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Minnesota Technology, Inc
2006 Annual Report
On State Science & Technology Research & Development

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, 2005 and June 30, 2006 (FY 2006). The report includes:

- Analysis of research and development activities funded by the state during fiscal year 2006 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 2006.

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 2006 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 and value 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

When reporting multi-year projects, Minnesota Technology asked funding organizations to list only the amounts they actually intended to disburse in fiscal year 2006, which will yield a more accurate picture of R&D expenditures of state origin.

Further, reporting organizations are requested to identify those R&D projects having job creation or economic development as an explicit goal.

2. Summary of R&D Expenditures in FY 2006

MTI requested R&D expenditure information from fifty-five state institutions and offices. Thirteen institutions and offices responded to our request for information. The organizations that reported R&D funds allocated a total of \$15,277,009 in grants, loans and special appropriations for scientific and technological research and development during FY 2006. In all, reporting organizations provided data on 341 funded projects. A complete list of reported projects funded in FY 2006 is presented at the end of this document.

- The dominant research category was Transportation & Energy Sciences, accounting for 43.78 percent of the total reported R&D expended. The Natural Resources category was the next largest with 23.24 percent of the funding. Table 1 provides a breakdown of the respondents R&D activities by subject category.
- The largest funding organization who responded to this survey was by far the Minnesota Department of Transportation, which supported 144 research projects totaling \$6.47 million in funding during FY 2006. This comprised 42.37 percent of all reported funding. The University of Minnesota Graduate School was the second-largest organizational funder of R&D projects reporting, disbursing \$2.96 million for 118 projects in eight of the nine of the R&D categories.
- Fourteen of the research and development projects reported were oriented toward economic development or job creation as a primary goal. These projects totaled \$2.11 million.
- 94.43 percent of all projects from reporting organizations underwent some type of peer review process prior to final selection.

Table 1.
State-Supported Science and Technology Research and Development
Amount of Funding by Research Category
Fiscal Year 2006

Research Category	Major State-Funded Sources ¹	Category Funding (All Sources)	Percent of Total R&D Funding
Transportation & Energy Sciences	<ul style="list-style-type: none"> • Minnesota Department of Transportation • Minnesota State University—Mankato • University of Minnesota Graduate School 	\$6,688,099	43.78
Natural Resources	<ul style="list-style-type: none"> • Minnesota Geological Survey • Minnesota Department of Natural Resources - Lands and Minerals, Forestry, and Fisheries Divisions. • Minnesota State University—Mankato • University of Minnesota Graduate School 	\$3,550,406	23.24
Agriculture & Food Sciences	<ul style="list-style-type: none"> • Minnesota Racing Commission • University of Minnesota Graduate School 	\$141,462	0.95
Computers, Communications, and Microelectronics	<ul style="list-style-type: none"> • Minnesota State College—Southeast Technical • Southwestern Minnesota State University • University of Minnesota Graduate School 	\$213,125	1.39
Human Health	<ul style="list-style-type: none"> • Minnesota State College—Southeast Technical • Minnesota State University—Moorhead • University of Minnesota Graduate School • Winona State University 	\$1,554,033	10.17
Manufacturing Engineering	<ul style="list-style-type: none"> • Minnesota Center for Engineering and Manufacturing Excellence • Minnesota State College—Southeast Technical • Minnesota State University—Mankato • Minnesota State University—Moorhead • University of Minnesota Graduate School • Winona State University 	\$1,932,047	12.64
Social Sciences	<ul style="list-style-type: none"> • Southwestern Minnesota State University • University of Minnesota Graduate School 	\$571,285	3.73
Physical and Natural Sciences	<ul style="list-style-type: none"> • Minnesota State University--Mankato • Minnesota State University—Moorhead • University of Minnesota Graduate School 	\$417,074	2.73
Environmental Protection & Waste Management	Minnesota State University--Mankato	\$209,477	1.37
TOTAL		\$15,277,008	100.00

¹ 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.

1) Minnesota Center for Engineering and Manufacturing Excellence (MNCEME)

Summary by Research Category

Manufacturing and Engineering FY 2006
\$89,483

Recipient	Project Title	
Northeast Minnesota Higher Education District of Itasca Community College	MNCEME	\$89,483
Subtotal		\$89,483

2) Minnesota Department of Natural Resources. Division of Lands and Minerals

Summary by Research Category

Natural Resources FY 2006
\$447,061

Recipient	Project Title	
Univ. of Minnesota	Oxygen Sensor Validation (NRRI)	\$2,603
Univ. of Minnesota	Taconite Concentrator Modelling (CMRL)	\$26,530
Univ. of Minnesota	Liberation Characteristics (CMRL/NRRI)	\$3,614
Univ. of Minnesota	Pot Grate Induration Simulator (CMRL/NRRI)	\$5,206
Virginia, MN	Novel Methods for Increasing Filtration (MinnTac)	\$15,908
Virginia, MN	Concentrate Effects on Pellet Induration (MinnTac)	\$47,911
Tower, MN	Size Analyzer Study	\$25,000
Univ. of Minnesota	Bedrock/Quaternary Geology	\$9,343
Univ. of Minnesota	Upgrade of Aeromag Databases	\$53,506
Univ. of Minnesota	Follow-up Mapping	\$19,947
Univ. of Minnesota	Data Compilation of USS Exploration Data	\$8,720
Univ. of Minnesota	Finish Logging Drill Core	\$8,124
St Paul, MN	Mercury/Taconite Studies	\$142,298
Univ. of Minnesota	Separation of Mercury from Wet Scrubber solids	\$367
Univ. of Minnesota	Gas Chemistry Measurements in Taconite Furnaces	\$43,725
Grand Forks, ND	Controlling Mercury in Taconite Stack Emissions	\$22,260
Duluth, MN	Modelling of Emissions from Haul Roads	\$12,000
Subtotal		\$447,061

