Introductory Overview of All RHSP Projects

RHSP – Celebrating 30 Years of Scientific Achievements

Bruce Napier

JCCRER Programmatic Directions

- **Direction 1: Community Health Effects Research**

  Analyze the carcinogenic risk of radiation exposure in the public

- **Direction 2: Worker Health Effects Research**

  Analyze the carcinogenic risk of radiation exposure in workers

These first two directions encompass the DOE's Russian Health Studies Program

- **Direction 3: Information Technologies and Decision Making Support for Radiation Accidents and Health Effects from Radiation Exposure**

  Identify further areas of collaborative research in the fields of accident consequence management and to facilitate joint exercises. Workshop on Responses to Radiation Accidents was conducted in November 1996.

Project 1.1: Techa River Population Dosimetry

- **Principal Investigators:**
  - R.F.: Marina Degteva; Urals Research Center for Radiation Medicine
  - U.S.: Lynn Anspaugh, University of Utah; Bruce Napier, Pacific Northwest National Laboratory

- **Individual annual organ radiation dose estimates for the Techa River, EURT -> Southern Urals Populations Exposed to Radiation (SUPER) cohort – in support of Project 1.2b**

Project 1.2a: Data Preservation and Scanning

- **Principal Investigators:**
  - R.F.: Nikolai Startsev; Urals Research Center for Radiation Medicine
  - U.S.: Donna Cragle; Oak Ridge Institute for Science and Education

- **Established a document imaging system at URCRM for preserving medical records containing information from 1951 to the present with details on medical examinations, individual dose measurements, addresses, causes of death, and other data necessary for epidemiologic studies and dose reconstruction**

Project 1.2b: Techa River Population Cancer Morbidity and Mortality

- **Principal Investigators:**
  - R.F.: Mira Kossenko, Alexander Akleyev and Lyudmilla Krestinina, Urals Research Center for Radiation Medicine
  - U.S.: Faith Davis, University of Illinois at Chicago; Daniel Stram, University of Southern California
- **Assess carcinogenic effects among populations exposed to offsite releases of radioactive wastes into the Techa River. Study of cancer in the Southern Urals Populations Exposed to Radiation (SUPER) cohort (combined Techa River, EURT, Offspring cohorts)**
- **A continuation of the Techa River Population Cancer Mortality, formerly sponsored by the U.S. National Cancer Institute**

Project 1.3: Reconstruction of Radionuclide Contamination of the Techa River

- **Principal Investigators:**
  - R.F.: Yuri Mokrov, Yuri Glagoleko; Mayak Production Association
  - U.S.: Bruce Napier; Pacific Northwest National Laboratory

- **A pilot study investigating the feasibility of reconstructing the releases of a limited number of radionuclides from measurements made at a limited number of downriver locations, using historically measured water flow rates and total-beta radioactivity measurements – in support of Project 1.1**
- **Ultimately completed for complete source term via ISTC Project #2841**

Project 1.4: Ozersk Population Dose Reconstruction from Mayak Operations

- **Principal Investigators:**
  - R.F.: Yuri Mokrov, Mayak
  - U.S.: Lynn Anspaugh, University of Utah; Bruce Napier, Pacific Northwest National Laboratory
- **Reconstruct individual radiation doses to the residents of the city of Ozersk, Russia, and the surrounding area from atmospheric releases of radionuclides from Mayak, with focus emissions of I-131 and dose to the thyroid glands of children**
  - Releases were estimated and models and parameters prepared; Mayak stopped participation in 2009
  - The models and data were subsequently used in Project 1.1 to estimate atmospheric release thyroid doses for the SUPER cohort

Project 2.1: Metabolism and Dosimetry of Plutonium Industrial Compounds

- **Principal Investigators:**
  - R.F.: Valentin Khokhryakov, Southern Urals Biophysics Institute
  - U.S.: Ronald E. Filipy, Washington State University Tri-Cities

