

LEGISLATIVE REFERENCE LIBRARY
SB945.G9 G96 1984
- Gypsy moth environmental impact st



3 0307 00061 7517

840394

GYPSY MOTH

ENVIRONMENTAL IMPACT STATEMENT



MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION
90 WEST PLATO BOULEVARD
ST. PAUL, MN 55107

SB
945
.G9
G96
1984

GYPSY MOTH

ENVIRONMENTAL IMPACT STATEMENT

Prepared Pursuant to Chapter 18, Sections 44-61 of the
Minnesota Plant Pest Act of 1959 and
Pursuant to Section 102 (2) (C) of the
National Environmental Policy Act of 1969

April 1984

PLANT INDUSTRY DIVISION
DEPARTMENT OF AGRICULTURE
ST. PAUL, MINNESOTA 55107

TABLE OF CONTENTS

INTRODUCTION	1
Purpose, Situation	1
Major Issues and Concerns	2
Potential Range, Damage Potential of Gypsy Moth in Minnesota	3
MINNESOTA'S GYPSY MOTH SITUATION; EVALUATION AND DECISION	5
Public Informational Meetings, Division of Plant Industry Staff Recommendation	6
Information from Other States; Information from U. S. Department of Agriculture, Findings and Conclusions	7
Decision	8
1984 MINNESOTA GYPSY MOTH SITES SPECIFIC ENVIRONMENTAL DOCUMENT	10
Statement of Purpose and Need; Discussion of Alternative Treatments	10
Description of Affected Environment	11
Discussion of the Environmental Consequences of the Alternative Treatments	12
Discussion of the Public's Opportunity to Provide Input to the Decision Making Process	12
Discussion of Considerations to Mitigate Potential Adverse Impact	14

PUBLIC NOTIFICATION AND INVOLVEMENT 15

City of Sauk Rapids:	Informational Letter	15
	Proposed Spray Area	17
	Soil Associations	18
City of Stillwater:	Informational Letter	23
	Proposed Spray Area	25
	Soil Associations	26
City of St. Anthony:	Informational Letter	33
	Proposed Spray Area	35

APPENDICES

A.	GYPSY MOTH PUBLIC INFORMATIONAL MEETINGS ..	A (1-22)
	Sauk Rapids, MN	A (2)
	Stillwater, MN	A (8)
	St. Anthony, MN	A (17)
B.	MEDIA COVERAGE OF GYPSY MOTH	B (1 - 8)
C.	GYPSY MOTH CHRONOLOGY - MINNESOTA	C (1-12)
D.	BIOLOGICAL INSECTICIDE THURICIDE 48LV AND PLYAC SPREADER-STICKER INFORMATION ...	D (1 - 5)
E.	GYPSY MOTH SUPPRESSION AND ERADICATION PROJECTS; FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS) (Federal Register, Volume 49, No. 58, March 16, 1984 102 pages)	Separate Document

INTRODUCTION

INTRODUCTION

PURPOSE

The attached documents present the proposed Minnesota Department of Agriculture, and United States Department of Agriculture, Animal and Plant Health Inspection Service Cooperative Gypsy Moth Eradication and Regulatory program nationally and in the State of Minnesota. Activities, successes and failures of gypsy moth eradication, suppression and regulatory programs in other states are discussed. Alternatives of control or no control in Minnesota are examined. Whatever alternative is selected will guide the concerned agencies' program until new insecticides or application methods are proposed, or environmental analyses have identified unreasonable risks to human health or the environment associated with the proposed project.

The documents were developed to fulfill the requirements of the National Environmental Policy Act. Four alternatives of dealing with the gypsy moth are examined.

1. Biological insecticide treatments to eradicate, suppress, or regulate gypsy moth infestations.
2. Chemical insecticide treatments to eradicate, suppress, or regulate gypsy moth infestations.
3. Integrated pest management approach to suppress or regulate gypsy moth infestations.
4. No action.

THE SITUATION

The gypsy moth, Lymantria dispar (L.) is a native insect to many areas of Europe, Asia, and Africa. This pest was introduced and accidentally released in Massachusetts in 1869. The gypsy moth became established and slowly spread throughout the northeastern portion of the United States. Outbreak populations periodically occurred in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

Isolated infestations, resulting from the artificial spread of this insect, presently occur in localized areas of Arkansas, California, Illinois, Michigan, Minnesota, Nebraska, North Carolina, Ohio, Oregon, Virginia, Washington, West Virginia, and Wisconsin.

The most recent gypsy moth outbreak in the northeastern United States began in 1980 when defoliation reached a phenomenal increase to over 5.1 million acres from approximately 644 thousand acres in 1979. Three states - northeastern Delaware, Maryland and northcentral Michigan were added as newly infested to the 9 gypsy moth established states. Gypsy moth defoliation peaked to over 12.8 million acres in 1981 but dropped to over 8.1 million acres in 1982. There was a further sharp drop in gypsy moth defoliation to approximately 2.4 million acres in 1983. Vermont reported no defoliation. The defoliation in 1983, however, was still higher than all the defoliation peaks since 1924 and prior to 1980.

The extremely high population levels of gypsy moth in the northeastern states overtaxed regulatory efforts in some instances. The presence of this pest in Minnesota was traced to artificial movement from areas of heavy gypsy moth activity. Two isolated infestations were detected in the cities of St. Paul and Woodbury during 1982. Viable egg masses were found within 100 yards of suspected introduction points and multiple moth catches. The two infestations in Minnesota were eradicated in 1983 using Carbaryl (Sevin-4 oil).

Pheromone trapping and egg mass surveys in the summer and fall of 1983 confirmed three new isolated infestations in Minnesota. They are in Sauk Rapids (Benton county), St. Anthony (Hennepin county) and Stillwater (Washington county). See Gypsy Moth Chronology - Minnesota, Appendix .

MAJOR ISSUES AND CONCERNS

On the national level the general buildup of gypsy moth populations has focused public attention on efforts to suppress infestations and regulate spread. The current concerns of those state agencies with well established infestations of gypsy moth are the impacts of larval nuisance, tree defoliation, and tree mortality.

Nationally the USDA Forest Service cooperative gypsy moth suppression projects are focused on the protection of high-use and high-value forested areas from excessive tree defoliation and mortality, larval populations and nuisance within the generally infested states.

The USDA, APHIS program is directed to reducing the risk of natural and long-range spread of the gypsy moth and eliminating small infestations. Isolated infestations are known to occur in Arkansas, California, Illinois, Michigan, Minnesota, Nebraska, North Carolina, Ohio, Oregon, Virginia, Washington, West Virginia, and Wisconsin.

Minnesota's gypsy moth regulatory program is directed at protecting the state from introductions, maintaining survey and detection programs, and to eradicating or limiting the spread of infestations as they are found before they become firmly established. Our immediate concern is to inform the citizens of the situation and with their input determine the most effective and safe method to eradicate the three known infestations.

POTENTIAL RANGE OF GYPSY MOTH IN MINNESOTA

Based on climatic data, gypsy moth could spread throughout the southern half of Minnesota approximately limited by a line from Washington County in the east to Clay County in the west. This region has winters no more severe than gypsy moth infested areas of New England.

DAMAGE POTENTIAL

In Minnesota the primary timber trees which are also hosts for the gypsy moth are oak and aspen. The approximate commercial value of the potential mortality of these trees in the projected range of gypsy moth in Minnesota are \$15 million for oak and \$2.1 million for aspen. The gypsy moth, if not controlled, could ultimately cost the Minnesota forest industry an estimated \$18 million. Inflation would drive this figure upwards in the future.

Within the potential range of gypsy moth are many areas valued for their scenic beauty. Whitewater State Park, the most heavily used park, and the Mississippi river along State Highway 61 are two examples. Tourism could be significantly impaired due to gypsy moth defoliation of hardwoods which make these areas unattractive to visit.

If hardwoods are defoliated at a time when other stresses exist, drought for example, they can be killed. If conifers are defoliated they are killed without the necessity of additional stress. While it will take several years for gypsy moth to spread in Minnesota, the twin city metropolitan area, with its current infestations will be the first to experience the impact.

In general, when trees die in the urban environment they are replaced. Three nurseries were contacted to obtain cost figures for replacing urban trees with seven or eight inch Marshall's seedless ash. Estimates include cost of removal of similarly sized trees. The average cost of replacement is estimated at \$1,200 per tree. An average city lot in St. Anthony has five trees. Total replacement costs for approximately 94 city lots in the proposed treatment area in St. Anthony would easily exceed \$0.5 million.

It is apparent from these figures and examples that if left uncontrolled gypsy moth will have a significant impact on Minnesota's citizens, municipal shade tree programs, forest and tourist industries.

Not to be overlooked are the ramifications of quarantines from outside and within Minnesota. Regulatory actions are expensive to enforce and maintain. These actions restrict the free movement of many commodities essential to the economic well being of Minnesota. While Minnesota will be under federal and state gypsy moth quarantines no matter what control actions are taken, the external quarantines will be more severe if no action is taken at all.

All action taken to date by the Minnesota Department of Agriculture has been done to comply with the intent of the National Programmatic Environmental Impact Statement. This document is to be considered an integral part of the Department's report and activity.

MINNESOTA'S GYPSY MOTH SITUATION
EVALUATION AND DECISION

STATE OF MINNESOTA
DEPARTMENT OF AGRICULTURE

St. Paul, Minnesota

MINNESOTA'S GYPSY MOTH SITUATION
EVALUATION AND DECISION

March 16, 1984

While the only two known infestations of the Gypsy moth were eradicated in 1983, subsequent surveys have revealed three additional widely separated infestations. In addition to these three infestations there is reason to believe others may be confirmed in late 1984. My first reaction was to ask are we ahead of the Gypsy moth or are we behind it? Is it here to stay? The staff of the Plant Industry Division and our principal cooperator the USDA, Animal and Plant Health Inspection Service, believe we are ahead of this pest and in a position to remain this way for the time being. They have convinced me of this belief. All the infestations located to date in Minnesota have been directly linked to movement here by man at a time when the Gypsy moth was in an outbreak status in the eastern states. The major outbreaks have now subsided. Coupled with this, steps have been taken to reduce the pest's movement here on household goods. However, once again I find myself in the situation when I must render a decision as to our immediate course of action. The Gypsy moth appears to be no less of a threat to the well being of our citizens now as it was last year.

In the best interest of the citizens we must continually evaluate the Gypsy moth and control options. Information has been gathered from the following sources:

- (1) Public informational meetings held by the State and Federal Departments of Agriculture in the three infested cities on February 6, 14, and 15. Press releases, television and radio interviews all provided and encouraged the opportunity for the public to express their concerns;
- (2) The recommendation of our own Plant Industry Division staff from its own investigation, reviews of technical and scientific data and contacts with other Gypsy moth workers;
- (3) Contacts with and data provided by other State's officials dealing with similar Gypsy moth infestations in their own respective states;
- (4) Input from persons representing the infested cities; University of Minnesota; U.S. Forest Service, State and Private Forestry, Minnesota Department of Natural Resources; and
- (5) The contacts with and detailed data from the USDA, Animal and Plant Health Inspection Service, Plant Protection and Quarantine Program, who have been continuously involved in the Gypsy moth regulatory and control programs throughout the nation.

