mannequin during the four-minute equipment time check?** Yes

13. **Must an entrant remain connected to the SRL while placing the safety cover back on the manhole?**
    Yes
14. **Can someone other than the entrants remove and replace the safety cover?**
    Yes
15. **Will the SRL and Safe Approach winch be in their bags/boxes when the event begins?**
    No

Will the hose be attached to the gas meter at the beginning of the event?
    No

16. **What are the dimensions of the starting/stopping, decontamination and the equipment storage areas?**
    The start/stop line is 3ft wide X11 ft long. The decontamination area is 3 ft wide X 5 ft `long. The equipment storage area is 3 ft wide X 16 ft long.

17. **What is the definition of dropping/abusing tools or equipment?**
    Dropping tools or equipment from a distant that could damage it. Abusing tools is doing anything that could damage the equipment

18. **The attendant can replace the porta-cover when all entrants are out. Is this correct?**
    Yes
19. **The attendant can insert and remove the ventilation equipment from the manhole as long as he does not break the plane. Is this correct?**
    Yes

LAB EVENT 2010

Event: Perform all steps of an E. coli membrane filtration analysis using Hach products following all method requirements and aseptic techniques as outlined in the Hach m-ColiBlue24 method and Standard Methods 9222B, 18th Ed.

General NOTES:

1. Team Captain tells the Lead judge they are ready to begin and the Lead judge says "START" to signal the beginning of the event. The Lead judge and one other judge will be the timekeepers.

2. Event is complete when all tasks have been completed and Team Captain hands in the work sheets to the Lead judge and says the team is finished.

3. To ensure a fair contest and to avoid challenges, judges will not speak to contestants while the event is being performed.

4. The Event Coordinator will settle disputes with input from the event judges.

5. All team members must participate in the event, but are not limited to performing only one task.

6. After the event, the Event Coordinator may explain to the Team Captain what was done incorrectly, but will NOT reveal penalty points or total score.

7. Team members may ask judges questions before the beginning of the event, but the judge may choose not to answer the question, depending on the type of question asked.

ALL STEPS OF THE PROCEDURE MUST BE PERFORMED FROM MEMORY. NO BOOKS OR PRINTED MATERIALS ARE ALLOWED IN THE LABORATORY COMPETITION AREA.

Materials Required:

Sterile petri dishes
Sterile pads
Sterile membrane filters with grids
Forceps
Small beaker with alcohol
Alcohol Burner
m-ColiBlue ampoules
Membrane filtration apparatus (suction flask doubled, tubing, suction pump)
Incubator
Microscope
Colony tally counter
Sharpies

m-ColiBlue24 ampoules
Funnel assembly
Sterile water in bottle
Hach buffer dilution water pillows (#2143166)
1 mL sterile pipettes (individually wrapped)
10 mL sterile pipettes (individually wrapped)
100 mL bottles with sterile water
Sterile 50 mL cylinders
Incubator
Autoclave bags with ties
Calculator
Bin for autoclave bags
Autoclave tape
QC sample tubes
Steril squeeze bottle
Squeeze bottle with isopropyl alcohol
1 liter squeeze bottle for dilution water.
1 liter sterile water bottles, glass
Autoclave wrap
Bottle of dilute “bleach” solution
Paper towels
Nail clippers (for opening pillows)

Setup:
Anyone involved with the set up, preparation of samples and plates, funnel assembly, squeeze bottles etc… must clean hands once before touching anything by rubbing hands with isopropyl alcohol from the isopropyl squeeze bottle (real isopropyl will not be used). Hands do not have to be cleaned for reading of plates, calculation of plates, or preparation for autoclaving.

I. Preparing Petri Dishes

Clean work area before STARTING BY squirting a small amount of the dilute bleach solution onto the work area and then wiping area dry.
All dishes must be labeled legibly on the underside using a sharpie marker provided as outlined below. This must be done to all Petri dishes before any lids are removed.
1. Label one dish as “positive QC”.
2. Label one dish as “negative QC”
3. Label one dish as “Effluent 100 mL”
4. Label one dish as “Effluent 10 mL”
5. Label one dish as “Effluent 1 mL”
6. Lable one dish “Blank”

II. Use sterilized forceps to place a sterile absorbent pad in each

petri dish and replace lid.

