Modeling Groundwater Flow and Pollution Transport

The Model illustrates key concepts in groundwater flow.

Curriculum/State Standards
Std 1: Analysis, Inquiry and Design
Std. 4: Science
Std. 7: Interdisciplinary Problem Solving
Performance Indicator 1.2g

Overview
Through the use of the Groundwater Flow Model, several activities can be developed to illustrate key concepts in groundwater flow. Groundwater pollution is then demonstrated and protection of this resource can be discussed.

The concept of groundwater flow is difficult to present since its movement is unseen. The Groundwater Model effectively illustrates this unseen movement. Groundwater is often the source for our drinking water and protecting this resource from pollution is vital. The model demonstrates pollution flow and how certain factors may affect this process. Discussions naturally channel to how to protect this resource.

Objectives
The student will identify basic components of an aquifer.
The student will see how soil permeability affects groundwater flow to a well.
The student will list three sources of groundwater pollution.
The student will describe the relationship between soil permeability and rate of pollution transport.
The student will list two other factors that may influence the rate of pollution transport.
The student will discuss the impact humans have on an aquifer.
The student will develop several ways we can protect our aquifer, including technological and legislative actions.

Materials
Groundwater Model, 10cc syringe, food coloring, 10 feet of ½” diameter plastic tubing

Readiness Activity
notes/video on groundwater
field trip to a local environmental drilling company to observe a well drilling demonstration.

Strategies/Activities
Brief explanation of the model components relating it to our local geology.
1. Review terms such as well, water table, saturated zone, unsaturated zone, infiltration, permeability.
2. Using a washable overhead marker, have several students label the above terms on the model.
3. Fill up the model and begin pumping, showing how well drawdown occurs.
4. Discuss natural fluctuations in our water table and human impact on it and how our groundwater is recharged.
5. Place colored water in potential contamination sources and observe pollution transport.
6. Pump wells to show how this affects pollution transport.
7. Discuss what factors affect pollution transport.
8. Identify at least four potential sources of groundwater pollution.
9. Discuss ways to protect the aquifer.

Culminating Activity
Design and construct a "Groundwater Model"

THIS WINNING PROJECT IDEA SUBMITTED BY:
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Newsletter” for parents and community leaders. The newsletter will describe our aquifer and its characteristics, its importance to our community and the need for enforceable guidelines as to its use and protection.

Evaluation Method
1. An on-line investigation was used:
(http://classzone.com/books/earth_science/terc/content/investigations/es1401/es1401page01.cfm?chapter_no=investigation
2. Unit exam consisting of multiple choice and free response type questions.
3. Grading rubric used for the newsletter evaluation.