Our evaluation and decision has utilized all of these informational sources.

PUBLIC INFORMATIONAL MEETINGS

A public informational meeting was held in each of the areas where Gypsy moth infestations have been confirmed. These meetings were held as follows: Sauk Rapids, February 6; Stillwater, February 13; and St. Anthony, February 14, 1984. The areas of concern expressed by the citizens in attendance were not unlike that of last year. Most of these concerns are spelled out in the Site Specific Environmental Analysis but are summarized as follows:

- (1) The impact of Bacillus thuringiensis (B.t.) on human health and other non-target organisms in the area;
- (2) Information and effects concerning the actual application procedures, safeguards, public notification and physical impact;
- (3) The economic impact at municipal and homeowner level; and
- (4) The availability of information on Gypsy moth control programs including chemical and other biological alternatives.

DIVISION OF PLANT INDUSTRY STAFF RECOMMENDATION

The staff of the Division of Plant Industry has accumulated data on the Gypsy moth, suppression and control, has made extensive surveys of the State of Minnesota and of the involved area, has had numerous communications with various State, Local, Industry and Federal officials which has been intimately familiar with Gypsy moth control. In addition, a great deal of experience was gained from the apparently successful eradication of the Gypsy moth from St. Paul and Woodbury in 1983 with the use of carbaryl (Sevin 4-oil). Staff personnel carefully reviewed information provided by USDA, APHIS, PPQ on the results of the biocide Bacillus thuringiensis (B.t.) used on Gypsy moth during 1983 in states under an eradication mode similar to ours. After reviewing and assessing the information the Division of Plant Industry staff recommended that there be limited aerial applications B.t. to the affected area. This recommendation is made with the consideration of the isolation of the infestation which lends itself to eradication and the physical characteristics of the involved area. The alternatives included the use of the chemical insecticide carbaryl (Sevin 4-oil) and/or the immediate use of parasites and predators. The biocide Bacillus thuringiensis, (B.t.) was selected in full consideration of safety and health factors and all known reports of problems to the contrary.

INFORMATION FROM OTHER STATES

Information from certain states was requested and received concerning their Gypsy moth infestations and control procedures. These states are located between Minnesota and the generally infested areas in the eastern United States and are actively engaged in controls of isolated infestations. The knowledge of their concern and actions are important in lending justification to our own course of action.

INFORMATION FROM U.S. DEPARTMENT OF AGRICULTURE

A constant and continuous dialogue and cooperative working relationship in regulatory matters exists between the Minnesota Department of Agriculture and the USDA, Animal and Plant Health Inspection Service. In these regards it was the cooperative efforts of both agencies that detected and delineated our Gypsy moth infestations. Whatever the future brings with Gypsy moth we will maintain this cooperative relationship in dealing with it. This is underscored by the financial support received in the past on detection and delimiting surveys and with control efforts proposed to eradicate current infestations. Our control efforts will be compatible with the federal "Programmatic Environmental Impact Statement" prepared and submitted by the Department of Agriculture to comply with The National Environmental Policy Act.

FINDINGS AND CONCLUSIONS

As stated earlier, we have followed a deliberate approach in making this evaluation and decision. Recognizing my responsibilities as the person required to make the final decision extends to all residents of the state, and to all aesthetic, recreation and commercial interests of the state, with particular attention to those in Stillwater, St. Anthony, and Sauk Rapids. With this in mind, the following findings and conclusions are made under the provisions of the Minnesota Plant Pest Act, Chapter 18, Sections 44-61:

(1) The Gypsy moth is recognized as the most serious defoliators of trees in the United States. If this pest established itself in our State it can seriously endanger the agricultural and horticultural interests of this state. Since 1950, Gypsy moth infestations have gradually spread southward from the northeastern portion of the country to the mid-Atlantic states. In 1981 alone, over 13 million acres were defoliated causing an estimated economic loss of 764 billion dollars as well as substantial

adverse environmental impacts. In 1982 nearly 8 million acres were defoliated. In the State of Pennsylvania 1.4 million acres were defoliated in 1983, a 40% drop from a year earlier. Unfortunately, timber losses in the damaged acreage rose sharply to about 50%. According to the Chief of Pennsylvania's forest pest management program, \$160 million of timber, nearly all oak, was lost to the Gypsy moth during the past 12 years. This pest is known to feed on over 300 species of trees and shrubs. I believe from the vast majority of opinions expressed most everyone recognizes the gravity of a Gypsy moth infestation in our state.

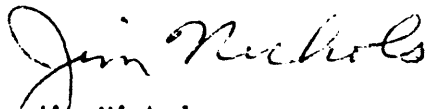
(2) We have examined whether we should continue in the eradication mode or enter into a suppression mode. More infestations were confirmed in 1983 with others likely to be found in 1984. After reviewing all the present situations in Minnesota and elsewhere everyone has recommended to continue in the eradication mode in 1984. In my opinion the situation now is the same as it was in 1983. If the Gypsy moth is allowed to remain, continuous and ever-increasing control measures would have to be anticipated during subsequent years. Sound judgement dictates that eradication of these Gypsy moth infestations be pursued by the department rather than suppression efforts or no action at all. It is not responsible to accept the view that eradication not be attempted because of the possibilities of future introductions.

(3) Having determined a direction of eradication should be pursued by the department, the next consideration is to determine what materials and procedures should be utilized. In this regard there are only two viable alternatives currently recognized for Gypsy moth control in the specific areas identified in Stillwater, St. Anthony and Sauk Rapids, a chemical insecticide carbaryl (Sevin), and the biological insecticide Bacillus thuringiensis (B.t.). Other alternatives such as the introduction of parasites, predators or cultural controls, have not shown a high degree of eradication effectiveness. After carefully examining each of the three areas of infestation, reviewing eradication efforts in other states, and consulting with our principal cooperators, our staff has recommended we use the biocide Bacillus thuringiensis (B.t.) in 1984. While carbaryl (Sevin) has proven itself in eradication programs here and elsewhere and will remain a high priority insecticide in future Gypsy moth control and eradication programs in Minnesota, I will accept the recommendation of my staff for 1984.

DECISION

The above summarizes our evaluation of all the information we have seen. Responses to the three public informational meetings have given us the public input needed. It is my decision the biocide Bacillus thuringiensis (B.t.) should be aerially applied at the appropriate rate of not less than 16 BIU's per acre per application to the described areas of Stillwater, St. Anthony and Sauk Rapids. The Division of Plant Industry staff should implement this decision by developing a work plan to include the following:

- (1) On determining the dates and times when aerial application of the biocide would be made, the staff should give written notice to all residents in the area by the best practical means available. Any residents who have notified the department of special sensitivities to the biocide Bacillus thuringiensis (B.t.), or have other disabling problems should receive the written notices either by personal delivery or certified mail. The notice should include the dates and hours of application, the type of aircraft utilized, and some suggested procedures that residents could take in order to minimize exposure to themselves. The notice should also provide a means by which residents can communicate with the department.
- (2) The materials, methods and times of application should also be given to all local law enforcement agencies, public health agencies, the area's medical community and schools located in the area.
- (3) Monitoring should be undertaken during the progress of the program with the local news media utilized in order to advise residents of any relevant information.
- (4) The pesticide applicator contract must provide for services in accordance with the product-label instructions and precautions.
- (5) After the monitoring and other information is obtained, the staff should determine what follow-up procedures are appropriate and advise me accordingly.


Jim Nichols
Commissioner

1984 MINNESOTA GYPSY MOTH SITES SPECIFIC ENVIRONMENTAL DOCUMENT

1984 MINNESOTA GYPSY MOTH

SITES SPECIFIC ENVIRONMENTAL DOCUMENT

February 21, 1984

1. Statement of Purpose and Need.

Minnesota is not known to have endemic populations of the gypsy moth. The current gypsy moth infestations in Minnesota require the implementation of a cooperative MDA and USDA Gypsy Moth Eradication Program. Pheromone trap and egg mass surveys in 1983 detected the presence of three small infestations in Minnesota. They are in Sauk Rapids (Benton county), Stillwater (Washington county), and St. Anthony (Hennepin county). The infestations were confirmed by both multiple moth collections in traps and evidence of other life stages - apparently viable egg masses and pupal cases on or near host plants.

In accordance with the Minnesota Plant Pest Act, Minnesota Statute 18:44-61, it is now our task to recommend a course of action for the eradication of the gypsy moth to prevent its establishment and dissemination within the state.

2. Discussion of Alternative Treatments.

Four alternatives of dealing with the gypsy moth are examined:

- (1) Biological insecticide treatments to eradicate, suppress or regulate gypsy moth infestations.

The use of the biocide, Bacillus thuringiensis (B.t.) two applications at the rate of 1/2 gallon per acre (32-35 BIU's flowable) at a cost of approximately \$18,000. The USDA and MDA to share the cost on a 50:50 basis. B.t. has been estimated to kill 80-90% of the gypsy moth larvae. The B.t. will be applied by helicopter in late May and again 10 days later. Mass trapping will follow B.t. applications. For additional information refer to Gypsy Moth Suppression and Eradication Project, FEIS, USDA-APHIS 1984, pages 19-21, Appendix E. A repeat of the treatments may be necessary in 1985 if male moths are recovered from the treatment areas.

- (2) Chemical insecticide treatments to eradicate, suppress or regulate gypsy moth infestations.

This treatment alternative would utilize the insecticide carbaryl. Sevin (carbaryl) successfully achieved the desired objective in the eradication of gypsy moth during 1983 in the Lake Phalen area of St. Paul (Ramsey county) and the Park Hills area of Woodbury (Washington county). For additional information on carbaryl and other chemical insecticides refer to Gypsy Moth Suppression and Eradication Projects, FEIS, USDA Publication 1984, pages 16-19, Appendix E.

- (3) Integrated pest management to suppress or regulate gypsy moth infestations.

The components of this strategy would include quarantines, inspections, biological and/or chemical insecticide applications, parasite and predator management, application of the gypsy moth pheromone, release of sterile or partially sterile gypsy moth life stages, etc. For an extensive discussion refer to pages 21-22 of Gypsy Moth Suppression and Eradication Projects, FEIS of USDA-APHIS 1984, Appendix E.

- (4) No action at this time.

No action alternative would only apply in 1984 if action is not taken in one of the other 3 alternatives. Refer to Gypsy Moth Suppression and Eradication Projects, FEIS of USDA-APHIS 1984, pages 15-16, Appendix E.

3. Description of the Affected Environment.

The three proposed treatment areas for the gypsy moth are described below.

- (1) City of Sauk Rapids, Benton County, Sauk Rapids Township, T36N, R31W, Section 23, SW 1/4. (Refer to detailed map with treatment area and the buffer zone, page 15.)

Soil Associations in this area - Hubbard-Duelm Association. Deep, excessively drained and somewhat poorly drained, nearly level and gently sloping loamy sands; on outwash plains and terraces.

This association is on nearly level and undulating glacial outwash plains and terraces adjacent to the Mississippi River and along its old glacial drainage-ways. Relief ranges from 5-10 feet. The short, gentle slopes are 100 to 200 feet in length. All drainage in the proposed treatment area would enter the Mississippi River.

This soil association covers about 12 percent of the county. About 62 percent of it is Hubbard soils, 6 percent Duelm soils, and 32 percent is minor soils. (For further information refer to Soil Survey, Benton County, USDA Soil Conservation Service and Minnesota Agricultural Experiment Station, pages 18-23.)

