Chapter 33

Federal Research and Development in New York

- Approximately $2.9 billion of federal R&D funds are spent each year in New York.
- New York ranks 8th 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 received by New York for purposes other than the direct support of individuals (e.g. such entitlements as retirement, disability, and housing assistance, etc.) is spent on R&D.

Figure 33.1 – Sources of Federal R&D Dollars Spent in New York (Total Federal R&D ~$2.9 billion)
BACKGROUND

In recent years, the federal government has spent in the neighborhood of $2.9 billion annually in New York on research and development (R&D). On average, federal dollars for R&D account for approximately 7 percent of all federal funds received by New York for purposes 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 New York. Foremost among these agencies are the Departments of Health and Human Services (HHS), Defense (DOD), and Energy (DOE), which account for 35, 27, and 25 percent of all federal R&D dollars spent in the state, respectively. The National Science Foundation (NSF) accounts for an additional 7 percent of all federal R&D dollars spent in New York. The remaining federal R&D dollars come collectively from the National Aeronautics and Space Administration (NASA), the Departments of Agriculture (USDA), Commerce (DOC), Transportation (DOT), and Interior (DOI), and several other federal agencies.33

All federal R&D dollars spent in New York 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 New York.

FEDERAL R&D UNITS IN NEW YORK

Bronx, New York, is home to a Department of Veterans Affairs (DVA) R&D unit.

- While the principal focus of the Bronx 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 195 projects with

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33 For a complete agency-by-agency breakdown of these R&D dollars, see Appendix C.
total funding of approximately $3.1 million. These R&D activities focus on a wide range of topics, including viral oncogenesis, AIDS, prosthetic devices for spinal cord injuries (SCI), metabolic alterations in SCI patients, Alzheimer’s disease, psychiatry, renal disease, and disorders associated with alcoholism, tobacco, and digestion. This facility is also the site of a spinal cord tissue bank and a brain bank.

Brooklyn, New York, is home to HHS’s Northeast Regional Laboratory.

- The Northeast Regional Laboratory is a unit of HHS’s Food and Drug Administration. It conducts research on the safety and nutritiousness of food and the safety and efficacy of human drugs. Specific areas of research activity focus on drug and food chemistry, pesticides, and microbiology. This federal unit annually receives approximately $894,000 of federal R&D dollars and has about 13 FTEs directly involved in R&D activities.

Cortland, New York, is home to DOI’s Tunison Laboratory of Aquatic Sciences Field Station.

- The Tunison Laboratory of Aquatic Sciences Field Station is a unit of the Great Lakes Science Center inside DOI’s U.S. Geological Survey (USGS). It conducts research on fish populations and communities, aquatic habitats, terrestrial ecology, nearshore and coastal communities, and the biological processes that occur in the complex ecosystem of the Great Lakes. Specific research activities of this unit include client-oriented integrated laboratory and field research to help foster sound management and stewardship of aquatic ecosystems and assist in restoring depleted species in the Northeast. This federal R&D unit annually receives approximately $516,000 of federal R&D funds and has about eight FTEs.

Geneva, New York, is home to USDA’s Plant Genetic Resources Unit.

- The Plant Genetic Resources Unit is part of USDA’s Agricultural Research Service (ARS). This unit, which is on the Geneva
campus of Cornell University, is part of the national Plant Germplasm System. It was formed in 1986 by merging the Northeast Regional Plant Introduction Station and the newly created National Clonal Germplasm Repository for Apple and Grape. The research focus of this unit is on the conservation and utilization of apple, cold-hardy grape, tart cherry, and certain vegetable crops. The funding and staff figures for this federal R&D unit are included in those provided for the U.S. Plant, Soil, and Nutrition Laboratory described below.

Greenport, New York, is home to USDA's Plum Island Animal Disease Center.

- The Plum Island Animal Disease Center is a unit of USDA's ARS. It conducts research to protect U.S. animal industries and exports against catastrophic economic losses caused by foreign animal disease agents introduced either accidentally or deliberately into the United States. Specific research activities of the center include the development of more sensitive and accurate methods of disease agent detection and identification; the development of new strategies to control disease epidemics, including rDNA vaccines, antiviral drugs, and transgenic, disease-resistant animals; and the assessment of risks involved in importation of animals and animal products from countries where epidemic animal diseases occur. This federal R&D unit annually receives about $9.3 million of federal R&D funds and has about 50 FTEs.

Ithaca, New York, is home to one of DOI’s New York Cooperative Fish and Wildlife Research Units; USDA’s Plant, Soil, and Nutrition Laboratory; and the headquarters of NSF’s National Astronomy and Ionosphere Center.

