

2003 Survey of Industrial Research and Development

Form RD-1

Instructions

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2003 Survey of Industrial Research and Development

Form RD-1

General Instructions

Changes from 2002 to 2003 R&D survey year

- 1) Some item headings and numbers have changed. The five mandatory items are now as follows:
 - Question 2, line A
 - Question 2, line B
 - Question 4D, column 1
 - Question 4D, column 3
 - Question 11
- 2) The categories for energy in Question 12 are changed so that conservation and utilization are now reported under "All other energy."

How this information is used

Information about corporate research and development (R&D) activities is important in assessing our nation's scientific and technological resources. Your survey answers help us to provide national data on industrial R&D. This information is not available from any other source. Your participation is appreciated so that we can produce timely and comprehensive data.

Who fills out this survey?

U.S. publicly traded and privately owned, nonfarm business firms

This survey does **not** include:

- Operations owned by Federal, state, or local governments
- Nonprofit organizations
- Trust or pension plans performing only investments

If you received this form in error, please explain in the Remarks section on page 10 of the survey form and return the form.

Which company operations should you include in your survey answers?

Report all domestic operations of your **entire consolidated domestic enterprise**, including all U.S. subsidiaries, affiliates, and branches.

Report all parts of the company located in the 50 United States and the District of Columbia (D.C.), except where indicated differently.

For holding companies, report for all U.S. subsidiaries, affiliates, and branches under the ownership and control of the holding company.

EXCEPTION: If you report separately for a component of this company based upon an arrangement with the Census Bureau, please continue to do so.

Reporting period for your survey answers

Please provide calendar year 2003 information, if possible. If not, please use your fiscal year ending between September 2003 and March 2004

Comparing your 2002 and 2003 responses

If your company reported for 2002, entries from that form are preprinted on this form. (If you would like to correct these figures, please do so.) If your answers for 2003 are substantially higher or lower than your 2002 answers, you may comment on the reasons in the Remarks section on page 10 of the survey form." Such reasons may include new government contracts, a revised accounting method, or an R&D unit that was acquired or disposed of during 2002 or 2003.

How to report tax incentives for R&D

The Federal government and many states offer incentives for research and development activity. For purposes of this survey, please report your total R&D expenditures regardless of any tax incentives.

For further information on the Federal research tax credit please go to:

<http://www.irs.gov/businesses/>

For further information on state tax incentives, please contact the Comptroller of the Treasury in your state.

To request more time to complete your form or additional copies of the form

Please provide your 11-digit identification number (ID) as printed on the form above your address when you contact us.

For more time, call the Census Touchtone Data Entry System: 1-800-851-2014.

For official copies of the form, call (812) 218-3331.

OR

Write: U.S. Census Bureau
1201 East 10th Street
Jeffersonville, IN 47132-0001

To obtain a sample copy of the form, please visit the following web site. However, that sample copy cannot be used to submit your survey response because it lacks the appropriate labeling.

<http://help.econ.census.gov/econhelp/rd/>

For answers to your questions regarding this form

Write:

U.S. Census Bureau, Manufacturing and Construction Division
ATTN: Special Studies Branch
Room 2135/4
Washington, DC 20233-6900

Phone:

1-800-851-2014 (option "0")

Use our web site at <http://help.econ.census.gov/econhelp/rd/>

- Submit e-mail via our secure server to encrypt your message and to keep your survey participation confidential
- See answers to frequently asked questions

Electronic alternative for reporting

An electronic questionnaire may be used to report your responses. This electronic alternative potentially saves time for you and helps us to reduce processing costs. If you use the electronic alternative, please do **not** mail in the paper form. For questions about installing or using the electronic questionnaire, please call the Electronic Reporting Staff at 800-838-2640.

System Requirements

1. Microsoft Windows 98 or higher.
2. Microsoft Internet Explorer or Netscape Navigator 4.0 or above (128-bit encryption).
3. If you set your screen display for 16-bit color or higher, the forms will be easier to read. The forms are harder to read with 256-color display.