- (2) City of Stillwater, Washington County, Stillwater Township, T30N, R20W, Section 21, SE 1/4. (Refer to detailed map with treatment area and the buffer zone, page 25.)

Kingsley sandy loam, 12 to 18 percent slopes. This hilly soil is well drained. It is on steep, narrow side slopes and knolls on terminal ground moraines. Typically the surface layer is dark brown sandy loam about 3 inches thick.

The permeability of this Kingsley soil is moderately slow. The available water capacity is moderate. Surface runoff is rapid. Dorerton-Rock outcrop complex, 25 to 65 percent slopes. This complex consists of very steep, well drained soils and Rock outcrop on stream valley side slopes. It is 50 to 75 percent Dorerton soils and 15-20 percent Rock outcrop. Typically the Dorerton soil has a surface layer of very dark gray sandy loam about 4 inches thick over a fine sandy loam, dark brown subsurface layer about 6 inches thick. Permeability is moderate and moderately rapid. Surface runoff is rapid. Typically, the Rock outcrop consists of limestone bedrock 2 to 4 feet high and 10 to 50 feet long. In some places sandstone bedrock is exposed on lower foot slopes. Most areas of this complex remain in native hardwoods and are used primarily for scenic purposes. Approximately 60% of surface runoff on the proposed treatment area would go directly into the St. Croix River. The remaining 40% would be through the municipal storm sewer system. (Refer to pages 26-32.)

- (3) City of St. Anthony, Hennepin County, T29N, R23W, Section 6, SE 1/4 of NW 1/4. Refer to detailed map with treatment area and the buffer zone, page 35.

Soil associations in this area are Hayden-Kingsley Urban land. Undulating to steep, well drained, moderately coarse textured soils and urban land; on uplands. They are formed under deciduous forests. Slope ranges from 2-30 percent.

Typically the soils have a dark brown sandy loam surface layer and a reddish brown sandy loam subsoil. Permeability is moderate to moderately slow. Surface runoff is rapid. Urban land consists of residential development and is covered by asphalt, concrete and buildings.

Drainage in the spray area is as follows: Area between Belden Drive and Edward Street and 33rd and 35th drains into 3 pipes located at junctions of 32nd, 33rd, 34th Avenues and Edward Street. This then enters the Minneapolis sewer system. Area between Belden Drive and Silver Lake Road, some of it drains south to a catch basin at junction Hilldale Avenue and Silver Lake Road. The northern part of this area drains north to a holding pond located at junction Highcrest and 39th Avenue. This eventually drains into the Rice Creek Watershed district.

4. Discussion of the Environmental Consequences of the Alternative Treatments.

BIOLOGICAL INSECTICIDES - One commercial formulation of the bacterium Bacillus thuringiensis Berliner (B.t.); which is an aerobic, spore-forming, crystal producing member of the genus Bacillus, is proposed to eradicate the gypsy moth.

Studies indicate the B.t. spores will persist in soil for several weeks depending on the soil type, soil flora, and on factors such as pH, moisture and solar radiation. Survival of B.t. on leaves is minimal when no additives are added to the sprays. A sticker will be added to the spray to extend the life of B.t. For more information refer to Appendix D.

B.t. is exempted from tolerance and no residue analysis on food or feed has been done. Refer to Gypsy Moth Suppression and Eradication Projects, FEIS 1984, pages 64-65, Appendix E.

CHEMICAL INSECTICIDES - Direct studies of insecticide effects on humans, particularly children and abnormally sensitive persons are lacking. Therefore, small animal effects studies have been extrapolated to humans. Carbaryl is a contact and stomach insecticide which was used successfully in Minnesota in 1983.

Carbaryl is effective against members of most insect orders. The residue of carbaryl does retain insecticidal properties for 1 or 2 weeks. Residues of carbaryl applied as Sevin 4 Oil formulation remained high at least 60 days after treatment. On forest foliage, typical initial residues after treatment range from 30 to 100 ppm when carbaryl is applied for gypsy moth control. These decline to 5 to 20 ppm in two to three weeks. For a detailed discussion on environmental consequences of carbaryl use refer to Gypsy Moth Suppression and Eradication Projects, FEIS, 1984, pages 43-57, Appendix E.

INTEGRATED PEST MANAGEMENT - This approach provides a wider range of options in dealing with the gypsy moth problem by providing both short-term and long-term solutions; however, some of this technology still is in the developmental state. Refer to Gypsy Moth Suppression and Eradication Projects, FEIS 1984, pages 69-74, Appendix E.

NO ACTION - If no eradication action is taken against isolated infestations by state or local communities, gypsy moth populations, depending on local site conditions, are expected to thrive and become well established. Under this alternative, gypsy moth populations in areas having susceptible host trees may remain at low levels for some years. Eventually, the populations will build to outbreak levels creating conditions similar to those occurring in northeastern U.S. For a more detailed discussion refer to the Gypsy Moth Suppression and Eradication Projects, FEIS 1984, pages 36-37, Appendix E.

5. Discussion of the Public's Opportunity to Provide Input to the Decision Making Process.

Public informational meetings were held in each of the three cities - Sauk Rapids, Stillwater, and St. Anthony.

Appropriate city officials were contacted in person and by letter: St. Anthony on January 16; Stillwater on January 20; and Sauk Rapids on January 23. The mayors and the council members were also informed. A public informational meeting was organized with city, state and federal personnel cooperating. The meeting at Sauk Rapids was held on February 6, 1984 and was attended by 14 citizens. For details of the meeting, the questions and answers recorded see Appendix A-2 to A-7.

Similar meetings were also held in Stillwater on February 13, with 18 people attending, and in St. Anthony on February 14, 1984 with 31 people attending. The details of the meetings, the questions and answers recorded are found in Appendix A-8 to A-22.

The meetings were informative and provided an opportunity for the public to ask questions and address their concerns.

The final decision will be made by the Commissioner of Agriculture by mid-March, pages 8-9.

6. Discussion of Considerations to Mitigate Potential Adverse Impact.

Every effort is being made to inform all the residents of the three cities, especially those within the spray areas. The reaction from the residents has been positive thus far. Some negative reaction was expected from some environmental groups but nothing adverse has happened so far.

All of the cooperating agencies will do their utmost to keep the citizens informed which seems to be the key for the success of the gypsy moth control treatments.

Use of B.t. followed by intensive mass trapping should yield the expected results. Mass trapping will place additional stress on the populations. The public seem to accept this approach taken by the cooperating agencies.

Only one factor might weigh heavily on the outcome. The weather conditions at the time of and immediately following the two spray operations.

PUBLIC NOTIFICATION AND INVOLVEMENT



Minnesota State Department of Agriculture
90 West Plato Boulevard, St. Paul, Minnesota 55107

725-2302 (Hayward)
296-8328 (Mason)
Phone: _____

January 27, 1984

Mr. Robert Haarman, Administrator
City of Sauk Rapids
104 N. Benton Drive
Sauk Rapids, MN 56379

Dear Mr. Haarman:

Mr. Hayward and I thank you for your interest and time spent last Monday, January 23, discussing the Gypsy moth with our employees, Mr. Hart Graeber and Mark Schreiber. Please express our thanks to Richard Gronau and the Councilman also in attendance. Our success in dealing with the Gypsy moth in your city depends on open communication and our ability to work together.

The Gypsy moth, Lymantria dispar, is one of the most serious defoliators of trees in the nation. This pest was accidentally introduced into Massachusetts in 1869 and has subsequently spread throughout the northeastern portion of the United States and some portions of Canada. At the peak of the recent Gypsy moth outbreak in the Northeast, during 1980, 81 and 82, 13 million acres of trees were defoliated. Most of our infestations in Minnesota coincide with this outbreak. Fortunately this outbreak is over relieving the pressure of additional introductions to our State. It is our goal to eliminate our infestations before they become firmly established, widespread and/or cause noticeable damage.

Our intensive surveys for male Gypsy moths and other life stages have pinpointed a likely introduction site in Sauk Rapids. In reviewing the situation in your city we have concluded the egg masses found are from a very recent introduction of the pest. A firm establishment of the Gypsy moth at that site is unlikely. The biological pesticide (Bacillus thuringiensis) (B.t.) combined with high density trapping has been demonstrated as effective in controlling this pest under similar infestation conditions. Although the chemical insecticide carbaryl has been shown to be effective in Minnesota, this Gypsy moth site is immediately adjacent to the Mississippi River limiting our use of it. For these reasons

Mr. Robert Haarman, Administrator
January 27, 1984
Page Two

we are proposing to the Commissioner of Agriculture and the U. S. Department of Agriculture that B.t. be applied by helicopter late in May and again early in June 1984, followed by high density trapping. (A map is enclosed showing the proposed 26 acre treatment area and the additional buffer area for notification purposes.) While the entire site is situated on an individuals private property the helicopter applying the pesticide will be flying low over the highways and properties' of others. For these reasons we would expect the city to be somewhat involved.

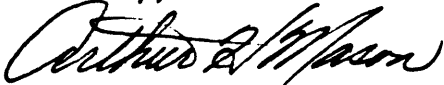
The entire treatment procedure will most likely have to be repeated in 1985 to effect the reduction of the Gypsy moth population to a non-detectable level. It must be realized this is only a proposal. The final decision rests with the Minnesota Commissioner of Agriculture.

Nearly all costs of the treatment program will be shared with the State and Federal governments. However, we must now work cooperatively to discuss this Gypsy moth situation with affected citizens. We plan to acquaint them with the pest and its potential for damage, discuss control solutions, and certainly address their concerns.

The date, time and place tentatively agreed upon for an informational meeting appear satisfactory: Monday February 6, 6:30 p.m., City Hall, 104 North Benton Drive, Sauk Rapids.

Inquiries for further information should be directed to one of us.

