

ENGINEERS

turning

tech
days
2004

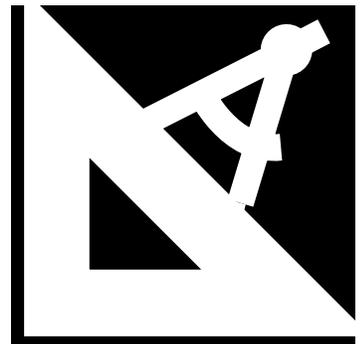
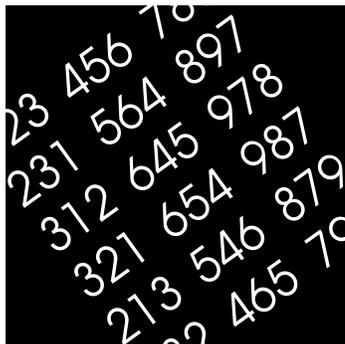
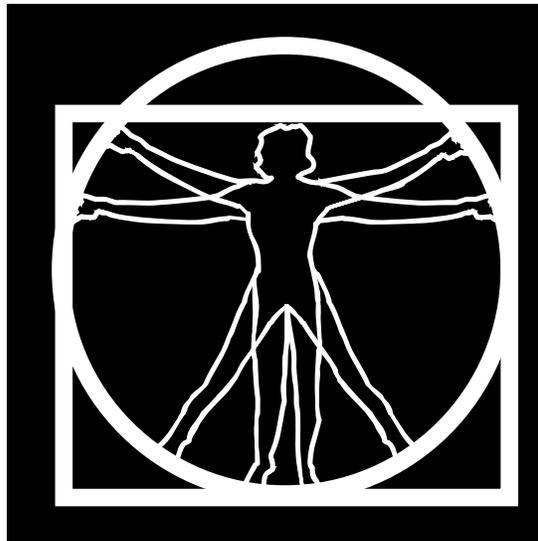
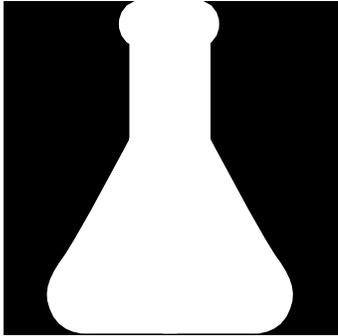
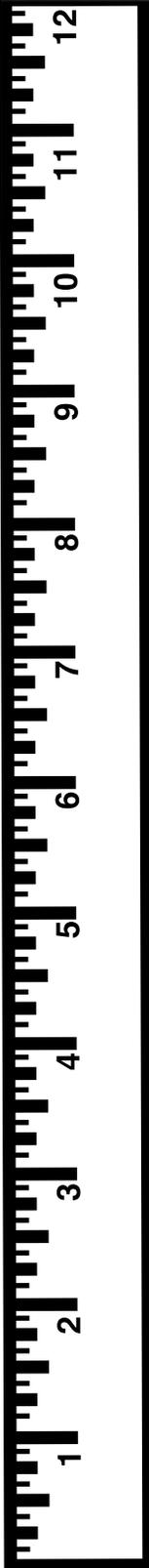
REALITY

ideas into

tech days 2004

FEBRUARY 10 - 11

Exhibits Descriptions



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Eloy Saldivar
James Sproull
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Harold Sturm

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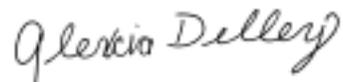
I am pleased to welcome you to Technology Days 2004. This is an annual event sponsored by the Savannah River Site (SRS) and is part of National Engineers Week. Again this year we will present Technology Days at the National Science Center's Fort Discovery, which has proven to be an exceptional venue for the event because of its broad range of interactive displays.

The theme of Technology Days 2004 is "Engineers: Turning Ideas Into Reality." Our goal is to challenge students to think about how technology is a factor in their daily lives and how they can become a part of it. We want them to think about why things work the way they do. In order to accomplish this goal, each exhibit will be categorized by National Math and Science Standards, and will serve to inform students of the school subjects they should study if they want to pursue a career demonstrated by the exhibit. In addition to the SRS exhibits, we will have exhibits and presentations from the Savannah River Ecology Laboratory, the Medical College of Georgia, local television weather stations, and the popular Jabberwok. This year, the Family Night will feature science project presentations by local middle and high school students.

This booklet is provided to help you select as many exhibits as time permits for you and your students to attend. On the following pages are brief synopses provided by our exhibitors that describe their cutting edge technologies, some of which can be found only at SRS.

As the Technology Days 2004 Chair, I am excited to welcome you and your students to this event and hope that you find it rewarding and educationally challenging.

Sincerely,



Alexcia Delley

Chair, SRS Technology Days 2004

National Math and Science Subject Categories

New this year, exhibitors are asked to identify a science and math subject category illustrated by their exhibit. These categories are geared toward National Math and Science Standards, and will serve to inform students of the school subjects they should study if they want to pursue a career demonstrated by the exhibit.

The math and science subjects the exhibitors designate will be displayed with their exhibit during the 2004 Technology Days. Exhibitors will be requested to explain to the students the importance of studying the educational subjects they identify, in the event the student wants to pursue a career demonstrated by the exhibit.

