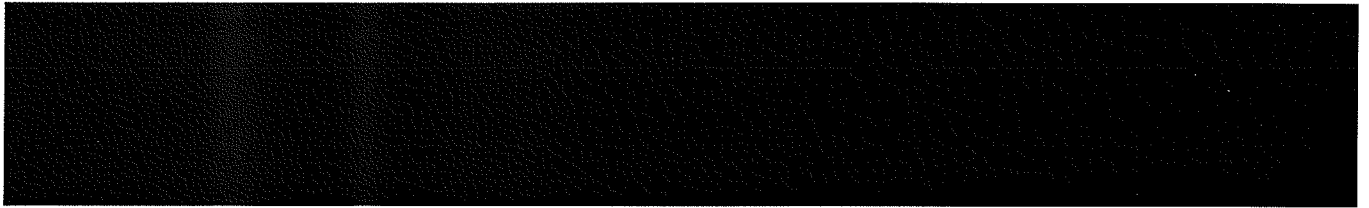


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Minnesota Technology, Inc

2003 Report

On State Science & Technology Research & Development

Minnesota Technology, Inc. 

a NIST | Network
MEP | Affiliate



FOREWORD

This report, prepared by Minnesota Technology, Inc. according to its responsibilities outlined in Minnesota Statutes 1160.71, describes scientific and technological research and development (R&D) activities sponsored by the State of Minnesota between July 1, 2002 and June 30, 2003 (FY 2003). The report includes:

- Analysis of research and development activities funded by the state during fiscal year 2003 and reported to Minnesota Technology, Inc.
- A list, organized by funding organization, of all reported R&D projects for which state dollars were allocated during fiscal year 2003.

Minnesota Technology, Inc. greatly appreciates the cooperation of state agencies, boards, commissions, authorities and institutions for providing information on their R&D activities for this report.

Analysis of research and development activities funded by the state during FY 2003 and reported to Minnesota Technology, Inc.

1. Overview of Minnesota Technology's Reporting Guidelines

Under Minnesota Statutes, state agencies and other organizations are required to notify Minnesota Technology, Inc. of any state funds allocated for science and technology research and development.

This reporting requirement applies only to dollars for which the state of Minnesota is the source; funding allocations from private sector or federal sources are excluded.

To help organizations comply with reporting requirements, Minnesota Technology has adopted specific reporting guidelines. These guidelines are described in the manual entitled *Peer Review and Reporting of State Funded Science and Technology Research and Development*, first distributed in August 1989.

Funding organizations are asked to categorize each R&D project they report into one of nine major research areas. These areas are:

- Agriculture & Food Science
- Transportation & Energy Sciences
- Natural Resources
- Environmental Protection & Waste Management
- Computers, Communications & Microelectronics
- Social Science
- Manufacturing & Engineering
- Human Health
- Physical & Natural Science

Further, because economic development and job creation are particularly important public policy goals, reporting organizations are asked to identify those R&D projects having job creation or economic development as an explicit goal.

2. Reporting Procedures

- When reporting multi-year projects, Minnesota Technology asked funding organizations to list only the amounts they actually intended to disburse in fiscal year 2003. In past years, some organizations have reported the total allocation for a multi-year project in one fiscal year, usually the year in which the project was initiated. Identifying actual per-year allocations for multi-year projects yields a truer picture of state-origin R&D expenditures in Minnesota. However, this reporting method, introduced in 1994, makes comparisons between funding levels identified in this report and those contained in reports prior to 1994 invalid.

3. Summary of R&D Expenditures in FY 2003¹

Reporting organizations allocated a total of \$28,425,826 in grants, loans and special appropriations for scientific and technological research and development during FY 2003. In all, about 450 projects were funded by 8 organizations. A complete list of reported projects funded in FY 2003 is presented at the end of this document.

- The dominant research category was Agriculture and Food Sciences, which accounted for 63.5 percent of the total reported R&D expended (Table 1). Transportation & Energy Sciences was the next largest category with 24.0 percent of the funding.
- The largest funding organization by far was the Agricultural Experimental Station, which supported 268 research projects totaling \$17.3 million in funding during FY 2003. This comprised 61.0 percent of all reported funding. The Minnesota Department of Transportation was the second-largest organizational funder of R&D projects, disbursing \$6.8 million for 109 projects in the transportation & energy sciences category.
- At least thirty of the research and development projects reported were oriented toward economic development or job creation as a primary goal. The projects represented \$716,922 or 2.5% of total reported funding. The Agricultural Utilization Research Institute funded all of these projects. Table 2 lists the projects having an economic development goal.
- About 96 percent of all projects from reporting organizations underwent some type of peer review process prior to final selection.

¹ Please note that most of the research conducted at the University of Minnesota is not covered by this report. The University receives most of its funds from the federal government (primarily through the National Science Foundation and the National Institutes of Health) and from contracts with private firms. This report provides information solely on funds allocated by the State of Minnesota. In addition, please note that data from many state agencies and organizations were unavailable for FY03, and as a result are not included in this report.

Table 1.
State-Supported Science and Technology Research and Development
Amount of Funding by Research Category
Fiscal Year 2003

Research Category	Major State-Funded Sources²	Category Funding (All Sources)	Percent of Total R&D Funding
Transportation & Energy Sciences	Minnesota Department of Transportation	\$6,871,239	24.0
Natural Resources	Minnesota Geological Survey, Minnesota Department of Natural Resources - Division of Lands and Minerals, Minnesota Department of Natural Resources - Division of Forestry, Minnesota Department of Natural Resources - Fisheries Division	\$3,343,032	12.0
Agriculture & Food Sciences	Agricultural Utilization Research Institute, Agricultural Experimental Station	\$18,063,555	63.5
Environmental Protection & Waste Management	Legislative Commission on Minnesota Resources (through the Minnesota Pollution Control Agency)	\$148,000	0.5
TOTAL		\$28,425,826	100.0

² A "major source" is considered a source contributing more than 20% of the funds disbursed in a particular research category. Therefore, a source may be listed for more than one category. For each category, sources are listed in order of reported funding level.

Table 2.
R&D Projects in FY 2003
With an Economic Development or Job Creation Goal

Project Title	Recipient(s)	Funding Organization	Amount
NRRI #4	NRRI	Agricultural Utilization Research Institute	\$376,526
Utilization of Fiber	University of Minnesota	Agricultural Utilization Research Institute	\$58,458
Site-Specific Management of Green Peach Aphid in Potato	University of Minnesota	Agricultural Utilization Research Institute	\$36,249
Minnesota Interiorscapes Biocontrol	University of Minnesota	Agricultural Utilization Research Institute	\$33,543
Minnesota Populus Plantations Management of Cottonwood Leaf Beetle	University of Minnesota	Agricultural Utilization Research Institute	\$22,459
Lecithin Fractionalization	Soymor	Agricultural Utilization Research Institute	\$22,000
Cucumber Beetle Organic Pest Management	University of Minnesota	Agricultural Utilization Research Institute	\$16,441
Strawberry New Pest Management	University of Minnesota	Agricultural Utilization Research Institute	\$15,586
Honey Bee Disease and Mite Resistance	University of Minnesota	Agricultural Utilization Research Institute	\$15,557
Integrated Pest Management of Fungus Gnats- Phase 2	University of Minnesota	Agricultural Utilization Research Institute	\$14,680
Septoria Speckled Leaf Blotch Barley Resistance	University of Minnesota	Agricultural Utilization Research Institute	\$12,689
Vegetable Crop IPM Novel Seed Treatments	University of Minnesota	Agricultural Utilization Research Institute	\$11,816
Barley Beta Glucan	Minnesota Barley Research & Promotion Council	Agricultural Utilization Research Institute	\$11,506
Reducing Insecticide Use in Cabbage	University of Minnesota	Agricultural Utilization Research Institute	\$9,009
On Farm Pesticide Reduction Strategies	Minnesota Sustainable Farming Association	Agricultural Utilization Research Institute	\$7,980
Management of Black Vine Weevil	University of Minnesota	Agricultural Utilization Research Institute	\$7,096
Medicinal Herb Research	University of Minnesota, Financial Reporting	Agricultural Utilization Research Institute	\$6,294
E-Diesel Research	Minnesota Corn Growers Association	Agricultural Utilization Research Institute	\$5,000