3) Minnesota Department of Natural Resources. Fish and Wildlife Division

Summary by Research Category

Natural Resources FY 2006
\$244,769

Recipient	Project Title	
Univ. of Minnesota,	Statistical Consulting	\$7,500
Univ. of Minnesota,	Human Dimensions Studies	\$40,000
Univ. of Minnesota,	Diagnostic Genetic Markers at the Species and Subspecies Level	\$30,000
Simon Frazer Univ.,	Statistical Consulting on Mark-Recapture Population Estimates Mille Lacs Lake	\$2,000
Univ. of Minnesota,	Real Time Mortality Estimation by Acoustic Telemetry	\$5,600
Bemidji State Univ.,	Red Lake SocioEconomic Survey	\$1,500
Univ. of Minnesota,	Fishing in the Neighborhood Human Diimensions Study	\$12,000

Mississippi State Univ.,	Relationship Between Aquatic Plants and Selected Fish Species	\$34,159
Dr. D. Fulton, Univ. of Minnesota, St. Paul, MN	Forestry BMP in Riparian Zone	\$12,500
Univ. of Minnesota,	Electronic Licensing Study Evaluation	\$8,800
Dr. T. Hrabik, Univ. of Minnesota, Duluth, MN	Lake Superior Hydroacoustics	\$30,250
Univ. of Minnesota,	Walleye Tournament Mortality Study	\$30,000
Univ. of Minnesota,	Cormorant Consumption Study	\$9,000
Bemidji State Univ.,	Rusty Crayfish Behavior	\$21,460
	Subtotal	\$244,769

4) Minnesota Department of Natural Resources. Forestry Division

Summary by Research Category

FY 2006

Natural Resources

\$805,363

Recipient	Project Title	
In house (MN DNR Resource Assessment)	Satellite Imagery and Aerial Photography for Monitoring the Implementation of the	\$95,000
Scotford & Nichols Associates,	Third Party Monitoring of the Implementation of the Timber Harvesting and Forest	\$105,000
In house (MN DNR Resource Assessment via USDA Grant through	Logging Residue Study	\$90,000
Mike Kilgore,	Developing a Methodology for Assessing Drivers of and Trends in Forest Parcelization	\$30,563
Peter Bundy,	Status and Outlook of Private Forest Consultant Capacity	\$4,800
In house (MN DNR Resource Assessment via USDA Grant)	Urban Ash and Elm Health Survey	\$60,000
Bill Bergeson,	Forest Productivity Cooperative	\$410,000
Andrew David,	Forest Tree Improvement	\$10,000
	Subtotal	\$805,363

5) Minnesota Department of Transportation

Summary by Research Category

FY 2006

Transportation & Energy

\$6,473,373

Recipient	Project Title	
University of Minnesota	History of Minnesota Highways	\$4,000
University of Minnesota	Research Publication and Outreach Services (2004-2006)	\$29,164
University of Minnesota	INV 645: 2005/2006 Task 11 "To Pave or Not To Pave"	\$5,600
Red Lake Co	Pavement	\$10,000
Mn/DOT Materials Lab	INV 771: Use of Ground Penetrating Radar to Review Cross-Section of Road	\$31,988
University of Minnesota	2004-2005 Minnesota Airport Technical Assistance Program (AirTAP)	\$63,000
Mankato State University	Wildlife Value of Reed Canary Grass Infested	\$23,678
University of Minnesota	2006 Environmental Stewardship and Streamlining	\$24,561
Iowa State University	INV 805: Safety Impacts of Street Lighting at Isolated Rural Intersections - Phase II	\$12,795
University of Minnesota	INV 806: Snow & Ice Maint Operation Field Guide & Accompanying Training Course	\$8,840
University of Minnesota	Chemical Inventory and Database Development for Recycled Material Substitutes	\$15,000
University of Minnesota	Biological Control of Canada Thistle in Wetland Prairie Restoration	\$29,700
University of Minnesota	Load Rating by Load Testing on Bridges	\$51,036
University of Minnesota	INV 799: Impact of Alternative Storm Water Management Approaches on Highway Infrastructure	\$13,552