Sincerely,

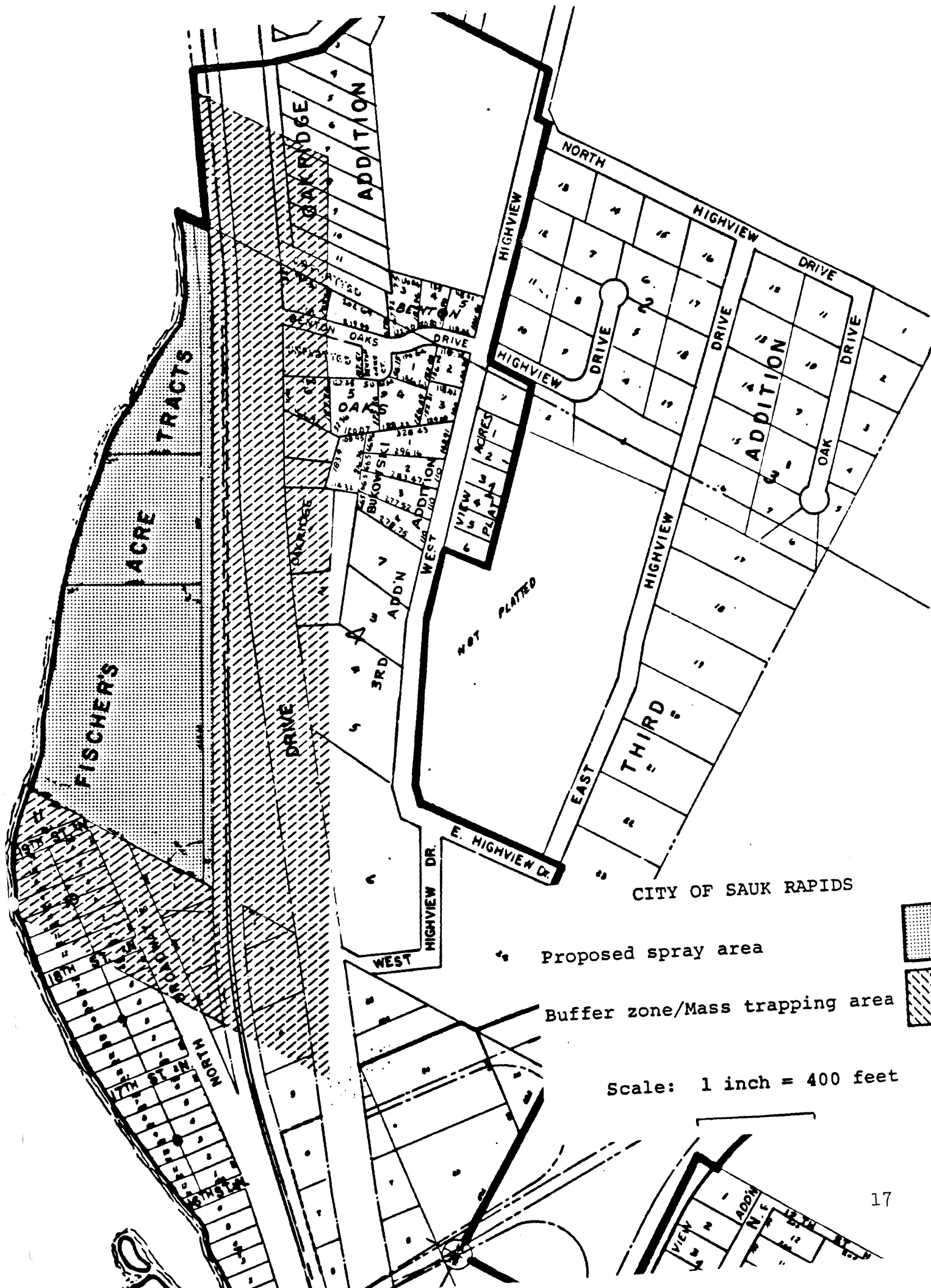


Arthur H. Mason, Assistant Director
Division of Plant Industry
Minnesota Department of Agriculture

John Hayward, Officer in Charge
U. S. Department of Agriculture
APHIS, PPQ

AHM/JH:jml

Enc.





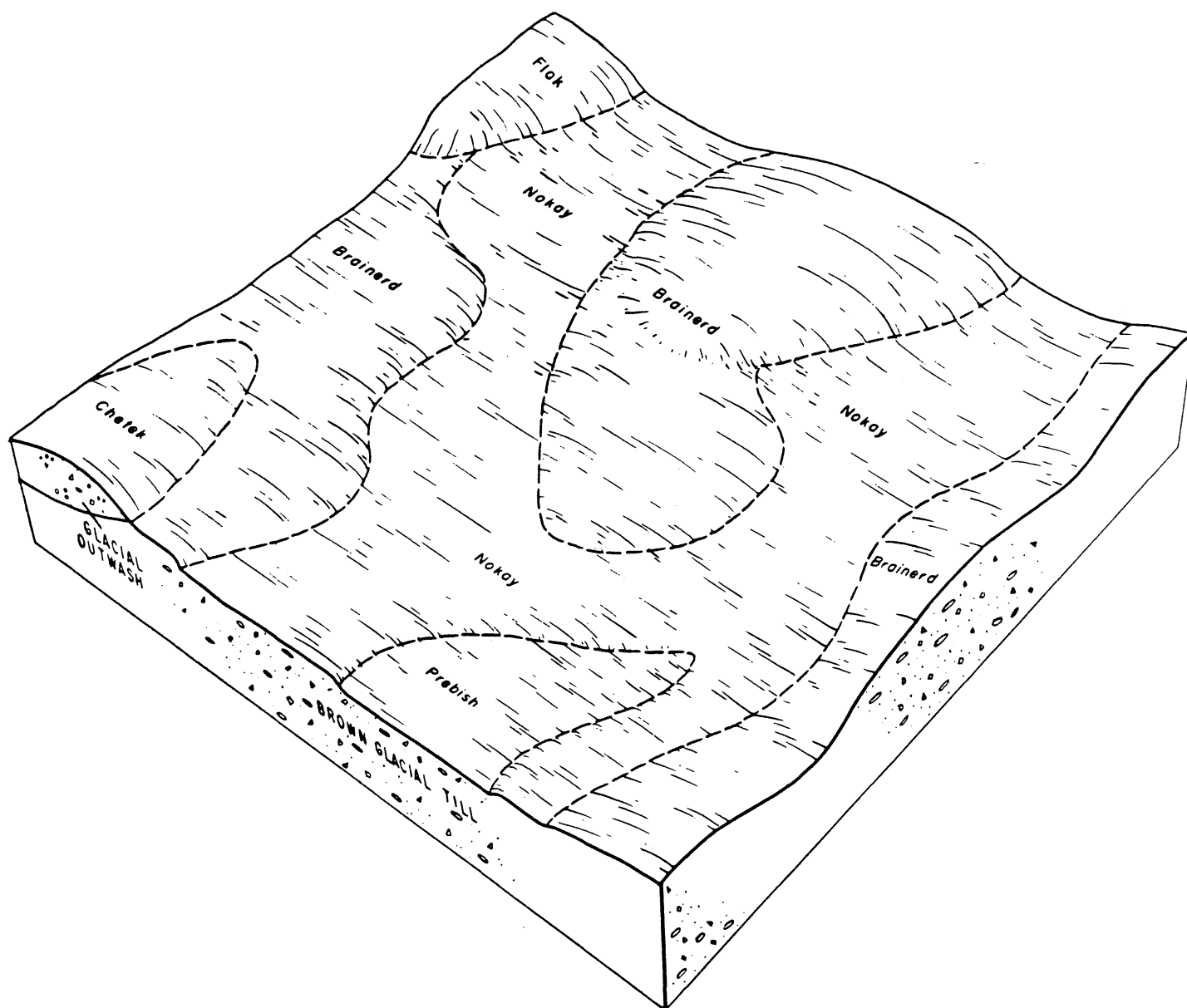


Figure 3.—Pattern of soils and underlying material in association 3.

needs of management are controlling water erosion, improving drainage, maintaining tilth, and increasing fertility. Stones must be removed periodically.

About 70 percent of this association is in cultivated crops. Some steep areas, forested areas, and undrained wet areas are used for permanent pasture and wildlife habitat. The main enterprise is dairying. The soils have moderate potential for all cultivated crops commonly grown in the county.

4. Hubbard-Duelm association

Deep, excessively drained and somewhat poorly drained, nearly level and gently sloping loamy sands; on outwash plains and terraces

This association is on nearly level and undulating

glacial outwash plains and terraces adjacent to the Mississippi River and along its old glacial drainage-ways. Relief ranges from 5 to 10 feet. The short, gentle slopes are 100 to 200 feet in length. Slopes are steeper in a few places along the drainageways.

This soil association covers about 12 percent of the county. About 62 percent of it is Hubbard soils, 6 percent is Duelm soils, and 32 percent is minor soils.

Hubbard soils are on outwash terraces and are nearly level and gently sloping. They are excessively drained. Permeability is rapid. The surface layer is black and very dark grayish-brown loamy coarse sand about 23 inches thick. The subsoil is dark-brown to brown sand. The underlying material is brown, loose sand.

Duelm soils are in shallow depressions and narrow

areas that border deeper depressions. They are somewhat poorly drained. Permeability is rapid. The surface layer is black loamy sand about 9 inches thick. The subsoil is dark grayish-brown and brown loamy sand. It is underlain by brown sand at a depth of about 52 inches.

Minor soils in this association are in the Isanti series. Also included are Alluvial land and mucky peats. The Isanti soils and the mucky peats formed in the deep depressions. The alluvial soils formed along the Mississippi River and other streams where frequent or occasional flooding has occurred.

Corn, soybeans, small grain, and hay are suited to the soils of this association. Fertility, organic-matter content, and available water capacity are moderately low. The main needs of management are controlling wind erosion, increasing fertility, improving drainage in wet areas, and providing adequate moisture for crops.

About 65 percent of this association is in cultivated crops. The rest is used as permanent pasture, is idle, or is open oak woods. In recent years pine plantings have increased. The main enterprise is dairying. Where these soils are not irrigated, they have low potential for all cultivated crops commonly grown in the county.

5. Hubbard-Sartell association

Deep, excessively drained, nearly level and undulating loamy sands and fine sands; on outwash plains and terraces

This association is on nearly level and undulating glacial outwash plains and terraces that roughly parallel the Mississippi River in the Little Rock area and extend northward. Relief ranges from 10 to 20 feet. Undulating to steep dunelike areas are on the east side of Little Rock Lake (fig. 4). The slopes are 100 to 200 feet in length.

This association covers about 6 percent of the county. About 55 percent of it is Hubbard soils, 29 percent is Sartell soils, and 16 percent is minor soils.

Hubbard soils are on outwash terraces. They are excessively drained. Permeability is rapid. The surface layer is black and very dark grayish-brown loamy coarse sand about 23 inches thick. The subsoil is dark-brown to brown sand. The underlying material is brown loose sand.

Sartell soils generally are undulating and occur in dunelike areas that are undulating to steep. They are excessively drained. Permeability is rapid. The surface layer is very dark brown and very dark grayish-brown loamy fine sand about 4 inches thick. The subsoil is dark-brown and brown loose fine sand. The underlying material is brown to light yellowish-brown loose fine sand.

Minor soils in this association are in the Duelm, Isanti, Langola, and Pomroy series. Also included are mucky peats. Duelm soils occupy shallow depressions and narrow areas bordering deeper depressions. Isanti soils and the mucky peats formed in the deep depressions.

Corn, soybeans, small grain, and hay are grown on the soils of this association. Fertility, organic-matter content, and available water capacity are low. The

main needs of management are controlling wind erosion, increasing fertility, and providing adequate moisture for crops.

About 60 percent of this association is cultivated, and the rest is used for wild pasture and open oak woods. In recent years, pine plantings have increased. The main enterprise is dairying. Where these soils are not irrigated, they have low potential for all cultivated crops commonly grown in the county.

6. Sartell-Isanti-Mucky peat association

Deep, excessively drained and very poorly drained, nearly level and undulating fine sands, loamy fine sands, and mucky peat; on outwash plains

This association is on glacial outwash plains. Relief ranges from 10 to 40 feet. The slopes range from 100 to 200 feet in length. Slopes are steeper in a few places along the drainageways.

This association covers about 5 percent of the county. About 45 percent of it is Sartell soils, 25 percent is Isanti soils, 20 percent is Mucky peat and 10 percent is minor soils.