Table 2. (Continued)
R&D Projects in FY 2003
With an Economic Development or Job Creation Goal

Project Title	Recipient(s)	Funding Organization	Amount
Tom Turkey	Minnesota Turkey Research & Promotion Council	Agricultural Utilization Research Institute	\$4,960
Reduce Pesticide for Canola Flea Beetle	Minnesota Canola Growers Association	Agricultural Utilization Research Institute	\$4,800
Product Development	Steven Read	Agricultural Utilization Research Institute	\$4,675
Integrated Pest Management of Fungus Gnats	University of Minnesota	Agricultural Utilization Research Institute	\$4,511
Meat Analogue	NutriFoods, Inc.	Agricultural Utilization Research Institute	\$3,125
Crop Rotation Impact on Canola Diseases	Minnesota Canola Growers Association	Agricultural Utilization Research Institute	\$2,786
Feed Trials	Glacial Grain Spirits, LLC	Agricultural Utilization Research Institute	\$2,500
Product Development	Cedar Summit Dairy	Agricultural Utilization Research Institute	\$1,708
Sieve and Steel	AURI/Public	Agricultural Utilization Research Institute	\$1,676
Coordinate Process Control	Wildlife Sciences	Agricultural Utilization Research Institute	\$1,371
Mississippi Topsoils	Mississippi Topsoils	Agricultural Utilization Research Institute	\$1,125
Liquid Compost	Greener Pastures	Agricultural Utilization Research Institute	\$800
TOTAL			\$716,922

Agricultural Utilization Research Institute

Summary by Research Category

FY 2003

Agriculture & Food Science		\$	716,921.53
Recipient	Project Title		FY 2003
NRRI	NRRI #4	\$	376,525.96
University of Minnesota	Utilization of Fiber	\$	58,458.00
University of Minnesota	Site-Specific Management of Green Peach Aphid in Potato	\$	36,248.50
University of Minnesota	Minnesota Interiorscapes Biocontrol	\$	33,542.51
University of Minnesota	Minnesota Populus Plantations Management of Cottonwood Leaf Beetle	\$	22,458.91
Soymor	Lecithin Fractionalization	\$	22,000.00
University of Minnesota	Cucumber Beetle Organic Pest Management	\$	16,440.70
University of Minnesota	Strawberry New Pest Management	\$	15,585.63
University of Minnesota	Honey Bee Disease and Mite Resistance	\$	15,556.53
University of Minnesota	Integrated Pest Management of Fungus Gnats- Phase 2	\$	14,679.75
University of Minnesota	Septoria Speckled Leaf Blotch Barley Resistance	\$	12,688.53
University of Minnesota	Vegetable Crop IPM Novel Seed Treatments	\$	11,816.17
Minnesota Barley Research & Promotion Council	Barley Beta Glucan	\$	11,505.77
University of Minnesota	Reducing Insecticide Use in Cabbage	\$	9,009.01
Minnesota Sustainable Farming Association	On Farm Pesticide Reduction Strategies	\$	7,980.00
University of Minnesota	Management of Black Vine Weevil	\$	7,095.84
University of Minnesota, Financial Reporting	Medicinal Herb Research	\$	6,293.65
Minnesota Corn Growers Association	E-Diesel Research	\$	5,000.00
Minnesota Turkey Research & Promotion Council	Tom Turkey	\$	4,959.72
Minnesota Canola Growers Association	Reduce Pesticide for Canola Flea Beetle	\$	4,800.00
Steven Read	Product Development	\$	4,674.83
University of Minnesota	Integrated Pest Management of Fungus Gnats	\$	4,511.13
NutriFoods, Inc.	Meat Analogue	\$	3,125.30
Minnesota Canola Growers Association	Crop Rotation Impact on Canola Diseases	\$	2,786.06
Glacial Grain Spirits, LLC	Feed Trials	\$	2,499.90
Cedar Summit Dairy	Product Development	\$	1,707.74
AURI/Public	Sieve and Steel	\$	1,675.70
Wildlife Sciences	Coordinate Process Control	\$	1,370.54
Mississippi Topsoils	Mississippi Topsoils	\$	1,125.15
Greener Pastures	Liquid Compost	\$	800.00
	Subtotal	\$	716,921.53

Legislative Commission on Minnesota Resources (through the Minnesota Pollution Control Agency)

Summary by Research Category

FY 2003

Environmental Protection & Waste Management		\$	148,000.00
Recipient	Project Title		FY 2003
Minnesota Environmental Science and Economic Review Board.	Wastewater Control and Phosphorus Reduction Initiative	\$	148,000.00
	Subtotal	\$	148,000.00

Minnesota Department of Natural Resources, Division of Lands and Minerals

Summary by Research Category

FY 2003

Natural Resources		\$	1,057,137.48
Recipient	Project Title		FY 2003
In-house, St Paul, MN	Range Hydrology	\$	127,581.65
Northshore Mining, Silver Bay, MN	Fundamentals of Taconite Agglomeration	\$	93,460.53
University of Minnesota, Minneapolis, MN	PGE Potential Outside Duluth Complex	\$	90,000.00
University of Minnesota, Minneapolis, MN	BWCA Land Valuation Study	\$	82,491.01
University of Minnesota, Minneapolis, MN	Performance Testing of Fine Screens - Phase II	\$	71,063.78
Cliffs Mining, Duluth, MN	Borehole Geophysics - Phase II	\$	70,360.55
University of Minnesota, Minneapolis, MN	PGEs & PGMs in Duluth Complex	\$	59,346.94
University of Minnesota, Minneapolis, MN	Aggregate Mapping at the County Level	\$	49,096.52
In-house, St Paul, MN	Aggregate Mapping at the County Level	\$	48,747.72
Cliffs Mining, Duluth, MN	Particle Size Distribution Study	\$	46,000.00
David Hopstock, Roseville, MN	Liberation Analysis of Taconite	\$	31,893.67
University of Minnesota, Minneapolis, MN	Mercury Balance at Taconite Concentrators	\$	30,000.00

University of Minnesota, Minneapolis, MN	Concentrator Modelling Development	\$	29,961.54
University of Minnesota, Minneapolis, MN	Mercury Balance at Taconite Concentrators	\$	29,930.75
Cliffs Mining, Duluth, MN	Balling Line Surges Study	\$	29,600.00
In-house, St Paul, MN	Mercury and Mining	\$	29,391.04
In-house, St Paul, MN	Mine Waste Mitigation	\$	22,543.03
In-house, St Paul, MN	Mine Waste Database	\$	20,816.44
University of Minnesota, Minneapolis, MN	Economic Evaluation of Taxes and Royalties	\$	19,380.65
University of Minnesota, Minneapolis, MN	Fen Restoration Study	\$	17,901.91
University of Minnesota, Minneapolis, MN	SEDEX Potential	\$	15,000.00
University of Minnesota, Minneapolis, MN	Adaptive Process Controls	\$	14,709.07
In-house, St Paul, MN	Non-ferrous Data Analysis	\$	11,386.07
In-house, St Paul, MN	Biosolids Project	\$	7,968.87
In-house, St Paul, MN	Waste Mitigation	\$	3,805.00
In-house, St Paul, MN	Microencapsulation	\$	2,510.95
In-house, St Paul, MN	Individual Minerals	\$	2,189.79
	Subtotal	\$	1,057,137.48

