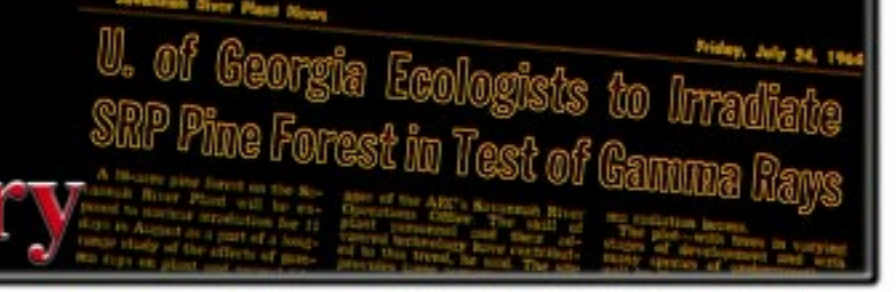
the History of Radioecology Research at the Savannah River Ecology Laboratory


Savannah River Plant News

Friday, July 24, 1964

U. of Georgia Ecologists to Irradiate SRP Pine Forest in Test of Gamma Rays

Radioecology is the study of the sources, transport, fate, and effects of radionuclides in the biosphere. Research on radioecology at the Savannah River Ecology Laboratory (SREL) dates back almost to the time SREL was founded in 1951 by Dr. Eugene Odum, a professor at the University of Georgia and one of the pioneers of radioecology. Over the years SREL has developed an international reputation in radioecology and almost 200 scientific publications in radioecology have resulted from research studies conducted by scientists working at SREL, an accomplishment rivaling that of any other laboratory in the world. Today, SREL is one of the few institutions in the U.S. conducting research in radioecology. The overall objectives of SREL research in radioecology have been to:

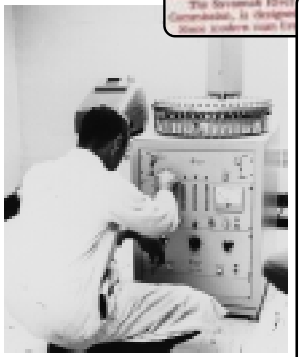
- Understand the transport, fate and effects of radionuclides in the environment,
- Conduct research on basic ecological processes using radioisotope tracers, and
- Use the opportunities and resources available at the Department of Energy's Savannah River Site (SRS) to train students in radiological principles and techniques.


Dr. Eugene Odum

Some of the earliest work in radioecology at SREL consisted of studying the effects of radiation in natural environmental settings by exposing plants and animals to controlled radiation doses under laboratory and field conditions. This was done by constructing radiation sources and irradiating plants and animals. At the time this work was done in the 1950s and 1960s, little was known about the effects of ionizing radiation, or what the ecological consequences might be of a nuclear reactor accident or nuclear war. Later on, similar studies were also conducted at other Department of Energy sites and the results of these studies formed the original base of knowledge for what is known about the effects of radionuclides on plants and animals. More recently, studies have been initiated at the site of the Chornobyl nuclear reactor accident using newly developed techniques in molecular biology to assess whether genetic effects may


ANIMAL RESEARCH—Technicians check an irradiated field mouse at the Savannah River Ecology Laboratory. The animal was exposed to the radiation as a part of the center's research for the AEC.