- **A feasibility study to compare the two autopsy programs; progressed to combining and jointly analyzing the actinide metabolism data collected by the Dosimetric Registry of the Mayak Production Association (DRMPA) and the United States Transuranium and Uranium Registries (USTUR)**
- **The whole body counter from the Rocky Flats Plant became operational for measurements of actinide body burden in the Mayak workers**

Project 2.2: Mayak Worker Cancer Mortality

- **Principal Investigators:**
  - R.F.: Mikhail Sokolnikov, Southern Urals Biophysics Institute
  - U.S.: Elaine Ron, Ethel Gilbert, NCI; Dan Stram, University of Southern California
- **Assess carcinogenic risks from both protracted external exposure and from internal exposure to plutonium.**
- **The first study to demonstrate a statistically significant association between occupational exposure to plutonium and bone, lung, and liver cancer.**

Project 2.3: Deterministic Effects in Mayak Workers

- **Principle Investigators**
  - Nadezda Okladnikova, Branch 1 Institute of Biophysics = SUBI
  - Gregg Claycamp, Neal Wald, University of Pittsburgh; Bruce Boecker, Inhalation Toxicology Research Institute

- **Validate current dose-response models for acute exposure and develop new dose-response models for chronic internal and external exposure to ionizing radiation**
- **Sponsored by the U.S. Nuclear Regulatory Commission**

Project 2.4: Mayak Worker Dosimetry

- **Principal Investigators:**
  - R.F.: Mikhail Gorelov, Evgenie Vasilenko, Mayak; Valentin Khokhryakov, Victor Khokhryakov, Anatoly Schadilov, Alexander Efimov, Southern Urals Biophysics Institute
  - U.S.: Scott Miller, University of Utah, Jack Fix, Robert Scherpelz, Bruce Napier, Pacific Northwest National Laboratory
- **Dose reconstruction of individual internal and external radiation doses and uncertainty about those doses for each member of the Mayak worker cohort**

Project 2.5, Improved Plutonium Dose Assessment Methods for Mayak Workers

- **Principle Investigators:**
  - R.F.: Sergey Romanov, Yekaterina Zayteseva, Southern Urals Biophysics Institute
  - Raymond Guilmette, Lovelace Respiratory Research Institute; Guthrie Miller, Los Alamos National Laboratory

- **Demonstrate that the histological, autoradiographic and particle scoring methods were comparable between labs**
- **Determine the microscopic distribution of Pu particles in human lung**

- **Merged into Project 2.4 in FY 2010**

Project 2.6: Molecular Markers of Lung Cancer in Mayak Workers

- **Principal Investigators:**
  - R.F.: Vitaliy Telnov, Southern Urals Biophysics Institute
  - U.S.: Steve Belinsky, Lovelace Respiratory Research Institute

- **Demonstrated that plutonium plant workers with adenocarcinoma of the lung had a statistically significant increased risk of methylation of the p16 tumor suppressor gene. Examined methylation profiles in both adenocarcinomas and squamous cell carcinomas of the lung**

Project 2.7: Radiation Biomarkers

- **Principal Investigators:**
  - R.F.: Tamara Azizova, Southern Urals Biophysics Institute
  - U.S.: David Brenner, Columbia University

- **Demonstrated a statistically significant dose-response between plutonium exposure and intra-arm chromosomal aberrations from worker blood samples sensitive enough to distinguish internal from external exposures**

Project 2.8: Mayak Worker Tissue Repository

- **Principal Investigators:**
  - R.F.: Evgenia Kirillova, Southern Urals Biophysics Institute
  - U.S.: Christopher Loffredo, Georgetown University

- **Establish and maintain a state-of-the-art tissue repository at the Southern Urals Biophysics Institute in Ozersk to serve as a resource for studies of the effects of protracted internal and external radiation exposure on human health**

Project 2.9: Database Integration

- **Principal Investigators:**
  - R.F.: Mikhail Sokolnikov, Southern Urals Biophysics Institute, and Mikhail Gorelov, Mayak
  - U.S.: Dale Preston, Eric Grant, Radiation Effects Research Foundation

- **Improve the quality and accessibility of the data needed. Combined databases located in four different laboratories of two Russian organizations through the creation of a unified relational database**