- The New York Cooperative Fish and Wildlife Research Unit is part of DOI’s USGS. It is on the campus of Cornell University. It conducts research on aquatic resource problems and issues of the northeastern states, paying particular attention to these issues in New York. Specific research activities of this unit include
studying waterfowl biology and management, with a major emphasis on the productivity and harvest studies of Canada geese and mallard ducks in the Atlantic flyway. Other recent R&D activities emphasize the effects of human activities on aquatic systems, focusing on fish. This federal R&D unit annually receives approximately $281,000 of federal R&D funds and has about three FTEs.

• The U.S. Plant, Soil, and Nutrition Laboratory is a unit of USDA’s ARS located on the campus of Cornell University. It conducts research on the movement of essential or toxic elements through soil to plant roots, interactions at the root-soil interface, uptake by roots, translocation of elements to edible plant parts, and utilization of elements by humans or animals. Specific research activities include the development of plant varieties with higher concentrations of critical nutrients to create food-based solutions to malnutrition, improving root systems that can grow in nutrient-depleted soils, and utilizing plants to clean up polluted soils. This federal R&D unit annually receives approximately $6.2 million in federal R&D funds and has about 44 employees.

• The National Astronomy and Ionosphere Center (NAIC) is a federally funded research and development center (FFRDC) sponsored by NSF, headquartered at Cornell University, and physically located in Puerto Rico. NAIC’s Arecibo Observatory conducts research in astronomy and atmospheric sciences. It also develops new techniques and instruments for astronomical and atmospheric observations and data processing. The Arecibo Radio Telescope enables astronomers to detect the faint radio emissions from the universe. Experiments performed at the observatory help scientists measure the upper atmosphere composition, temperature, and densities. This federally owned and university-operated unit annually receives a total of approximately $12 million of federal R&D funds, an estimated $3 million of which are spent in New York.
New York, New York, is home to DOE's Environmental Measurement Laboratory, NASA's Goddard Institute for Space Studies, the Smithsonian Institution’s National Museum of the American Indian and Cooper-Hewitt National Design Museum, and a DVA R&D unit.

- The Environmental Measurement Laboratory is a unit of DOE. It provides program management, technical assistance, and data quality assurance for measurements of radiation and radioactivity relating to environmental restoration, global nuclear non-proliferation, and other priority issues for DOE, as well as for other government, national, and international organizations. The activities of the laboratory include environmental sampling, aerosol measurements, radiological surveys, and radon assessments. This federal facility annually receives approximately $6 million of federal R&D funds and has about 62 employees.

- The Goddard Institute for Space Studies is a unit of NASA's Goddard Space Flight Center in Greenbelt, Maryland. It focuses on the broad study of global change, an interdisciplinary research initiative addressing natural and man-made changes in our environment, which occur on various time scales from decades to millennia and which affect the habitability of Earth. The institute's research combines analyses of comprehensive global datasets of atmospheric, land surface, and oceanic processes and includes the study of past events on Earth, such as paleoclimate change and the study of other planets as an aid to prediction of future evolution of Earth on a planetary scale. This federal unit annually receives approximately $9 million and has about 150 employees.

- The National Museum of the American Indian is a unit of the Smithsonian Institution. It conducts research on the life, arts, culture, and history of the native people of the Western Hemisphere. The museum annually receives approximately $1.4 million of federal R&D funds and employs about 60 FTES, an estimated 10 percent of whom are involved in R&D activities.

- The Cooper-Hewitt National Design Museum is also a unit of the Smithsonian Institution. It conducts research on design
and decorative art objects, including drawings, prints, textiles, furniture, metalwork, ceramics, glass, woodwork, wall coverings, embroidery, and lace. The museum annually receives approximately $120,000 of federal R&D funds and employs about 43 FTEs, only a fraction of whom are directly involved in R&D activities.

- While the principal focus of the New York 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 218 projects with total funding of approximately $3 million. These R&D activities focus on a wide range of topics, including immunology, molecular biology, AIDS, infectious diseases, nephrology, and cell biology.

Oswego, New York, is home to DOI’s Lake Ontario Biological Station.

- The Lake Ontario Biological Station is a unit of the Great Lakes Science Center inside DOI’s USGS. It conducts research on fish populations and communities, aquatic habitats, terrestrial ecology, nearshore and coastal communities, and the biological processes that occur in the complex ecosystem of the Great Lakes. Specific research activities of this unit include assessing prey fishes to determine Lake Ontario’s capacity to support stocked trout and salmon and evaluating restoration of naturally reproducing lake trout. This federal R&D unit annually receives approximately $376,000 of federal R&D funds and has about five FTEs.