Here's how it works: If, for example, your students are interested in the exhibit that is demonstrating a Virtual Sports System, they will see a poster at the booth with two colors and two symbols: Red with the symbol for Earth and Space Science, and Light Purple with the symbol for Numbers and Operations. These colors and symbols indicate that students who would like to pursue a career in Simulation Technology should make sure they study both Earth and Space Science, and Numbers and Operations, in addition to other classes identified by their particular school.

The color codes for the exhibits are listed below to help you identify exhibits of interest to you and your students during Technology Days. The National Math and Science Category symbols are defined on pages v and vi. The symbols are displayed next to the exhibit descriptions provided in this book to help you identify exhibits of interest to you and your students both before and during Technology Days. The National Math and Science Category definitions are provided on page vii to help you and your students understand the categories.

Math Category

Color Code

Algebra	Purple
Geometry	Light Green
Measurement	Orange
Data Analysis & Probability	Light Blue
Numbers & Operations	Light Purple

Science Category

Color Code

Life Science	Blue
Earth & Space Science	Red
Physical Science	Yellow
Science & Technology	Green

CSRA Science Forum

New this year to SRS Technology Days, the CSRA Science Forum is featuring a competition among middle and high school students who will present scientific or engineering research projects to a panel of judges and members of the audience on February 10, 4:30-7:30 p.m.

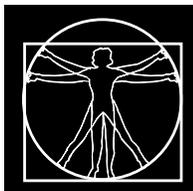
The Science Forum will highlight the practical application of science and math skills students learn in the classroom. Although the presentations will feature primarily science fair projects, other research work such as Invention Fair, Engineering Fair, Boy and Girl Scouts, and 4-H exhibits are eligible.

During the competition, Science Forum participants will describe their scientific or engineering research projects in 10-minute presentations, followed by 5-minute question-and-answer sessions conducted by the judges. Contestants will be judged on poise, voice, organization of presentation, visual aids, content knowledge, and project creativity. Students who present evidence of original or independent thinking will earn higher scores during the competition.

The CSRA Science Forum is cosponsored by SRS Technology Days and the CSRA Science and Engineering Fair, Inc., and is open to students in grades 6 through 12. Make plans now to attend this exciting science and engineering project competition.

Exhibits Contents

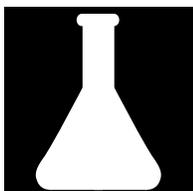
**Science
Category
Symbols**



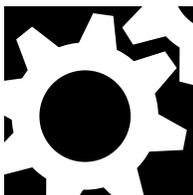
Life Science Exhibits 1



Earth & Space Science Exhibits 3



Physical Science Exhibits 7



Science & Technology Exhibits 12

Math Category Legend

Symbol

Math Category



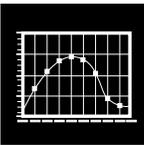
----- Measurement



----- Geometry



----- Algebra



----- Data Analysis & Probability



----- Number & Operations

Math and Science Subject Category Descriptions

Science Categories

Life Science

- Structure and function in living systems
- Reproduction and heredity
- Regulation and behavior
- Populations and ecosystem
- Diversity and adaptations of organisms

Science & Technology

- Abilities of technological design
- Identify appropriate problems for technological design
- Design a solution or product
- Implement a proposed design
- Evaluate completed technological designs or products
- Communicate the process of technological design

Earth & Space Science

- Structure of the earth
- Earth's history
- Earth in the solar system

Physical Science

- Properties and changes of properties in matter
- Motions and forces
- Transfer of energy

Math Categories

Algebra

- Understand patterns, relations and functions
- Represent and analyze mathematical situations and structures using algebraic symbols
- Use mathematical models to represent and understand quantitative relationships
- Analyze change in various contexts

Geometry

- Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships
- Specify locations and describe spatial relationships using coordinate geometry and other representational systems
- Apply transformations and use symmetry to analyze mathematical situations
- Use visualization, spatial reasoning and geometry modeling to solve problems

Data Analysis and Probability

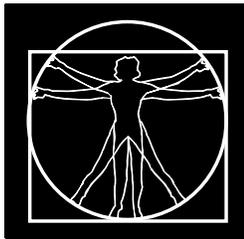
- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them
- Select and use appropriate statistical methods to analyze data
- Develop and evaluate inferences and predictions that are based on data
- Understand and apply basic concepts of probability

Measurement

- Understand measurable attributes of objects and the units, systems, and processes of measurement
- Apply appropriate techniques, tools, and formulas to determine measurements

Number and Operations

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
- Understand meanings of operations and how they relate to one another



Life Science Exhibits

South Carolina Regional Future City Competition Display

Monica Mace

Booth # 17

Math Category: Measurement and Geometry

Have you ever thought about creating a city underwater or on the moon, where people travel in flying cars and students don't go to school because they learn in their sleep? Well, now's your chance. The models on display in the Future City Competition have been built by middle school students. Find out how your school can become involved in the competition that sends students to Space Camp. Future City is a National Design Competition for middle school students, who use SIMCITY software to design and build a City of the Future, while working with a teacher and engineer mentor. Models built by past students will be on display.