Sartell soils are in undulating to steep dunelike areas and are excessively drained. Permeability is rapid. The surface layer is very dark brown and very dark grayish-brown fine sand about 4 inches thick. The subsoil is dark-brown and brown loose fine sand. The underlying material is brown to light yellowish-brown loose fine sand.

Isanti soils are in depressions and drainageways and are very poorly drained. Permeability is rapid. The surface layer is black mucky loamy fine sand 11 inches thick. The subsoil is dark-gray and grayish-brown fine sand. The underlying material is light brownish-gray loose fine sand.

The Mucky peat soils are in deep depressions and are very poorly drained. They consist of black or very dark brown organic material that is partly to completely decomposed. The underlying material is sand, loam, or organic material.

Minor soils in this association are in the Langola, Pomroy, Watab, and Nokasippi series. Langola and Pomroy soils are nearly level and undulating. They are well drained and moderately well drained. The Watab soils are nearly level and are somewhat poorly drained. The Nokasippi soils are in depressions and are very poorly drained.

Corn, soybeans, small grain, and hay are grown on the soils of this association. Fertility is low. Organic-matter content generally is high to very high, but the Sartell soils have a low organic-matter content. The available water capacity is moderate to low for all the soils except the mucky peat, which has high available water capacity. The main needs of management are controlling wind erosion, increasing fertility, providing adequate drainage to the wet soils, and irrigating the Sartell soils.

About 40 percent of this association is in cultivated crops. The rest is used for wild pasture, hay, or oak woods. In recent years, pine plantings have increased. The main enterprise is dairying. The soils have a low to fair potential for all cultivated crops commonly grown in the county.

Hillet silt loam (Hm).—This nearly level soil is in depressions and drainageways that have a gradient of less than 1 percent. It is on an outwash plain in the vicinity of the hamlet of Glendorado. Areas range from 5 to 160 acres in size, but most areas are 15 to 50 acres in size.

This soil has a profile similar to the one described as representative for the series, but it is somewhat wetter.

Included with this soil in mapping are areas of soils that have a surface layer of loam and very fine sandy loam, and some soils covered by a thin layer of mucky peat less than 12 inches thick. Also included are areas of soils that are underlain by coarse material at a depth of 24 to 42 inches, and small areas of Mucky peat that are too small to map separately.

This Hillet soil has a high water table in spring. The growing season is shortened at times because of the high water table, frequent ponding, and the hazard of early frost. To prevent compaction, use of heavy machinery should be avoided when the soil is wet.

This soil is used mainly for pasture and wild hay, but if excess water is drained and the proper level of fertility is maintained, it is suited to corn, soybeans, small grain, grasses, and shallow-rooted legumes. Capability unit IVw-1; woodland suitability group VII; building site group 9.

Hillet silt loam, level (HmA).—This soil is on wet flats of a glacial outwash plain in the vicinity of the hamlet of Glendorado. Areas range from 10 to 100 acres in size, but areas 15 to 30 acres in size are most common.

This soil has the profile described as representative for the series.

Included with this soil in mapping are areas of soils that have a surface layer of very fine sandy loam and loam and some areas of soils that are covered by a thin layer of mucky peat less than 12 inches thick. Also included are areas of soils that are underlain by coarse material at a depth of 24 to 42 inches, and small areas of shallow peat too small to map separately.

This Hillet soil has a high water table in spring. The high water table and the hazard of early frost shorten the growing season in some years. To prevent compaction, traffic of heavy machines should be avoided when the soil is wet.

This soil is used mainly for pasture and wild hay, but if excess water is drained and the proper level of fertility is maintained, it is suited to corn, soybeans, oats, grasses, and shallow-rooted legumes. Capability unit IIIw-1; woodland suitability group VII; building site group 9.

Hubbard Series

The Hubbard series consists of deep, nearly level to steep, excessively drained soils on glacial outwash plains and valley trains. These soils formed in leached, calcareous sands in the Mississippi Valley under prairie grasses and scattered bur oak and hazelnut shrubs.

In a representative profile the surface layer is black and very dark grayish-brown loamy coarse sand about 23 inches thick. The subsoil is dark-brown and brown, very friable to loose sand about 21 inches thick. The underlying material is brown, loose sand.

Permeability is rapid, and available water capacity

low. The content of organic matter and available phosphorus, potassium, and nitrogen is low. Depth to the water table is 10 feet or more.

Most areas of these soils are in crops. Some areas are in open woods and pasture. These soils are poorly suited to all of the crops commonly grown in the county. Irrigation is needed to insure good crop production.

Representative profile of Hubbard loamy coarse sand, 0 to 2 percent slopes, in a woodlot, 457 feet north and 60 feet west of southeast corner of the NE¼ of sec. 21, T. 37 N., R. 31 W.:

- A11—0 to 12 inches, black (10YR 2/1) loamy coarse sand; weak, medium, subangular blocky structure; very friable; medium acid; clear, wavy boundary.
- A12—12 to 16 inches, black (10YR 2/1) loamy coarse sand; weak, medium, subangular blocky structure; very friable to loose; medium acid; clear, wavy boundary.
- A3—16 to 23 inches, very dark grayish-brown (10YR 3/2) loamy sand; massive; very friable to loose; strongly acid; gradual, wavy boundary.
- B2—23 to 31 inches, dark-brown (10YR 3/3) sand that grades to dark yellowish brown (10YR 3/4); single grained; very friable to loose; strongly acid; gradual, wavy boundary.
- B3—31 to 44 inches, brown (10YR 4/3) sand; single grained; loose; some gravel; medium acid; diffuse boundary.
- C—44 to 61 inches, brown (10YR 4/3) sand; single grained; loose; medium acid.

The solum and underlying material above a depth of 50 inches generally are free of coarse fragments, but in some places gravel-sized particles either dispersed in the matrix or as strata make up as much as 20 percent, by volume. The solum ranges from 26 to 50 inches in thickness. The A1 horizon is 9 to 18 inches thick and is medium acid or slightly acid. It is black or very dark gray loamy coarse sand, loamy sand, coarse sand, or sand. Structure ranges from weak crumb to subangular blocky. The A3 horizon is very dark brown, dark brown, or very dark grayish brown and is 3 to 14 inches thick. It has weak crumb or subangular blocky structure.

The B horizon is 16 to 38 inches thick and ranges from loamy coarse sand or loamy sand to coarse sand or sand. Reaction is strongly acid or medium acid. This horizon is dark brown and brown and has a higher value with depth. Structure ranges from massive to single grained.

The C horizon is loose coarse sand or sand. Reaction ranges from medium acid to mildly alkaline. This horizon is brown, pale brown, or light yellowish brown and is mottled below a depth of 40 inches in some places.

The Hubbard soils in Benton County have more fine sand than is defined as within the range for the series, but this difference does not alter the usefulness or behavior of the soils.

Hubbard soils are near Dickman and Duelm soils. They have more sand and less silt and clay in the A horizon and in the upper part of the B horizon than those soils. They have a higher chroma in the B horizon than Duelm soils.

Hubbard loamy coarse sand, 0 to 2 percent slopes (HoA).—This soil is on a glacial outwash terrace that is 1 to 6 miles wide and is parallel to the Mississippi River. Areas are elongated and are 160 to 400 acres in size. Narrow and shallow drainageways form a braided pattern on the surface. These drainageways are parallel to the river, and during spring thaws, the flow is in the same general direction. Some areas of this soil surround depressions and pits or iceblock holes.

This soil has the profile described as representative for the series. In cultivated areas, most of the acreage of this soil is slightly eroded, but some spots are moderately eroded.



Figure 9.—Wind stripcropping on Hubbard soils in the Rice Prairie area.

Included with this soil in mapping are areas of soils that have a sandy loam surface layer and occur in very narrow drainageways. Also included are some areas of soils that are underlain by bands of gravelly sand that are as much as 18 inches thick.

The major limitation to the use of this Hubbard soil is its low available water capacity. This soil is droughty during dry spells, and where cultivated, the soil is also subject to wind erosion. Cropping systems that conserve moisture and increase organic-matter content are needed on this soil. The use of field shelterbelts and wind stripcropping are practices that help to reduce wind erosion.

Most areas of this soil are cultivated. Some of the acreage in the Rice Prairie area has been planted to pine trees. This soil is poorly suited to late-maturing crops. It is better suited to deep-rooted legume crops and to early maturing crops, such as winter rye. Capability unit IVs-2; woodland suitability group VI; building site group 2.

Hubbard loamy coarse sand, 0 to 2 percent slopes, wind eroded (HoA2).—This soil is on a glacial outwash terrace 1 to 6 miles wide along the Mississippi River. Areas are elongated and are generally 160 to 400 acres in size. Some very shallow and very narrow drainageways 10 to 25 feet wide form a braided pattern on the surface. Some small areas of this soil are adjacent to depressions of semicircular iceblock holes.

This soil has a profile similar to the one described as representative for the series, but much of the original surface layer has been removed by wind erosion. Erosion is evidenced by the accumulation or drifting of soil along fence rows and field boundaries. Much of the fine textured material has been removed from the plow layer. The color of the surface layer is mainly dark brown. In places a few pebbles are on the surface.

Included with this soil in mapping are areas of soils that occur in the very narrow drainageways and have a surface layer of sandy loam. Also included are small areas of severely eroded soils that are on the crests of slight rises and have a sand surface layer. There are some areas of soils that are underlain by bands of gravelly sand as much as 18 inches thick.

The major limitation to the use of this soil is the low available water capacity, which makes the soil droughty in dry spells. A severe hazard of wind erosion is also a limitation. Cropping systems that conserve moisture and increase organic-matter content are needed. Field shelterbelts and wind stripcropping help to reduce wind erosion (fig. 9).

Most areas of this soil are cultivated. Many areas in the Rice Prairie area have been planted to pine trees. This soil is poorly suited to late-maturing crops. It is better suited to deep-rooted legume crops and to early maturing crops, such as winter rye. Crop growth is



Minnesota State Department of Agriculture
90 West Plato Boulevard, St. Paul, Minnesota 55107

725-2302 (Hayward)
Phone: 296-8328 (Mason)

January 27, 1984

Mr. John Shelton
Public Works Superintendent and
City Forester
Stillwater City Hall
216 N. 4th Street
Stillwater, MN 55082

Dear Mr. Shelton:

Mr. Hayward and I thank you for your interest and time spent last Friday, January 20, discussing the Gypsy moth with employees of our offices, Mr. Robert Thiewes and Dr. Dharma Sreenivasam. Please convey our thanks to George Wohlers as well. Our success in dealing with the Gypsy moth in your city depends upon our ability to work together.

As you well know the Gypsy moth, Lymantria dispar, is one of the most serious defoliators of trees in the nation. This pest was accidentally introduced into Massachusetts in 1869 and has subsequently spread throughout the northeastern portion of the United States and some portions of Canada. At the peak of the recent Gypsy moth outbreak in the Northeast, during 1980, 81 and 82, 13 million acres of trees were defoliated. Most of our infestations in Minnesota coincide with this outbreak. Fortunately this outbreak is over relieving the pressure of additional introductions to our State. It is our goal to eliminate our infestations before they become firmly established, widespread and/or cause noticeable damage.

