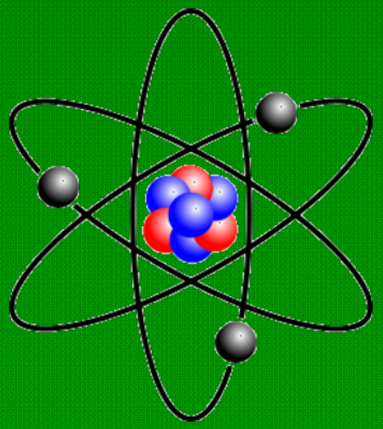
Importance and Role of Isotopes to Agricultural Research and Programs



DOE Workshop on the Nation's Needs for Isotopes

August 2008, Rockville, Maryland

USDA Radiation Safety Staff

John Jensen, Director

George Washington Carver Center

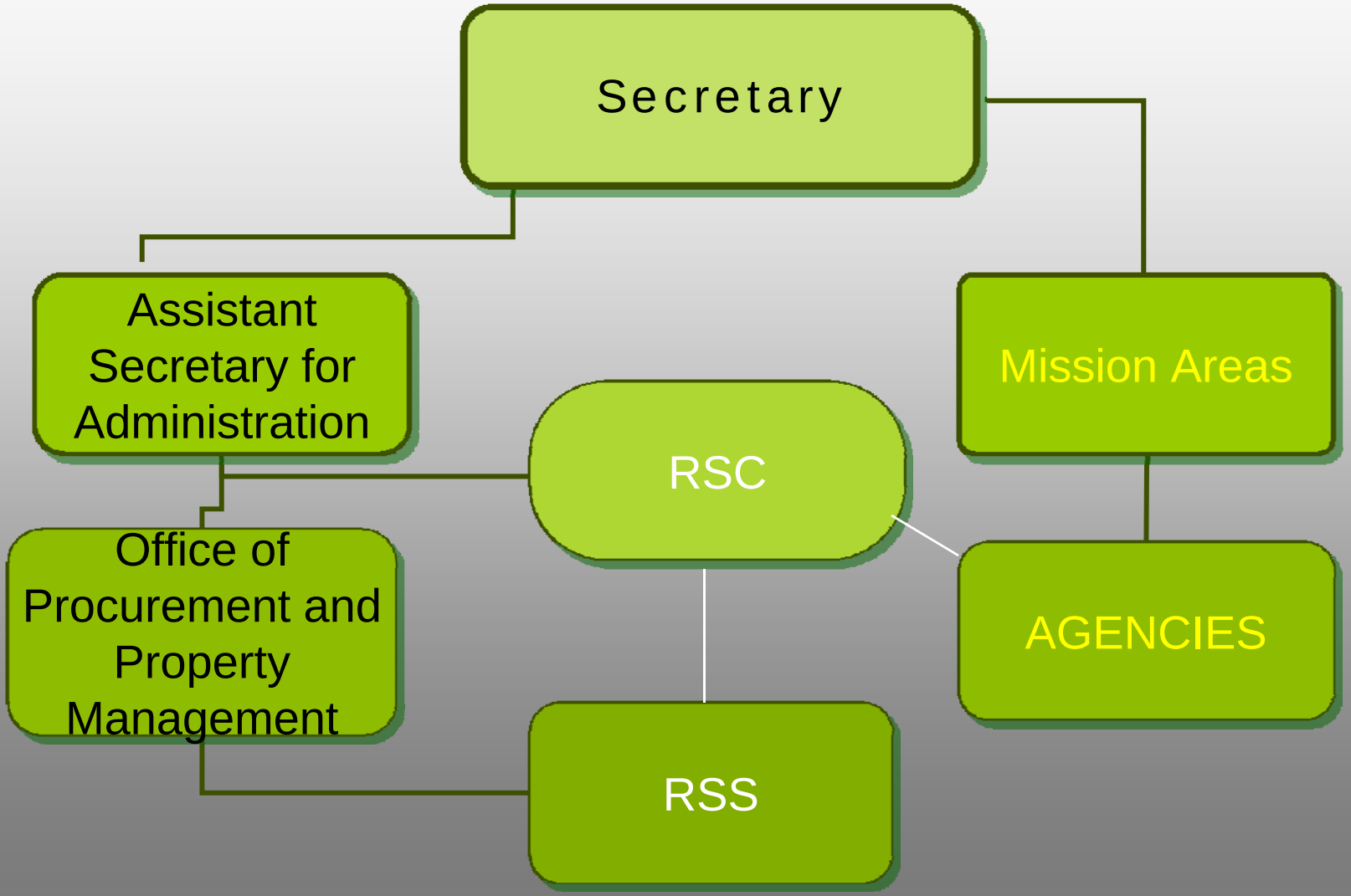
5601 Sunnyside Ave

Beltsville, MD 20705

301-504-2440

www.rss.usda.gov

Organization



USDA RADIOISOTOPE USAGE

- 225 PERMITS/PRIMARY USERS
- 955 SECONDARY USERS
- 6 USDA AGENCIES
- 100 LOCATIONS/FACILITIES
- 3 INTERNATIONAL LOCATIONS
  - Does not include funded research and programs

USDA RADIOISOTOPE TYPES

- RADIO-LABELED CHEMICALS
- SEALED SOURCES
  - Irradiators
  - Portable Gauges
  - Electron Capture Detectors
  - X-ray Fluorescence Analyzers