1. To sterilize forceps, dip them in the beaker labeled “alcohol” and hold over alcohol burner for a count of two (one one-thousand, two onethousand). FOR SAFETY, BURNERS WILL NOT ACTUALLY BE BURNING.
2. Using the forceps, pick up an absorbent pad at the edge and place one in each petri dish.
3. Remove the lid immediately before placement of the pad, and replace the lid immediately after placing the pad. To avoid contamination, never place lid on the table.

III. Add m-ColiBlue24 media to each dish.

1. Invert m-ColiBlue24 ampoule 3 times (count 1, 2, 3), remove cap and pour 1 ampoule evenly over the absorbent pad in each dish.
2. Replace the petri dish lid immediately after adding the ampoule. Never place lid on the table.

IV. Set up the membrane filter and funnel.

1. Unwrap sterile funnel apparatus. DO NOT TOUCH THE INSIDE OF THE FUNNEL OR THE bottom FILTER SEAT. These areas must remain “sterile”.
2. Place the bottom part of the funnel into the suction flask.
3. Sterilize forceps, dip them in the beaker labeled “alcohol” and hold over alcohol burner for a count of two (one one-thousand, two onethousand).
4. Unwrap a sterile filter. Avoid touching it with your hands.
5. Use the sterile forceps to grasp the filter at an edge, and lay the filter centered on the filter seat GRID SIDE UP.
6. Attach top part of funnel to bottom.

V. Preparation of sterile water.

1. Prepare buffer solution by shaking (invert 3x, count 1, 2, 3) and then adding 1 potassium phosphate pillow to 1 liter sterile dilution water. Repeat with one magnesium chloride pillow, adding it to the same bottle.
2. Cap bottle and repeat step one with a second 1 liter bottle of sterile water so that there are two liters prepared dilution water when completed. At this point the bottles with dilution water are normally autoclaved, but we will skip this part.
3. Un-wrap sterilized 1 liter squeeze bottle. Invert 1 bottle of sterile dilution water bottle 3 times (count 1, 2, 3) to mix. Without touching the lip of the bottle, the inside of the lid, or any part that goes into the

squeeze bottle, aseptically pour sterile dilution water into the squeeze bottle. Replace lid on sterile water bottle, and attach lid of squeeze bottle. Do not touch the nozzle tip of the squeeze bottle.

VI. Blank preparation

1. Using sterile water from the squeeze bottle, add a small amount of sterile water to funnel.
2. Apply vacuum to funnel assembly. (This is where you check to see if the assembly is “tight” and that no water is seeping out between the top and bottom part of the assembly). Once the dilution water has passed through, turn off vacuum.
3. For the dish labeled “Blank”: Mix a 1 liter bottle marked “Sterile Dilution Water” by inverting 3 times (count 1, 2, 3).
4. Using a sterile 100 mL cylinder, aseptically measure out 100 mLs of sterile water from the dilution water bottle and pour into the filter funnel.
5. Apply vacuum. Once water has passed through the filter, turn off vacuum.
6. Remove top of filter assembly. Place on inside surface of the original sterile filter wrapper.
7. Sterilize forceps, dip them in the beaker labeled “alcohol” and hold over alcohol burner for a count of two (one one-thousand, two onethousand).
8. Grasp the filter on the edge. Remove the lid to the dish labeled “Blank”. Place the filter into the dish by inserting the filter against the inside edge of the dish against the pad, grid side up and use a rolling motion to exclude any air from between the filter and pad until the filter is laying flat. Make sure that the filter touches the entire pad. Replace petri dish lid.
9. Invert petri dish.

