Chapter 50

Federal Research and Development in West Virginia

- Approximately $261 million of federal R&D funds are spent each year in West Virginia.
- West Virginia ranks 34th among the 50 states, District of Columbia, and Puerto Rico in terms of the amount of federal R&D dollars received annually.
- Approximately 7 percent of all federal funds spent in West Virginia each year on matters other than the direct support of individuals (i.e., such entitlements as retirement, disability, and housing assistance) is spent on R&D.

Figure 50.1 - Sources of Federal R&D Dollars Spent in West Virginia
(Total Federal R&D ~$261 million)
Background
In recent years, the federal government has spent in the neighborhood of $261 million annually in West Virginia on research and development (R&D) activities. On average, federal R&D dollars account for approximately 7 percent of all federal funds spent in West Virginia each year on matters other than the direct support of individuals (i.e., such entitlements as retirement, disability, and housing assistance).

Most major federal agencies that currently support federal R&D efforts provide funding for R&D activities in West Virginia. Foremost among these agencies is the Department of Energy (DOE), which accounts for 44 percent of all federal R&D dollars spent in the state. The Department of Health and Human Services (HHS), the National Science Foundation (NSF), and the Department of Agriculture (USDA) account for an additional 15, 14, and 9 percent of the federal R&D dollars spent in West Virginia, respectively. The Department of Defense (DOD) and the National Aeronautics and Space Administration (NASA) each account for an additional 6 percent of the federal R&D dollars spent in the state. The remaining federal R&D dollars come collectively from the Department of Transportation (DOT) and several other federal agencies.50

All federal R&D dollars spent in West Virginia either cover the costs of operating federal R&D units in the state, including paying the salaries of federal R&D personnel working at these units, or are awarded as grants, contracts, or cooperative agreements to entities in the state. The following is an overview of what becomes of these federal R&D dollars once they arrive in West Virginia.

Federal R&D Units in West Virginia
Beckley, West Virginia, is home to USDA’s Appalachian Farming Systems Research Center.

- The Appalachian Farming Systems Research Center, formerly the Appalachian Soil and Water Conservation Laboratory, is a

50 For a complete agency-by-agency breakdown of these R&D dollars, see Appendix C.
unit of USDA's Agricultural Research Service (ARS). The center conducts research on soil quality, forage and grazing management, the ecology of underutilized or marginal land, and silvo-pastoral and understory crop production systems. Specific research activities of the center include studies on the utilization of woodlots in traditional pasture systems as a means to modify the distribution and quality of forage resources. Other research activities include identifying soil physical and biophysical properties that are sensitive indicators of soil quality in grazed systems. This federal R&D unit annually receives approximately $4.6 million in federal R&D funds and has about 62 FTEs.

Charleston, West Virginia, is home to the Department of Interior's (DOI's) West Virginia District Office of Water Resources.

- The West Virginia District Office of Water Resources is a unit of DOI's U.S. Geological Survey (USGS). It oversees the R&D activities of USGS's National Water-Quality Assessment (NAWQA), Ground-Water Resources Assessment, Toxic Substances Hydrology, and Federal State Cooperatives programs. The NAWQA program conducts research on the nation's surface and groundwater resources to better understand the effect of pesticides, erosion, and bacterial contamination on water quality. The Ground-Water Resources Assessment program studies groundwater systems to develop models and simulations to better understand the workings of these systems. The Toxic Substances Hydrology program studies the behavior of toxic substances in hydrologic environments. These research activities investigate subsurface contamination at local releases and aquatic ecosystem contamination on a watershed and regional scale. The Federal State Cooperatives program studies the effects of agricultural chemicals, floods, droughts, and waste disposal on water supply and groundwater quality. This federal unit annually receives approximately $993,000 in federal R&D funds.