Rome, New York, is home to part of DOD’s Air Force Research Laboratory Information Directorate and Air Force Research Laboratory Sensors Directorate.

- The Information Directorate is a unit of DOD’s Air Force Research Laboratory. It is headquartered at the Rome Research Site, with another site in Dayton, Ohio. The R&D of this unit focuses on the advancement and application of information
system science for aerospace command and control and its transition to air, space, and ground systems. Its areas of investigation include a broad spectrum of information and fusion, communication, collaborative environment, modeling and simulation, defensive information warfare, and intelligent information systems technologies. This federal unit annually receives approximately $101 million of federal R&D funds, only about 16 percent of which is spent on in-house R&D activities, and employs about 699 civilians, only a portion of whom are involved in R&D activities.

- The Sensors Directorate is a unit of DOD’s Air Force Research Laboratory. It is headquartered in Dayton, Ohio, with other sites in Boston, Massachusetts, and Rome, New York. This unit works closely with industry, universities, and other DOD agencies to conduct R&D to ensure that U.S. air and space forces have the very best reconnaissance, surveillance, precision engagement, and electronic warfare capabilities. This federal unit annually receives approximately $10 million of federal R&D funds, only about 28 percent of which is spent on in-house R&D activities, and has about 83 civilian personnel, only a portion of whom are involved in R&D activities. A portion of these funds is spent on the maintenance and operation of R&D equipment and facilities.

Syracuse, New York, is home to USDA’s Urban and Community Ecosystems Research Unit.

- The Urban and Community Ecosystem Research Unit Laboratory is a unit of the Northeastern Research Station inside USDA’s Forest Service. It conducts research on vegetation and associated resources in cities, suburbs, and developing areas. Specific research activities of this unit include developing planting models to help modify city climates and studying the effects of urban vegetation on air quality and atmospheric carbon dioxide. This federal R&D unit annually receives approximately $750,000 of federal R&D funds and has about 12 employees.
Troy, New York, is home to DOI’s New York District Office of Water Resources.

- The New York District Office of Water Resources is a unit of DOI’s 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 $1.9 million in federal R&D funds.

Upton, New York, is home to DOE’s Brookhaven National Laboratory.

- The Brookhaven National Laboratory is an FFRDC sponsored by DOE and operated by Brookhaven Science Associates, a partnership between the State University of New York at Stony Brook and Battelle Memorial Institute. It houses the National Synchrotron Light Source and the Alternating Gradient Synchrotron particle accelerators. It also houses the Protein Data Bank, a digital repository containing thousands of detailed atomic structure maps of proteins and other biomacromolecules and the High-Flux Beam reactor, a reactor dedicated to research in the physical, chemical, biological, and environmental sciences. The laboratory has more than 600 R&D programs in fields ranging from high-energy physics to drug addiction to
weapons nonproliferation. This federally owned and contractor-operated laboratory annually receives approximately $370 million of core funding and conducts an estimated $286 million of specific R&D projects. A substantial portion of these funds is spent on the maintenance and operation of R&D equipment and facilities.

Watervliet, New York, is home to a unit of DOD’s Armament Research, Development, and Engineering Center.

- The Benet Laboratories are a unit of the Army’s Armament Research, Development, and Engineering Center inside DOD. The center is headquartered in Picatinny, New Jersey, with subordinate research activities in Rock Island, Illinois; Watervliet, New York; and Aberdeen, Maryland. It conducts research on integrating complex armament technologies into guns, ammunition, and fire control systems through research, development, acquisition, and sustainment. The laboratories conduct R&D on large-caliber armament systems, such as cannons, mortars, and recoilless rifles; tank gun mounts and recoil mechanisms; and tank turret components. This federal unit annually receives approximately $1.3 million of federal R&D funds for in-house activities and has about 191 civilian personnel.

Albany, Bath, Brooklyn, Buffalo, Canandaigua, Northport, and Syracuse are also home to VA Medical Centers. While the principal focus of all of these federally owned and operated centers is providing medical care to veterans, each center is also the location of a number of research activities. In a recent year, these federally owned and operated facilities were the site of 1,529 projects with total funding of approximately $4.9 million. These activities focus on a wide range of topics, including schizophrenia, AIDS, alcohol abuse, diabetes, and environmental hazards.
Federal R&D Grants to New York Entities

