HYDROGEOLOGY

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Students will manipulate a groundwater computer model, answer questions about groundwater concepts, and evaluate solutions, based on hydrogeological evidence, to reduce anthropogenic effects on groundwater.

A TEAM OF UP TO: 2 **APPROXIMATE TIME:** 50 Minutes

2. **EVENT PARAMETERS:**
   a. **The local supervisor will provide needed equipment and the test for Part 1. The Groundwater Foundation will provide the Hydrogeology Challenge scenario URL, background notes, answer sheets, keys and other resources for Parts 1 & 2 if requested.**
   b. Students may bring a calculator, writing utensils, a protractor and each team may bring one 8.5"x11" sheet of paper that may contain information on both sides in any form from any source.

3. **THE COMPETITION:** Students will be given Parts 1 - 3 at the beginning of the event and have 50 minutes to complete them in any order. Students will complete Parts 2 & 3 using a scenario **provided by the supervisor or The Groundwater Foundation if requested**. See http://groundwater.beehere.net for sample computer model program and practice scenarios.
   a. **Part 1**: Students take a written test that must consist of at least one question related to each of the following areas: the fundamentals of groundwater and hydrogeology, surface-groundwater interactions, the relation of groundwater flow to geologic structure, and the management of contaminated groundwater. Questions can be multiple choice, true/false, fill in the blank, or short answer.
   b. **Part 2**: Students will use and manipulate the scenario provided by the supervisor. Static pumping conditions will be used in the scenario to answer questions.
      i. Supervisors will provide the Hydrogeology Challenge scenario URL to students.
      ii. Students must fully complete the scenario for three wells in static conditions. The three wells will be provided by the supervisor (For example: Wells A, B, and C).
      iii. Students will submit results online.
   c. **Part 3**: The supervisor will provide a **situation in which a contaminant is introduced.** Students will: 1) evaluate the risk of contamination to wells in the Hydrogeology Challenge scenario, 2) explain any and all assumptions that were made in their analysis, and 3) complete a Remediation Techniques Table.
      i. The **situation** must include the following: a **contaminant** (from the Contaminant Table found online), a **contamination** source to be located at one well**, and at least one well must be pumping water (non-static conditions)**. The **situation** may include **information on** well types, well uses, and/or any other information the supervisor deems relevant.
      ii. Students will manipulate the Hydrogeology Challenge scenario to determine which wells are at risk of contamination and approximately how long until the contamination may occur.
      iii. Students will fill out a Remediation Techniques Table for the given **situation** (see example table online). The supervisor will provide the remediation techniques in the Remediation Techniques Table. The student will have to fill out: the remediation technique definition, whether the technique is in-situ or ex-situ, the type of technique (chemical, biological, etc.), the **relative** cost of the technique (low, medium, or high), and whether the technique is applicable to the contamination given in the **situation**. Students and supervisors may use the Remediation Table for Hydrogeology (located online) as a guide, but are not limited to the techniques listed in this resource.
      iv. Students will use their results from the Hydrogeology Challenge and Remediation Techniques Table to answer questions about the **situation**. Questions can be multiple choice, true/false, fill in the blank, or short answer.

4. **SCORING:** Highest total score wins. **(Part 1 = 30%, Part 2 =10%, Part 3 = 60%).** First tiebreaker: highest score on Part 3. Second tiebreaker: highest score on pre-selected questions from Part 1. Answers must include units where appropriate.

Recommended Resources: All reference and training resources including the **Hydrogeology DVD (HGD)** and the **Problem Solving and Technology CD (PTCD)** are available on the Official Science Olympiad Store or Website at www.soinc.org. For rules questions go to FAQs and for more information or help go to www.groundwater.org/so.html

THIS EVENT IS SPONORED BY THE GROUNDWATER FOUNDATION