Have your username (UID) and password (PW) handy. ***The username and password are case sensitive.***

1. Go to the following Business Help Site at: www.census.gov/econhelp/rd
2. Click on Electronic Reporting
3. Follow the instructions for downloading software.

Transmitting your data

You may transmit your completed data to the Census Bureau electronically via Internet, or by mail.

Burden hour estimate

Public reporting burden for this collection of information is estimated to average 18 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimates or any other aspects of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
National Science Foundation
4201 Wilson Boulevard, Room 485
Arlington, VA 22230.

Survey Definitions of R&D

R&D includes the following:

- the planned, systematic pursuit of new knowledge or understanding toward general application (basic research);
- the acquisition of knowledge or understanding to meet a specific, recognized need (applied research); and
- the application of knowledge or understanding toward the production or improvement of a product, service, process, or method (development).

This survey covers industrial R&D performed by people who are

- 1) trained—either formally or by experience—in engineering or in the physical, biological, mathematical, statistical, or computer sciences, and
- 2) employed by a publicly or privately owned firm engaged in for-profit activity in the 50 U.S. states or D.C. (This also includes R&D they may perform **outside** of the 50 states and D.C.)

This survey specifically **excludes** quality control, routine product testing, market research, sales promotion, sales service, and other nontechnological activities; routine technical services; and research in the social sciences or psychology.

This survey defines basic research, applied research, and development as follows:

Basic research is the pursuit of new scientific knowledge or understanding that does not have specific immediate commercial objectives, although it may be in fields of present or potential commercial interest.

Applied research applies the findings of basic research or other existing knowledge toward discovering new scientific knowledge that has specific commercial objectives with respect to new products, services, processes, or methods.

Development is the systematic use of the knowledge or understanding gained from research or practical experience directed toward the production or significant improvement of useful products, services, processes, or methods, including the design and development of prototypes, materials, devices, and systems.

Survey Definitions of R&D (continued)

Types of R&D activities to consider for this survey

INCLUDE:	EXCLUDE:
<ul style="list-style-type: none"> • Activities that incorporate: <ul style="list-style-type: none"> – Basic and applied research in the sciences and engineering – Design and development of new products and processes – Enhancement of existing products and processes • Activities carried on by persons trained, either formally or by experience, in: <ul style="list-style-type: none"> – Biological sciences (e.g., medicine) – Computer science – Engineering – Mathematical and statistical sciences – Physical sciences (e.g., chemistry and physics) • Activities that take place in: <ul style="list-style-type: none"> – Separate R&D organizational units of the company – Company laboratories – Technical groups not part of an R&D organization. 	<ul style="list-style-type: none"> • R&D from acquired companies prior to acquisition (in-process R&D) • Amortization above the actual cost of property and equipment related to your R&D activities • Test and evaluation once a prototype becomes a production model • Routine product testing • Geological and geophysical exploration activities • Technical services such as: <ul style="list-style-type: none"> – Quality and quantity control – Technical plant sanitation control – Troubleshooting in connection with breakdowns in full-scale production • Advertising programs to promote or demonstrate new products or processes • Assistance in preparation of speeches and publications for persons not engaged in R&D • Social science R&D including: <ul style="list-style-type: none"> – Personnel R&D – Economic R&D – Artificial intelligence and expert systems R&D – Consumer, market, and opinion R&D – Engineering psychology R&D – Management and organization R&D – Actuarial and demographic R&D – Educational processes and applications R&D – R&D in law

Question-by-Question Instructions

Question 1

Question 1 asks about your company's ownership as of December 31, 2003.

If "yes," your company was owned or controlled by another company on December 31, 2003, follow the instructions below:

Your situation	Action to take
Your company was purchased by another company after March 31, 2003	Note the new owner and purchase date under the Remarks section on page 10 of the form. Complete the rest of the form for the months prior to the purchase of your company.
Your company was purchased by another company on or prior to March 31, 2003	Note the new owner and purchase date under the Remarks section on page 10 of the form and return the form without completing the rest of it.

If you have questions, please call the R&D Survey staff at 1-800-851-2014 (option "0") to determine whether you are required to complete the form.