Minnesota Department of Natural Resources, Fisheries Division

Summary by Research Category			FY 2003
Natural Resources		\$	127,524.00

Recipient	Project Title		FY 2003
Dr. Ira Adelman	Index of Biotic Integrity	\$	32,000.00
Dr. Anne Kapuscinski, University of Minnesota, St. Paul, MN	Diagnostic Genetic Markers at the Species and Subspecies Level	\$	30,000.00
Dr. David Fulton	Trends on Fisheries Issues in Minnesota	\$	16,430.00
Dr. Malcom Buller	Population Studies of Aquatic	\$	12,300.00
North Dakota State University	Macroinvertebrates and Aquatic Macrophytes		
Faroo North Dakota			
Dr. David Willis	Food Habits of Young-of-the-year Walleye	\$	11,500.00
Dr. S. Weisburg, University of Minnesota, St. Paul, MN	Statistical Consulting	\$	7,500.00
Dr. George Spangler, University of Minnesota, St. Paul, MN	Real Time Mortality Estimation by Acoustic Telemetry	\$	6,000.00
Dr. Carl Schwarz	Statistical Consulting on Mark-Recapture	\$	5,442.00
Simon Fraser University	Population Estimates		
Burnaby British Columbia Canada			
Dr. George Spangler	A Proposal to Evaluate the Restoration	\$	4,850.00
Dr. David Fulton and Dr. Bruce Vondracek, University of Minnesota,	Constraints and Opportunities for Quality Trout Angling Experiences in Southeastern	\$	1,502.00
	Subtotal	\$	127,524.00

Minnesota Department of Natural Resources, Forestry Division

Summary by Research Category			FY 2003
Natural Resources		\$	327,240.00

Recipient	Project Title		FY 2003
In-house, St Paul, MN	Monitoring the Implementation of the Timber Harvesting and Forest Management	\$	125,000.00
In-house, St Paul, MN	Harvest of Riparian Forests in Minnesota	\$	76,000.00
Alan Ek	Urban and Community Forestry Program	\$	49,500.00
In-house, St Paul, MN	Two-Lined Chestnut Borer Survey - Risk Assessment	\$	44,240.00
Lee E. Frelch	Natural Disturbance Dynamics and Regeneration of White Pine	\$	20,000.00
Andrew David	Forest Tree Improvement	\$	10,000.00
Paul D. Anderson	White Pine Seed Zones in Minnesota	\$	2,500.00
	Subtotal	\$	327,240.00

Minnesota Department of Transportation

Summary by Research Category			FY 2003
Transportation & Energy		\$	6,871,239.21

Recipient	Project Title		FY 2003
University of Minnesota	FY2002-2003 CTS Operations	\$	800,000.00
University of Minnesota	US DOT IVI Specialty Vehicle Field Operational Test	\$	375,000.00
University of Minnesota	Environmental Hazard Assessment for Transportation Related Chemicals	\$	300,000.00
University of Minnesota	INV 792: Pavement Research Institute	\$	300,000.00
University of Minnesota	Using ITS to Better Serve Diverse Populations	\$	281,250.00

University of Minnesota	Employment of the Traffic Management Laboratory (TRAMLAB) for Evaluating Ramp	\$	249,608.00
Cambridge Systematics	Mileage Based User Fees Demonstration	\$	218,481.00
University of Minnesota	Minnesota Airport Technical Assistance Program Supplement (AirTAP)	\$	200,000.00
University of Minnesota	Minnesota Value Pricing	\$	185,936.00
University of Minnesota	Testing of PCC Pavement Design and Rehabilitation Features	\$	171,325.00
University of Minnesota	Use of FRP Sheets to Retrofit (Strengthen) Pier Caps	\$	170,000.00
University of Minnesota	Context Sensitive Design Training and CSD Web Site Development	\$	162,800.00
University of Minnesota	INV 785: Cost/Benefit Study of Spring Load Restrictions	\$	150,097.00
University of Minnesota	INV 764: Investigation of Factors Related to Surface-Initiated Cracks in Flexible Pavements	\$	145,337.00
University of Minnesota	Physical and Mechanical Properties of Innovative Concrete Mixtures	\$	144,871.00
University of Minnesota	Load Rating by Load Testing on Bridges	\$	138,735.00
SRF Consulting Group, Inc.	INV 645: Implementation of Research Findings (2001-2002)	\$	123,552.00
University of Minnesota	Laboratory Measurements of Storm-Water Quality Improvement in Detention Ponds	\$	108,866.00
University of Minnesota	Research Management and Outreach Services	\$	102,917.00
University of Minnesota	Phase 3 - Rapid Assessment of and Decision-Making Strategies for Distortional Fatigue in Multi-Girder Steel Bridges	\$	98,000.00
University of Minnesota	The Effectiveness and Safety of Traffic and Non-Traffic Related Messages Presented on Changeable Message Signs	\$	91,375.00
University of Minnesota	Stability Tests of Prestressed Concrete Through-Girder Pedestrian Bridge under Lateral Impact - Phase II	\$	90,000.00
University of Minnesota	Characteristics of Erosion Control Measures and Their Impact on Erosion	\$	85,000.00
University of Minnesota	Development of a Economic Impact Measurement Tool for Small/Medium Commercial and Public Use Airports in Minnesota	\$	80,000.00
University of Minnesota	Inoculated Legumes and Revegetation/Roadside Plantings	\$	78,594.00
University of Minnesota	Developing Project Management Expertise	\$	78,297.00
University of Minnesota	Moisture Effects on DCP and Portable Vibratory Deflectometer (PVD) Measurements - Phase II	\$	77,196.00
University of Minnesota	The Effects of Fire Versus Mowing on Prairie Plant Communities	\$	75,000.00
University of Minnesota	Dynamic and Resilient Modulus of Mn/DOT Asphalt Mixtures	\$	67,869.00
University of Minnesota	Earth Pressure Behind Retaining Walls	\$	64,080.00
University of Minnesota	Fatigue-resistant Design Details for Overhead Signs, Mast-arm Sign Poles, and Lighting Standards	\$	52,587.00
University of Minnesota	INV 800: Cost Effectiveness Analysis of Storm Water Runoff Best Management	\$	52,000.00
University of Minnesota	INV 733: VEHICLE/Pedestrian Collision Model for Neighbor Traffic Control	\$	50,000.00
University of Minnesota	INV 776: Improve the Design of Roadside Ditches to Decrease Transportation-Related Surface Water Pollution	\$	50,000.00
University of Minnesota	The Effects of Fire Versus Mowing on Prairie Plant Communities	\$	50,000.00
University of Minnesota	Context-Sensitive Design Training	\$	46,750.00
University of Minnesota	Scoping Study for the Development of Design Guidelines for Bioengineering in the Upper Midwest	\$	45,500.00
University of Minnesota	INV 760: Reducing Crashes at Controlled Rural Intersections	\$	44,762.40
University of Minnesota	Transportation Related Costs of Different Regional Land Use Scenarios	\$	40,000.00
University of Minnesota	INV 758: Properties and Aggregate Potential of Coarse Taconite Tailings	\$	37,000.00
University of Minnesota	If They Come, Will You Build It?	\$	36,137.00
University of Minnesota	"Performance Measurement and Evaluation" and "Equipment Management" Training Module Development	\$	34,200.00
University of Minnesota	INV 700(2): Field Investigation of an Integral Abutment Bridge - Phase II	\$	34,000.00
University of Minnesota	Development of Policy Analysis Tool for Quantifying and Characterizing Biodiesel Consumption in Minnesota by Season	\$	33,600.00
University of Minnesota	Validation of Superpave Fine Aggregate Angularity (FAA) Values	\$	33,267.00
University of Minnesota	Economic and Environmental Impacts of Modal Shifts from the Mississippi River and Lake Superior to Highways	\$	33,000.00
University of Minnesota	Trade Centers of the Upper Midwest - A 1998 Update	\$	32,790.00
University of Minnesota	Transportation and Regional Growth - Process Design for Integrating Research Findings into Public Outreach	\$	32,725.00
University of Minnesota	INV 783: Development of Simple Asphalt Test for Determination of RAP Blending Chart	\$	31,320.00
University of Minnesota	State Aid Mechanic Training	\$	31,250.00
University of Minnesota	INV 775: Accident Analysis for Low Volume (Very Low) Township and County Roads	\$	31,205.00
University of Minnesota	INV 777: Transportation Finance Reform	\$	30,770.00
University of Minnesota	Fine Particle (Nanoparticle) Emissions from Minnesota Transportation	\$	30,000.00
University of Minnesota	INV 727: Investigating the Effects of Traffic Calming Strategies on Driver Behavior	\$	30,000.00
University of Minnesota	Environmental Hazard Assessment for Transportation Related Chemicals	\$	29,979.00
University of Minnesota	INV 788: Recycled Asphalt Pavement (RAP) Effects on Binder and Mixture Quality	\$	28,299.00
University of Wisconsin, Milwaukee, WI	The Effect of MN Aggregates on Rapid Chloride Permeability Tests	\$	28,112.00
University of Minnesota	Fatigue Evaluation of Bridge 69832	\$	27,500.00
University of Minnesota	Inventory of Properties of Minnesota Certified Asphalt Binders	\$	26,411.00