University of Minnesota	Driver Performance During 511information	\$6,999
University of Minnesota	Moisture Effects on DCP and Portable Vibratory Deflectometer Measurements	\$120,741
University of Minnesota	Stability Tests of Prestressed Concrete	\$20,000
University of Minnesota	INV 787: Risk Assessment Tool for Selection of Erosion Control Practices	\$65,000
U of W- Madison	INV 786: Volume Threshold for Installing Bridge Approach Guardrail	\$18,970
University of Minnesota	Improving Capacity Planning for Demand-Responsive Para Transit Services	\$27,150
U of W- Madison	INV 791: Safety & Operational Characteristics of Two-Way Left Turn Lanes	\$43,738
University of Minnesota	INV 797: Urbanization of MN's Countryside: 2000-2025 - Future Geographics & Trans. Impacts	\$13,277
University of Minnesota	INV 801: Adaptation of Mechanistic-Empirical 2003 Guide for Design of MN Low-Volume PCC	\$46,238
University of Minnesota	INV 804: Determ. Of Low-Temp. Fracture Properties of Three Mn/Road Asphalt Mixtures	\$60,914
University of Minnesota	INV 784: Guidelines for using Rumblestrips	\$124,659
University of Minnesota	Guide and Mn/PAVE Pavement Design	\$21,516
University of Minnesota	Self Compacting Concrete (SCC) for Prestressed Bridge Girders	\$100,000
University of Minnesota	Water Quality Performance of Dry Detention Ponds with Underdrains	\$11,000
American Eng. Testing	IMP 2005: Minne-ALF Results Marketing/Evaluation	\$14,820
University of Minnesota	INV 792: Pavement Research Institute	\$60,000
University of Minnesota	Pavement Design using Unsaturate Soil Technology	\$105,500
University of Minnesota	Freeway Network Traffic Detection/Monitoring Incidents	\$7,350
U of W- Madison	INV 810: Demonstration of Ash Utilization in Low Volume Roads	\$54,738
University of Minnesota	INV 812: Resilient Modulus & Strength of Base Course with Recycled Asphalt Pavements	\$29,610
University of Minnesota	INV 815: Calibration of the 2002 AASHTO Pavement Design Guide for MN PCC/HMA Pavements	\$106,497
U of W Milwaukee	Access Study Administration and Outreach	\$12,670
University of Minnesota	Evaluation of Minnesota's Operational NightCAP	\$23,904
ERES Consultants - ARA	INV 821: Assess Life-Cycle Costs and Roadway Surfacing Impacts of Increasing Roadway Construction Standards	\$5,287
University of Minnesota	INV 826: Appropriate Use of RAP	\$5,770
University of Minnesota	INV 645: 2005/2006 Task 10 - Screening Tool for Using Waste Materials (fly ash) in Paving Projects-Demo/Training	\$4,000
University of Minnesota	INV 998: 2006 Operational Research Program for Local Transportation Groups. OPERA	\$2,917
University of Minnesota	TERRA Board Support	\$21,700
University of Minnesota	Turn Lane Lengths for Various Speed Roads and Evaluation of Determining Criteria	\$49,051
SRF Consulting Group, Inc	LRRB-ORS Web Site Maintenance	\$4,622
University of Minnesota	INV 817-1: Determination of Optimum Time for Application of Surface Treatments to Asphalt Concrete Products	\$93,000
University of Minnesota	Commuter Bicyclist Behavior and Facility Disruption	\$56,994
Mn/DOT Materials Lab	INV 753: Duration of Spring Road Restrictions on Gravel Roads	\$6,910
University of Minnesota	06-07 AirTAP Work Plan - Revised	\$67,000
University of Minnesota	INV 849: Study of Environmental Effects of De-icing Salt on Water Quality in Minnesota	\$4,667
University of Minnesota	Beyond "Business as Usual". Ensuring the Network We Want is the Network we Get.	\$44,000
University of Minnesota	Pavement Evaluation Using Ground Penetrating Radar	\$43,432
University of Minnesota	of Bridge Decks	\$45,000
University of Minnesota	Application of Precast Decks and Other Elements to Bridge Structures	\$39,725
University of Minnesota	Management Practices for Weed Control in Roadway Ditches	\$103,544