WSRC Recruiting

Susan Carlisle

Booth #21

Math Category: Not Applicable

If you ever wonder what types of work are performed at the Savannah River Site, don't miss this exhibit. Examples of technologies used at SRS will illustrate the diversity of the work force, as well as the work performed. Students interested in pursuing a career as a scientist, engineer, or in a technology-related field will have an opportunity to visit with SRS representatives about WSRC job opportunities in South Carolina, as well as worldwide.

Environmental Monitoring at SRS

Peter Fledderman

Booth # 43

Math Category: Measurement

Environmental monitoring programs are established to protect people, animals, and the environment. Students will learn the importance of environmental monitoring programs and the role that scientists play in their development and implementation. Various pieces of monitoring equipment will be demonstrated, including methods used at the Savannah River Site to monitor the environment for contamination.



When Soil Gets Dirty



Jim Mason

Booth #53

Math Category: Measurement, Geometry, Algebra, and Data Analysis & Probability

What happens when contaminants are released to the soil? Students will learn the answer to that question when they watch a demonstration of the Edible Earth Parfait, a groundwater contamination model prepared with ice cream and a soft drink. Soil and groundwater remediation strategies and technologies will be discussed with the students, before they are invited to eat the Parfait.



Earth & Space Science Exhibits

Virtual Sports System

Fort Discovery

Booth #1

Math Category: Number & Operations

One of the Fort Discovery exhibits, the Virtual Sports System demonstrates how simulation technology can be used to participate in one of several sporting events.



Global Positioning System (GPS)

Fort Discovery

Booth #3

Math Category: Geometry

The Global Positioning System, one of the Fort Discovery exhibits, demonstrates how a network of satellites around the Earth provides precise measurements of time, latitude, and longitude.



Maglev Transportation

Fort Discovery

Booth #4

Math Category: Measurement

Fort Discovery's Maglev Transportation simulates the "floating effect" caused by magnetic repulsion.



Human Gyro

Fort Discovery

Booth #7

Math Category: Geometry

One of the Fort Discovery exhibits, the Human Gyro, gives students an opportunity to experience horizontal, longitudinal, and vertical motion, all at the same time.



Environmental Geology at SRS and Drinking Water Quality



Jessica Witt

Booth #11

Math Category: Data Analysis & Probability

Environmental geology involves studying qualities of our environment, such as the land, water (ground and surface), and air. It provides a better understanding of the world in which we live. At the Savannah River Site, environmental geology also includes removing hazardous and non-hazardous waste from the environment. Students will learn about aquifer specimens and the basic tools used by geologists. By participating in an interactive exercise, they will determine where water may have been stored within an aquifer and have the opportunity to examine microscopes, rocks, and minerals. In addition, they will learn the origin of drinking water, and become familiar with aquifers, including the importance of maintaining their cleanliness for future generations.

WSRC Recruiting

Susan Carlisle

Booth #21

Math Category: Not Applicable

If you ever wonder what types of work are performed at the Savannah River Site, don't miss this exhibit. Examples of technologies used at SRS will illustrate the diversity of the work force, as well as the work performed. Students interested in pursuing a career as a scientist, engineer, or in a technology-related field will have an opportunity to visit with SRS representatives about WSRC job opportunities in South Carolina, as well as worldwide.

New Technologies in Waste Minimization and Pollution Prevention

Sarita Berry and Russ Muschick

Booth #51

Math Category: Not Applicable

Pollution prevention and waste minimization have become major issues in America. At SRS, engineers encounter contaminated equipment in need of decontamination. Decontaminating equipment allows the equipment either to be reused or disposed of as non-contaminated. Disposal of non-contaminated equipment is much more cost effective than disposal of radiological or hazardous waste. Recycling, waste minimization, and pollution prevention methods used at the Savannah River Site will be on display. Specific emphasis will be placed on the use of renewable biofuels to replace fossil fuels for steam generation in boilers used at SRS. Students will have an

opportunity to participate in a pollution prevention game, and will have fun with a hand-powered pelletizer. A video tour of the SRS steam plant, which uses processed engineered fuel, will be available for viewing.

Waste Glass Melting at DWPF



Jim Sproull

Booth #52

Math Category: Data Analysis & Probability

Temperatures of up to 2100 degrees F are used at the Savannah River Site to melt high-level waste into glass. At the SRS Defense Waste Processing Facility, opaque stainless steel canisters are filled with the molten glass and then stored for final processing. Students will learn how an infrared camera is used to measure the height of the glass in a canister, and why the equipment must be used from a remote location. Samples of simulated glass marbles will be provided to the students.

When Soil Gets Dirty



Jim Mason

Booth #53

Math Category: Measurement, Geometry, Algebra, and Data Analysis & Probability



What happens when contaminants are released to the soil? Students will learn the answer to that question when they watch a demonstration of the Edible Earth Parfait, a groundwater contamination model prepared with ice cream and a soft drink. Soil and groundwater remediation strategies and technologies will be discussed with the students, before they are invited to eat the Parfait.

Do You Have the Energy to Clean Up?



Dennis Jackson

Booth #55

Math Category: Measurement and Data Analysis & Probability

Several technologies developed at the Savannah River Site will be on display to help students understand new processes used to clean up soil and groundwater. Students also will have an opportunity to operate the models, and to calculate measurements using the Baroball, Deep Charge Aquifer, and Foster, which are used to measure the volume of water and/or the carbon dioxide concentration.