University of Minnesota	INV 772: Design and Construction of Pavement Embankments in Minnesota	\$	26,406.00
Iowa State University	INV 798: Effectiveness of All Red Clearance Time on Intersection Accidents and Violation Trends	\$	26,362.00
University of Minnesota	Adaptability and DNA Fingerprinting of Native Plant Populations from Diverse Eco-Regions	\$	26,273.00
Iowa State University	INV 769: Cost Comparison of Treatments Used to Maintain or Upgrade Aggregate Resilient Modulus Testing Following LTPP-46 Protocol	\$	25,000.00
University of Minnesota	Transportation and Regional Growth - Education/Public Involvement	\$	25,000.00
University of Minnesota	GPS-Based Real-Time Identification of Tire-Road Friction Coefficient	\$	24,000.00
University of Minnesota	The Value of Time for Freight Movements	\$	23,905.00
University of Minnesota	INV 774: Driver Assistive Systems for Rural Applications: A Path to Deployment	\$	22,500.00
University of Minnesota	INV 757: Designing Pavement Drainage Systems	\$	22,000.00
Engineering Services, Ltd	Research Implementation Plan Development	\$	21,128.00
University of Minnesota	INV 730: Transverse Stiffener Beams in Longitudinally Nail Laminated Timber Decks	\$	21,000.00
University of Minnesota	Deer Avoidance Research: Use of Motion Detector Flashing Light	\$	20,700.00
University of Minnesota	Economic Benefits of Bicycling in Minnesota	\$	20,000.00
University of Minnesota	INV 759: Impact of Roughness Elements on Reducing the Shear Stress Acting on Soil Particles	\$	18,000.00
University of Minnesota	Dynamic Estimation of Freeway Weaving Capacity for Traffic Management and Operations - Phase II	\$	17,000.00
University of Minnesota	Real-Time Collision Warning and Avoidance at Intersections	\$	16,250.00
University of Minnesota	IMP 2003-03 (2 of 2) TRAMLAB Software, Training, and Support	\$	15,600.00
University of Minnesota	INV 799: Impact of Alternative Storm Water Management Approaches on Highway Infrastructure	\$	15,209.00
University of Minnesota	Building Our Way Out of Congestion? Highway Network Design for the Twin Cities	\$	14,000.00
University of Minnesota	INV 779: Evaluation of Asphalt Binders Used for Emulsions	\$	13,500.00
University of Minnesota	IMP 2003 - 02 Production of Beneficial Mycorrhizal Inoculum	\$	12,500.00
University of Minnesota	INV 755: Pavement Preventative Maintenance Methods - Phase II	\$	10,855.04
University of Minnesota	Experimental Investigation of the Effect of Vertical Pre-Release Cracks in Prestressed Bridge Girders, Phase II	\$	10,000.00
University of Minnesota	INV 676: Information Processing System for Mn/ROAD Phase II	\$	10,000.00
University of Minnesota	GIS Parcel Map Inventory	\$	9,500.00
University of Minnesota	INV 781: Investigating the Effects of In-Lane Rumble Strips on the Stopping Perf. Of Sleep-Deprived & Alcohol-Impaired	\$	9,000.00
University of Minnesota	INV 728: Superpave Level 1 Mix Design at the Local Government Level	\$	8,000.00
University of Minnesota	Practical Usability of Wireless Video/Image Transmission - Phase 2	\$	6,875.00
Iowa State University	INV 756: Methods to Reduce Traffic Speeds in High Pedestrian Areas	\$	6,800.00
University of Minnesota	User Perspectives on Location Efficient Mortgages (LEMS) and Car Sharing: Implications for Transportation, Smart Growth	\$	5,725.00
University of Minnesota	HMA Specification Development	\$	5,000.00
University of Minnesota	INV 998: Operational Research Program for Local Transportation Groups	\$	5,000.00
University of Minnesota	Mn/ROAD TDR Evaluation and Data Analysis	\$	5,000.00
University of Minnesota	Special-Needs Transit Education Curriculum	\$	5,000.00
University of Minnesota	Design/Development Principles for Livable Suburban Arterial Roadways	\$	4,800.00
University of Minnesota	Handling Pedestrian Control Issues at Busy Intersections	\$	4,132.00
University of Minnesota	INV 798: Preliminary Laboratory Investigation of a Commercial Enzyme Solution as a Soil Stabilizer	\$	4,130.00
Dan Krivit and Assoc.	Using Scrap Shingles as a Road Construction Material Implementation and Expansion	\$	4,085.00
University of Minnesota	Wireless Transmission of Image and Video Data	\$	4,000.00
University of Minnesota	Publishing Assistance	\$	3,480.00
University of Minnesota	Editing/Writing Services	\$	3,033.00
University of Minnesota	An Automatic Visibility Measurement System Based on Video Cameras	\$	3,000.00
University of Minnesota	Case Study for Application of Business Management Strategies and Techniques to Mn/DOT Operations	\$	3,000.00
Mankato State University	INV 802: Perf. Of Pvmt. Crack Sealants Beneath Bituminous Overlays	\$	3,000.00
Roadscanners Oy	INV 771 - ROAD DOCTOR Software Training	\$	2,500.00
University of Minnesota	INV 761: Eliminating Driver Forward Blindspots at Rural Intersections	\$	2,250.00
University of Minnesota	Effect of Material Chemistry on Rebar Corrosion	\$	1,959.45
University of Minnesota	Screening and Selection of Salt Tolerance in Native Warm Season Minnesota Grasses	\$	1,329.00
Civil Engineering Research Foundation	INV 765: Verification of Dust Control and Soil Stabilization Products	\$	1,000.00
University of Minnesota	INV 696: The Influence of Rural Road Quality on Vehicle Operating Costs	\$	102.32
	Subtotal	\$	6,871,239.21