University of Minnesota	Compaction Remediation for Construction Sites	\$44,090
Iowa State University	Cost Effectiveness of Design-Build, and A + B Contracting Techniques	\$14,703
University of Minnesota	Canada Thistle Seed Movement	\$12,000
North Dakota State Univ.	INV 832: Volume Warrants for Right Turn Lanes	\$41,573
North Dakota State Univ.	INV 831: Investigation of Stripping in MN Class 7 and Full Depth Reclamation Base Material	\$5,833
University of Minnesota	Low Cost Innovative Approaches to Improve Safety at Un-Signalized Intersections on 4-Lane Highways	\$24,000
St. Cloud State University	Feasibility Study of Portable Weigh-in-Motion (WIM) Systems for Highway Speed	\$13,588
University of Minnesota	INV 668: 2005 Minnesota Technology Transfer (T2) LTAP Program	\$303,714
University of Minnesota	IMP 2005: GPR Implementation	\$30,000
University of Minnesota	A Nonlinear State Space Approach to Arterial Travel Time Prediction	\$3,261
University of Minnesota	Determining Shear Capacity of Prestressed Concrete Beams	\$101,550
University of Minnesota	Fatigue - resistant Design Details for Overhead Signs, Mast-arm Sign Poles, and Lighting Standards	\$25,780
University of Minnesota	Cross - Median Crashes	\$4,550
University of Minnesota	IMP 2005: Erosion Control in Roadside Ditches Preliminary Design Standards Best Mangement Practices	\$11,772
Mankato State University	Development of Operational Strategies for Travel Time Information and Emergency Evacuation on a Freeway Network	\$48,750
University of Minnesota	Enhanced Coordination of Cadastral Information	\$15,727
University of Minnesota	INV 833: Design Tool for Controlling Runoff and Sediment from Highway Construction	\$10,000
University of Minnesota	Investigation of Deterioration of Stainless Steel Dowel Tubes Under Repeated Loading	\$59,998
University of Minnesota	INV 998: 2004-2005 Operational Research Program for Local Transportation Groups	\$24,347
North Dakota State Univ.	Development of Measurement Sources for Freight Performance Indicators	\$33,500
University of Minnesota	Improved methodologies for the inoculation of prairie legumes in roadside/revegetation settings	\$19,500
University of Minnesota	INV 814: Implications of State Aid Cuts for Local Road Funding (LRRB funds withdrawn 3/05. See Status Note 5/6/05)	\$4,564
University of Minnesota	Instrumentation of a Full Depth Precast Concrete Bridge Deck System	\$13,461
University of Minnesota	Rapid Assessment and Decision Making Strategies for Distortional Fatigue Multi-Girder Steel Bridges	\$2,500
University of Minnesota	Development of a Trash Harvester for Mn/DOT - Phase 1	\$48,000
University of Minnesota	Local Road Funding History	\$57,203
University of Minnesota	IMP2005: Implementation of Enhanced PFWD Recommendation	\$17,432
University of Minnesota	INV 835: Best Use of Cone Penetration Testing	\$22,000
University of Minnesota	IMP 2005: Conflict Management in Transportation Project Public Involvement	\$6,800
University of Minnesota	Right of Way Preservation for Future Development of Highways	\$8,412
University of Minnesota	Development of Accessibility Measures	\$44,000
University of Minnesota	FY06-07 CTS Operations	\$800,000
University of Minnesota	INV 645: 2005/2006 Task 13- RIC Best Practices for Concrete Repair for Local Streets and County Roads	\$1,395
University of Minnesota	Facilitating native plant community establishment in wetlands following invasive plant removal	\$30,201
University of Minnesota	INV 823: The Road to A Thoughtful Street Tree Master Plan	\$3,958
University of Minnesota	INV 824: Dev. Of Improved Proof Rolling Methods for Roadway Embankment Construction	\$44,825
University of Minnesota	INV 830: Evaluating Roadway Subsurface Drainage Practices	\$127,302
University of Minnesota	The Implementation of Fly Ash Sulfate Stabilization Synthesis and Training	\$18,000
University of Minnesota	INV 808: Pavement Rehabilitation Selection	\$22,440
SRF Consulting Group, Inc	INV 999: LRRB Outreach/Communication Activities	\$16,669

University of Minnesota	INV 834: Assessment of Storm Water Management Practices on the Water Quality of Runoff	\$83,272
Mankato State University	INV 836: Design Procedures for Bituminous Stabilized Road Surfaces for Low Volume Roads	\$30,916
University of Minnesota	Development of a Trash Harvester for Mn/DOT - Phase 1	\$28,000
University of Minnesota	Utility Coordination Implementation	\$39,625
North Dakota State Univ.	Best Value Based on Performance	\$42,000
University of Minnesota	Access to Destinations: Refining Methods for Calculation Non-Auto Travel Times	\$37,878
University of Minnesota	2005 Midwest Regional Context Sensitive Design and Solutions Workshop	\$48,676
University of Minnesota	I-394 MnPASS Outreach and Education	\$33,536
University of Iowa	Employment of the Traffic Management Lab for the Evaluation and Improvement of Stratified Metering Algorithm	\$75,000
U of M - Duluth	Development of Portable Eight-Channel WIM Analysis System Based on Analog WIM Signals	\$33,185
Mankato State University	The Implementation of an International Roughness Index for Mn/DOT Pavement Const. & Rehabilitation	\$17,368
University of Minnesota	The Implementation of Machine Control Training	\$24,600
Frentress Enterprises LLC	INV 645: 2005/2006 Task 9 - Best Practices Manual for Rehabilitation of Low Volume Concrete Roads in Minnesota	\$20,000
University of Minnesota	Employment of Traffic Management Lab for the Evaluation and Improvement of Stratified Metering Algorithm	\$5,000
University of Minnesota	Minnesota Local Agency Safety Pilot	\$7,000
University of Minnesota	INV 768: Geosynthetics in Roadway	\$6,000
Iowa State University	INV 645: 2005/2006 Task 12 Crash Mapping Analysis Tool for Minnesota DOT	\$12,000
University of Minnesota	ITS Institute Mn/DOT Match	\$150,000
University of Minnesota	Minnesota Guidestar Support - FY05	\$16,693
University of Minnesota	Evaluating the Effectiveness of the Minnesota Speed Management Program	\$78,000
University of Minnesota	Access to Destinations: Estimation of Arterial Travel Times	\$54,984
University of Minnesota	Access to Destinations: Twin Cities Metro-Wide Traffic Micro-Simulation: Feasibility Investigation	\$14,000
University of Minnesota	Tofte Core Village Plan	\$2,000
University of Minnesota	Improving the Ability of Drivers to Avoid Collisions with Snowplows	\$15,501
University of Minnesota	INV 668: 2004 Minnesota Technology Transfer	\$104,000
University of Minnesota	Implementation and Closeout of FY - 06	\$21,516
University of Minnesota	RSS Research Report Management	\$13,353
University of Minnesota	The Safety of Pedestrian and Bicycle Travel in Minnesota: Inventory, Analsis and Prospectus	\$35,500
University of Minnesota	Column Supported Embankment on TH 241	\$25,000
University of Minnesota	Motor Grader and Gravel Road Maintenance Techniques Training Video and Suggested Instructional Guide	\$9,000
University of Minnesota	Automated Winter Road Maintenance Using Road Surface Condition Measurements	\$60,000
University of Minnesota	PIARC Technical Committee 1.3 Performance of Road Administrations	\$31,959
University of Minnesota	Traffic Lab Design & Infrastructure	\$15,000
University of Minnesota	Using Archived ITS Data to Improve Transit Performance and Management	\$963
SRF Consulting Group, Inc	INV 645: Implementation of Research	\$153,111
University of Minnesota	INV 837: Mn/ROAD Reconstruction of Low Volume Road	\$25,251
University of Minnesota	IMP 2005: Train the Trainer Workshop for Blowing Snow Control	\$24,500
University of Minnesota	INV 668: 2006 Minnesota Technology Transfer LTAP Program	\$100,166
University of Minnesota	Evaluation and Analysis of Mn/DOT Steel Bridges Inventory for Prioritizing Bridge Maintenance Needs	\$23,000
Mn/DOT Material Lab	INV 676: CY2006 Support of Mn/ROAD Low Volume Road	\$280,000