VII. Sample preparation. Shake the sample bottle 20 times prior to each filtration.

1. Sterilize forceps, dip them in the beaker labeled “alcohol” and hold over alcohol burner for a count of two (one one-thousand, two one-thousand).
2. Use the sterile forceps to grasp a new filter at the edge, and lay the filter centered on the filter seat GRID SIDE UP.
3. Attach top part of funnel to bottom.
4. Using sterile water from the squeeze bottle, add a small amount of sterile water to funnel.
5. Apply vacuum to seat filter. Once the dilution water has passed through, turn off vacuum.
6. For the dish labeled “1 mL”: Mix the 1 liter bottle marked “Sterile Dilution Water” by inverting 3 times (count 1, 2, 3).
7. Using a sterile 10 mL pipette, add 10 mLs of the dilution water

from the dilution water bottle to the filter funnel.
8. Shake sample 20 times. Using a sterile 1 mL pipette, add 1 mL of sample to the dilution water in funnel.
9. Apply vacuum to funnel only after sample has been added to the dilution water.
10. Once sample has passed through filter, Use a sterile cylinder to add 20 mLs of sterile dilution water to the funnel.
11. Once the 20 mLs has passed through the filter, add another 20 mLs of dilution water. After that passes, add a third volume of 20 mLs of dilution water to the filter.
12. Once the third volume has passed, turn the vacuum off.

VIII. Transfer the filter to a sterile petri dish.

1. Remove top of filter assembly. Place on inside surface of the original sterile filter wrapper.
2. Sterilize forceps, dip them in the beaker labeled “alcohol” and hold over alcohol burner for a count of two (one one-thousand, two one-thousand).
3. Grasp the filter on the edge. Remove the lid to the dish labeled “1 mL”. Place the filter into the dish by inserting the filter against the inside edge of the dish against the pad, grid side up and use a rolling motion to exclude any air from between the filter and pad until the filter is laying flat. Make sure that the filter touches the entire pad. Replace petri dish lid.
4. Invert petri dish.

IX. Rinse filter assembly.

1. Replace the funnel on the filter seat.
2. Apply vacuum and using the squeeze bottle rinse the inside walls of the filter funnel for a count of 3 (count one onethousand, two one-thousand, three one-thousand).

X. Sections VII, VIII are repeated for the 10 mL sample:

1. Sterilize forceps, dip them in the beaker labeled “alcohol” and hold over alcohol burner for a count of two (one one-thousand, two onethousand).
2. Use the sterile forceps to grasp a new filter at the edge, and lay the filter centered on the filter seat GRID SIDE UP.
3. Attach top part of funnel to bottom.
4. Using sterile water from the squeeze bottle, add a small amount of sterile water to funnel.
5. Apply vacuum to seat filter. Once the dilution water has passed through, turn off vacuum.

6. For the dish labeled “10 mL”: Mix the 1 litter bottle marked “Sterile Dilution Water” by inverting 3 times (count 1, 2, 3).
7. Using a sterile 10 mL pipette, add 10 mLs of the dilution water from the dilution water bottle to the filter funnel.
8. Shake sample 20 times. Using a sterile 10 mL pipette, add 10 mL of sample to the dilution water in funnel.
9. Apply vacuum to funnel only after sample has been added to the dilution water.
10. Once sample has passed through filter, Use a sterile cylinder to add 20 mLs of sterile dilution water to the funnel.
11. Once the 20 mLs has passed through the filter, add another 20 mLs of dilution water. After that passes, add a third volume of 20 mLs of dilution water to the filter.
12. Once the third volume has passed, turn the vacuum off.
13. Remove top of filter assembly. Place on inside surface of the original sterile filter wrapper.
14. Sterilize forceps, dip them in the beaker labeled “alcohol” and hold over alcohol burner for a count of two (one one-thousand, two onethousand).
15. Grasp the filter on the edge. Remove the lid to the dish labeled “10 mL”. Place the filter into the dish by inserting the filter against the inside edge of the dish against the pad, grid side up and use a rolling motion to exclude any air from between the filter and pad until the filter is laying flat. Make sure that the filter touches the entire pad. Replace petri dish lid.
16. Invert petri dish.