Minnesota Geological Survey

Summary by Research Category

	FY 2003
Natural Resources	\$ 1,831,131.00

Recipient	Project Title		FY 2003
Minnesota Geological Survey	State Special Appropriation to MGS- many projects	\$	1,278,688.00
Minnesota Geological Survey	County Geologic Atlas Program from DNR	\$	243,159.00
Minnesota Geological Survey	Groundwater and well database from MN Dept. of Health	\$	176,381.00
Minnesota Geological Survey	Platinum Potential of Intrusions from DNR	\$	81,840.00
Minnesota Geological Survey	Aqregate Mapping, Itasca County from DNR	\$	49,073.00
Minnesota Geological Survey	Mineral Potential, Greenwood Lake from DNR	\$	1,990.00
	Subtotal	\$	1,831,131.00

Minnesota Agricultural Experiment Station

Recipient	Project Title		FY 2003
Sugarbeet Disease Control and Fertility Management	NWROC - Crookston	\$	9,979.00
Host Plant Control Resistance to and Best Management Practices for Karnal Bunt of Wheat	NWROC - Crookston	\$	54,942.00
Biological Events That Characterize Ewe/Lamb Production Unit	WCROC - Morris	\$	156,169.00
Technology Use On Minnesota Dairy Farms	WCROC - Morris	\$	108,770.00
Developing Cultural Systems to Improve Horticultural Crop Production	NOROC	\$	114,721.00
Methods to Increase Reproductive Efficiency In Cattle	NOROC	\$	73,908.00
Management Systems to Improve The Economics and Environmental Sustainability of Dairy Enterprises	SROC - Waseca	\$	376,709.00
Diversification of Corn-Soybean Rotation In Integrated Pest Management	SROC - Waseca	\$	245,744.00
Research Operations	Biosystems and Agricultural Engineering	\$	179,509.00
Management of Grain Quality and Security for World Markets	Biosystems and Agricultural Engineering	\$	41,950.00
Injury Prevention and Health Promotion Research for Production Agriculture	Biosystems and Agricultural Engineering	\$	19,362.00
Development and Testing of Dry Fertilizer Sensors and Machinery for Precision Agriculture	Biosystems and Agricultural Engineering	\$	51,703.00
Improvement of Thermal and Alternative Processes for Foods	Biosystems and Agricultural Engineering	\$	61,239.00
Investigating Drainage Design and Management Alternatives for Meeting Both Env. and Agro. Objectives	Biosystems and Agricultural Engineering	\$	45,623.00
Sand Plain Research Farm-Operations	Biosystems and Agricultural Engineering	\$	87,873.00
Improved Characterization and Quantification of Flow and Transport Processes In Soils	Biosystems and Agricultural Engineering	\$	59,914.00
Development and Evaluation of Tmdl Planning and Assessment tools and Processes	Biosystems and Agricultural Engineering	\$	51,826.00
Agricultural Waste Management-Water Quality Beneath Manure Storages	Biosystems and Agricultural Engineering	\$	104,509.00
Environmental and Air Quality Assessment and Control of Livestock Facilities	Biosystems and Agricultural Engineering	\$	91,585.00
Animal Manure and Waste Utilization, Treatment and Nuisance Avoidance for A Sustainable Agriculture	Biosystems and Agricultural Engineering	\$	125,808.00
Advanced Sensing, Processing and Control Technology for Biological, Agricultural and Food Engineering	Biosystems and Agricultural Engineering	\$	93,580.00
Aerial Pollutant Emissions From Animal Confinement Buildings	Biosystems and Agricultural Engineering	\$	43,732.00
Research Operations	Agronomy and Plant Genetics	\$	538,636.00
Wheat Breeding and Genetics	Agronomy and Plant Genetics	\$	144,435.00
Oat Breeding and Genetics	Agronomy and Plant Genetics	\$	119,496.00
Characterizing Weed Population Variability for Improved Weed Management Decision Support System to Reduce Herbicide Use	Agronomy and Plant Genetics	\$	67,694.00
Molecular Cytogenetics In Plant Improvement	Agronomy and Plant Genetics	\$	136,405.00
Heterosis and Genetic Variation In Corn	Agronomy and Plant Genetics	\$	76,368.00
forage Protein Characterization and Utilization for Cattle	Agronomy and Plant Genetics	\$	17,194.00
Soybean Breeding and Genetics	Agronomy and Plant Genetics	\$	211,296.00
Genetics and Breeding of Alfalfa for New Uses and forage Quality Strategies for Maximizing Profitability While Reducing Risk In Soybean Production	Agronomy and Plant Genetics	\$	68,737.00
Barley Breeding and Genetics	Agronomy and Plant Genetics	\$	71,315.00
Legumes In Cropping Systems	Agronomy and Plant Genetics	\$	113,372.00
Alternative forage and Turf Grass Breeding, Genetics and Seed Production	Agronomy and Plant Genetics	\$	145,183.00
		\$	121,737.00