University of Minnesota	INV 999: CY2006 Program Administrator	\$94,947
University of Minnesota	MnROAD Lessons Learned	\$48,448
Iowa State University	Field Validation of Intelligent Compaction Monitoring Technology for Unbound Materials and Hot Mix Asphalt	\$6,250
University of Minnesota	Revision of the MnROAD Offline Data Peak	\$21,975
Iowa State University	Snow and Ice Operation Cost	\$40,206
Castle Rock Consultants	LRRB-ORS Web Site Maintenance	\$19,324
Bently Systems Inc.	Handheld Field Training	\$32,950
HNTB Corporation	IMP 2005: Bike and Pedestrian Implementation	\$24,869
University of Minnesota	Monitoring and Analysis of a Full Depth Precast Concrete Bridge Deck System	\$77,629
University of Minnesota	Truck Weight Compliance Education and Outreach Program	\$156,000
Subtotal		\$6,473,373

6) Minnesota Geological Survey

Summary by Research Category

FY 2006

Natural Resources \$1,749,043

Recipient	Project Title	
MGS	State Special Appropriation for Special R&D Projects	\$1,029,433
MGS from DNR County Atlas	County Geologic Atlas Program	\$181,453
MGS match of USGS	USGS Statemap, Bureau of Reclamation, and Stream Sediment	\$180,359
MGS from LCMR	Mesabi range and hydrology of Mine Lakes	\$61,611
MGS from DNR MCC	Geology of Mesabi, PGE Evaluation, and upgrade of aeromagnetic databases	\$82,796
MGS from Met Council	Water supply development	\$13,973
MGS from Health Dept.	St. Lawrence Formation	\$36,221
MGS from various counties	Scott County update, Todd, Carlton, McLeod counties atlases	\$161,011
MGS from Shakopee Mdewakanton	Groundwater management Sioux Community	\$2,186
Subtotal		\$1,749,043

7) Minnesota Racing Commission

Summary by Research Category

FY 2006

Agriculture and Food Science \$20,000

Recipient	Project Title	
Clinical and Population Sciences, College of Veterinary Medicine, University of Minnesota	Effects of triheptamoin on muscle metabolism during submaximal exercise	\$20,000
Subtotal		\$20,000

8) Minnesota State College--Southeast Technical (MSC-ST)

Summary by Research Category

FY 2006

Computers, Communications & Microelectronics \$12,000
Human Health \$45,000
Manufacturing Engineering \$450,000

Recipient	Project Title	
MSC-ST, Winona, MN	Nursing Curriculum Alignment	\$45,000
MSC-ST Faculty, Winona, MN	PDA Viability for Evaluation Feasibility	\$12,000
SE Tech & Business Partners, Southeast Minnesota Region	Development of Process Engineering - Lean Manufacturing Curriculum	\$450,000
Subtotal		\$507,000

9) Minnesota State University--Mankato

Summary by Research Category

FY 2006

Natural Resources	\$109,336
Manufacturing Engineering	\$1,239,378
Environmental Protection & Waste Management	\$209,477
Transportation & Energy	\$152,502
Physical & Natural Science	\$8,093

Recipient	Project Title	
MSU, M; CSET	Lean Process Technology (LPT)	\$89,378
MSU, M; CSET	Effect of Hunter Density on Quality of Hunt for Wild Turkey	\$12,500
MSU, M; CSET	Greater Blue Earth River Watershed Monitoring	\$6,300
MSU, M; CSET	Public Drainage Ditch Buffer Strip Study	\$50,976
MSU, M; CSET	Development of an IRI Smoothness Specification for New Pavement Construction	\$17,368
MSU, M; CSET	Update of Vehicle Classification for Country Road Pavement Design	\$54,094
MSU, M; CSET	Predicting the Occurrence of Bumps in Overlays	\$31,040
MSU, M; CSET	The Utility of Wildlife Crossings in Minnesota	\$30,336
MSU, M; CSET	BWSR Wetland Evaluation	\$15,631
MSU, M; CSET	The Utility of Wildlife Crossings in Minnesota	\$14,000
MSU, M; CSET	MN River Monitoring, IVMI Data Collection & Compilation Project	\$71,392
MSU, M; CSET	Tile Monitoring for Fecal Coliform Bacteria	\$7,560
MSU, M; CSET	2006-2007 Minnesota River Report and Summit	\$57,618
MSU, M; CSET	MN Department of Ag E20 Material Compatibility	\$50,000
MSU, M; CSET	Southern Minnesota Mathematics Science Partnership	\$8,093
MSU, M; CSET	Best Practices: Managing and enhancing roadside vegetation for desirable wildlife.	\$52,500
MSU, M; CSET	MN Center of Excel in Engineering and Manufacturing	\$1,150,000
Subtotal		\$1,718,786

