

Supplement 2: Technology Transfer

We interact extensively with researchers from industry, academia, and not-for-profit organizations in pursuit of our technology transfer role. That role focuses on providing technical solutions to challenges in the fields of energy, the environment, transportation, information, materials, and the life sciences. Our interactions, in most cases conducted under formal R&D agreements, enhance our programs and provide a means of transferring into use the technologies and methodologies created by our researchers. These interactions ultimately enhance U.S. economic productivity, international competitiveness, and society as a whole.

A. R&D Agreements

Argonne's Office of Technology Transfer (OTT) is responsible for a broad range of activities. The office's overall objective is to increase the impact of our research and expand use of its R&D results. OTT (1) manages the development of R&D agreements, including cooperative R&D agreements (CRADAs) and "work-for-others" (WFO) contracts; (2) seeks opportunities to increase collaboration with the University of Chicago; (3) develops partnerships with industry and licenses intellectual property we have developed; (4) manages the process of developing intellectual property; and (5) serves as a point of contact for our outreach activities and for incoming inquiries. Table S2.1 summarizes our technology transfer activities for FY 2000-FY 2002 and projects those activities for the subsequent three years.

Staff of OTT work closely with Argonne research divisions to develop new contract activities efficiently and to identify strategically important technology transfer opportunities with potential for high impact. OTT staff also are intimately involved with the Argonne Partnership Committee, under whose auspices participating research managers meet regularly in tactical working groups to explore opportunities for transferring technology to industry and to identify

promising R&D programs that will have programmatic and commercial importance. The tactical working groups coordinate opportunities in eight focus areas based on our research: (1) transportation technology, (2) materials development, (3) process industries technology, (4) carbon management technology, (5) biotechnology, (6) environmental stewardship, (7) urban technology, and (8) national security.

Argonne research staff and OTT managers aggressively develop joint research programs and other collaborations with non-DOE organizations. They work with the Laboratory's operating contractor, the University of Chicago, to use the resources and facilities of both institutions more effectively.

B. Licensing

For Argonne inventions thought to have the greatest commercial potential — on the basis of their benefit to users, commercial value, and strategic need — OTT works with research divisions to develop market-based technology commercialization strategies. The assessment of commercial potential includes such factors as economic value compared with current alternatives, market size, cost of implementation, industry trends, and customer need for the technology. Through cooperative agreements, Argonne collaborates with industrial participants to seek the shortest and most effective route to technology commercialization and wide market adoption.

Table S2.1 reports royalties and other income received from licensing our inventions. Royalties received to date stem from two sources: (1) up-front payments for licenses, options, and assignments and (2) licensing agreements, as well as current royalties from continuing product and software sales. Income resulting from the commercial use of an Argonne technology is shared between its inventors or authors and the research divisions from which the technology

Table S2.1 Activities Conducted by Argonne's Office of Technology Transfer

	Actual Values			Projected Values		
	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
Office of Technology Transfer						
Funding (\$ in millions)	2.0	2.3	2.0	2.0	2.1	2.3
Staffing (FTEs)	16	16	16	17	18	18
Active Agreements (including amendments)^a						
Cost-shared (CRADAs)	27	27	32	32	37	37
Reimbursable (WFOs and technical service agreements)	230	246	248	278	300	300
With other DOE contractors	300	351	349	370	390	390
Total	557	624	629	680	727	727
Agreement Funding (funds to the Laboratory, \$ in millions)^a						
Cost-shared (CRADAs)	15.7	12.1	5.0	7.0	8.0	9.0
Reimbursable (WFOs and technical service agreements)	69.1	70.0	89.7	108.0	110.0	115.0
With other DOE contractors	37.5	35.3	49.9	50.0	55.0	60.0
Total	122.3	117.4	144.6	165.0	173.0	184.0
Intellectual Property						
Inventions reported	111	106	106	120	140	150
Software reported	8	17	15	20	25	25
Patent applications filed ^b	52	47	46	55	65	75
Patents issued ^b	28	46	27	30	35	40
Active licenses (all sources) ^c	78	121	150	175	195	200
Royalties (gross, \$ in millions)	0.7	2.4	2.5	2.0	2.5	3.0

^a Includes agreements with both nonfederal and federal organizations.