Our intensive surveys for male Gypsy moths and other life stages have pinpointed a likely introduction site in Stillwater. We have concluded the infestation is extremely small and very localized. Although we were unsuccessful in finding egg masses at the suspected introduction site, spent pupal cases were found on patio furniture transported here from New Jersey in 1980. Our concern is intensified by the abundance of host trees in the area and close proximity to the St. Croix River. We know

John Shelton
Public Works Supt. & City Forester
January 27, 1984
Page Two

that the biological pesticide (Bacillus thuringiensis) (B.t.) combined with high density trapping are effective in controlling this pest under similar infestation conditions. Because of the close proximity of the potential infestation to the St. Croix River we are proposing to the Commissioner of Agriculture and the U. S. Department of Agriculture that B.t. be applied by helicopter late in May and again early in June 1984 followed by high density trapping. (A map is enclosed showing the proposed 32 acre treatment area and the additional buffer area for notification purposes.)

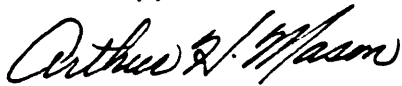
The entire treatment procedure will most likely have to be repeated in 1985 to effect the reduction of the Gypsy moth population to a non-detectable level. It must be realized this is only a proposal. The final decision rests with the Minnesota Commissioner of Agriculture. Other alternatives have merit and will be discussed with input sought at an informational meeting.

Nearly all costs of the treatment program will be shared with the State and Federal governments. However, we must now work cooperatively to discuss this Gypsy moth situation with affected citizens. We plan to acquaint them with the pest and its potential for damage, discuss control solutions, and certainly address their concerns.

The date, time and place tentatively agreed upon for an informational meeting appear satisfactory: Monday, February 13, 7:00 p.m. in the Council Chambers, 216 N. 4th Street, Stillwater.

Inquiries for further information should be directed to one of us.

Sincerely,

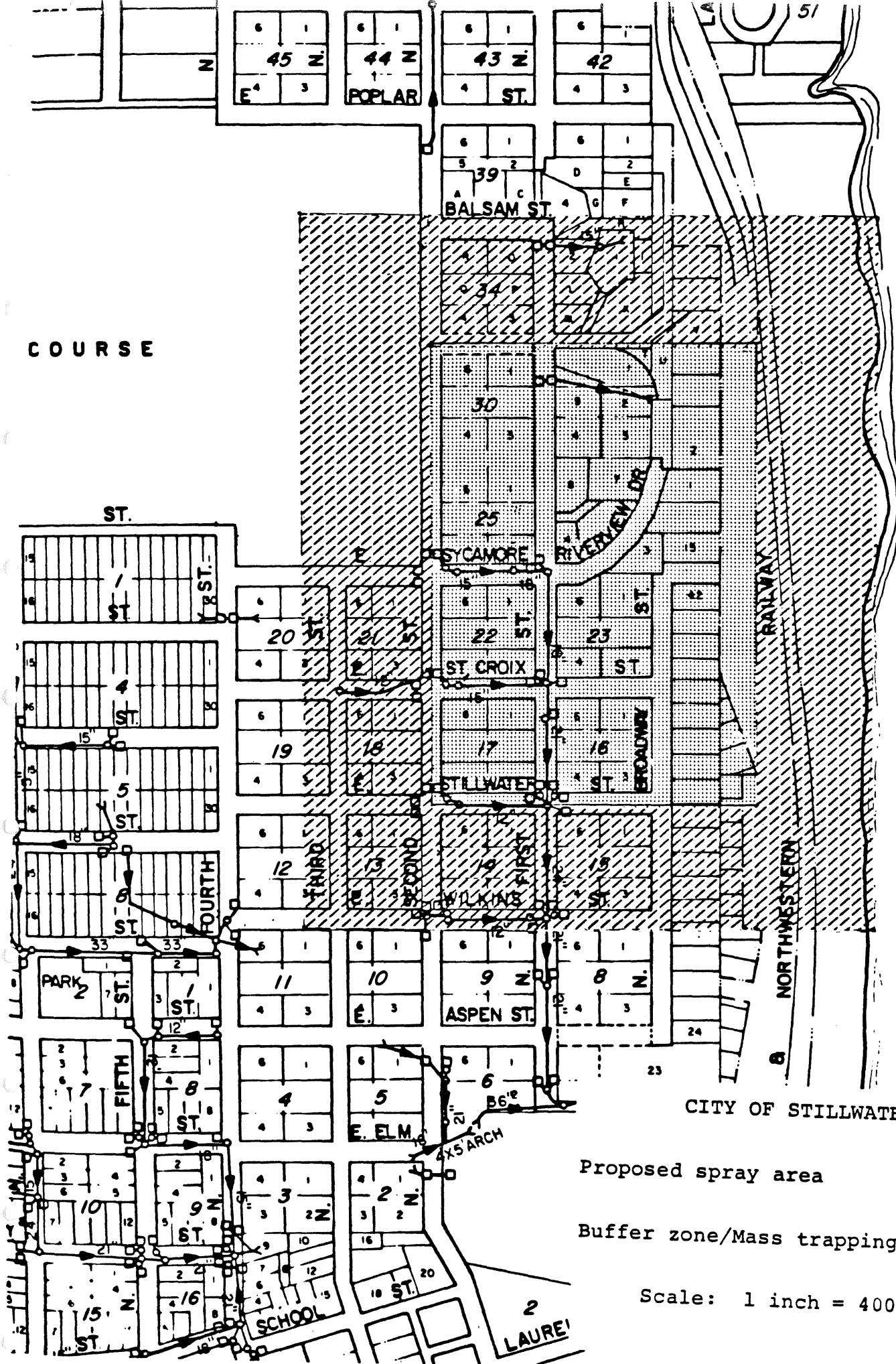


Arthur H. Mason, Assistant Director
Division of Plant Industry
Minnesota Department of Agriculture

John Hayward, Officer in Charge
U. S. Department of Agriculture
APHIS, PPQ

AHM/JH:jml
Enc.

COURSE

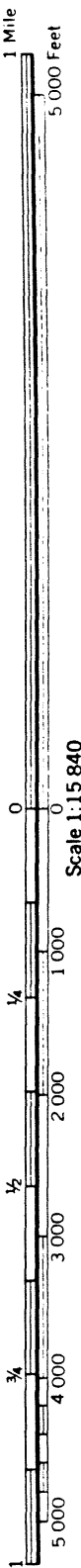
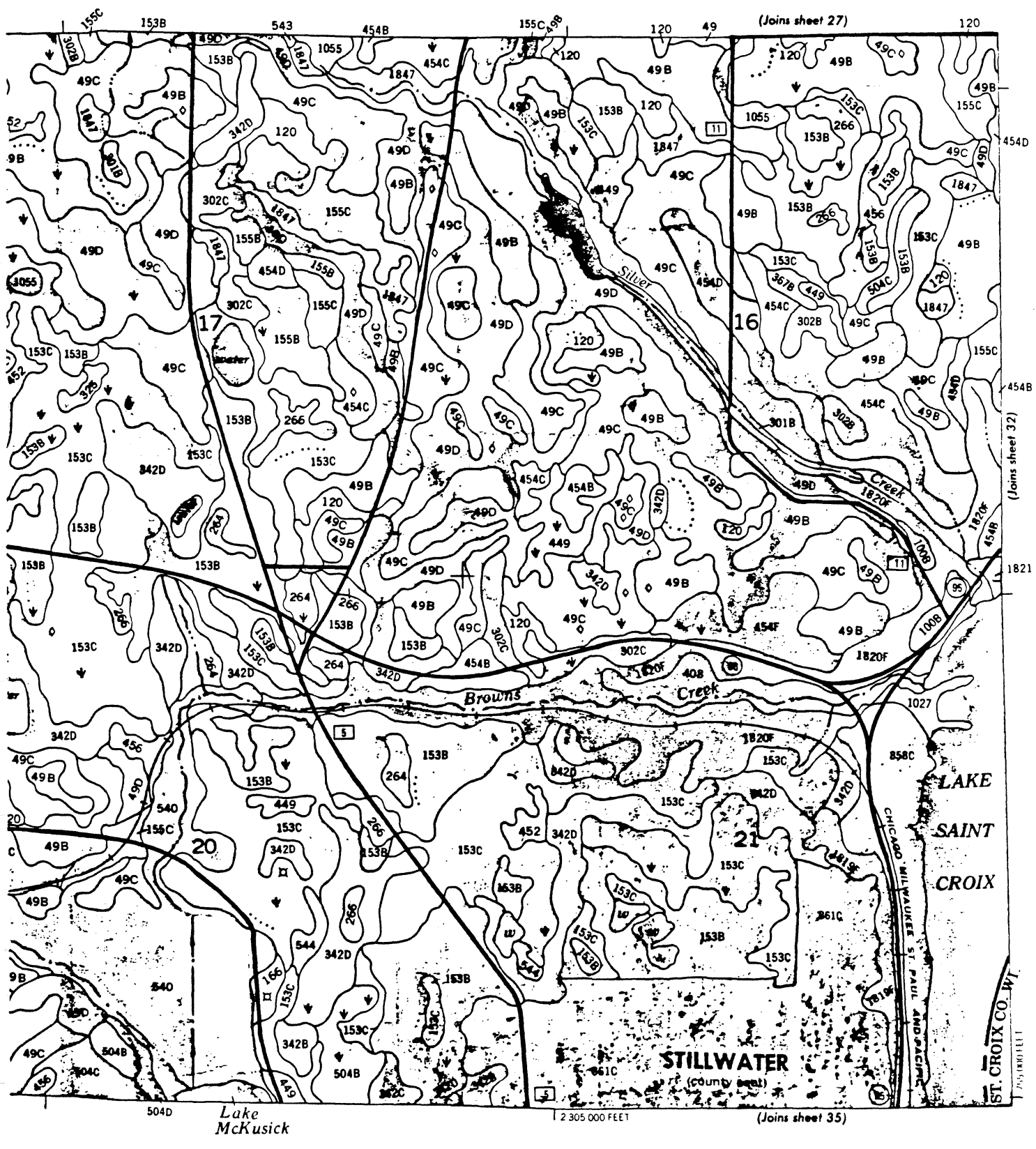


T C R O I X
MINNESOTA

Proposed spray area

Buffer zone/Mass trapping area

Scale: 1 inch = 400 Feet



Included with this soil in mapping are small areas of moderately well drained Freeon soils and well drained Kingsley soils. The Kingsley soils formed entirely in sandy loam till, whereas the Santiago soil formed in loess and the underlying loamy till. Also included are somewhat poorly drained Freer and poorly drained Auburndale soils which occupy small depressions.

Permeability of the Santiago soil is moderately slow. Surface runoff is slow. The available water capacity is high. Natural fertility is medium, and the organic matter content is moderate.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. It has fair to good potential for most sanitary facilities and good potential for building site development.

Most areas of this soil are used to grow corn and soybeans. It is well suited to crops. The surface layer tends to seal during rains, however, and to crust upon drying. Erosion is a moderate hazard on the steeper slopes, however slopes are generally too short or too irregular to permit effective contour farming or terracing. Minimum tillage, returning crop residue to the soil, and a crop rotation that includes forage crops help to control erosion and maintain the tilth of this soil. Fall plowing permits freezing and thawing of clods during the winter and generally helps to provide a well prepared seedbed early in spring.

This soil is well suited to pasture and hay production. Proper grazing management and weed control will result in an adequate cover of the more productive plants. Interseeding with more desirable and approved species will help to improve yield potential.