XI. Preparation of the 100 mL sample.

Section IX and section VII 1-5 are repeated:
1. Replace the funnel on the filter seat.
2. Apply vacuum and using the squeeze bottle rinse the inside walls of the filter funnel for a count of 3 (count one one-thousand, two onethousand, three one-thousand).
3. Sterilize forceps, dip them in the beaker labeled “alcohol” and hold over alcohol burner for a count of two (one one-thousand, two onethousand).
4. Use the sterile forceps to grasp a new filter at the edge, and lay the filter centered on the filter seat GRID SIDE UP.
5. Attach top part of funnel to bottom.
6. Using sterile water from the squeeze bottle, add a small amount of sterile water to funnel.
7. Apply vacuum to seat filter. Once the dilution water has passed through, turn off vacuum.
8. For the dish labeled “100 mL”, shake sample 20 times and pour out 100 mLs of sample into an unused sterile cylinder.
9. Using sterile water from the squeeze bottle, add a small amount of sterile water to funnel.
10. Apply vacuum to seat filter. Once the dilution water has passed through, turn off vacuum.

11. Pour the 100 mLs of sample into the filter assembly.
12. Apply vacuum to funnel only after sample has been added to the dilution water. Rinse the graduated cylinder 3x with sterile water and pour through filter.
13. Once sample has passed through filter, Use the sterile cylinder to add 20 mLs of sterile dilution water to the funnel.
14. Once the 20 mLs has passed through the filter, add another 20 mLs of dilution water. After that passes, add a third volume of 20 mLs of dilution water to the filter.
15. Once the third volume has passed, turn the vacuum off.

XII. Follow section VIII to place filter in dish labeled 100 mL.

XIII. Repeat section XI for 100 mLs of the E. coli QC which can be poured straight from the bottle into the funnel. See preparation of QC samples below. Repeat section XI for 100 mLs of the P. aeruginosa which can be poured straight from the bottle into the funnel. See preparation of QC samples below.

XIV. Preparation of QC samples.

1. Label 2 bottles of sterile water. Label one as “E. coli”, and the other “P. aeruginosa”.
2. Remove rehydrated bacteria tubes from incubator.
3. Invert tubes 3 times (count 1, 2, 3).
4. Open tube and aseptically transfer rehydrated E. coli to bottle marked E. coli.
5. Re-cap bottle and shake for a count of 3(count 1, 2, 3).
6. Open tube and aseptically transfer rehydrated P. aeruginosa to bottle marked P. aeruginosa.
7. Re-cap bottle and shake for a count of 3(count1, 2, 3)

Place inverted petri dishes in incubator. Complete Bench Sheet (Date, analyst initials, time in incubator, sample volumes, and appropriate incubator temperature.)

XV. Reading plates

1. Remove the 6 samples from the incubator which have been incubating for 24 hours.
2. Count the number of blue colonies on each plate and record in the appropriate box on the bench sheet provided.
3. Calculate the colony count for each sample according to section XVI and record in the appropriate box on the bench sheet.
4. Record the results for the two QC samples and the blank as either “Positive Growth” or “Negative Growth” on the bench sheet.

5. Place dishes in an autoclave bag, seal with a twist tie, and mark with a piece of autoclave tape. Place in the “to be autoclaved” bin.

XVI. Calculations:

1. Select Filters with 20-80 **BLUE** colonies. Total number of blue colonies on the plate cannot be greater than 200. *If total number of **BLUE** colonies is greater than 200, record as TNTC (Too Numerous to Count) in the appropriate box.*
2. If only one filter meets the requirement of 20-80 **BLUE** colonies, use the following equation:

_____# of BLUE colonies ____ X 100 = E coli / 100 mL
Total Volume of Sample (s)

3. If more than one filter meets the requirements of 20-80 **BLUE** colonies, sum the number of colonies and sample volumes for the plates which meet the 20-80 requirement, and use the above equation. OMIT ANY PLATES OUTSIDE OF THE 20-80 RANGE.

XVII. A short quiz will be included. The quiz may cover holding times, incubation temperatures, and short definitions related to microbiology work.

Maintenance Event – 2010

The Ohio event will utilize the rules produced by WILO for the national event. A pdf document of these rules is available upon request.

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