Every major institution of higher education in New York 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, NSF, and DOD to individual faculty members and therefore ultimately inure to the benefit of such institutions as Columbia University, Cornell University, State University of New York (SUNY), New York University (NYU), University of Rochester (Rochester), Albert Einstein College of Medicine (AECOM), Mount Sinai School of Medicine (MSSM), and Rockefeller University. The table below shows the total number of R&D grants active in FY 1998, highlighting those made by HHS, NSF, and DOD to parties at the various institutions and estimates of the total dollars transferred to them in FY 1998 pursuant to the terms of these grants. Among the grants in the “Other Agencies” category going to Columbia are $8 million from DOE, $7 million from DOC, and $4 million from NASA. Of the grants in this same category going to Cornell are $13 million from USDA and $4 million each from NASA and DOE. The grants going to SUNY in this category include $9 million from DOE, $5 million from the Department of Education,

Table 33.1 – Sources of Federal R&D Grants to Higher Education in New York

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<th>Institution</th>
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<th>NSF</th>
<th>DOD</th>
<th>Other Agencies</th>
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<tr>
<td>Columbia</td>
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<td>131</td>
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</tr>
<tr>
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<td>$8M</td>
<td>122</td>
<td>$6M</td>
</tr>
<tr>
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<td>2,011</td>
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</tbody>
</table>
and $3 million each from DOC and NASA. NYU’s grants in the “Other Agencies” category are split between DOE and the Environmental Protection Agency (EPA).

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, such as the School of Arts and Sciences at Columbia University.

Several other nonacademic institutions in New York also receive a significant amount of federal R&D grants each year. Foremost among the institutions that received R&D grants in FY 1998 are the Memorial Sloan-Kettering Cancer Center in New York City ($57 million), the Research Foundation for Mental Hygiene ($48 million) in New York City, Health Research, Inc. ($35 million), in Albany and Buffalo, Cold Spring Harbor Laboratory ($23 million), and the National Development and Research Institutes ($13 million) in New York City.

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 New York received 167 SBIR awards totaling $38 million. Examples include a $750,000 award from the Air Force to Laser Photonics Technology, Inc., in Amherst for work on high-capacity holographic data storage and a $500,000 award from the Department of Transportation to Innovative Dynamics in Ithaca for work on remote sensors for pavement ice detection.

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 New York are ones valued at more than $5.7 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 New York every year to foster research in water and water-related problems.

**Other Federal R&D Activities in New York**

Several entities in New York also receive notable sums from federal agencies in the form of contracts and cooperative agreements for specific R&D efforts. By far, the majority of these funds go to the New York–based divisions of Northrop Grumman and Lockheed Martin, which in FY 1998 received close to $308 million and $72 million, respectively, in contracts from DOD for R&D work on such programs as the Joint Surveillance and Target Attack Radar System (JSTARS), E-2C aircraft, LAMPS helicopters, and Lightweight Broadband Variable Depth Sonar (LBVDS). In addition, Calspan Corporation, LNY Sales, ITT Industries, and General Electric each received between $8 million and $22 million of R&D contracts from federal agencies in FY 1998. The University of Rochester, Cornell University, Columbia University, NYU, and Yeshiva University (home of AECOM) also received contracts from various federal agencies to conduct R&D for the federal government that collectively totaled $28 million in FY 1998. Although these amounts are notable, they do not come close to eclipsing the funds that these institutions receive from federal R&D grants.

A total of $106 million of federal R&D dollars in the form of cooperative agreements was also received in FY 1998 by entities located in New York. By far the largest of these cooperative agreements ($25 million) went from DOE to the University of Rochester for the management and operation of the National Laser User’s Facility (NLUF). This facility is the heart of the Laboratory for Laser Energetics (LLE) operated by the University of Rochester for DOE’s Office of Inertial Fusion. LLE was established in 1970 to support investigations of the interaction of intense radiation with matter and to house experiments in plasma physics, x-ray laser physics, spectroscopy, and instrumentation development. Other federal agencies awarding cooperative agree-
ments to New York–based entities include NSF, DOC, and DOD. Among these latter cooperative agreements are awards supporting two of NSF’s Science and Technology Centers—the Center for High-Pressure Research, at SUNY–Stony Brook, and the Center for Photo-induced Charge Transfer at the University of Rochester. In addition, New York is home to four of NSF’s Materials Research Science and Engineering Centers—the Center for Novel Materials by Thermal Spray Research at SUNY–Stony Brook, the Materials Science Center at Cornell University, the Mixed Organic/Inorganic Materials Center at Columbia University, and the Center for Polymers at Engineered Interfaces at SUNY–Stony Brook. Not included among these cooperative agreements is one for $12 million awarded by NSF to Cornell University for the operation of the National Astronomy and Ionosphere Center, an FFRDC located in Arecibo, Puerto Rico. This FFRDC is detailed in the section on “Federal R&D Units in Puerto Rico.”