This soil is well suited to building site development. Soil strength is low in the silty mantle but is high in the underlying material. Unless properly designed, roads, driveways, and parking lots may be damaged by frost action. The soil has poor trafficability when wet. It has fair suitability for septic tank absorption fields because of the moderately slow permeability. Enlarging the filter field of septic tanks will help the systems function properly. Lawns, trees, and shrubs are generally easy to establish on this soil.

This soil is in capability subclass IIe and woodland suitability group 2o.

153C—Santiago silt loam, 6 to 15 percent slopes. This gently rolling to hilly soil is well drained. It is on crests and sides of hills on ground moraines. Mapped areas are irregular in shape and are commonly 10 to 30 acres.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 30 inches thick. The upper part is brown and dark brown silt loam. The lower part is reddish brown fine sandy loam. The underlying material is reddish brown sandy loam. In some places the surface layer has eroded and the silty mantle is less than 15 inches thick.

In other places the silty mantle is more than 30 inches thick. Slope is less than 6 percent in some mapped areas.

Included with this soil in mapping are small areas of moderately well drained Freeon soils and well drained Kingsley soils. The Kingsley soils formed entirely in sandy loam till, whereas the Santiago soil formed in loess and loamy till. Also included are somewhat poorly drained Freer soils and poorly drained Auburndale soils in small depressions.

Permeability of the Santiago soil is moderately slow. Surface runoff is medium to rapid. The available water capacity is high. Natural fertility is medium, and the organic matter content is moderate.

Most areas of this soil are farmed. It has good potential for crops and for grass and legume hay and pasture. It has good potential for woodland. This soil has fair potential for most sanitary facilities and good potential for building site development.

This soil is well suited to all crops commonly grown in the survey area. Most areas are used to grow corn and soybeans. The surface layer of this soil is easily eroded and tends to seal during rains and crust on drying. Erosion is a severe hazard. In some places contour strip-cropping can be used to control erosion, but most slopes are too short or too irregular for effective contour farming. Minimum tillage can control erosion in most places, or a rotation can be used that includes forage crops. Fall plowing permits clods to be broken by freezing and thawing during the winter, which improves tilth.

The use of this soil for pasture and hay is an effective means of controlling erosion. Proper stocking, rotation grazing, and weed control help to keep the pasture and soil in good condition. Planting pasture and hay may be desirable to improve plant species and potential yield.

This soil is well suited to trees. Seedling mortality, equipment limitations, and the hazard of erosion are slight. Clearing, spraying, or other site preparation is needed to eliminate brush and reduce plant competition.

This soil is well suited to building site development although slope is a limitation. Soil strength is low in the silty mantle but it is high in the underlying material. Because sidehill seepage occurs where slope is more than 12 percent, tile should be installed around foundations to drain off accumulated water.

This soil has fair suitability for septic tank absorption fields because of its moderately slow permeability and the hazard of side slope seepage. Lawns, trees, and shrubs are generally easy to establish.

This soil is in capability subclass IIIe and woodland suitability group 2o.

155B—Chetek sandy loam, 0 to 6 percent slopes. This nearly level to undulating soil is somewhat excessively drained. It is on low hills and knolls on broad outwash plains. Delineations are commonly irregular in shape and range from 5 to 20 acres.

Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick, and the subsurface

342D—Kingsley sandy loam, 12 to 18 percent slopes. This hilly soil is well drained. It is on steep, narrow side slopes and knolls on terminal ground moraines. Individual areas range from 5 to 60 acres and are irregular in shape.

Typically, the surface layer is dark brown sandy loam about 3 inches thick. The subsurface layer is grayish brown and dark brown sandy loam about 3 inches thick. The subsoil is reddish brown sandy loam about 19 inches thick. The underlying material is reddish brown sandy loam. In some areas the original surface layer has been removed by erosion and the present surface layer is dark brown sandy loam. In small areas slope is less than 12 percent or more than 18 percent. Some areas have a loam texture throughout.

Included with this soil in mapping are small areas of Freeon, Rosholt, and Ronneby soils. The Freeon soils are moderately well drained and are in lower, less steep positions on the landscape. The Rosholt soils are well drained and contain sand and gravel in the underlying material. The Ronneby soils, which occur in small depressions, are somewhat poorly drained.

The permeability of this Kingsley soil is moderately slow. The available water capacity is moderate. Surface runoff is rapid. The natural fertility is medium, and the organic matter content is moderate.

Most areas of this soil are used for pasture or woodland. It has fair potential for corn, small grains, and forage crops. It has good potential for woodland. This soil has poor potential for sanitary facilities and fair potential as building sites.

This soil has fair suitability for crops commonly grown in the survey area. The steep slope is the main hazard for production of crops. When farmed, this soil is better suited to small grains or hay than to row crops. The hazard of erosion is severe. No-till planting or using minimum tillage and a high percentage of forage crops reduces erosion. Surface rocks and pebbles impede tillage. Operation of modern farm machinery is difficult on steep slopes.

This soil has fair suitability for pasture and hay. Productivity is fair for all kinds of forage except the wetland species. Proper stocking, rotation grazing, fertilization, and weed control help to keep the pasture and soil in good condition. The use of this soil for pasture or hay is effective in controlling erosion, but care must be taken to prevent overgrazing. Planting pasture and hay may be desirable to improve plant species and potential yield.

This soil is well suited to trees. Plant competition is moderate to severe, however, site preparation and weeding are needed to insure the survival of plantings. Seedling mortality is slight. Equipment limitations and the hazard of erosion are severe. Precautions are needed to keep equipment from tipping on the steeper slopes. To control erosion, this soil should be mulched at time of planting and a protective cover of vegetation must be kept on it.

This soil is suitable as building sites although slope is a severe limitation. Sites for building should be carefully

chosen to reduce the amount of excavating and the consequent erosion. Because of its slope and moderately slow permeability, this soil is poorly suited to septic tank absorption fields. To prevent surface seepage, tile lines should follow the contour of the filter field. Lawns, trees, and shrubs are fairly easy to establish. It is recommended that sod be used to reduce the erosion hazard if the lawn is established from grass seed.

This soil is in capability subclass IVE and woodland suitability group 3r.

342E—Kingsley sandy loam, 18 to 30 percent slopes. This steep to very steep soil is well drained. It occurs on narrow side slopes on end moraines. Individual areas are elongated in shape and range from 5 to 20 acres.

Typically, the surface layer is very dark gray sandy loam about 3 inches thick. The subsurface layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is reddish brown sandy loam about 14 inches thick. The underlying material is reddish brown sandy loam. In some areas the original surface layer has been removed by erosion and the present surface layer is reddish brown sandy loam. In places the subsoil and underlying materials are loam. In some small areas slope is less than 18 percent.

Included in mapping are a few small areas of Freeon, Rosholt, and Ronneby soils. The Freeon soils are moderately well drained. They occupy drainageways and the lower, less steep positions on the landscape. The Rosholt soils are well drained and have underlying materials of sand and gravel. The Ronneby soils, which occur in depressions, are somewhat poorly drained.

Permeability of the Kingsley soil is moderately slow. The available water capacity is moderate. Runoff is rapid. The natural fertility is medium, and the organic matter content is moderate.

Most areas of this soil are used for pasture or woodland. This soil has poor potential for crops and fair potential for pasture, hay, and woodland. It has poor potential for sanitary facilities and as building sites.

This soil is too steep to cultivate. Slopes are generally too short and too irregular to make terracing feasible. It is better suited to permanent vegetation than to cultivated crops. Pastures should not be overgrazed because this soil erodes easily if not covered by vegetation. It is hard to renovate and improve, because farm machinery is hard to operate on the steep slopes. In some places gullies on this soil need to be stabilized by engineering structures.

This soil has fair suitability for trees. Seedling mortality is slight on north- and east-facing slopes and moderate on south- and west-facing slopes. Site preparation and weeding are needed to reduce competition from undesired plants. A protective cover of vegetation is needed to prevent erosion. The use of heavy machinery is difficult on the steep slopes.

This soil is poorly suited to sanitary facilities and building site development. Extensive excavating is required



Figure 12.—Houses on Urban land-Waukegan complex, 3 to 15 percent slopes. Retaining walls are needed to stabilize the underlying Waukegan soils.

The Chetek soil is used for parks, lawns, and gardens or is the site for future building. It has fair potential for lawns, gardens, trees, and shrubs. It has good potential for building site development and public sewers.

The major limitations for grasses, gardens, and trees are the low fertility and low available water holding capacity of the Chetek soil. Frequent applications of fertilizer and water are necessary. Sodding produces a quick permanent cover and reduces erosion. Recommended and adapted plant species should be planted for a better survival rate. In some places the underlying material has been exposed and should be topdressed with loamy material before planting.

The Chetek soil is well suited to building site development. Limitations are few. Sidewalls in the underlying material have poor stability and may cave in during excavation. Temporary retaining walls help to prevent this.

Water may seep into basements in the lower areas if they are not properly designed and protected. Onsite investigation is needed to determine the suitability of this complex for any proposed use.

This complex is not assigned to any interpretive group.

858C—Urban land-Chetek complex, 3 to 15 percent slopes. This complex consists mostly of Urban land and undulating to hilly, somewhat excessively drained Chetek soils on outwash plains. Up to 90 percent of this area is Urban land. Delineations are irregular in shape and range from 5 to 80 acres.

The Urban land is mainly developed for residential uses. A few small shopping centers and their adjacent parking lots are included.

In undisturbed areas the Chetek soils typically have a surface layer of brown sandy loam about 6 inches thick

and a reddish brown sandy loam subsoil about 12 inches thick. The underlying material is strong brown gravelly sand. In some places slope is less than 3 percent or more than 15 percent. In some places the soil has been removed and the underlying material is exposed. Other areas are covered with fill of varying depths.

Included in mapping are areas of Rosholt, Emmert, and Mahtomedi soils. Rosholt soils are well drained and have a thicker sandy loam mantle over sands and gravel than the Chetek soils. Emmert and Mahtomedi soils have a sandier surface mantle than the Chetek soils.

Permeability of the Chetek soil is moderately rapid in the surface and subsurface layers and rapid in the underlying material. Natural fertility and the available water holding capacity are low. Runoff is medium to rapid.

The Chetek soils are used for parks, lawns, and gardens or as the site for future building. They have fair potential for lawns, gardens, trees, and shrubs and are good potential building sites.

The major limitations for grasses, gardens, and trees are the low natural fertility and low available water capacity of the Chetek soil. Frequent applications of fertilizer and water are necessary. Sodding produces a quick permanent cover and reduces erosion. Planting adapted and recommended species increases the survival rate. In some places where the underlying material is exposed, topdressing with loamy material is desirable before planting.

The Chetek soil is well suited to building site development although slope is a limitation for some uses. This soil erodes easily, and erosion control, especially during and immediately following construction, is desirable. The surface soil should be stripped and returned after construction to allow easier revegetation. Excavation is easy, but stability in the underlying material is poor. Caving in of sidewalls can be reduced by use of temporary retaining walls. Because many areas are covered by impervious structures, the volume of runoff is large. It can cause severe erosion if not properly channeled. Water may seep into basements in the lower areas unless they are tile drained or are placed above the water level. Onsite investigation is recommended to determine the potentials and limitations of this complex for any proposed use.