10) Minnesota State University--Moorhead (MSUM)

Summary by Research Category

FY 2006

Human Health	\$1,230
Manufacturing Engineering	\$77,943
Physical & Natural Science	\$2,675

Recipient	Project Title	
MSUM - Dept of Education	Teacher Research Network of Science & Math	\$2,675
MSUM SBDC	MN Small Business Development Center	\$77,943
MSUM - Speech, Language, Hearing Clinic	Voice and Speech Science	\$1,230

Subtotal \$81,848

11) Southwestern Minnesota State University (SMSU)

Summary by Research Category

FY 2006

Computers, Communications & Microelectronics	\$72
Social Science	\$1,380

Recipient	Project Title	
SMSU	140533-Active Learning Advocate	\$72
SMSU	210809-Regional Research	\$1,380

Subtotal \$1,452

12) University of Minnesota--Graduate School

Summary by Research Category

FY 2006

Agriculture and Food Science	\$121,462
Natural Resources	\$194,834
Computers, Communications & Microelectronics	\$201,053
Human Health	\$1,346,476
Manufacturing Engineering	\$54,970
Transportation & Energy	\$62,224
Social Science	\$569,905
Physical & Natural Science	\$406,306

Recipient	Project Title	
DeMuth, David M	Robotic Telescope Project at UMC	\$21,886
Keranen, Mark D	Fluorescent Molecular Devices as Environmental Sensor-Scavengers	\$28,700
Barker, Lucia P	Screening Natural Products for Anti-Mycobacterial Activity	\$25,000
Berry, Steven M	Investigation of Metalloenzyme Function by Design of Catalytic Activity	\$25,648
Doorn, David J	Employer Provided Health Insurance and the Demand for Part-time Labor	\$16,964
Einat, Haim	Individual Variability in Models of Mania: Towards Exploration of Endophenotypes	\$24,718
Ernst, Julie A	Factors Relating to K-12 Teachers' Use of Environment-Based Education	\$18,356
Etterson, Julie R.	Testing the Evolutionary Potential of Polyploids	\$30,484
Johnson, Joseph L	Elucidation of the Structure and Function of Five Mammalian Beta-secretase Isoforms	\$30,000
Johnson, Thomas C	The Past 100,000 Years of Climate Variability in East Africa	\$33,538
Kiprof, Paul	Purchase of an Autotuning Attachment for the 500MHz NMR	\$13,600
Merreddy, Venkatram R	A Novel Protocol for the Asymmetric Synthesis of Aminoboronic Acids: Synthesis of New Folic Acid Based Boronic Acids as Cancer Chemotherapeutic and BNCT Agents	\$25,887
Nemykin, Viktor N	Synthesis and Modeling of Macrocycles with Long Range Metal-Metal Coupling	\$29,987
Noreddin, Ayman M	Liquid Chromotography/Mass Spectrometry Instrument	\$38,000
Rother, Michael A	Surfactant Effects on Thermocapillary Motion of Drops	\$16,223
Schultz, Jennifer S	Implications of Rising Employer Health Insurance Costs	\$25,999
Willemsen, Peter J	Behavior Simulation Support for Large Scale Virtual Environments	\$32,324
Boyd, Sylke G	Computer Modeling of Point Defect Formation in crystalline RDX	\$18,147
Abernathy, Scott F	Transport Democracy: Education Policy and the American Occupation of the Philippines	\$17,038