AGRICULTURAL RESEARCH SERVICE

- RADIO-LABELED CHEMICALS
  - HUMAN NUTRITION
  - ANIMAL STUDIES
  - PLANT STUDIES

ANIMAL and PLANT HEALTH INSPECTION SERVICE

- **RADIO-LABELED CHEMICALS**
  - PEST MANAGEMENT
- **SEALED SOURCES**
  - PESTICIDE TESTING
  - INSECT STERILIZATION

FOREST SERVICE

- RADIO-LABELED CHEMICALS
  - PLANT and SEED STUDIES
- SEALED SOURCES
  - CONSTRUCTION QA
  - SAMPLE TESTING

NATURAL RESOURCES CONSERVATION SERVIC

- SEALED SOURCES
  - WATER MANAGEMENT
  - CONSTRUCTION QA

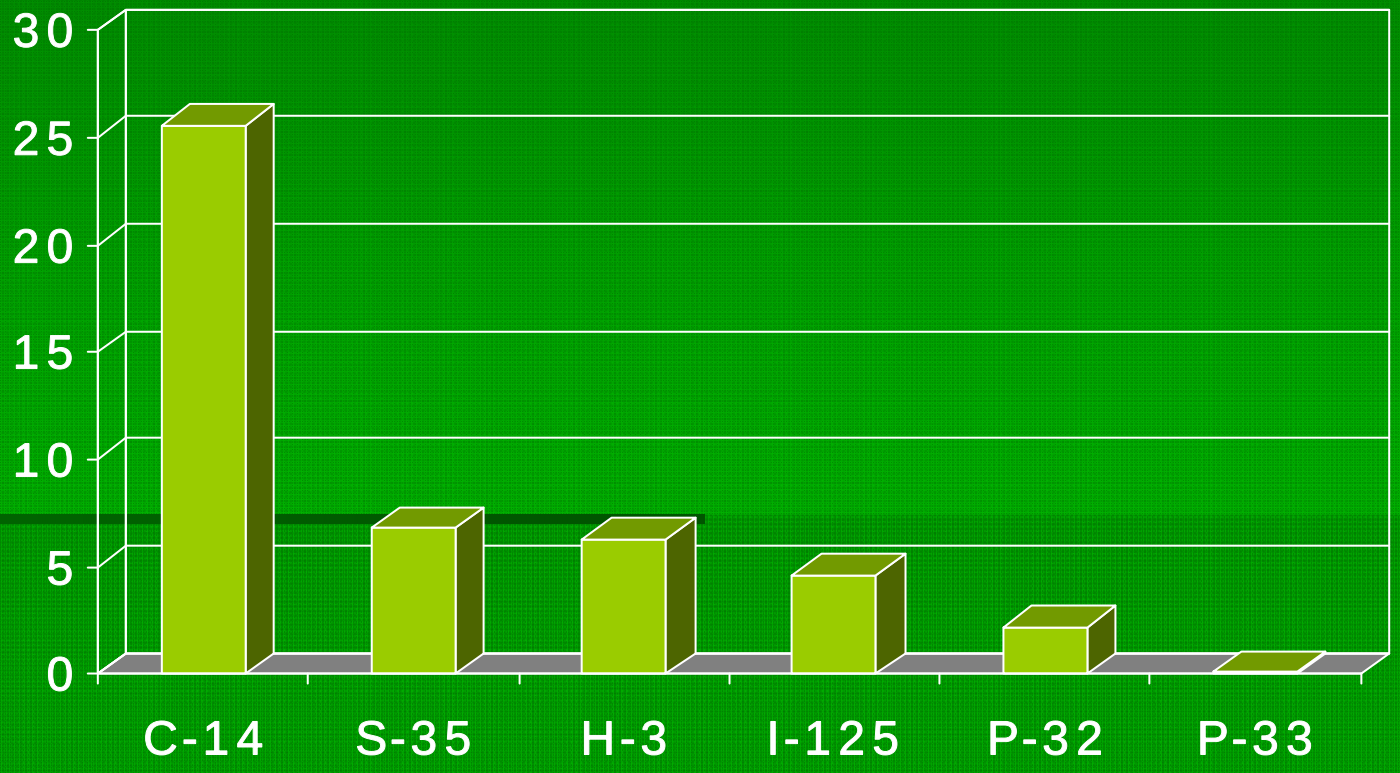
FOOD SAFETY INSPECTION SERVICE

- SEALED SOURCES
  - FOOD SAMPLE ANALYSIS

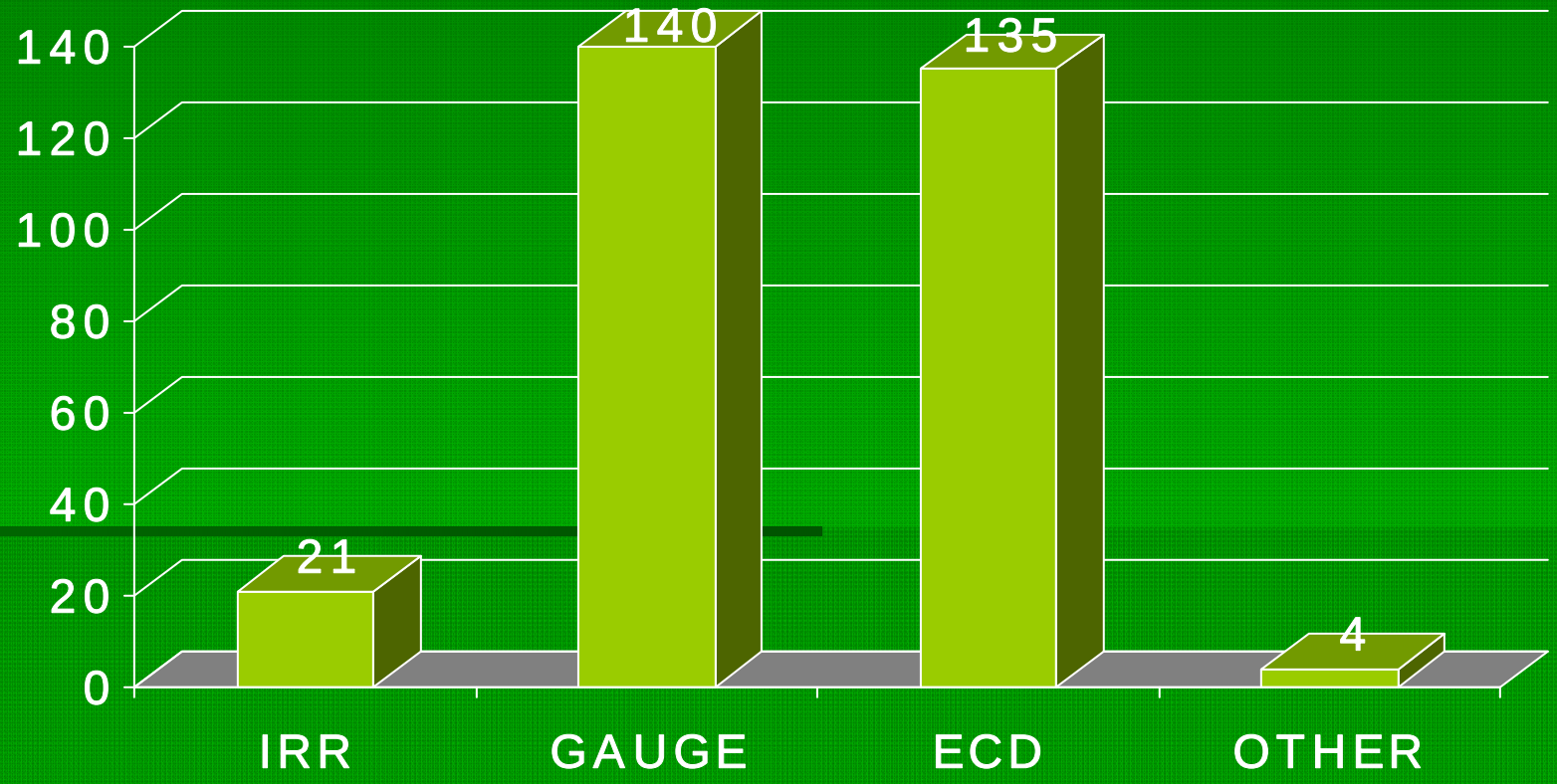
AGRICULTURAL MARKETING SERVICE

- SEALED SOURCES
  - FOOD SAMPLE ANALYSIS

RADIO-LABELED CHEMICALS – Annual Activity (mCi)