Earthquake Monitoring at SRS



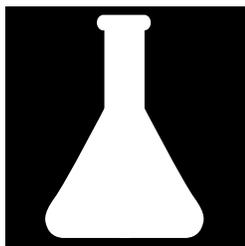
Don Stevenson

Booth #72

Math Category: Measurement, Geometry, Algebra, and Data Analysis & Probability



One of the most important functions of a seismologist is to use seismic recording technology to monitor vibrations of the earth. A seismograph will graphically demonstrate ground motion produced by students who wish to participate. Students will discover the historic and current earthquake locations on both a local and regional scale, while they make their own earthquakes using a working seismograph and sensor. An old seismic trigger recovered from the Savannah River Site's K Reactor, which was used to initiate the dropping of reactor control rods in the event of a large earthquake, will be on display.



Physical Science Exhibits



Tesla Coil (Lightning Show)

Fort Discovery

Booth #5

Math Category: Measurement

Named after the inventor, Nickoli Tesla, Fort Discovery's Lightning Show demonstrates the creation of lightning, using a resonant high voltage generator.



Thermal Imaging

Fort Discovery

Booth #8

Math Category: Measurement

Thermal Imaging, one of the Fort Discovery exhibits, demonstrates the use of infrared radiation (a form of invisible light) to create a visible image.



Captured Shadow

Fort Discovery

Booth #9

Math Category: Measurement

As one of the Fort Discovery exhibits, students will see how light is emitted after a source of radiation (phosphorescence) is removed.



High Wire Bike

Fort Discovery

Booth #10

Math Category: Measurement

The High Wire Bike, a Fort Discovery exhibit, will demonstrate to students how a low center of mass relates to balance.

Properties of Cryogenic Liquids



Allen Taylor

Booth #16

Math Category: Measurement

Through the use of simple demonstrations, students will learn about some of the properties of cryogenic liquid, such as how rapidly it boils and the fog it creates. The demonstrations will show how soft materials become brittle and metal shrinks with exposure to the liquid. In addition, students will gain an appreciation for how information learned in the classroom can be applied in the work place.

The Power of a Vacuum



Michael Autry and Annamarie Herb

Booth # 24

Math Category: Algebra

Facilities at SRS handle various gases during process operations. Students will learn how SRS uses pumps to move gases while performing a simple, algebraic equation to predict a change in pressure due to a change in volume. The students will open and close valves on a pressurized line to cause these pressure/volume changes, and then compare the calculations that they performed to the actual pressure readings on the vessel gauges. To demonstrate the power of a vacuum, a pump will be used to evacuate a box. The box has a line and valve that are connected to an empty, open soda can. When the valve between the evacuated box and soda can is opened, students will see the can collapse violently. Students will learn why the can collapsed, what a vacuum is, and how vacuums are used in industry.

Yellow Submarine

Janine Horn

Booth #31

Math Category: Not Applicable

The Savannah River Site uses engineered instruments to manipulate the flow and pressure of gaseous material. Using a toy submarine in a tank, students will have an opportunity to use manual valves to control the gas flow of compressed air to raise the submarine to the surface. Pressure gauges set up on the air lines will indicate the amount of air pressure. Students will see how gas flow and pressure change can make the submarine rise and lower in the tank.

Light Your Path with Math



Steve R. Smith

Booth #33

Math Category: Algebra and Measurement

Kirchoff's physical science law states that electric current flows in a loop. This exhibit challenges students to connect the appropriate wires from multiple lights that allow electricity to flow in a loop and light a bulb. After lighting the bulb, students will use a formula to calculate the quantity of electric current they control in the light and an ammeter to verify the calculated current flow.

Go with the Flow



Dan Wojtowicz

Booth #34

Math Category: Measurement

Proper heating, ventilation, and air-conditioning (HVAC) are extremely important at SRS, especially for ventilation systems that are used to maintain control of airborne contamination in processing facilities. Regularly scheduled testing of these systems is critical to ensure proper performance. Students will see a demonstration of the various instruments used to measure airflow, along with fun ways to look at some of the factors that influence air flow properties (i.e., temperature, pressure, and humidity). As a practical exercise, students will interact with the test engineer in performing airflow measurements throughout the demonstration.

Making Sparks: Introduction to Electrical Principles



Pamela Grooms

Booth #36

Math Category: Number & Operations, Measurement, and Data Analysis & Probability



Almost everything uses electricity to operate. Students will learn the basic principles of electricity through several hands-on demonstrations involving an oversized, homemade capacitor and a battery. Students also will make their own transistor radio that will tune to AM and FM stations. Problem-solving situations will help students understand the importance of respecting electricity and the functions of basic electrical components.

Design and Performance of Light-Weight Bridges



Sharma Pogula
 Booth #37
 Math Category: Geometry

Bridges provide access across many of our local waterways. This exhibit provides students hands-on experience to help them understand the application of structural design principles. Students will design model bridges with light-weight wood and demonstrate the effectiveness of truss design by applying loads to their bridge. Models of various designs of bridges and trusses will be on display for discussion.

