



Connect Tri-Cities
STEM Competition
October 2017
Mission Support Alliance, LLC

Connect Tri-Cities STEM Competition

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Section 1 – Guidelines and Background

The objective of the competition is to stimulate interest in Science, Technology, Engineering, and Math (more commonly referred to as “STEM”). The competition will allow teams to demonstrate essential problem solving skills.

The competition is among student teams, each representing a high school, to develop new concepts for solving a problem or addressing a basic need of general interest to society or of particular relevance to their state or region. Each team will be comprised of five students and a faculty coach, all selected by the participating high school. All teams will work on the same STEM problem as described in Section 2¹.

The competition’s prizes and awards are as follows:

- a. 1st place – \$2,000 scholarship for each student team member and \$1,000 for the faculty coach
- b. 2nd place – \$1,500 scholarship for each student team member and \$750 for the faculty coach
- c. 3rd place – \$1,000 scholarship for each student team member and \$500 for the faculty coach

Each team will receive an SE200 Community Chlorine Maker (<https://www.msrgear.com/global-health/se200>) and power supply kit (<https://www.msrgear.com/global-health/se-200-accessories-1/se200-community-chlorine-maker-power-supply-kit>) for use in the competition and for subsequent teaching applications at the school. Additionally, each team will be given \$100 for additional expenses necessary to complete the competition.

Judging and selection of competition winners will be performed as part of the Connect Tri-Cities event that will be held in Kennewick, WA in October 2017.

Each team shall submit a written project summary, which will be provided to the competition’s judges in advance of the Connect Tri-Cities event. Requirements associated with the project summary are provided in Section 3.

At the Connect Tri-Cities event, each team will be scheduled to make a presentation of their work to the judges. The rules and competition schedule are provided in Section 4.

Using the written project summary and results of the presentation, the judges will evaluate each team’s effort according to the criteria presented in Section 5.

Section 6 includes answers to some common questions regarding this competition.

¹ Problem was adapted from a STEM Bowl Scholarship Competition hosted by Lockheed Martin in 2013.

Section 2 – Problem Statement

You live in a small rural community (population of approximately 500 people) in an area that has been struck by a magnitude 6 (on the Richter scale) seismic event. The seismic event has knocked out power to the region and has damaged roads and bridges such that access to surrounding towns is not possible. The seismic event has struck during the summer where temperatures routinely top 100 degrees Fahrenheit.

Three hundred of the community members, including your team, have taken refuge in the town high school. Roughly 17% of the people taking refuge in the high school are either younger than 10 or older than age 65. Several people are being treated for injuries sustained in the earthquake and several others appear to have a flu-like virus. Volunteer fire fighters with basic emergency medical training are present and assisting, but have limited equipment and supplies. An ambulance with supplies is not reachable due to the damaged roads infrastructure. The school has a swimming pool, but because the school was under renovation at the time (having seismic upgrades completed), the filter pumps have not been in service and the quality of the water is unknown. With the exception of the STEM wing, most other areas of the high school can be accessed. Most people have congregated in the cafeteria. Due to power being out in the region and with no back-up power source for the high school, there is no running water or electrically powered systems/devices. There are vehicles in the parking lot, but due to the damaged infrastructure it is not possible to travel more than a quarter mile in any direction from the school. The occupants of the school expect to be isolated for at least 72 hours.

As part of your school's chemistry curriculum, you have been using a 12 volt direct-current device that generates a 0.8% sodium hypochlorite solution from water and table salt (i.e., the SE200 Community Chlorine Maker). You have the device in your backpack with you in the cafeteria, and the cafeteria is stocked with an ample supply of table salt. You think you may be able to apply the device to your situation, together with other resources likely to be on-hand. First, however, you have to convince others in the school that you understand (1) the basic process by which the device works, and (2) the potentially useful properties of what it produces. If you succeed in convincing them, they'll want to know how it can help them until relief comes.

What needs do the people in the school have, and what dangers do they face? How might each need be met or danger avoided using the objects and materials commonly found in a high school plus, if appropriate, your device? What did you say that convinced the others you understood the device and what it produced?

Of the needs and dangers that the device might help address, pick two you think other disaster survivors are likely to face. For each, provide:

1. A step-by-step process for meeting the need or avoiding danger, including how to employ the device and its product and avoid potential misuse.
2. At least two alternate concepts for meeting the need or avoiding the danger WITHOUT the device.
3. A comparison of the process that uses the device with the alternate concepts, including the estimated relative costs of implementing them and maintaining their readiness for a disaster.
4. Your recommendation for the most effective concept and how to deploy it in small rural communities.

Section 3 – Requirements for Written Project Summary

The written project summary should conform to the following format and content requirements.

Format specifics:

1. Software – Microsoft Office Word
2. Page size – Letter (8.5” x 11”)
3. Margins – 1” top and bottom, 1.25” left and right
4. Text Alignment – Left justified
5. Font and Size – Times New Roman, 12 point
6. Line Spacing – Single
7. Document Length – 10 pages maximum, including tables, figures, and illustrations, but not including cover page

Content specifics:

Project Summary Outline

1. Cover Page

The project summary cover page should list the project title, team members, faculty coach, and school.