Question 2A

Question 2A covers domestic company sales. Report only the parts of your company located **within** the 50 United States or D.C.

INCLUDE:	EXCLUDE:
<ul style="list-style-type: none"> • Sales, operating receipts, and revenues from all domestic operations of the company, net of returns and allowances • Receipts from sales of products and services provided to other companies, individuals, U.S. Government agencies, and foreign countries • Net selling value of shipments, f.o.b. plant, after discounts and allowances minus freight charges and excise taxes • Revenue from investments, rents, and royalties only if it is the principal business of the company • Interest, dividends, commissions, and rental income as part of revenues only if you are a finance, insurance, or real estate company • Value of assets sold under a capital lease agreement • Export transfers to your foreign subsidiaries, affiliates, and branches. 	<ul style="list-style-type: none"> • Sales and other taxes collected and paid directly to government taxing agencies • Domestic intracompany transfers • Receipts from sale of products and services provided by your foreign subsidiaries, affiliates, and branches. • Receipts from sale of products and services provided by your subsidiaries, affiliates, and branches in Puerto Rico and other U.S. territories outside the 50 United States and D.C. • Income from interest, dividends, and commissions (Exception: Companies in the finance, insurance, and real estate industries) • Other nonoperating income (e.g., royalties)

Question 2B

Question 2B covers domestic company employment. Report only the parts of your company located **within** the 50 states or D.C.

INCLUDE:

- Full- and part-time employees of the company as defined on Treasury Form 941, Employer's Quarterly Federal Tax Return, and Circular E, Employer's Tax Guide, if filed for the entire company
- Number of employees in all activities **within** the 50 United States or D.C. during the pay period that includes March 12, 2003
- Persons on paid sick leave, paid holidays, and paid vacations during the pay period that includes March 12, 2003.

Question 3

Question 3 covers the scientists and engineers who are employees of your company and perform R&D activities. It asks for the number of full-time equivalent (FTE) scientists and engineers who work on your company's R&D **within** the 50 United States or D.C.

There are two steps to calculate the number of FTEs for R&D scientists and engineers:

1. For company laboratories performing only research and development, count the number of scientists and engineers employed in January 2004.
2. For employees whose activities are not solely devoted to R&D, use the proportion of their time that is devoted to R&D to compute the number of full-time equivalent R&D scientists and engineers. For example, if a company had 60 scientists and engineers in January 2004 and one-fourth of their time was charged to R&D projects, then that company would have 15 full-time equivalent R&D scientists and engineers. Add these full-time equivalents to the count from the previous step.

INCLUDE:

- All persons engaged in scientific or engineering work at a level that requires knowledge of physical or life sciences or engineering or mathematics
- Persons with experience equivalent to completion of a 4-year college course with majors in these fields, regardless of whether they actually hold degrees in the fields

Question 4

Question 4 covers the R&D that is performed both (1) **within** your company and (2) **within** the 50 United States or D.C.

How to decide which expenditures to include as R&D costs

INCLUDE:	EXCLUDE:
<ul style="list-style-type: none">• Wages, salaries, and related costs• Materials and supplies consumed• R&D depreciation• Cost of computer software used in R&D activities• Utilities, such as telephone, telex, electricity, water, and gas• Travel costs and professional dues• Property taxes and other taxes (except income taxes) incurred on account of the R&D organization or the facilities they use• Insurance expenses• Maintenance and repair, including maintenance of buildings and grounds• Company overhead including: personnel, accounting, procurement and inventory, and salaries of research executives not on the payroll of the R&D organization	<ul style="list-style-type: none">• R&D from acquired companies prior to acquisition (in-process R&D)• Capital expenditures• Test and evaluation once a prototype becomes a production model• Patent expenses• Income taxes and interest

Question 4 (continued)