Clarksburg, West Virginia, is home to a Department of Veterans Affairs (DVA) R&D unit.
• While the principal focus of the Louis A. Johnson VA Medical Center in Clarksburg is providing medical care to veterans, it is also the location of a number of research activities. In a recent year, this federally owned and operated facility was the site of 11 projects with total funding of less than $25,000. These R&D activities focus on a wide range of topics, including posttraumatic stress disorder, prostate cancer, heart disease, diabetes, and kidney disease.

Green Bank, West Virginia, is home to a portion of NSF’s National Radio Astronomy Observatory.

• The National Radio Astronomy Observatory (NRAO) is a federally funded research and development center (FFRDC) sponsored by the National Science Foundation and operated by Associated Universities, Inc. It is headquartered in Charlottesville, Virginia, with observing sites in Green Bank, West Virginia; Tucson, Arizona; and Socorro, New Mexico. NRAO was established to ensure that all qualified scientists have access to radio astronomy facilities. The Green Bank site is home to the Green Bank Telescope, which is a 100-meter telescope that allows spectral lines to be studied at centimeter wavelengths. Each year, the four sites of this federally owned and consortium-operated unit collectively receive approximately $44 million of federal R&D funds to conduct operations. The Green Bank site annually receives approximately $21 million of federal R&D funds and has about 85 employees. A substantial portion of these funds is spent on the maintenance and operation of R&D equipment and facilities.

Huntington, West Virginia, is home to a DVA R&D unit.

• While the principal focus of the Huntington VA Medical Center is providing medical care to veterans, it is also the location of a number of research activities. In a recent year, this federally owned and operated facility was the site of 34 projects with total funding of approximately $80,000. These R&D activities focus on a wide range of topics, including diabetes, pneumonia, bronchitis, and hepatitis.
Kearneysville, West Virginia, is home to USDA's Appalachian Fruit Research Station and DOI's Biological Resources Division Eastern Regional Office.

- The Appalachian Fruit Research Station, a unit of USDA's ARS, consists of two research divisions—the Breeding and Biotechnology Research Unit and the Production and Storage Unit. This research station conducts research on the critical problems of temperate fruit production. Specific research activities of this station include studies to maximize productivity and quality of fruit crops and minimize the adverse effects of biotic and environmental factors on these crops. This federal R&D unit receives approximately $6.3 million in federal R&D funds and has about 63 FTEs.

- The Biological Resources Division Eastern Regional Office inside DOI's USGS has direct line authority over the six science centers in its region. The office coordinates science and operational activities among the Eastern Region's centers and integrates with the Western and Central Regions. The office also provides research expertise to other DOI bureaus and coordinates and integrates this activity within DOI as well. In addition, a cooperative unit coordinator/eastern supervisor is located in Kearneysville. Altogether, this federal R&D unit annually receives approximately $611,000 of federal R&D funds and has about eight FTEs.

Leetown, West Virginia, is home to DOI's Leetown Science Center and the USDA's National Center for Cool and Cold Water Aquaculture.

- The Leetown Science Center is a unit of DOI's USGS. Leetown has additional research units located in Wellsboro, Pennsylvania, and Turners Falls, Massachusetts. It conducts research on high-priority needs of aquatic resource managers and public policymakers regarding fishery research. Specific research activities of this unit include studying the behavioral ecology of migrating fish impacted by dams and barriers, pollution, and human development; developing methods for detecting, controlling, and...
preventing diseases; and investigating the effects of environmental factors on the physiology, pathology, biochemistry, behavior, and ecology of aquatic organisms. This federal R&D unit annually receives approximately $2.7 million of federal R&D funds and has about 53 FTEs.

- The National Center for Cool and Cold Water Aquaculture is a unit of USDA's ARS. It conducts research on the organismic, cellular, and molecular levels of gene expression to improve cool- and cold-water aquaculture species. Specific research activities of the center include identifying and evaluating the genetic and the physiological factors that control complex traits important to production and identifying and genetically characterizing phenotypic variation in economically important traits, such as growth, disease resistance, reproductive performance, and response to stress. This federal R&D unit annually receives approximately $223,000 in federal R&D funds and has one FTE.

