

Date of Report: July 1, 2002
LCMR Final Work Program Report
Date of Workplan Approval:
Project Completion Date: June 30, 2002

FINAL REPORT

I. PROJECT TITLE: By-Products Application to Agricultural, Mineland, and Forest Soils

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Total Biennial Budget:	\$371,000		
\$ LCMR:	\$350,000	\$ Match:	\$21,000
- \$ LCMR Amount Spent:	<u>\$349,443.20</u>	- \$ Match Spent:	\$21,000
= LCMR Balance:	<u>\$556.80</u>	= \$ Match Balance:	\$0

Appropriation Language

Carryforward Language: ML 2001, 1st Special Session, Chp 2, Sec. 14, Subd. 18 paragraph (a): The availability of the appropriation for the following project is extended to June 30, 2002: ML 1999, Chap. 231, Sec. 16, Subd. 10(g) (010g), By-Products Application to Agricultural, Mineland, and Forest Soils.

A. Legal Citation: ML 1999, Chap. 231, Sec. 16, Subd. 10(g)

B. Carryforward Language: The availability of appropriations for the following project is extended to June 30, 2002: ML 2001, 1st Special Session, Ch. 2, Sec. 14, Subd. 18 (010g), By-Products Application to Agricultural, Mineland, and Forest Soils.

\$175,000 the first year and \$175,000 the second year are from the trust fund to the Pollution Control Agency for an agreement with the Western Lake Superior Sanitary District to create a Northeast Minnesota consortium of public utilities, wood-products and mining industries to research environmentally sound co-applications of industrial and municipal by-products for agriculture, forestry and mineland reclamation. The appropriation must be matched by at least \$21,000 of nonstate money.

C. Status of Match Requirement: Match commitments from project collaborators for by-product testing and analysis are as follows. Letters of commitment and final receipts on file.

Lake Superior Paper:	\$8,000
Potlatch:	\$3,000
EVTAC	\$6,525
City of Virginia paid Northeast Tech Services	\$1,945
WLSSD: In Kind and cash	\$8,056

II. and III. FINAL PROJECT SUMMARY

RESEARCH PROJECT

The overall goal of this project was to evaluate the potential for application and co-application of municipal and industrial by-products in agriculture, forestry, and mineland reclamation with particular emphasis on beneficial use of by-products in northeastern Minnesota.

Overall Project Outcome and Results

A review of literature pertaining to beneficial utilization of by-products indicated that the dominant by-products in the region include wood ash generated from paper mill companies and biosolids from municipalities. Based on chemical characterization of inorganic and organic constituents, these by-products meet existing federal and state limits for beneficial application as soil amendments. The wood ash is a potential liming amendment and potassium source while biosolids can supply organic matter and many nutrients including nitrogen and phosphorus.

A series of laboratory, greenhouse, and field studies conducted over a 3-year period suggest that application and co-application of by-products can be a sustainable management practice for the region. The by-products either increased yield of crops tested or had no effect on yield compared to conventional practices without by-product application. When applied or co-applied at agronomic rates, environmental monitoring indicated no adverse effect of amendments on available metals in soil, levels of nitrate in soil water, or plant uptake of metals. A novel by-product application trenching method was developed for mineland reclamation with hybrid poplar.

Project Results Use and Dissemination

The results from this project are being used by the University of Minnesota and State Agencies to address environmental and production concerns related to by-product application. Two technical workshops, four presentations at national and regional meetings, and more than 20 related presentations and field tours were given. The audiences included scientists, by-product generators and managers, farmers, foresters, mineland reclamation professionals, extension educators, and regulatory agency employees. A literature review and preliminary forestry results can be accessed at:

<http://www.cnr.umn.edu/FR/publications/staffpapers/Staffpaper153.PDF> and
<http://www.cnr.umn.edu/FR/publications/staffpapers/Staffpaper162.pdf>

IV. OUTLINE OF PROJECT RESULTS (see Attachment 1)

Result I. Evaluation of By-Products:

Final Status June 2002

LCMR budget \$76,500

-LCMR amt. spent \$76,005.44

LCMR balance \$494.56

Match budget \$13,000

Match spent \$13,000

Match balance \$0

Result II. Field Research Design, Study, and Monitoring:

Final Status June 2002

LCMR budget: \$226,000

-LCMR amt. spent: \$225,985.10

LCMR balance \$14.90

Match budget \$8000

Match spent \$8,000

Match balance \$0

Result III. Dissemination and Outreach (Information Sharing):

Final Status June 2002:

LCMR budget: \$ 47,500

LCMR amt. spent: \$ 47,452.66

LCMR amt. left: \$ 47.34