Ahmad, Mansur	Tubular Capillary Formation by Irradiated Endothelial Cells on 3D Scaffolds	\$25,000
Aksan, Alptekin	Ultrafast Vitrification of Microdroplets	\$26,083
Amin, Elizabeth A	Molecular Modeling of Matrix Metalloproteinases	\$16,400
Arnold, Todd W	Effects of Competition and Predation on Survival of Mallard Ducklings	\$17,922
Bee, Mark A	Auditory Scene Analysis and the 'Cocktail Party Problem' in Animal Acoustic Communication	\$32,869
Bhattacharya, Mrinal	Multilayered Assembly for Hard Tissue Application	\$30,738
Bradeen, James M.	The Effects of Temperature on Resistance Gene Expression in Potato	\$13,720
Caraway, Teri L	The Liberalization of Labor Regulation	\$28,083
Chandra, Abhishek	Providing Guarantees in Distributed Resource Allocation	\$21,738
Chatterjee, Singdhansu B	Generalized Bootstrap Techniques for Models with Dependent Data	\$24,124
Christ, Theodore J	Measurement for Sub-Skill Analysis of Reading Fluency (SARF): Pilot Work to Support Ongoing Research and External Funding	\$30,107
Cloyd, James C	Acquisition of HPLC Auto Sampler to Support Clinical Research	\$12,446
Derby, Jeffrey J	Modeling Colloidal Crystal Growth: Convective Assembly and Capillarity	\$17,785
DeVaughn, Michael L	Experience Working Together and Influences on Short-Term Learning and Performance Outcomes	\$18,871
Doering, Aaron H	Enhancing Geographic Literacy with GIS in the K-12 Classroom	\$27,724
Downs, Levi S	Utility of siRNA against HPV E6 and E7 in the Treatment of Cervical Cancer	\$30,182
Dumitrica, Traian	Laser-Driven Transformations in Nanostructures-Theory and Simulations	\$21,738
Elliott, Bruce C	Ethics of Pharmaceutical Marketing	\$22,200
Elliott, Ryan S	Computationally Assisted Materials Design: A Technique for Discovering Materials with Never-Before-Seen Properties	\$22,924
Fallon, Ann M	Optimization of Wolbachia Production in a Mosquito Cell Line	\$29,523
Fulkerson, Jayne A	Validation of a Self-Administered Tool to Assess Foods Served at Family Meals for the Prevention of Childhood Obesity	\$26,453
Gantt, James S	Leica DM5000 B Microscope	\$22,511
Geng, Jian-Guo	Serum Amyloid P Component Negatively Regulates P-selection Adhesion Activity	\$25,000
Girshick, Steven L	Thermal Plasma Synthesis of Carbon Nanotubes	\$28,887
Goetz, Edward G	Economic and Social Change in High Poverty Urban Neighborhoods	\$3,700
Goh, Michael P	Cultural Intelligence: Construct Validation of a New Measure of Cultural Competence	\$16,999
Hadjiyanni, Tasoulla	Designing with Culture in Mind - Understanding Mexican-Americans' Housing Needs	\$23,383
Heimpel, George E	Molecular Evolution of Sex Determination in Parasitoid Wasps	\$26,541
Hilbink, Elisabeth	Judging for Democracy? Analyzing the Role of Judges in Four Democratic Transitions	\$28,915
Hill, Kimberly M	Segregation and Mixing of Particle-Laden Flow	\$26,819
Hirschmann, Marc M	Acquisition of a Confocal Raman Microscope for Use in Science, Engineering, and Medicine	\$30,000
Hokanson, Stan C	Genetics of Resistance to Blackspot Disease in Roses	\$27,363
Hopper, Nicholas J	Anonymous Communications on the Internet	\$21,888
Huang, Cheng-Cher	Studies of Molecular Ordering in Bow-Shaped Liquid Crystals Using Ellipsometer and Resonant X-Ray Diffraction	\$26,154
Huh, Jisu	Website Credibility and Its Influence on Consumers' Responses to Information on the Website	\$24,344
Huo, Yuqing	Leukocyte C2GlcNAcT-I plays a Role in the Formation of Atherosclerotic Lesions	\$28,459
Jansa, Sharon A	Multi-gene Molecular Systematics of Marsupial Mammals	\$29,538
Jehangir, Rashne R	Longitudinal Impact of Learning Communities on First-Generation College Students.	\$24,683
Johnson, Ross G	Preparing Research Samples for Electron Microscopy	\$31,002
Jovanovic, Mihailo	Model-Based Sensorless Flow Control	\$23,083
Kaufman, Dan S	Human Embryonic Stem Cells as a Unique Model for Lymphocyte Development	\$30,000
Kehl, Lois J	Anatomical and Biochemical Correlates of Low Back Pain	\$30,000