Morgantown, West Virginia, is home to HHS's Division of Safety Research, Division of Respiratory Disease Studies, and Health Effects Laboratory; DOE's National Energy Technology Laboratory-Morgantown; DOI's West Virginia Cooperative Fish and Wildlife Research Unit; and USDA's Morgantown Forestry Science Laboratory.

- The Division of Safety Research, the Division of Respiratory Disease Studies, and the Health Effects Laboratory Division are units of the National Institute of Occupational Safety and Health (NIOSH) inside HHS's Centers for Disease Control and Prevention (CDC). They conduct research on occupational-injury and public health activities directed toward prevention of occupational respiratory diseases. Specific research focus areas include agriculture, asthma, construction, fibers, mining, and surveillance. The units also perform research to identify and control harmful workplace agents and to help identify early detection of occupational diseases. These federal R&D units combined annually receive approximately $36.1 million of federal R&D funds and have about 369 FTEs.
• The National Energy Technology Laboratory—Morgantown, formerly a part of the Federal Energy Technology Center, is a unit of DOE. It is affiliated with the National Energy Technology Laboratory—Pittsburgh in Pennsylvania. It develops technologies related to coal, oil, and natural gas (i.e., fossil energy), and environmental cleanup. Specifically, the laboratory conducts research on fuel gas reaction engineering, CO2 sequestration, and steady low-flow nitrous oxide combustion. While the laboratory maintains a modest in-house R&D capability, most of its staff oversees extramural R&D projects conducted with federal R&D funds. This federal laboratory annually receives approximately $259 million of total funds, only about $32 million of which is spent on R&D activities conducted on site. The laboratory has about 407 employees.

• The West Virginia Cooperative Fish and Wildlife Research Unit is part of DOI’s USGS. It is on the campus of West Virginia University. It conducts research on environmental impacts on the ecosystem. Specific research activities of this unit include investigating the effects of timber harvesting on birds, studying wildlife in early successional habitats, and looking into the effects of acidic waters on aquatic species. This federal R&D unit annually receives approximately $155,000 of federal R&D funds and has about two FTEs.

• The Morgantown Forestry Sciences Laboratory is a unit of the Northeastern Research Station inside USDA’s Forest Service. It conducts research on harvesting strategies and on disturbance ecology and management of oak-dominated forests. Specific research activities of this lab includes studying the changes in ecological processes brought on by disturbances by the gypsy moth, developing effective silvicultural treatments for rehabilitating and regenerating oak forests, and evaluating alternative harvesting strategies for all forested geographic regions in the northeastern United States. This federal R&D unit annually receives approximately $1.8 million in federal R&D funds and has about 14 employees.
Parsons, West Virginia, is home to USDA's Forest Service Timber and Watershed Laboratory.

- The Timber and Watershed Laboratory is a unit of the Northeastern Research Station inside USDA’s Forest Service. It conducts research into sustaining forest ecosystems in the central Appalachians. Specific research activities of this lab include studying the historical disturbance patterns and influences on ecosystem processes and investigating silvicultural alternatives for meeting complex management objectives. This federal R&D unit annually receives approximately $1.7 million in federal R&D funds and has about 21 employees.

Princeton, West Virginia, is home to USDA’s Forest Service's Forestry Sciences Laboratory.

- The Princeton Forestry Sciences Laboratory is a unit of the Northeastern Research Station inside USDA’s Forest Service. It conducts research on silvicultural systems and forest operations. Specific research activities of this lab include developing estimates of primary and secondary hardwood product production and consumption activities and analyzing factors and events that could alter these patterns. Also, the unit conducts an analysis on the structure, conduct, and performance of hardwood products industries. This federal R&D unit annually receives approximately $2.2 million in federal R&D dollars and has about 19 employees.