How to decide which category of R&D

<p>1. Basic research</p>	<p>Projects that pursue new scientific knowledge or understanding that does not have specific immediate commercial objectives, although it may be in fields of present or potential commercial interest</p>	
<p>2. Applied research</p>	<p>Projects that apply the findings of basic research or other existing knowledge toward discovering new scientific knowledge that has specific commercial objectives with respect to new products, services, processes, or methods</p>	
<p>3. Development</p>	<p>Projects that are directed toward the systematic use of the knowledge or understanding gained from research or practical experience directed toward the production or significant improvement of useful products, services, processes, or methods, including the design and development of prototypes, materials, devices, and systems</p>	
	<p>INCLUDE:</p>	<p>EXCLUDE:</p>
	<ul style="list-style-type: none"> • Expenditures for designing and conducting clinical trials of drugs, pharmaceuticals, or other products that have not been marketed • Software development <ul style="list-style-type: none"> – Designing and/or adapting software if the application has commercial value (exclude software development for internal use) – Beta version of software being developed that has potential commercial application – Design and operation of pilot plants and semiwork plants • Engineering activity required to advance the design of a product or process so it meets specific functional and economic requirements • Design, construction, and testing of prototypes and models including test models for defense contracts • Designs for special manufacturing equipment and tools • Preparation of reports, drawings, formulas, specifications, standard practice instructions, or operating manuals 	<ul style="list-style-type: none"> • Software development intended for <i>within</i> company use only • Routine technical services to customers • Tool making and tool tryout • Production of detailed construction drawings and manufacturing blueprints

Question 4 (continued)

How to decide which category to use for sources of R&D funding

Source of R&D	INCLUDE:	EXCLUDE:
Federal funds	<ul style="list-style-type: none"> • Federally funded R&D performed within the company. Include only the amount of work done on Federal R&D contracts or subcontracts in the current year. • R&D portion of procurement contracts or subcontracts 	<ul style="list-style-type: none"> • Federally funded R&D contracted or subcontracted to or otherwise performed by others outside of your company. (Report such funds in Question 6, line A.) • Expenditures for independent research and development (IR&D). (Report in column 2, Company funds.)
Company and other	<ul style="list-style-type: none"> • R&D from company and other nonfederal sources that is performed within the company. <p>NOTE that “company and other funds” and “company funded” are used interchangeably in the Form RD-1.</p> <ul style="list-style-type: none"> • R&D your company performs under contracts you have with non-Federal sources • Costs for independent research and development (IR&D). We define IR&D funds as R&D performed by the company for which you anticipate reimbursement by the government through indirect charges for the purchase of products or services. Qualified projects usually have potential interest to the Department of Defense or other agencies of the Federal government. These IR&D funds are excluded from federal funds received for federally sponsored research and development contracts. 	<ul style="list-style-type: none"> • R&D from nonfederal sources that is contracted to or otherwise performed by others outside of your company (Report such funds in Question 6, line A.)

Question 5

Question 5 asks for an estimate or projection of the cost of R&D your company expects to perform in 2004 in the 50 United States or D.C. that will be funded by company and other non-Federal sources.

Question 6A

Question 6A covers the R&D that was **both** performed for your company (1) by **others outside your company** such as contractors, and (2) **within** the 50 United States or D.C.

Include payments for R&D projects, contracts, or services performed for your company by contractors, suppliers, educational institutions, or other organizations.

Question 6B

Question 6B asks for the type of organizations that performed the portion of your answer to question 6A for company and other nonfederal sources of R&D funding.

Definitions for types of organizations	
For-profit companies	A company that is organized to pursue profit
Universities and colleges	A degree-granting institution of higher learning, having facilities for teaching and research
Other nonprofit organizations	An organization that is not organized to pursue profit. However, universities and colleges are reported in another category.

Question 7A

Question 7A covers R&D performed **outside** the 50 United States and D.C. including R&D performed in Puerto Rico.

For Question 7A, line 1, report payments for R&D projects, contracts, or services performed for your company by contractors, suppliers, educational institutions, or other organizations.

Question 7B

Question 7B provides more detail for your answer to Question 7A, line 4. If a country is not listed, please include the R&D in the "Other" category.

Question 8

Question 8 covers domestic federally funded R&D by agency.