A National Agricultural Program to Clear Pest Management Agents for Minor Uses	Agronomy and Plant Genetics	\$	34,802.00
Integrated Weed Management Strategies	Agronomy and Plant Genetics	\$	84,701.00
Managing Biodiverse Agroecosystems: Ecological and Social Dimensions	Agronomy and Plant Genetics	\$	88,983.00
Molecular Genetics of Barley and Wheat	Agronomy and Plant Genetics	\$	40,986.00
Weed Management Strategies for Small Grain Production Systems	Agronomy and Plant Genetics	\$	24,719.00
Cropping Systems, Cover Crops, and Alternative Crops Research In Northern Minnesota	Agronomy and Plant Genetics	\$	176,306.00
Improving forage Production and Utilization In Minnesota	Agronomy and Plant Genetics	\$	139,332.00
Soybean Breeding for Iron-Deficiency Chlorosis Responses	Agronomy and Plant Genetics	\$	3,070.00
Weed Management In Disturbed and Undisturbed Systems (Current Focus: Vegetables, Invasive Species, Water Quality)	Agronomy and Plant Genetics	\$	161,141.00
Decision Making for Diversified Cropping Systems	Agronomy and Plant Genetics	\$	22,184.00
Physiology of Corn Kernel Development	Agronomy and Plant Genetics	\$	105,531.00
Weed Management Strategies for Corn and Soybean Production Systems	Agronomy and Plant Genetics	\$	101,420.00
Small Grains Production and Management	Agronomy and Plant Genetics	\$	24,068.00
Integrated Weed and Soil Management Options for Organic Cropping Systems In Minnesota	Agronomy and Plant Genetics	\$	9,236.00
Research Operations	Applied Economics	\$	362,466.00
Enhancing The Financial Viability of Minnesota Family Farms	Applied Economics	\$	16,795.00
Decision Making for Agricultural Firms Considering Risk and The Environment	Applied Economics	\$	17,094.00
Profitability and Adoption of New Technology and Implications for Agricultural Policy	Applied Economics	\$	17,684.00
Management Information Systems for Firms In The Food System	Applied Economics	\$	15,891.00
Economic Analysis of Livestock Industry Marketing, Prices, Production and Policy	Applied Economics	\$	18,812.00
Competitiveness and Value-Added Markets In The U.S. Grain and Oilseed Industry	Applied Economics	\$	16,166.00
Economic Relationship Between The Changing Structure of The Food Industry and Consumer's Expenditure Patterns On Food	Applied Economics	\$	72,173.00
Impacts of Structural Change In The Dairy Industry	Applied Economics	\$	65,925.00
Financing Agriculture and Rural America: Issues of Policy, Structure and Technical Change	Applied Economics	\$	34,654.00
An Economic Analysis of U.S. Livestock Sector Facing Demand and Supply Structural Changes	Applied Economics	\$	41,762.00
Environmental and Trade Competitiveness Issues In Agriculture	Applied Economics	\$	56,253.00
Determinants of Education and Nutrition Outcomes In Developing Countries	Applied Economics	\$	47,357.00
The International Economics of Intellectual Property Rights and Public Health	Applied Economics	\$	3,487.00
U.S. Agricultural and Environmental Policy	Applied Economics	\$	26,770.00
Economic Analysis of Limited Property Rights Transfer	Applied Economics	\$	10,847.00
Examining Policies and Institutions for Land and Water Resource Protection In Minnesota	Applied Economics	\$	69,513.00
Public Sector Impacts On State Economic Growth	Applied Economics	\$	9,553.00
Rural Labor Market Behavior and Outcomes: The Role of Work Support Policies and Economic Changes	Applied Economics	\$	9,343.00
The Economic and Distributional Effects of Federal and State Tax Reform	Applied Economics	\$	20.00
Research Operations	Animal Science	\$	582,375.00
Role of Phosphotyrosine Signaling In Bone Development and Remodeling	Animal Science	\$	31,704.00
Advanced Technologies for The Genetic Improvement of Poultry	Animal Science	\$	98,973.00
Interpreting Cattle Genomic Data: Biology, Application, Outreach	Animal Science	\$	194.00
Genetic Selection and Crossbreeding to Enhance Reproduction and Survival of Dairy Cattle	Animal Science	\$	185,047.00
Genetic and Functional Genomic Approaches to Improve Production and Quality of Pork	Animal Science	\$	48,730.00
Metabolic Relationships In Supply of Nutrients for Lactating Cows	Animal Science	\$	115,074.00
Improving Turkey Production Performance Through Nutrition and Management	Animal Science	\$	29,796.00
Development of Theory, Methods and Computational tools for Quantitative Analysis In Animal Genomics	Animal Science	\$	42,646.00
Factors Affecting Biological and Economic Efficiency of The Beef Cattle Enterprise	Animal Science	\$	302,336.00

Applied Nutrition and Feeding Management of Dairy Cattle	Animal Science	\$	207,769.00
Methods for Achieving Optimal Protein Utilization In Ruminants	Animal Science	\$	27,724.00
Regulation of Factors Affecting Muscle Growth In Meat Animals	Animal Science	\$	81,123.00
Evaluation of New Nutritional Technologies for Situation Dependent Diet formulation In Swine	Animal Science	\$	557,363.00
Regulation of Ovarian Follicular Development With Application to Beef and Dairy Cattle Reproductive Management	Animal Science	\$	80,691.00
Genomic Characterization of Growth and Carcass Composition, Feed Conversion Efficiency and Meat Quality Traits In Swine	Animal Science	\$	27,658.00
The Effect of Growth Factors On The Processes of Skeletal Muscle Growth In Meat-Producing Animals	Animal Science	\$	80,419.00
Mechanisms of Ion Transport Across Porcine Endometrium	Animal Science	\$	91,209.00
Molecular Mechanisms Regulating Skeletal Muscle Growth and Differentiation	Animal Science	\$	77,542.00
Reproductive Performance of Turkeys	Animal Science	\$	94,589.00
Entomological Systematics and Museum Maintenance Program	Entomology	\$	159,787.00
Chironomidae As Indicators of Reference Conditions of Aquatic Habitats In North Central Hardwood Forest Region	Entomology	\$	8,630.00
Molecular and Morphological Studies of Insects and Other Arthropods In A Phylogenetic Context	Entomology	\$	28,230.00
Behavior and Stock Improvement of Bee Pollinators In Northern Climates	Entomology	\$	57,757.00
Resistance Traits In Woody Landscape Plants Against Abiotic and Biotic Stress	Entomology	\$	25,237.00
Ecology and Management of European Corn Borer and Other Stalk-Boring Lepidoptera	Entomology	\$	33,517.00
Management Strategies for European Corn Borer, Corn Rootworms, and Stand-Reducing Insects In Corn	Entomology	\$	22,983.00
Site Specific Management of Insect Pests	Entomology	\$	12,877.00
Genetic Manipulation of Sweet Corn Quality and Stress Resistance	Entomology	\$	14,915.00
Potato Insects: Biological and Cultural Control	Entomology	\$	67,070.00
Biological Control of Insect Pests In Minnesota: Principles and Implementation	Entomology	\$	43,742.00
Management of Insects and Insect Vectors of Plant Pathogens	Entomology	\$	50,937.00
Biology and Management of Muscid Flies Associated With Livestock and Poultry In Minnesota	Entomology	\$	42,388.00
Virulence and Host Specificity Mechanisms of Tick and Insect Pathogenic Microorganisms	Entomology	\$	53,400.00
Development of Molecular Approaches to Predicting and Monitoring Insecticide Resistance	Entomology	\$	60,687.00
Regulation of Ecdysis-Producing Neurons In Insects and Other Invertebrates	Entomology	\$	43,320.00
Reducing The Risk of Sweet Corn Integrated Pest Management	Entomology	\$	38,412.00
Management and Chemical Ecology of Forest and Wood-Products Insect Pests In Minnesota	Entomology	\$	13,459.00
Improved Stability of Dry Food Flavorings	Coafes - Food Science and Nutrition	\$	28,447.00
Functional Foods: Fiber-and Antioxidant-Enriched Foods	Coafes - Food Science and Nutrition	\$	24,174.00
Physico Chemical Properties of Dairy Macromolecules In Food Systems	Coafes - Food Science and Nutrition	\$	29,290.00
Characterization and Control of The Acid Resistance of Enterohemorrhagic Escherichia Coli	Coafes - Food Science and Nutrition	\$	33,984.00
The Impact of Natural Cheese Characteristics On Process Cheese Functional Properties	Coafes - Food Science and Nutrition	\$	41,165.00
Elimination of Escherichia Coli and Salmonellae From Ready to Consume Acid Foods	Coafes - Food Science and Nutrition	\$	44,056.00
Analysis of Bacteriophage Resistance and Bacteriocin Production of Lactococci, and Probiotic Characteristics of Bifidobacteria	Coafes - Food Science and Nutrition	\$	51,186.00
Application of Genetic Engineering Techniques for Dairy Starter Culture Improvement	Coafes - Food Science and Nutrition	\$	61,406.00
Structure/Function Relationships In Whole Grains and Their Influence On Processing and Nutritional Quality	Coafes - Food Science and Nutrition	\$	26,741.00
Processing and Storage Effects On Stability of Nutraceuticals	Coafes - Food Science and Nutrition	\$	44,983.00
Application of Chemiluminescent Antibiotics As Platform Technology for Development of Rapid Pathogen Detection	Coafes - Food Science and Nutrition	\$	5,152.00
Studies On The Secondary Oxidation of Various Lipids and Edible Fats In Vitro and In Vivo	Coafes - Food Science and Nutrition	\$	46,403.00
Breeding & Genetics of Fruit Crops for Cold Climates	Horticultural Science	\$	270,741.00
Potato Breeding and Genetics	Horticultural Science	\$	125,714.00