Waste Glass Melting at DWPF



Jim Sproull
 Booth #52
 Math Category: Data Analysis & Probability

Temperatures of up to 2100 degrees F are used at the Savannah River Site to melt high-level waste into glass. At the SRS Defense Waste Processing Facility, opaque stainless steel canisters are filled with the molten glass and then stored for final processing. Students will learn how an infrared camera is used to measure the height of the glass in a canister, and why the equipment must be used from a remote location. Samples of simulated glass marbles will be provided to the students.

When Soil Gets Dirty



Jim Mason
 Booth #53
 Math Category: Measurement, Geometry, Algebra, and Data Analysis & Probability



What happens when contaminants are released to the soil? Students will learn the answer to that question when they watch a demonstration of the Edible Earth Parfait, a groundwater contamination model prepared with ice cream and a soft drink. Soil and groundwater remediation strategies and technologies will be discussed with the students, before they are invited to eat the Parfait.

A Glovebox is Not Just for Your Driving Glasses



Peter Gourdin

Booth #70

Math Category: Measurement

Specially designed enclosures called gloveboxes are used at the Savannah River Site to protect employees from radiological exposure while performing specific tasks. Students will have an opportunity to experience working in a glovebox environment by manipulating actual gloves mounted in a lexan glovebox to perform tasks such as weighing, scooping simulated material into beakers, and performing simple maintenance-type functions that are expected of a glovebox operator at SRS. A demonstration will feature basic engineering principles and concepts such as ventilation design, equipment design, basic glovebox design, and mechanical engineering.

Advancing Hydrogen as a Safe Transportation Fuel

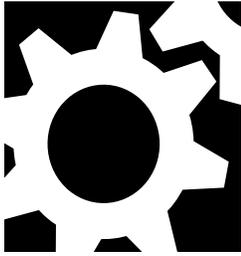


Martin G. Scott

Booth #71

Math Category: Algebra

Hydrogen is an abundant, renewable, non-polluting energy resource that is widely recognized as the fuel of the future. The Hydrogen Technology Laboratory at the Savannah River Technology Center (HyTech), in conjunction with other government agencies, academia and industry, seeks to promote the development of hydrogen technology. A key hydrogen technology used in the production facilities at SRS is metal hydrides, which safely store hydrogen in a compact, solid form at low pressures. Utilizing metal hydrides, HyTech has developed on-board storage systems for use in several prototype vehicles, and is seeking to integrate its hydrogen technology with the growing market of Proton Exchange Membrane fuel cells. Students will have an opportunity to “drive” a remote-controlled hydrogen-fuel cell vehicle and to operate a hydrogen fuel cell-powered train. Posters, displays, and demonstrations will illustrate the composition of hydrogen, where it can be found, and how it can be used.



Science & Technology Exhibits



Coupled Pendulums

Fort Discovery

Booth #2

Math Category: Measurement

One of the Fort Discovery exhibits, Coupled Pendulums, demonstrates how energy (in this case in the form of motion) can be transferred.



Virtual Reality Bikes

Fort Discovery

Booth #6

Math Category: Measurement

One of the Fort Discovery exhibits, Virtual Reality Bikes, demonstrates the use of virtual reality to perform physical exercise.



Seismic Tritium Confinement System—Earthquake Safety System

Glenn Mathues

Booth #12

Math Category: Measurement

In the event of an earthquake, it is important to be able to confine tritium gas in vessels that are designed to protect the public from being inadvertently exposed to the radioactive material. Students will be able to simulate an earthquake and see an actual confinement valve on the seismic detection and control system close, preventing a tritium release. They will learn the basic principles of how material moves in pipes, the opening and closing of valves, and the shutting off of pumps. They also will learn how engineers use their knowledge and education to design, construct, test, and operate a nuclear safety system.

Fire Protection Applications—Now and in the Future



Thomas Allison

Booth #13

Math Category: Data Analysis & Probability

Fire protection is an old, yet little known, engineering field. Students will learn about the various components of a career in fire protection. A fully operational fire alarm panel and sprinkler systems will be available for student interaction, as well as other unique fire protection devices.

Super Sleever—Portable Containment Device

Roger Brown

Booth #14

Math Category: Not Applicable

Developed and licensed through the Savannah River Site, the Super Sleever is a portable containment device used to protect equipment, hoses, cables, and breathing air hoses. Students will participate in a hands-on demonstration to learn how to “sleeve” a 50-foot breathing air hose using the old method of pushing the sleeve over the hose. Then, they will try the new, faster method of using the Super Sleever to contain the hose. Students also will learn how the device was designed and the mechanics of building the sleever.

South Carolina Regional Future City Competition Display



Monica Mace

Booth # 17

Math Category: Measurement and Geometry

Have you ever thought about creating a city underwater or on the moon, where people travel in flying cars and students don't go to school because they learn in their sleep? Well, now's your chance. The models on display in the Future City Competition have been built by middle school students. Find out how your school can become involved in the competition that sends students to Space Camp. Future City is a National Design Competition for middle school students, who use SIMCITY software to design and build a City of the Future, while working with a teacher and engineer mentor. Models built by past students will be on display.

Nondestructive Examination (NDE): Technology for the 21st Century

Marvin Trimm and William R. West

Booth # 18

Math Category: Not Applicable

Nondestructive examination (NDE) is not generally known by the average person who takes for granted that bridges will stand, pumps will keep pumping, and products will not fail. NDE is an industrial tool for assuring quality and reliability. It also contributes to improving economics, and minimizing injuries, loss of life, and production/maintenance costs. Students will operate specialized equipment, including pan and tilt cameras, ultrasonic flaw detectors, infrared cameras, and a mini-submarine to better understand how NDE technology relates to everyday life.