SEALED SOURCE TYPES



FUTURE NEEDS

- RADIO-LABELED CHEMICALS
  - NO INCREASE IN DEMAND
  - HIGH PURITY
  - AVAILABLITY
  - LOWER COST

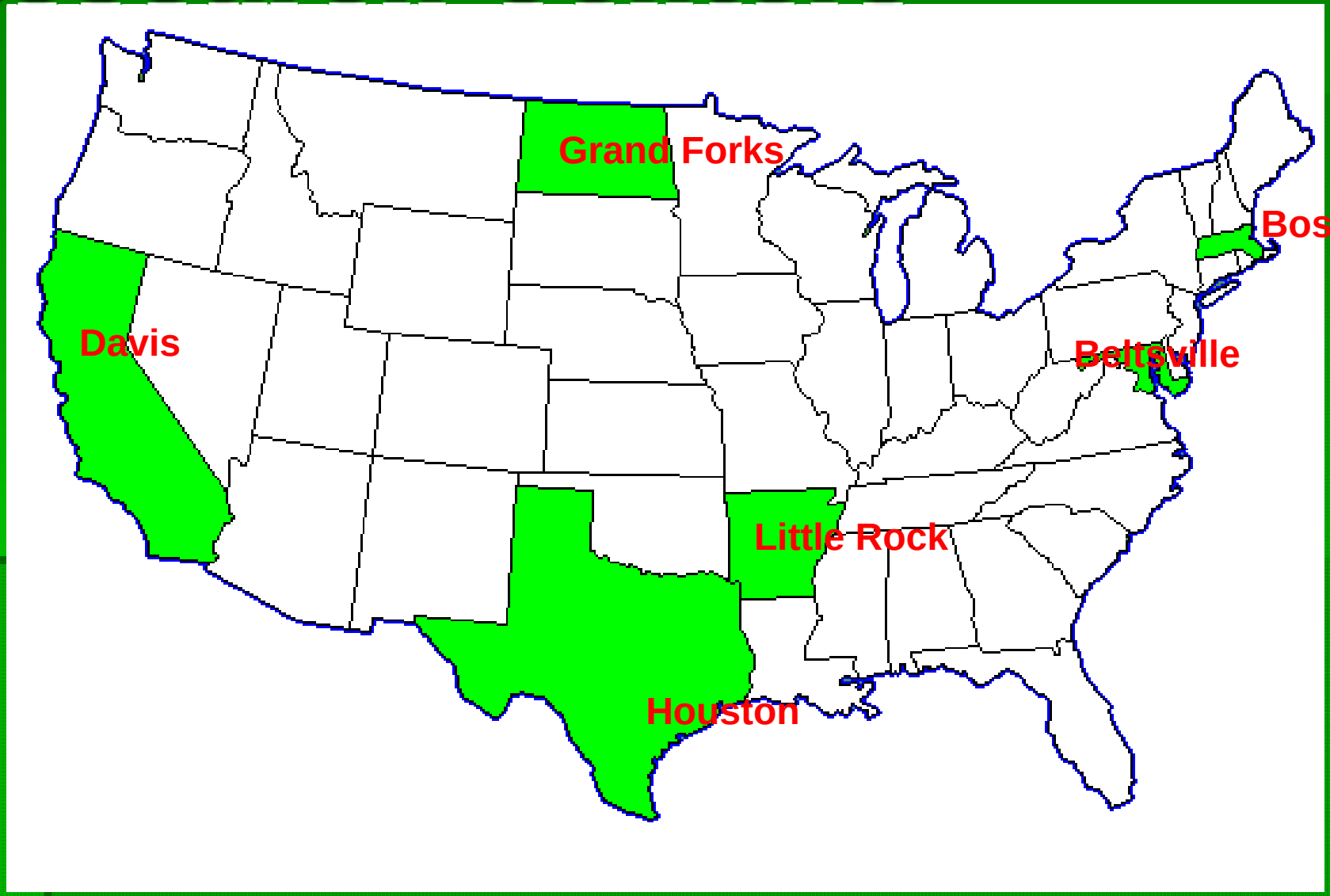
FUTURE NEEDS

- SEALED SOURCES
  - NO INCREASE IN DEMAND
  - SECURITY ISSUES

USDA Human Nutrition Program Mission Statement

To define the role of food and its components in optimizing health throughout the life cycle for all Americans by conducting high national priority research.

Human Nutrition Research Centers



USDA Human Nutrition Program Primary Research Focus Areas

- Nutrition Monitoring and the Food Supply
- Scientific Basis for Population Nutritional Standards and Dietary Guidelines
- Prevention of Obesity and Related Diseases
- Life Stage Nutrition
- and Metabolism

Stable Isotopes – Examples of Uses in Department of Agriculture Human Nutrit Research

- **Obesity Prevention – ^{18}O and ^{2}H labeled water to estimate energy expenditure in humans to understand food and physical activity energy balance**
- **Bioactive Food Components – C-13 labeled organic compounds in plant foods for human feeding trials to measure absorption and bioavailability. Example: labeled anthocyanins in strawberries**
- **Human nutrient metabolism studies – tracing compounds of interest via the ICP-MS analysis of enriched stable isotopes to understand nutrient metabolism and utilization. Examples:Fe-57, Fe-58, Zn-67, Zn-70, C-13, N-15, Ca-42, Ca-47, Mg-25, Mg-26**