Question 9

Question 9 covers R&D by type of expense

A. Wages and salaries of R&D personnel

INCLUDE:	EXCLUDE:
<ul style="list-style-type: none"> • Gross earnings paid in calendar year 2003 to employees engaged in R&D (follow the definition of salaries and wages that is used for calculating withholding tax) • Salaries of officers in the research establishment(s) of a corporation 	<ul style="list-style-type: none"> • Payments to proprietor or partners if an unincorporated concern • Employee fringe benefits (Report under "B. Fringe benefits.")

B. Fringe benefits of R&D personnel

A **fringe benefit** is an employment benefit granted by an employer that has monetary value but does not affect basic wage rates. It includes any benefits given in addition to wages.

INCLUDE:
<ul style="list-style-type: none"> • Disability benefits • Life and medical insurance • Paid holidays • Retirement benefits, pension, and social security contributions • Stock options • Time-off benefits • Vacation, annual, sick, and maternity leave

C. Materials and supplies consumed

Report the delivered cost for all purchased materials consumed.

INCLUDE:	EXCLUDE:
<ul style="list-style-type: none"> • Materials and supplies that were: <ul style="list-style-type: none"> – Received from other companies – Withdrawn from inventory – Received from other establishments of this company • All work done for your laboratories and other technical units by noncompany organizations; for example: Model construction by a non-company model shop 	<ul style="list-style-type: none"> • Purchases from other R&D organizations

Question 9 (continued)

D. Depreciation on R&D property and equipment

INCLUDE:

- Depreciation and amortization charged during the year against property and equipment related to your R&D activities
- Depreciation and amortization against property and equipment acquired since the beginning of the year that was ***sold or retired*** during the year and not in service at the end of the year
- Depreciated amounts no higher than the actual cost of property and equipment

E. All other R&D expenses

INCLUDE:

- Books and periodicals
- Company overhead
- Property and other taxes
- Utilities

Question 10A

Question 10A covers R&D by selected technology area.

A. Biotechnology

Definition of biotechnology for this survey:

Biotechnology is the application of science and technology to living organisms, as well as parts, products, and models thereof, to alter living or nonliving materials for the production of knowledge, goods, and services.

INCLUDE:

- DNA technologies such as:
 - Genetics
 - Pharmacogenetics
 - Gene probes
 - DNA sequencing/synthesis/simplification
 - Genetic engineering
- Protein and molecular technologies such as:
 - Protein/peptide sequencing/synthesis
 - Lipid/protein glycoengineering
 - Proteomics
 - Hormones
 - Growth factors
 - Cell receptors/signaling/pheromonics
- Cell and tissue culture and engineering including:
 - Cell/tissue culture
 - Tissue engineering
 - Hybridization
 - Cellular fusion
 - Vaccine/immune stimulants
 - Embryo manipulation
- Process biotechnologies such as:
 - Bioreactors
 - Fermentation
 - Bioprocessing
 - Bioleaching
 - Biopulping
 - Biobleaching
 - Biodesulphurization
 - Bioremediation
 - Biofiltration
- Subcellular organism research including:
 - Gene therapy
 - Viral vectors
- Other biotechnology areas such as:
 - Bioinformatics
 - Nanobiotechnologies

Question 10A (continued)

B. Software development

INCLUDE:	EXCLUDE:
<ul style="list-style-type: none">• Application development tools and environments• Applications software• Computer-aided design tools and methods• Computer systems software	<ul style="list-style-type: none">• Software programming or engineering used exclusively for internal company operations such as financial management or human resources

C. Materials synthesis and processing

Formulation and manipulation of new or improved materials using the data and techniques of science and engineering

INCLUDE:
<ul style="list-style-type: none">• Advanced structural materials in the industrial machinery, medical, building, and construction industries• Higher performance semiconductors and photonic devices in the semiconductor industry• Ceramics and alloys designed to withstand extreme temperatures and stresses for use in engine and structural parts in the aerospace and automotive industries• Composite materials for use in sporting goods• New and significantly improved synthesis and production techniques for existing materials

D. Other areas

Report the remainder of R&D costs so that the total for this question matches Question 4, line D, column 3.