Remote Crane

Matthew Forbes

Booth # 19

Math Category: Not Applicable

Operating a crane can be tricky business, but using a camera to remotely operate a crane requires specific skills. Using the camera, students will remotely operate a crane to move an object from one area or landing pad to another. The crane simulates the remote operation of a crane used in hazardous waste facilities at the Savannah River Site. The crane's functions will be split into stations, where students will sit beside each other and operate their assigned crane function. Students will learn the importance of good communication skills, as well as how engineering makes it possible to perform complex operations to avoid placing people in harm's way.

Automated Nuclear Alarm Tester

John McMahan

Booth # 22

Math Category: Data Analysis & Probability

An electronic instrument can be tested quickly, using a computer-based test system that uses voltage sampling hardware and data analysis and display software. This interactive exhibit will provide students with an opportunity to vary input to an instrument being tested, and to see and hear the resulting operation and the changes in analysis that result from the variations. The exhibit will contrast a traditional manual test with a faster, automated method, and illustrate the equipment developed by engineering to achieve the improvement.



The Power of a Vacuum



Michael Autry and Annamarie Herb

Booth # 24

Math Category: Algebra

Facilities at SRS handle various gases during process operations. Students will learn how SRS uses pumps to move gases while performing a simple, algebraic equation to predict a change in pressure due to a change in volume. The students will open and close valves on a pressurized line to cause these pressure/volume changes, and then compare the calculations that they performed to the actual pressure readings on the vessel gauges. To demonstrate the power of a vacuum, a pump will be used to evacuate a box. The box has a line and valve that are connected to an empty, open soda can. When the valve between the evacuated box and soda can is opened, students will see the can collapse violently. Students will learn why the can collapsed, what a vacuum is, and how vacuums are used in industry.

TRAC—A Mobile Radiation Detection and Monitoring Laboratory



Timothy Brown

Booth # 25

Math Category: Data Analysis & Probability and Measurement

The TRAC vehicle was developed to detect and identify forms of radioactivity in the air, as well as water and soil samples. This vehicle supports the Emergency Response Organization at the Savannah River Site. If an unplanned release of radioactivity should occur, the TRAC vehicle can be deployed to assess the impact and to track the migration of radioactivity at SRS, as well as in the surrounding communities. Students will see an actual demonstration of how radiation-measuring equipment is used on various natural materials.

3-D Approach to Project Design



Drew Negus

Booth #28

Math Category: Geometry

The Savannah River Site uses a comprehensive, intelligent computer-aided design and engineering application called PDS (Plant Design System) to design projects ranging from revamping small facilities to building new, multimillion-dollar buildings. The PDS software consists of an integrated Oracle database and 3-D models that correspond to engineering tasks specific to the design of a plant. Using the SmartPlant Review software, students will have an opportunity to navigate through a 3-D model of SRS nuclear facilities, experiencing the complexities of the nuclear industry and the dynamics of the software used to develop the facilities.

Natural Phenomena Hazard Technology at SRS



Wade Faires

Booth #30

Math Category: Measurement, Geometry, Algebra, and Data Analysis & Probability

We often take for granted that a building has been constructed to protect us against extreme natural phenomena hazards such as wind, floods, snow, earthquakes, and vibration forces. Students will learn how devastating wind and earthquake events can be, how susceptible South Carolina is to these events, and how structures have been designed to accommodate these hazards. In addition, students will be given the opportunity to operate a shaker table – a device that simulates the effects of earthquakes on structures, systems, and components.

Go with the Flow



Dan Wojtowicz

Booth #34

Math Category: Measurement

Proper heating, ventilation, and air-conditioning (HVAC) are extremely important at SRS, especially for ventilation systems that are used to maintain control of airborne contamination in processing facilities. Regularly scheduled testing of these systems is critical to ensure proper performance. Students will see a demonstration of the various instruments used to measure air flow, along with fun ways to look at some of the factors that influence air flow properties (i.e., temperature, pressure, and humidity). As a practical exercise, students will interact with the test engineer in performing airflow measurements throughout the demonstration.

Making Sparks: Introduction to Electrical Principles



Pamela Grooms

Booth #36

Math Category: Number & Operations, Measurement, and Data Analysis & Probability

Almost everything uses electricity to operate. Students will learn the basic principles of electricity through several hands-on demonstrations involving an oversized, homemade capacitor and a battery. Students also will make their own transistor radio that will tune to AM and FM stations. Problem-solving situations will help students understand the importance of respecting electricity and the functions of basic electrical components.

Two-Person Security Rule



John Blair

Booth #38

Math Category: Geometry

Protecting nuclear material is one of the Savannah River Site's most important responsibilities. A board will be used to display a typical room where nuclear materials are stored. Students will learn about the "two-person" and "four-person" security rule by placing toy men in appropriate locations inside the room. The focus of this exhibit is to teach students how to apply problem-solving and geometry skills.