Federal R&D Grants to West Virginia Entities

Every major institution of higher education in West Virginia is the recipient of significant federal R&D dollars each year through grants made by federal agencies to faculty, graduate students, and research centers. The vast majority of the R&D grants are made by HHS, DOD, NSF, and USDA to individual faculty members and therefore ultimately inure to the benefit of such institutions as West Virginia University (WVU) and Marshall University. The table below shows the
number of R&D grants active in FY 1998, highlighting those made by HHS, DOD, NSF, and USDA to parties at these institutions and estimates of the total dollars transferred to them pursuant to the terms of these grants. Most of the grants in the “Other Agencies” category going to WVU are from NASA and DOE.

Table 50.1 - Sources of Federal R&D Grants to Higher Education in West Virginia

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<th>Institution</th>
<th>HHS</th>
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<th>USDA</th>
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</table>

These activities are particularly significant because they fund much of the “basic research” so critical to expanding our knowledge and understanding of fundamental scientific phenomena. In addition, these funds account for a substantial portion of the dollars available each year to various academic departments within these institutions.

Several other nonacademic institutions in West Virginia also receive federal R&D grants each year. Foremost among the institutions that received R&D grants in FY 1998 are the Canaan Valley Institute in Davis ($6 million), the State of West Virginia ($1 million), and the West Virginia State Department of Health and Human Resource ($1 million) in Charleston.

Scattered among these grants, as well as among the contracts discussed in the section below, are small business innovative research (SBIR) awards. These are special awards made by the SBIR programs supported by the 10 federal agencies with annual budgets for extramural R&D of more than $100 million. In a recent year, small businesses in West Virginia received five SBIR awards totaling close to $500,000. Examples include a $100,000 award from DOD (Air Force) to Touchstone Research Labs, Ltd., in Triadelphia for work on
brazed aluminum ribbon composite materials for cryogenic tanks and a $100,000 award from OSD to Azimuth, Inc. in Morgantown to develop a small craft vision enhancement and situation awareness system.

Also included among these grants are formula grants from federal agencies. Formula grants differ from the much more common project grants in that the money transmitted through formula grants is allocated to a state or one of its subdivisions in accordance with a distribution formula prescribed by law or regulation. Among the formula grants benefiting West Virginia are ones valued at more than $2.7 million from USDA’s Cooperative State Research, Education, and Extension Service (CSREES) to State Agricultural Experiment Stations, forestry schools, and veterinary colleges for the support of research in agriculture, forestry, and animal health and disease. Similarly, a modest formula grant goes from DOI’s USGS to the Water Resources Research Institute in West Virginia every year to foster research in water and water-related problems.

Other Federal R&D Activities in West Virginia

Several entities in West Virginia also receive notable sums in the form of contracts or cooperative agreements from federal agencies for specific R&D efforts. The majority of these funds go to Bombardier Services Corp., which in FY 1998 received close to $6 million from DOD (Navy) for work on the Vertical Takeoff and Landing Unmanned Aerial Vehicle Flight Test Demonstration program. In addition, the West Virginia Department of Health and Human Resource ($1.5 million) and Alliant Techsystems, Inc. ($600,000), received significant R&D contracts from federal agencies in FY 1998. Note that these amounts are in addition to the federal R&D grants received by the West Virginia Department of Health and Human Resource. WVU ($1 million) also received contracts from various federal agencies to conduct R&D for the federal government. Although this amount is notable, it does not come close to eclipsing the funds that this institution receives from federal R&D grants.

A total of $431 million of federal R&D dollars was also received in FY 1998 by entities located in West Virginia in the form of cooper-
ative agreements. The largest of these cooperative agreements ($96 million in FY 1998) came from DOE to a team of performers connected to the National Energy Technology Laboratory—Morgantown for work on the McIntosh Unit 4B Demonstration Project in Florida. Other federal agencies awarding cooperative agreements to West Virginia–based entities include NSF and the Department of Justice.