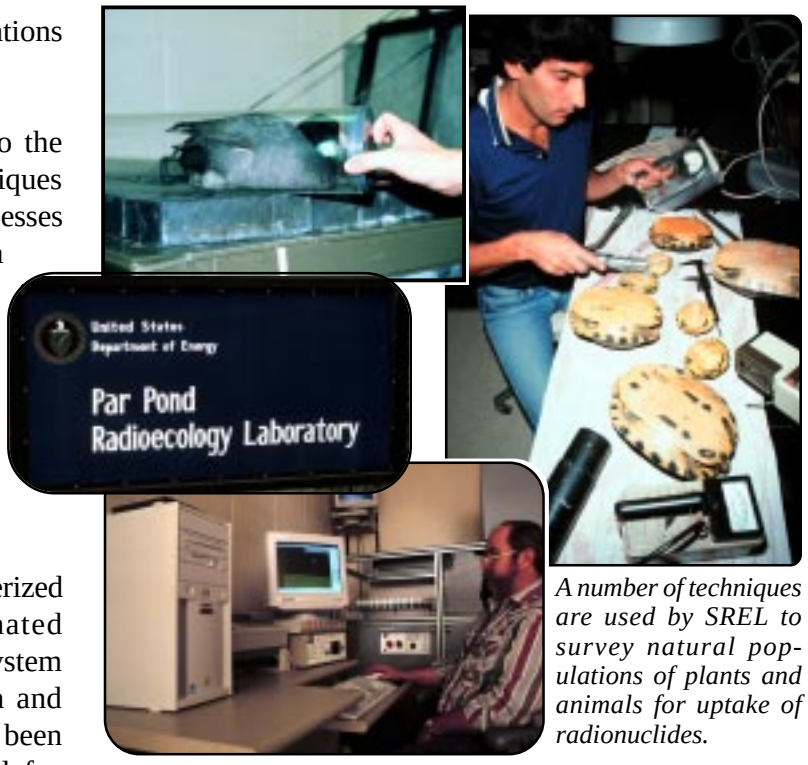
Georgia Ecology Center Allows Study Of Radiation Effects on Environment



Early SREL research focused on using tracers, such as phosphorus-32, to study ecological food chains (left photo) and the effects of ionizing radiation on plants and native wildlife. UGA scientists employed an outdoor cesium-137 source that emitted radiation (bottom right photo) and was used for some of these exposure experiments.

have occurred in the resident plant and animal populations as a result of radiation exposure.

Beginning in the 1950s and continuing through to the present, the development and application of techniques using radionuclides as tracers of basic ecological processes have allowed major advances to be made in understanding how ecosystems are structured and function. Using such techniques, significant scientific contributions have been made in determining how chemical elements move through ecosystems, how ecological food webs are structured, and how behavioral and physiological processes operate in individual species.



A number of techniques are used by SREL to survey natural populations of plants and animals for uptake of radionuclides.

Over the years, numerous SREL studies have characterized the distribution of radionuclides in contaminated environments and their occurrence in various ecosystem components such as soils, water, vegetation, fish and wildlife. Information gained from these studies has been important for defining existing conditions and for designing additional research to generate fundamental knowledge about radionuclides, the factors that control their distribution and cycling in space and over time, and reducing the risk they may pose to ecosystems and humans. Such research has shown the importance of seasonal variables in the cycling of radionuclides, the various factors that influence radionuclide uptake in agrosystems, the role of resuspension in transferring soil-borne contaminants onto plant surfaces, and the influence of animals in transporting radionuclides from a contaminated site.

SREL scientists have a long history of studying the effects of radiation on the ecology of the Savannah River Site. Clockwise from top left: Sampling radionuclides in sediment cores from Pond B; monitoring radiocesium levels in SRS alligators; fields being prepared for planting in H-Area in the 1970s, where studies examined the uptake and partitioning of radionuclides in various agricultural crops.

The nuclear reactor accident at Chornobyl in 1986, along with the emphasis on cleanup of contaminated DOE sites following the end of the Cold War, led to a renewed interest in the field of radioecology. In 1992, SREL constructed a 3,500 ft^2 radioecology laboratory at Par Pond on the SRS. This unique facility is used to conduct field and laboratory research in support of the Department of Energy's cleanup mission on the Savannah River Site. In 1998, an agreement was signed between the U.S. government and the government of Ukraine for SREL to develop an International Radioecology Laboratory at Chornobyl. This renewed interest in radioecology will extend our current understanding about radionuclides and provide educational opportunities to train the next generation of scientists needed to work in this important field. This will be done by building upon existing capabilities and expertise at the SRS, and by working with outstanding scientists and students from throughout the world.