Let "Poly-mer" Do the Dirty Work



Amanda Reedy

Booth #40

Math Category: Measurement

The Savannah River Site is using new technology to reduce the amount of liquid and organic waste generated at the Site. A "foaming technology" will be demonstrated to help students understand how void spaces in large pieces of equipment are filled before disposal of the equipment. Students also will have an opportunity to absorb water and vegetable oil, and to learn how the absorbents are used and why they are environmentally-friendly.

Demonstration of Air Stripper Technology

Joe Kanzleiter

Booth #45

Math Category: Not Applicable

The spill or release on volatile organic compounds (VOCs) to the ground can lead to contamination of the soil and groundwater above safe levels. Air stripping is used as an effective treatment technology to remove the VOCs from the groundwater. A demonstration will simulate the removal of trichloroethylene from wastewater by stripping with air. Popcorn will be used to represent the VOCs, and M&Ms will be used to represent the water source. Students will learn the general concept of air stripping by seeing how a hair dryer or similar blower is used to separate the popcorn (VOC) from the water phase.

Remote Systems and Inspections

Cassy Robinson

Booth #46

Math Category: Not Applicable

To protect SRS employees from exposure to certain types of hazardous materials, remote visual inspections are performed with the use of robotics. Students will participate in demonstrations of video and remote technologies related to robotics. This exhibit illustrates how understanding the science of human vision and the electromagnetic spectrum are applicable to remote viewing, and how robotics attempt to imitate human motions.

New Technologies in Waste Minimization and Pollution Prevention

Sarita Berry and Russ Muschick

Booth #51

Math Category: Not Applicable

Pollution prevention and waste minimization have become major issues in America. At SRS, engineers encounter contaminated equipment in need of decontamination. Decontaminating equipment allows the equipment either to be reused or disposed of as non-contaminated. Disposal of non-contaminated equipment is much more cost effective than disposal of radiological or hazardous waste. Recycling, waste minimization, and pollution prevention methods used at the Savannah River Site will be on display. Specific emphasis will be placed on the use of renewable biofuels to replace fossil fuels for steam generation in boilers used at SRS. Students will have an opportunity to participate in a pollution prevention game, and will have fun with a hand-powered pelletizer. A video tour of the SRS steam plant, which uses processed engineered fuel, will be available for viewing.

Waste Glass Melting at DWPF

Jim Sproull

Booth #52

Math Category: Data Analysis & Probability

Temperatures of up to 2100 degrees F are used at the Savannah River Site to melt high-level waste into glass. At the SRS Defense Waste Processing Facility, opaque stainless steel canisters are filled with the molten glass and then stored for final processing. Students will learn how an infrared camera is used to measure the height of the glass in a canister, and why the equipment must be used from a remote location.



When Soil Gets Dirty



Jim Mason

Booth #53

Math Category: Measurement, Geometry, Algebra, and Data Analysis & Probability



What happens when contaminants are released to the soil? Students will learn the answer to that question when they watch a demonstration of the Edible Earth Parfait, a groundwater contamination model prepared with ice cream and a soft drink. Soil and groundwater remediation strategies and technologies will be discussed with the students, before they are invited to eat the Parfait.

Guide to Safe Waste Disposal

Keith Liner

Booth #54

Math Category: Not Applicable

Everyone is responsible for protecting our environment and quality of life by properly disposing of items such as common household products and harmful chemicals. Students will be asked to identify the proper method of disposing of some of the more common household products. During the discussion, students also will learn innovative ways to reuse material that may otherwise be discarded.

Do You Have the Energy to Clean Up?



Dennis Jackson

Booth #55

Math Category: Measurement and Data Analysis & Probability

Several technologies developed at the Savannah River Site will be on display to help students understand new processes used to clean up soil and groundwater. Students also will have an opportunity to operate the models, and to calculate measurements using the Baroball, Deep Charge Aquifer, and Foster, which are used to measure the volume of water and/or the carbon dioxide concentration.

Moving On Out

Eloy Saldivar, Jr.

Booth #56

Math Category: Not Applicable

Technologies used at the Savannah River Site to reduce the amount of hazardous waste stored in 1.3-million-gallon waste tanks will be discussed with the students. Methods used to predict tank draining volumes, material balances for waste transfers between tanks, and the evaporation process that is used as a means to reduce liquid volumes will also be discussed. A hands-on demonstration will allow students to drain waste from a scaled-down model of a high-level waste tank, transfer the waste to an evaporator, and simulate the concentration of the waste.

Safe Transportation of Spent Nuclear Fuel

Bill Swift

Booth #58

Math Category: Not Applicable

In a world where spent or irradiated nuclear fuel is feared, students will see a demonstration of how this material is moved safely around the world. Students will see a demonstration of how on-site and off-site fuel is delivered to the L-Area Basin and the engineering that is involved in receiving, unloading, and closing fuel casks. In addition, students will learn how transportation hazards are analyzed and controls are developed to minimize those hazards. Scale models of transportation casks will be available to demonstrate how fuel is protected, and videos of casks being tested for their ability to contain material will be available for viewing.

Out With the Bad

Eloy Saldivar, Jr.

Booth #59

Math Category: Not Applicable

Some of the technologies being evaluated to remove cesium and actinides from hazardous waste at the Savannah River Site will be on display. Students will learn how resins and filters work to remove contaminants from a waste stream by participating in a demonstration in which they will throw simulated cesium molecule Velcro balls at a cesium removal column. The final step in the demonstration will be to deposit the waste collected on the column and in the filter in the appropriate SRS facility, helping students better understand the SRS Cleanup Program.