2. Abstract

Provide a brief summary of the background, objective, and potential benefits of the project.

3. Technical Details

This section should answer the questions posed in the problem and provide information requested in the problem (Section 2). Additionally, it should describe assumptions made by the team in addressing the problem statement, such as objects and materials commonly found in a high school that may be pertinent to the problem.

4. Team

Identify members of the team and delineate their contributions to the project. Explain how the team members worked together in terms of communication, scheduling, assignments, conflict resolution, etc.

5. Expense Report

Provide an itemized list of any materials that were purchased to support this project. Remember that the total value of procured items cannot exceed \$100.

6. References

List all sources of information (websites, books, journals, community resources, subject matter experts, etc.) that were consulted to complete the project. References shall be documented in accordance with the American Psychological Association (APA) citation and format (<https://owl.english.purdue.edu/owl/section/2/10/>).

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Additional considerations:

1. The written project summary should be structured for readability by the judges. Each judge will have up to 15 documents to review so please try to use graphics as well as text to communicate your important messages. A well-illustrated short document is more likely to be understood than 10 pages of dense text.
2. Pay attention to syntax as well as spelling and punctuation. Minimize the passive voice and maximize the active.
3. The written project summary and team presentation should be consistent and reinforce each other. Although the written project summary will be given to the judges in advance, a team should not assume that every judge will be intimately familiar with its content during the presentation. Points considered important by the team should be emphasized during the presentation.
4. Each team's written project summary is due by 12 a.m. (midnight) on October 2, 2017. It should be transmitted electronically to Tracy_Hale@ri.gov. All summaries should be transmitted as a single file.

Section 4 – Rules and Competition Schedule for Team Presentations

When: Tuesday, October 10, 2017

Where: Three Rivers Convention Center, Kennewick, WA

Rules and Schedule:

- a. Each team will bring their presentation on a marked USB thumb drive. Teams will not be allowed to use their own laptops or other audio/visual equipment. The following equipment/software will be available in the presentation room:
 - Microsoft Windows-based computing resource (laptop or desktop)
 - Standard Microsoft Office programs (e.g., PowerPoint, MediaPlayer, etc.)
 - Adobe Acrobat/Reader
 - Projector and screen
 - Pointing device (e.g., laser pointer)
- b. Teams will not be allowed to utilize the electro-chlorinator in the presentation room. All testing and experiments will be completed before the presentation is submitted. Teams that plan to use video or animation in their presentation should ensure that their USB thumb drive contains the necessary software application(s).
- c. Each team will have a total 15 minutes for their presentation. This includes time for questions from the judges, so the length of the actual presentation should be limited to 10 minutes. This will leave 5 minutes for questions from the judges.
- d. The faculty coach is expected to introduce themselves and their team members at the start of the presentation. Presentations will be made by student members of the team only.
- e. Only one team is permitted in the presentation room at the same time. Teams will not be allowed to listen or observe other team's presentations. No member of a team, school representative, friend, or affiliate is allowed to hear or observe a competing team's presentation.
- f. The presentation schedule will be communicated via the website at a later date.

Section 5 – Judging Criteria

The judges will evaluate each team's efforts against the following criteria:

1. Written Project Summary (30 points total):
 - a. Format follows requirements in Section 3 (15 points)
 - b. Clarity/use of visual aids such as charts, graphs, pictures, etc. (5 points)
 - c. Demonstration of critical thinking/problem solving skills (10 points)
2. Oral Presentation (30 points total):
 - a. Organization and presentation of content (10 points)
 - b. Clarity/use of visual aids (10 points)
 - c. Staying within allotted time (5 points)
 - d. Quality of responses to questions (5 points)
3. Meeting the overall intent of the competition (40 points total)
 - a. Understanding of STEM subjects (10 points)
 - b. Innovation and creativity in addressing the competition problem (10 points)
 - c. Use of the device and the expense funds (10 points)
 - d. Quality and persuasiveness in both the written project summary and oral presentation (10 points)

A total of 100 points is the highest possible score.

Section 6 – Common Questions

1. What are the team requirements?
 - a. The only requirements is that each team has five student members and a faculty coach from the sponsoring high school. The members can be from any grade level. The competition encourages creativity and “out of the box” thinking as well as some proficiency in STEM-related subjects. These qualities will be assessed at the team level, not at the individual level.

2. Can team membership change during the competition?
 - a. Once a team is formed, membership changes should be discouraged except in unavoidable circumstances. Each such request will be considered by the sponsoring school on a case-by-case basis.

3. Can teams use “outside” help?
 - a. Teams are encouraged to seek outside help for technical information and education, especially in the early stages of their activities, but are strongly discouraged from using such assistance to accomplish resolution of the problem. Teams shall not solicit or accept expense assistance beyond the \$100 provided, regardless of the form such assistance might take. Teams are on the honor system to comply with the spirit and intent of the competition, which is to encourage creative, independent thinking with a sound basis in STEM-related subjects on a level playing field.