Evaluation of Minnesota-Grown Grape Cultivars for Enological Viability and Establishment of Enology Outreach Service	Horticultural Science	\$	102,328.00
Sustainable Production Systems for Fruit Crops	Horticultural Science	\$	115,151.00
Changes In Quality of Horticultural Crops During Growth and Storage	Horticultural Science	\$	34,288.00
Using Native and Ornamental Grasses In The Landscape	Horticultural Science	\$	27,938.00
Restoration of Wetland Vegetation	Horticultural Science	\$	34,133.00
Increasing Production Efficiency and Long Term Health of Nursery Grown Crops	Horticultural Science	\$	22,858.00
Breeding and Genetics of Floricultural Crops: Old, New Crop Development, Germplasm Enhancement, Invasiveness Potential	Horticultural Science	\$	188,982.00
The Biology and Utilization of Turfgrasses	Horticultural Science	\$	44,141.00
Breeding, Evaluation & Selection of Hardy Landscape Plants	Horticultural Science	\$	88,989.00
Conservation, Management, Enhancement and Utilization of Plant Genetic Resources	Horticultural Science	\$	23,856.00
Impact of Temperature and Light On Flowering	Horticultural Science	\$	87,784.00
Molecular Analysis of Floral Gene Expression	Horticultural Science	\$	71,949.00
Biochemical/Molecular Factors Controlling Potato Processing Quality During Growth & Storage	Horticultural Science	\$	102,944.00
Plant Cold Hardiness: Improvement of Maize Chilling tolerance	Horticultural Science	\$	75,448.00
Plant and Root Response to Environmental Stress	Horticultural Science	\$	42,606.00
Comparative Genomics of Legumes	Plant Pathology	\$	67,482.00
Ecology of Microbes In Relation to Plant Disease, Biological Control, and Competitive Interactions	Plant Pathology	\$	54,244.00
Testing The Relationship Between Sympatric Macro and Microcyclic forms of A Naturally Occurring Rust Fungus Using Molecular Markers	Plant Pathology	\$	82,430.00
Management and Control of Diseases of Soybeans	Plant Pathology	\$	56,205.00
Genomics Resources to Facilitate Identification and Isolation of Disease Resistance Genes In Primitive Potato Species	Plant Pathology	\$	116,645.00
Pathology of Small Grains, Sugarbeets, and Potatoes	Plant Pathology	\$	19,977.00
Plant Nematodes Inhabiting The Soils of A Portion of Minnesota's Central Lakes Region: Their Occurrence & Potential Significance	Plant Pathology	\$	23,352.00
Management and Control of Diseases In Small Grains	Plant Pathology	\$	81,814.00
Rust Diseases of Cereals	Plant Pathology	\$	1,370.00
Biology, Control, and Biotechnological Uses of Forest Microbes	Plant Pathology	\$	156,005.00
Molecular Bases of Plant Defenses Against Fungal Diseases - Small Grain Cereals	Plant Pathology	\$	59,259.00
Atmospheric Deposition: Air Pollutants and Their Effects On Crops	Plant Pathology	\$	59,417.00
Identification, Characterization and Biology of Plant Pararetroviruses	Plant Pathology	\$	58,027.00
Etiology and Management of Soil Borne Pathogens of Vegetable Cropping Systems	Plant Pathology	\$	124,375.00
Research Operations	Rhetoric	\$	25,794.00
Human Communication Practices Related to Teaching Technical Communication	Rhetoric	\$	34,222.00
The Rhetoric, History, and Ethics of Native and Exotic Plant Species In An Urban Setting	Rhetoric	\$	10,067.00
Advanced Technology-Enhanced Learning: Strategic Approaches to Instructional Technology and Sharing Knowledge	Rhetoric	\$	8,994.00
Soil Resource Assessment and Interpretations for Minnesota Landscapes	Soil, Water, & Climate	\$	165,041.00
Assessing Nitrogen Mineralization and Other Diagnostic Criteria to Refine Nitrogen Rates for Crops and Minimize Losses	Soil, Water, & Climate	\$	30,098.00
Tillage and Nutrient Source Interactions On Non-Point Source Pollution From Surface and Subsurface Drainage Systems	Soil, Water, & Climate	\$	138,763.00
Management of Eroded Soils for Enhancement of Productivity and Environmental Quality	Soil, Water, & Climate	\$	77,554.00
Elemental Analysis of Biological Materials, Soil, Water and Waste Materials	Soil, Water, & Climate	\$	19,392.00
Impact Climate and Soils On Crop Selection and Management	Soil, Water, & Climate	\$	55,321.00
Improving The Capacity for Nodulation and Nitrogen Fixation of Crop, Pasture and Prairie Legumes	Soil, Water, & Climate	\$	59,605.00
Chemistry, Biology and Morphology of Wet Soils	Soil, Water, & Climate	\$	102,491.00
The Monitoring and Analysis of Climate	Soil, Water, & Climate	\$	57,726.00
Utilization of Waste for Sustainable Agricultural Production Systems	Soil, Water, & Climate	\$	110,586.00