Electrical Blackout: What Can Cause a Blackout and How Electrical Engineers Help to Prevent Them



Adolphus King

Booth #60

Math Category: Algebra, Measurement, and Data Analysis & Probability



The recent blackout in the northeastern United States was the result of a failure in an electrical grid system. To help students better understand electrical system failures, a computer simulation of an electrical grid system will be available for their use. The simulation will enable students to analyze the possible causes of a system failure, which can result in an electrical blackout. Basic electrical principles, such as voltage, current and impedance relationships, also will be explained.

Electronic Physical Security Systems



John Cathey

Booth #61

Math Category: Measurement

Department of Energy Orders require security measures to be in place to protect classified and radioactive information from being released to members of the public who may target DOE facilities or sites for terrorist attacks, to develop of weapons of mass destruction, or to otherwise commit acts detrimental to the U.S. national security. The Savannah River Site uses industry standard burglar alarms and access control devices to provide the necessary levels of security. Students will participate competitively in the operation of security systems, to learn how computers can perform, and control a specific task.

Maintaining Level/Temperature in a Tank with Temperature Indication



Ravi Murugappan

Booth #62

Math Category: Measurement

The temperature and level of radioactive material in a waste tank must be closely monitored to ensure the protection of personnel, the public, and the environment. While observing a model of a typical waste tank, students will learn how solenoid valves maintain the level in a tank, temperature switches turn on and off electrical heaters to maintain temperature, and a thermocouple signal provides input for temperature indication. They also will observe how temperature and the level in a tank can be changed by the addition of chilled water.

Technology in the Classroom

Carolyn Thorpe

Booth #63

Math Category: Not Applicable

Technology is changing the method of learning. In classrooms across the country, communication and collaboration devices of every type, including computers, projectors, digital cameras, camcorders, and interactive whiteboards, are changing how teachers teach and students learn. At the Savannah River Site, a Web-Based Training Conversion Team was established to convert traditional classroom training to web delivery. Students and teachers will be provided an opportunity to use many of the applications and technologies currently used for multimedia training and presentations. In addition, students will have an opportunity to produce a television commercial, using a video camera and film editing and animation software.

The Matrix—Machine vs. Man

A. Marie Coleman

Booth #65

Math Category: Not Applicable

“Smart” technologies, such as microwaves, vending machines, cell phones, and security systems, enhance everyday life. Students will participate in demonstrations of motion detectors, a CCTV system, video motion detectors, and GPS systems that focus on the engineering principles behind “smart” technologies.

Methodology for Cleanliness Testing Involving Process Equipment and Components

Robert Reed

Booth #69

Math Category: Not Applicable

Cleanliness testing is performed on process equipment, components, and piping at the Savannah River Site to products meet quality specifications for hydrocarbon or oil contaminants. Students will learn how to detect whether a piece of equipment or a process component is contaminated or clean by taking readings with the instruments. In addition, students will learn about the latest technological advances in infrared methodologies for cleanliness-testing applications in nuclear facilities.

A Glovebox is Not Just for Your Driving Glasses



Peter Gourdin

Booth #70

Math Category: Measurement

Specially designed enclosures called gloveboxes are used at the Savannah River Site to protect employees from radiological exposure while performing specific tasks. Students will have an opportunity to experience working in a glovebox environment by manipulating actual gloves mounted in a lexan glovebox to perform tasks such as weighing, scooping simulated material into beakers, and performing simple maintenance-type functions that are expected of a glovebox operator at SRS. A demonstration will feature basic engineering principles and concepts such as ventilation design, equipment design, basic glovebox design, and mechanical engineering.

RI Inspection Tools



Roland Sasser

Booth #73

Math Category: Measurement

Thread gauges, micrometers, dial calipers, and a Scopeman optical enhancement device are tools used to inspect various materials that are received at the Savannah River Site. Students will have an opportunity to interact with approximately 20 inspection tools that will be on display. The Scopeman, an optical enhancement device, may be of particular interest to students. This tool is used to magnify small details, such as those on U.S. currency that are invisible to the naked eye, imperfections in skin, jewelry, and clothing, and display them on a computer monitor.

Zoom Into Engineering

WSRC and the Ruth Patrick Science Education Center

Booth #75

Math Category: Not Applicable

Zoom™ is a daily PBS television series that challenges children to explore, experiment, and share their creativity. The Traveling Science and Mathematics demonstrations program, a partnership between the Westinghouse Savannah River Company and the Ruth Patrick Science Education Center, will be highlighted. Students will have an opportunity to build “puff mobiles” and “paper towers,” and to experience a liquid nitrogen demonstration.

USC—Project Lead the Way

Charles Brice

Booth #84

Math Category: Not Applicable

Project Lead the Way is a national alliance for pre-engineering programs. The objective is to address the needs in America, now and in the future, for highly skilled technology workers. Students will learn how, through Project Lead the Way, high school students can earn college credit for engineering courses taken in high school. In addition, students will learn about the Middle School Gateway to Technology program. Gateway to Technology is “activity oriented” to show students how technology is used in engineering to solve everyday problems.