Kells, Stephen A.	Presence and Significance of Resource Locating Allomones used by Stored Product Pests	\$23,238
Kim, Do-Hyung	Mechanisms of mTOR-Mediated Insulin Resistance	\$27,202
Kimberley, Teresa J	Reproducibility of fMRI in the Healthy and Stroke Population	\$31,887
Koutlas, Ioannis G	Dynamic Somesthetic Processing of Tactile Stimuli	\$24,162
Krebs, Ronald R	War, Crime, and Punishment; Counterterrorist Rhetoric and Policy in Comparative Perspective	\$24,852
Larson, Alice A	Behavioral Responses to Stress and Thalamic Mast Cells	\$25,000
Li, Tongbin	Building siRecords-An Extensive Database for Mammalian siRNAs	\$27,161
Linck, Richard W	Molecular Structure & Regulation of Cilia & Flagella	\$29,933
Lipsky, Sanford	Upgrade of Cary 14 UV-VIS Spectrophotometer	\$9,868
Lowe, Dawn A	Estrogen and Estrogen Receptors: Distinctive Affects on Skeletal Muscle	\$27,808
Lu, Junxuan	Histology Facility	\$20,000
Ludewig, Paula M	Development and Validation of an Ultrasound Measure of Subacromial Space Reductions	\$27,883
Mansky, Kim C	Role of Osteoclasts in Regulating Osteoblast Differentiation	\$25,000
Manson, Steven M	Does Sprawl Beget Sprawl? Urbanization in the Twin Cities of Minnesota, 1990-2005	\$23,924
Matsuo, Hiroshi	Determining the Cytidine-Deamination Mechanism of Human APOBEC 3G Protein	\$35,522
Maynard, Jennifer A	Engineering of Immune System Recognition	\$28,083
Mermelstein, Paul G	Novel Actions of Estradiol that Influence Brain Function	\$28,980
Mokbel, Mohamed F	Privacy-Aware Location-Based Database Servers	\$23,809
Mueller, Daniel L	Aberrant Ubiquitin-Mediated Molecular Trafficking in Anergic T-Cells	\$31,083
Nakagawa, Yasushi	Development of the Mouse Dorsal Thalamus	\$30,000
Nelson, Peggy B	Cochlear Compression in Hearing Loss: Relationship to Understanding Speech in Noise	\$23,413
Ngo, Bic	The Salience of "Culture" in Hmong Immigrant Students' Education: Parental Involvement, Funds of Knowledge and Culturally relevant Pedagogy	\$24,473
Nick, Teresa A	Mechanisms of Vocal Learning in the Zebra Finch	\$28,471
O' Sullivan, Daniel J	Controlled Anaerobic Culture Conditions	\$30,600
Pappaioanou, Marguerite	Pilot of Hospital-Based Surveillance for Influenza in Tanzania, Africa	\$30,000
Peloso, Marco	The Development of Thermal Equilibrium in the Early Universe	\$26,852
Peterson, Gail B	A New Technique for Teaching Words and Concepts to Children with Autism.	\$24,281
Petit, Moira	Optimizing Cardiovascular and Bone-Health in Children: A Novel Intervention	\$30,543
Raheja, Gloria G	A Whiter Shade of Blue: Whiteness, Class and Race in the Appalachian Region, 1926 to 1940	\$32,216
Rao, Raghavendra B	In vivo Substrate Utilization in the Newborn Rat Brain	\$30,406
Roberts, Jason M	Ambition, Competition, and Partisan Struggle: Studying Congressional Elections Across Time	\$26,151
Roehrig, Gillian H	Promoting Conceptual Chemistry Knowledge through Inquiry-Based Instruction	\$17,920
Roumeliotis, Stergios	An Indoor Localization Aid for the Visually Impaired	\$23,760
Roychowdhury, Jaijeet S	Fast Computational Methods for Oscillatory Biosystem Design and Characterization	\$23,083
Saar, Martin O	Developing a Hydrogeologic Computer Model for the Bemidji, MN Oil Spill	\$33,524
Saldanha, Arun J	Jan Huygen van Linschoten's Itinerario and the Historical Geography of Dutch Identity	\$21,802
Schimmenti, Lisa A	PAX2-Expression Profiling	\$22,542
Schuster, Mary L.	The Victim Impact Statement and the Impact on Sentencing in Felony Domestic Violence Cases in Hennepin County	\$22,924
Sheaff, Robert J	Regulation of the Cell Cycle Inhibitor p27kip1 by the PI3K/Akt Signaling Pathway	\$25,000
Sreevatsan, Srinand	Conformation Detection of Synthetic Prion Molecules: Development of Tools to Study Species-Barriers in Prion Disease	\$26,719
Stout, James H	Ion Microprobe Dating of Emplacement and Rotation of Tectonic Plates	\$7,680
Strolovitch, Dara Z	The Transnationalism of Social Justice Advocacy in the United States	\$31,462

Sturla, Shana J	Influence of Stereochemistry on the Anticancer Activity of Illudins	\$27,238
Suryanarayanan, Raj G	Temperature and Humidity Stage for Wide Angle X-Ray Diffractometer	\$30,000
Tewfik, Ahmed H	Uncovering Biomarkers and Genetic Pathways in Ovarian Carcinoma	\$23,083
Teyssier, Christian P	River Capture and Erosion Waves Along Strike-Slip Faults	\$20,000
Valls, Oriol T	Thermodynamic Stability of Ferromagnet/Superconductor	\$22,238
Van Ness, Brian G	Targeted Transgenic Mouse Model of Plasma Cell Malignancies	\$24,901
Wade, Michael G	Perceptual-Motor Ability of Children Diagnosed with Developmental Coordination Disorder (DCD)	\$23,288
Walters, Kylie J.	Structural Studies of NAT Substrate Specificity and Acetylation	\$27,239
Wells, Susan J	The Effectiveness of Child Protective Service Interventions	\$31,711
Wickman, Kevin D	GIRK4: A New Obesity Gene?	\$29,500
Wolfe, Thomas C	Mass Media and the Construction of "Europe"	\$27,238
Wu, Baolin	The Regularized Supervised and Unsupervised Learning for Microarray Data Analysis	\$21,738
Yuan, LiLian	Activity Regulation of Dendritic Function	\$26,925
Zhang, Liang	Explaining the Gender Gap in Wages among Recent College Graduates	\$18,813
Zhao, Minyuan	Understanding Local Clusters through Global Firms: the Semiconductor Industry	\$15,704
	Subtotal	\$2,957,231

13) Winona State University

Summary by Research Category

FY 2006

Human Health	\$161,327
Manufacturing Engineering	\$20,273

Recipient	Project Title	
Winona State University	MERC Grant	\$83,150.00
Winona State University	ORC Next Step Counseling	\$3,441.00
Winona State University	MJSP Watlow / PlastiCert	\$16,832.00
Winona State University	MJSP Winona Health	\$78,177.00

Subtotal **\$181,600**

Total (Institutions 1-13) **\$15,277,009**