Biogeochemistry and Ecological Risk Management of Trace Chemical Constituents	Soil, Water, & Climate	\$	185,898.00
Improving Plant Nutrient Use Efficiency	Soil, Water, & Climate	\$	138,195.00
Management of Nutrient Sources In Minnesota Cropping Systems	Soil, Water, & Climate	\$	289,287.00
Agricultural Impacts On Water Quality	Aes Administration	\$	63,539.00
College of Agricultural, Food, & Environmental Sciences - Administration	Coafes Administration	\$	351,142.00
Developing Decision Support Systems for Sustainable Land Use Planning In Exurban and Rural Landscapes	Landscape Architecture	\$	28,378.00
Dynamics, Management, and Sustainable Use of Northern Forest Ecosystems	Natural Resources Administration	\$	43,418.00
Water Quality Management In A Landscape Perspective	Fisheries and Wildlife	\$	22,293.00
Evolutionary Games and Modeling Conservation: Consequences of Space and Breeding Systems	Fisheries and Wildlife	\$	58,912.00
Effects of Endocrine Disrupting Compounds On Fish	Fisheries and Wildlife	\$	83,033.00
Forest Wildlife Relationships	Fisheries and Wildlife	\$	14,416.00
Identification and Functional Characterizations of Sex Pheromones In Cyprinid Fish	Fisheries and Wildlife	\$	14,164.00
Trophic Relations In Freshwater Systems	Fisheries and Wildlife	\$	22,058.00
Ecology and Management of Fishery Resources of Large Lakes In The Upper Midwest	Fisheries and Wildlife	\$	68,851.00
Influence of Fisheries Management Practices On Genetic Resources of Fish Populations	Fisheries and Wildlife	\$	29,573.00
Geo-Referenced Conservation Databases: Integrating Biodiversity Conservation & Sustainable Development	Fisheries and Wildlife	\$	29,696.00
Relationships Between Wild Ungulates & Natural Vegetation: Ecological & Management Aspects	Fisheries and Wildlife	\$	4,256.00
Forest Response to Environmental Change: An Approach to Multiple Interactions	Forest Resources	\$	20,584.00
Examining The Response of Mixed Species Regeneration, Composition, and Productivity to Partial Timber Cutting	Forest Resources	\$	23,391.00
Private Forest Land Ownership: Assessing and Evaluating Changes	Forest Resources	\$	4,854.00
Natural Resource Management for Livelihood and Lifestyle Goals In Minnesota Communities	Forest Resources	\$	36,459.00
Development of Silviculture Guidelines to Enhance Productivity and Assure Adequate Biodiversity In Disturbed Forests of Minnesota	Forest Resources	\$	18,217.00
Hydrologic Response of Watersheds to Changes In Forest Cover, AgroForestry, Wetlands, and Riparian Systems	Forest Resources	\$	39,336.00
Carbon and Water Flux In Eastern Forests: Data Collection, Model Development, and Application of Spatially-Explicit Models	Forest Resources	\$	27,458.00
Remote Sensing of Land, Vegetation, and Water Resources	Forest Resources	\$	858.00
Enhancing Rural Economies Through Sustainable Systems of Nature-Based tourism In Northern Minnesota	Forest Resources	\$	58,040.00
Maintaining and Enhancing The Functions and Values of Riparian Forests Through Forest Management	Forest Resources	\$	20,742.00
Growth Modeling and Information Delivery tools for Ecosystem Management	Forest Resources	\$	53,372.00
Modeling Forest Succession and Silvicultural Impacts Under Climate Change	Forest Resources	\$	28,971.00
Benefits-Based Management: Assessing and Managing for Public, Private, and Community Benefits	Forest Resources	\$	40,450.00
Evaluation, Planning, and Managing for Natural Resource-Based tourism	Forest Resources	\$	28,678.00
Evaluating Policy and Associated Economic Strategies for Sustainable Forest Management	Forest Resources	\$	21,290.00
Optimization of Forest Genetic Resources Through Integration of Tree Improvement and Silvicultural Processes	Forest Resources	\$	175,649.00
Net Primary Productivity and Carbon Sequestration Potential of Lake States Forests	Forest Resources	\$	17,746.00
Forest Management Models for Ecologic, Economic, and Social Sustainability	Forest Resources	\$	94,337.00
Financial Incentives & Approaches for Management of Nonindustrial Private Forest Lands	Forest Resources	\$	2,121.00
Development of Chemicals and Materials for Paper Applications	Wood and Paper Science	\$	66,193.00
Assessment of Changing Raw Material Needs and Life Cycle			
Environmental Impacts of Alternative Raw Materials	Wood and Paper Science	\$	68,638.00
Applications of Stochastic Systems Theory In The Paper Industry	Wood and Paper Science	\$	93,226.00

Papermaking Processes: Investigations On Optimizing Current Water Removal Processes and Developing New and Improved Processes	Wood and Paper Science	\$	48,153.00
Environmentally Friendly Pulping and Bleaching Processes	Wood and Paper Science	\$	70,144.00
Lignin Biosynthesis, Biodegradation and Derivative Plastics	Wood and Paper Science	\$	58,611.00
Investigations On Moisture, Preservatives, and Fungi In Reducing Wood Deterioration	Wood and Paper Science	\$	49,895.00
Creating and Communicating Value In The Forest Products Industry	Wood and Paper Science	\$	55,622.00
Family Systems and Family Realities	Family Social Science	\$	22,011.00
Family Boundary Ambiguity In Alzheimer's Disease and Other Situations of Unclear Loss and Change	Family Social Science	\$	11,298.00
Decision-Making Integral to Relationship Transitions In Families	Family Social Science	\$	23,182.00
Family Economic Well-Being: Transitions for Families	Family Social Science	\$	25,420.00
Relationships In Adoptive Families	Family Social Science	\$	35,071.00
Intergenerational Relationships In Southeast Asian Refugee Families	Family Social Science	\$	21,391.00
Financing Long Term Care and Later Life Financial Security: A Family Decision Making Perspective	Family Social Science	\$	18,852.00
Strengthening Fatherhood and Marriage In The Transition to Parenthood	Family Social Science	\$	28,807.00
Family Business: Work and Family Integration	Family Social Science	\$	21,893.00
The Ecology of Domestic Abuse and Violence: Antecedents and Consequences Linked to Gender and Sexuality	Family Social Science	\$	5,335.00
Self Employment Among The United States Hispanic Householders Population	Family Social Science	\$	20,214.00
Family Processes Influencing The Development of Psychopathology Among Rural Adolescents	Family Social Science	\$	2,586.00
Asset Accumulation for Low-Income Working Families	Family Social Science	\$	1,172.00
Research Operations	Design, Housing, & Apparel	\$	58,182.00
Dress, Identity and Cultural Heritage Among Minnesota Immigrants	Design, Housing, & Apparel	\$	26,321.00
Development of An Interior Material Rating System for Environmental Conservation	Design, Housing, & Apparel	\$	28,144.00
Impact of Technology On Rural Consumer Access to Food and Fiber Products	Design, Housing, & Apparel	\$	25,756.00
Housing Policy In Minnesota	Design, Housing, & Apparel	\$	20,324.00
Housing, Neighborhood, and Community Environments of Low-Resource Families With Young Children	Design, Housing, & Apparel	\$	25,072.00
Housing In Minnesota's Small towns	Design, Housing, & Apparel	\$	21,960.00
Apparel Products In The 21st Century	Design, Housing, & Apparel	\$	38,726.00
Identification of Factors Predicting Consumption of Selected Dietary Constituents	Che - Food Science and Nutrition	\$	27,399.00
Examination of Nutritional Status and Dietary Behavior for Minority Populations	Che - Food Science and Nutrition	\$	45,688.00
Dietary Regulation of Sex Hormone Synthesis and Metabolism	Che - Food Science and Nutrition	\$	48,539.00
Quantification of Fatty Acid and Triglyceride Flux In Fasted and Fed Humans	Che - Food Science and Nutrition	\$	36,169.00
Factors Affecting Food Acceptability and Methods of Assessment	Che - Food Science and Nutrition	\$	40,349.00
N-3 Polyunsaturated Fatty Acids and Human Health Disease	Che - Food Science and Nutrition	\$	21,045.00
A Multicultural Investigation of Food As Medicine	Che - Food Science and Nutrition	\$	14,057.00
Defining A Desirable Dietary Fiber Intake	Che - Food Science and Nutrition	\$	48,846.00
Community Health Practices	Che - Food Science and Nutrition	\$	38,675.00
Research Operations	Social Work	\$	55,952.00
Youth Civic Engagement Through Civic Youthwork	Social Work	\$	20,144.00
Measuring Exposure to and Impact of Adult Domestic Violence On Children	Social Work	\$	33,632.00
Patterns In The Development of Violent Behaviors	Social Work	\$	23,175.00
Studies In Residential Youthwork	Social Work	\$	9,996.00
Vital Involvement Practice: Promoting Life Strengths Among Diverse Elders	Social Work	\$	15,180.00
Social Support, Social Networks, and Family Violence	Social Work	\$	15,762.00
Impact of Restorative Justice	Social Work	\$	18,946.00
Professionalism Among Social Workers: Community Structure and Delivery of Human Services	Social Work	\$	51,700.00
Patterns of Adaptation and Acceptance of Hispanics In American Communities	Social Work	\$	4,293.00
Success and Challenges of African American Adolescents Raised By African American Grandmothers	Social Work	\$	5,325.00



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