^b Includes (1) patent applications filed by Argonne, ARCH Development Corporation, DOE, and others (e.g., inventors and companies) and (2) patents issuing from those filings.

^c Includes licenses executed by Argonne, ARCH Development Corporation, and DOE.

originated. The divisions can use the funds for internally supported R&D, staff development, or educational activities (under policies set in accordance with the *Prime Contract*).

Argonne licenses copyrighted software codes and accompanying documentation to commercial and educational organizations for a fee. In addition, selected software is distributed broadly under free licenses to maximize market impact and overall benefits to users. The Laboratory also registers trademarks associated with its software and some elements of its invention portfolios, in

order to distinguish and protect intellectual property when it is reported in scientific journals, in trade publications, or elsewhere.

Since 1999 we have made software available online from the *Argonne Software Shop* (URL: www.softwareshop.anl.gov). Argonne's home page links directly to this site. The following currently available software packages are enjoying significant use:

- LDAP Browser/Editor, a web-based server directory editor. Licenses have been executed

with a number of organizations, including the University of California, Smart Trust of Sweden, Gordon Food Services, and MetaSolv Software.

- GCTool, a thermodynamic modeling software package with several modules, including a module for modeling the performance of fuel cell systems. Purchasers of the software include the Georgia Tech Research Institute and the Korean Electric Power Research Institute, as well as several commercial companies.
- GTMax, a software package used for energy policy management, analysis of spot energy markets, and planning for new energy and electricity facilities to meet predicted future demands. GTMax has been licensed to Adica Consulting, a small business, for application and distribution.
- The Glass Furnace Model (GFM), a model of the glass bath and the glass furnace that supports predictive optimization of glass production. This computer code was written by Argonne in collaboration with five glass companies (Osram Sylvania Products, Inc.; Techneglas; Libby, Inc.; Visteon Glass Systems; and Owens Corning) and two universities (Purdue and Mississippi State). The glass companies provided access to their furnaces, where the universities collected operational data.

Altogether, we have distributed more than 2,000 copies of software to over 50 commercial and government licensees through our web site.

In conjunction with licensing agreements, Argonne often also executes R&D agreements aimed at precommercial R&D, through either WFO contracts (as discussed in Supplement 1) or CRADAs. In FY 2002 we executed 32 new CRADAs. Other types of agreements, such as personnel exchanges and technical service agreements, are also used when the arrangement meets the needs of the Laboratory and its sponsor or customer.

During FY 2002 Argonne also executed two memoranda of understanding with sister national laboratories to facilitate licensing of inventions: (1) with Fermilab, for a microcurrent therapy process, and (2) with Brookhaven, for a plasma valve.

Some of our recently executed CRADAs had the following objectives:

- PACCAR: Develop commercial heavy-vehicle (truck) external designs to improve truck aerodynamics and reduce fuel consumption.
- Caterpillar: Improve diesel engine performance and reduce emissions.
- Eltron Research: Develop advanced hydrogen transport membranes for future pollution-free, multipurpose fossil fuel plants, as being conceptualized by DOE for its Vision 21.
- Fuel Cell Energy: Develop advanced bipolar plate materials for molten carbonate fuel cells.
- CH₂M Hill: Assess the potential applications of our Ceramicrete technology for treatment of hazardous and nuclear waste.
- Sud Chemie, Inc.: Develop an improved sulfur-tolerant reforming catalyst for application to fossil fuels.
- Caterpillar: Develop approaches to analyzing underhood thermal management by using computational codes that integrate computational fluid dynamics and systems analysis.
- ITN Energy Systems: Apply novel composite membranes to hydrogen separation for gasification processes in Vision 21 energy plants.