Question 10B

Question 10B asks for the nanotechnology proportion of the R&D expenditures provided in Question 10A.

For example, if about a fourth of your biotechnology R&D expenditures was devoted to nanotechnology projects, report 25% in Question 10B.

Nanotechnology is the creation and utilization of materials, devices, and systems through the control of matter on the nanometer-length scale, that is, at the level of atoms and molecules in the range of 1 to 100 nanometers.

INCLUDE:
<ul style="list-style-type: none">Materials and systems that exhibit novel and significantly improved physical, chemical, and biological properties; phenomena; and processes because of their size

Question 11

Question 11 covers R&D for each state location where your company has research and development laboratories or facilities.

It is not necessary to calculate separately individual assignments made outside the home state of a particular research staff.

Question 12

Question 12 covers R&D by type of energy source.

The types of R&D projects that are included:

INCLUDE:
<ul style="list-style-type: none">R&D to increase energy resources or capabilitiesDevelopment of energy equipmentProducts and processes for exploration, extraction, transportation, processing, storage, generation (including conversion), distribution, conservationPresent, new, or improved forms of energy

How to estimate if the project is for joint or multiple purposes

Estimate the portion of the cost incurred for energy purposes.

Include the total cost of the R&D energy spending if the primary purpose of the project is energy R&D and costs cannot be apportioned.

Exclude costs if the project is not primarily for energy research and development and the costs cannot be apportioned.

Question 12 (continued)

What is included for each type of energy:

Type of energy	INCLUDE:
Nuclear	<ul style="list-style-type: none"> • Fission and fusion
Fossil fuels	<ul style="list-style-type: none"> • Oil • Gas • Shale • Coal <ul style="list-style-type: none"> – Including synthetic fuels designed to convert coal to gaseous and liquid products – Including equipment and techniques to improve the productivity and recovery rates of coal mining
Geothermal and solar	<ul style="list-style-type: none"> • Geothermal heat pumps • Geothermal power plant generators • Photovoltaic technology • Solar water-heating systems
All other energy sources	<ul style="list-style-type: none"> • Conservation and utilization R&D to reduce consumption either at the point of energy use or in the transmission, transportation, storage, and conversion of energy including such activities as: <ul style="list-style-type: none"> – Reduce fuel consumption in manufacturing – Improve the efficiency of transportation of energy products – Produce an end product that is more efficient in energy consumption • Wind, waste, hydroelectric • Other energy R&D that cannot be classified above

Question 13

Question 13 covers your share of R&D expenditures funded by company and other nonfederal sources for collaborative R&D by type of R&D partner. These joint activities may or may not be organized as alliances, partnerships, or joint ventures.

INCLUDE:	EXCLUDE:
<ul style="list-style-type: none">• Activities performed jointly with other organizations including legally distinct business units, universities, government agencies, or nonprofit organizations• Alliances• Partnerships• Joint ventures	<ul style="list-style-type: none">• Purchasing, funding, or financing relationships that do not involve joint or collaborative R&D

Definitions of types of R&D partners

For-profit companies	A company that is organized to pursue profit
Federal laboratories	An organization of the U.S. government
Universities and colleges	A degree-granting institution of higher learning, having facilities for teaching and research
Other nonprofit organizations	An organization that is not organized to pursue profit. However, universities and colleges are reported in another category.

Question 14

Question 14 asks for information on the time period that your survey responses cover. It also asks about your company organization.

Question 15

Question 15 provides space for your contact information. Please give the name and telephone number of the person in your company to contact regarding this report.

Remarks

The Remarks section provides space for your comments and explanations.

WARNING CONCERNING ELECTRONIC MAIL: The Internet is not a secure means of transmitting information unless it is encrypted. If you choose to communicate with the Census Bureau via electronic mail, the Census Bureau cannot guarantee the privacy of the information while transmitted, but will safeguard it in accordance with Title 13. Be advised that making inquiries regarding this survey via electronic mail may divulge your participation in this survey.