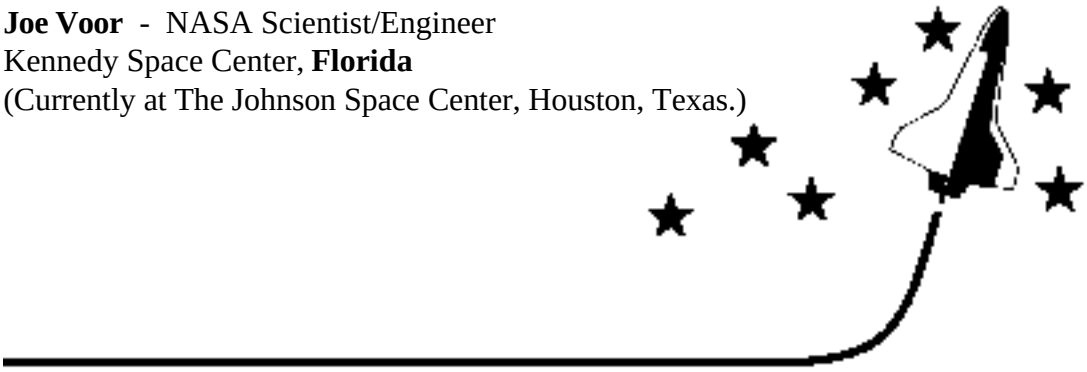
SPINOFFS

Spinoffs are relatively short learning modules inspired by the LTAs. They can be easily implemented to support student learning in courses ranging from prealgebra through calculus. The Spinoffs typically give students an opportunity to use mathematics in a real world context.

LuAnn Malik - AMATYC Writing Team Member
Community College Of Aurora, Aurora, **Colorado**
(Currently at Community College of Arapahoe, Colorado)

Pete Wildman - AMATYC Writing Team Member
Casper College, Casper, **Wyoming**

Joe Voor - NASA Scientist/Engineer
Kennedy Space Center, **Florida**
(Currently at The Johnson Space Center, Houston, Texas.)



Project Grant Team

John S. Pazdar
Project Director
Capital Comm-Tech College
Hartford, Connecticut

Patricia L. Hirschy
Principal Investigator
Asnuntuck Comm-Tech College
Enfield, Connecticut

This project was supported, in part, by the
National Science Foundation
Opinions expressed are those of the authors
and not necessarily those of the Foundation

Peter A. Wursthorn
Principal Investigator
Capital Comm-Tech College
Hartford, Connecticut

SPINOFF 5D

Using the World Wide Web to Do Risk Assessment

Most risk assessors do not have all the data at their fingertips that they need to complete their jobs. As you saw in the LTA, the Slope Factor was an important element of the Cancer Risk calculation and the Reference Dose was an important element of the Hazard Quotient calculation. The Environmental Protection Agency provides this data for each potentially toxic chemical. A risk assessor can have a great deal of difficulty finding this data. This data is probably not easily located in his/her office. It is even possible that the needed data is not available at local libraries.

Because of this situation, the EPA has set up a world wide web service called the Integrated Risk Information System (IRIS). By using IRIS, risk assessors can get the information they need quickly and easily.

Activities:

1) Log on the internet and locate the IRIS system at the following address:
   www.epa.gov/ngispgm3/iris

   There are many hot links at this site to other parts of the EPA system. Use the glossary of risk-assessment related terms to find the meanings of the following terms.

   Attributable Risk

   Estimated Exposure Dose

   Incidence Rate

   Organoleptic

   Slope Factor

2) Using the IRIS site listed, double click on the hot link to List of IRIS Substance Files with links to each file. This will bring you to a list of toxic chemicals which are links to files that give you information about the chemical. Use this system to find the Slope Factor and oral Reference Dose (if applicable) for each of the following chemicals:

   Acetone

   Benzidine

   Cyanide, free

Harmony

Asbestos

3) Use the IRIS system to do some actual risk assessment. Below you are given the chemical concentration of pollutants found at a site. For each site you should:
   a) Do the risk calculations (Cancer Risk and Hazard Quotient) for each chemical for the given pathway. You should also compute the pathway sums and total Cancer Risk and Hazard Quotient for the pathway.
   b) Analyze whether the Cancer Risk or Hazard Quotient determines a need for clean up at the given site. Use the EPA maximum levels for Cancer Risk and Hazard Quotients given in the LTA for your analysis.
   c) Write a memo to your supervisor stating your reasons for you answer in 3b. Be certain to give convincing details.

To make things easier you may assume that you are investigating a site that is only available to industrial workers (like the Hansom Landfill Site). You may also assume that the intake rates, exposure assumptions and intake factors are identical to those given in the LTA. You should also assume that the pathway is always ingestion of soil.

Risk Site Scenarios:

I) You are given the following chemical concentrations
   Barium 3.467E-01 mg/kg
   Carbaryl 1.502E+01 mg/kg
   Selenium 1.00345E-01 mg/kg

II) You are given the following chemical concentrations
   Arsenic 1.456E+00 mg/kg
   Styrene 2.356E-02 mg/kg
   Potassium Cyanide 3.56102E+00 mg/kg
   Glyphosate 4.567E+01 mg/kg

III) You are given the following chemical concentrations
   Di(2-ethylhexal)phthalate 2.569E+02 mg/kg
   o-Chlorotouline 1.056E+00 mg/kg
   Benzoic Acid 9.56E-02 mg/kg

4) You can use the EPA web site to search for toxic emissions during recent years in your zip code. From the EPA's home page (www.epa.gov) select the search by zip code button and enter your zip code or a nearby zip code and search for recent toxic emissions. Find a site with recent toxic emissions and determine if the emission poses a risk to the local community. If necessary calculate the Cancer Risk and/or Hazard Quotient associated with the emission.