This complex is not assigned to any interpretative group.

859B—Urban land-Zimmerman complex, 1 to 8 percent slopes. This complex consists of Urban land and very gently sloping to moderately sloping, excessively drained Zimmerman soils on outwash plains. Up to 90 percent of the complex is Urban land. Delineations are irregular in shape and range from 5 to 300 acres.

The Urban land part of this complex is dominantly developed for residential use. A few small shopping centers and their adjacent parking lots are included.

In undisturbed areas the Zimmerman soil typically has a surface layer of dark grayish brown loamy fine sand

about 15 inches thick. The subsoil is stratified light gray to pale brown fine sand with thin, discontinuous bands of dark loamy fine sand 1/4 to 1 inch thick. In places these bands are thick enough to be the dominant part of the subsoil. In some places the soil has been removed and the underlying material is exposed. Other areas are covered with fill of varying depths.

Included in mapping are small areas of Dickman and Sparta soils. The Dickman soils have a loamy mantle over the sand. The Sparta soils lack the textured bands of the Zimmerman soil and have a darker colored surface layer.

Permeability is rapid in the Zimmerman soil. It has low natural fertility and low available water capacity. Surface runoff is rapid and generally is channeled into storm sewers.

The major limitation to establishing lawns, gardens, and trees is the low available water capacity and low natural fertility of the Zimmerman soil. Places where the underlying material is exposed should be topdressed with loamy material before planting grasses or trees. Frequent watering and fertilization are necessary to keep lawns, gardens, trees, and shrubs growing well. Sodding produces a quick permanent cover and reduces erosion. Planting trees and shrubs that are resistant to drought will improve seedling survival and growth.

The Zimmerman soil is well suited to building site development. Limitations are few. Because this soil erodes easily, erosion control, especially during and immediately following construction, is desirable. The surface soil should be stripped and returned after construction to allow for easier revegetation. Excavation is easy, however sidewall stability in the underlying material is poor. Caving in of sidewalls can be reduced by use of temporary retaining walls. Because many areas are covered by impervious structures, the volume of runoff is large and can cause severe erosion if not properly channeled. Water may seep into basements in the lower areas unless they are tile drained or are placed above the water level. Onsite investigation is recommended to determine the potentials and limitations of this complex for any proposed use.

This complex is not assigned to any interpretative group.

860C—Urban land-Hayden-Kingsley complex, 3 to 15 percent slopes. This undulating to hilly complex is on knolls and hillsides of moraines. It consists mostly of Urban land and of well drained Hayden and Kingsley soils in undisturbed areas. Up to 90 percent of this complex is Urban land. Delineations are irregular in shape and range from 5 to 300 acres.

The Urban land is dominantly developed for residential use. A few small shopping centers and their adjacent parking lots are included.

Typically, the Hayden soils have a surface layer of very dark grayish brown fine sandy loam about 4 inches thick and a dark brown loam subsurface layer about 8

This complex is not assigned to any interpretative group.

861C—Urban land-Kingsley complex, 3 to 15 percent slopes. This undulating to hilly complex is on knolls and hillsides of glacial till moraines. It consists of Urban land and of well drained Kingsley soils in undisturbed areas. Up to 90 percent is Urban land. Delineations are irregular in shape and range from 5 to 300 acres.

The Urban land unit is dominantly developed for residential use. A few small shopping centers and their adjacent parking lots are included.

Typically, the Kingsley soils have a grayish brown sandy loam surface layer about 6 inches thick. The subsoil is about 26 inches thick. The upper part is dark brown sandy loam. The lower part is reddish brown sandy loam. The underlying material is dark reddish brown sandy loam. In some places the surface soil is sandier. In some places the soil has been removed and the underlying material is exposed. Other areas are covered with fill of varying depths.

Included in mapping are areas of Duluth, Freer, Prebish, and Ronneby soils. The Duluth soils are well drained and formed in loamy glacial till. The Freer, Prebish, and Ronneby soils are more poorly drained and all occur in shallow depressions. Many of these depressions are filled during construction to overcome the high water table.

The Kingsley soil has moderately slow permeability. It has a moderate available water capacity and is medium in natural fertility. Runoff is medium to rapid.

The soils in this complex are used for parks, lawns, and gardens or are future building sites. Potential is good for lawns, gardens, trees, shrubs, and for building site development.

The Kingsley soils are well suited to lawns, gardens, trees, and shrubs. Where the subsurface has been exposed by construction, a topdressing of loamy soil material is needed for better survival of plants. Sodding produces a quick permanent cover that reduces erosion. Adapted species should be planted for a better survival rate.

The Kingsley soils are well suited to building development. Slope is a limitation for most uses. Erosion needs to be controlled, especially during and immediately following construction. The surface soil that is stripped off should be returned after construction to allow for easier revegetation. Because many areas are covered with impervious structures, the volume of runoff is large. It can cause severe erosion if not properly channeled. Water may seep into basements in the lower areas unless they are tile drained or are placed above the water level. Onsite investigation is recommended to determine the potentials and limitations of this complex for any proposed use.

This complex is not assigned to any interpretative group.

861D—Urban land-Kingsley complex, 15 to 25 percent slopes. This hilly to very steep complex is on knolls and on sides of hills and ridges of glacial till moraines. It consists of Urban land and of well drained Kingsley soils in undisturbed areas. Up to 90 percent is Urban land. Delineations are irregular in shape and range from 20 to 200 acres.

The Urban land is dominantly developed for residential use. A few small shopping centers and their adjacent parking lots are included.

Typically, the Kingsley soils have a dark gray sandy loam surface layer about 3 inches thick. The subsurface layer is grayish brown sandy loam about 12 inches thick. The subsoil is dark brown and reddish brown sandy loam about 26 inches thick. The underlying material is reddish brown sandy loam. In some places the surface layer is sandier. In some places the soil has been removed and the underlying material is exposed. Other areas are covered with fill of varying depths.

Included in mapping are a few small areas of Duluth, Freer, Ronneby, and Prebish soils. The Duluth soils are well drained and formed in loamy glacial till. The Freer, Prebish, and Ronneby soils are more poorly drained and occupy depressions or small drainageways. Many of these depressions are filled during construction to overcome a high water table.

The permeability of the Kingsley soils is moderately slow. The available water capacity is moderate, and natural fertility is medium. Runoff is medium to rapid.

The soils in this complex are used for parks, lawns, and gardens or are future building sites. They have fair potential for lawns, gardens, trees, shrubs, and as building sites.

Because slopes are steep, there is a severe hazard of erosion. Areas that have been disturbed should be reseeded and mulched as soon as possible to reduce erosion. Sodding produces a quick permanent cover that reduces runoff and erosion. In some areas where the underlying material has been exposed, a topdressing of a loamy soil material should be applied. This improves the survival and growth of plants. Because trees and shrubs have different requirements, adapted species should be planted for a better survival rate.

The Kingsley soils have fair suitability as building sites. The steep slopes are limitations for most uses. Erosion needs to be controlled, especially during and immediately following construction. The surface soil that is stripped off should be returned after construction to allow for easier revegetation. Designing buildings to fit the slope reduces the need for grading and also reduces erosion and sedimentation. Because many areas are covered with impervious structures, the volume of runoff is large. It causes severe erosion if not properly channeled. Water may seep into basements in the lower areas unless they are tile drained or are placed above the water level. Onsite investigation is recommended to determine the potentials and limitations of this complex for any proposed use.

Most areas of this soil are farmed. This soil has fair potential for all the common crops grown in the survey area. It has fair potential for woodland and pasture. It has poor potential for sanitary facilities and fair potential as building sites.

This soil has fair suitability for most crops grown in the survey area. The surface layer is friable and easily tilled. It warms early in spring and dries soon after rains. Yields commonly are low. Because of the low available water capacity, early maturing crops, such as small grains, usually make best use of spring soil moisture. Irrigation is desirable on nearly level fields. This soil is subject to soil blowing, and young plants are often damaged by blowing sand. Soil blowing can be controlled by keeping the soil covered with plants over winter and by using minimum tillage. Additions of organic matter improve fertility and tilth and increase the available water capacity. Crops respond to small or moderate amounts of fertilizer unless the soil is irrigated or rainfall is timely.

This soil has fair suitability for pasture but is limited by low natural fertility and low available water capacity. Pasture production is fair in the spring and fall but is low during the summer months. Supplemental pasture may be needed during dry summer months. Keeping this soil under continuous grass reduces the hazard of soil blowing.

This soil has fair suitability for trees. Droughtiness and low natural fertility are major factors contributing to the moderate seedling mortality rate. Special care must be taken to minimize soil loss and damage to seedlings by blowing sand. Drought resistant trees are best suited to this soil.

This soil has fair suitability for building site development. Susceptibility to frost heave is moderate and needs to be considered in the design of roads and streets. Sidewalls of shallow excavations have poor stability and may cave in during excavation or installation of underground utilities. This can be prevented with temporary retaining walls. Because of the seasonal high water table, it is good practice to install drain tile around footings of foundations to prevent wet basements. A good drain tile outlet is needed. Septic tank absorption fields are limited by the seasonal high water table and the hazard of pollution of ground water supplies by seepage of effluent through the porous sand material. The absorption field should be specially designed to overcome these limitations. Lawns, trees, and shrubs are difficult to establish and maintain on this soil. Frequent watering and fertilizing along with a topdressing of loamy material before seeding are necessary to maintain vigorous growth.

This soil is in capability subclass IIIs and woodland suitability group 3s.

1819F—Dorerton-Rock outcrop complex, 25 to 65 percent slopes. This complex consists of very steep, well drained soils and Rock outcrop on stream valley side slopes. It is 50 to 75 percent Dorerton soils and 15

to 20 percent Rock outcrop. The Dorerton soils are on plane to slightly concave, mid and lower back slopes. The Rock outcrop is exposed near the shoulder slopes and on upper back slopes. The areas of Rock outcrop are so intricately mixed with the Dorerton soils or so small in extent that it is not practical to separate them in mapping. Individual areas of this complex range from 30 to 120 acres.

Typically, the Dorerton soil has a surface layer of very dark gray sandy loam about 4 inches thick over a fine sandy loam dark brown subsurface layer about 6 inches thick. The subsoil is about 12 inches thick. It is dark brown gravelly clay loam in the upper part and dark brown flaggy clay loam in the lower part. The underlying material is pale brown flaggy loamy sand. Limestone bedrock underlies the soil at a depth of 45 to 70 inches. In some areas the surface layer is darker colored.

Typically, the Rock outcrop consists of limestone bedrock 2 to 4 feet high and 10 to 50 feet long. In some places sandstone bedrock is exposed on lower foot slopes.

Included in mapping are areas of clayey soils developed from shale bedrock. These soils are on the upper back slopes and summits along the Mississippi River north of the Ford Parkway Bridge in Ramsey County.

Permeability of the Dorerton soil is moderate and moderately rapid. The available water capacity is moderate, organic matter content is low, and natural fertility is medium. Surface runoff is rapid. The rooting depth is restricted by the highly fractured limestone.

Most areas of this complex remain in native hardwoods and are used primarily for scenic purposes. The Dorerton soil has poor potential for hay, pasture, and for sanitary facilities and building site development.

Areas used for woodland wildlife should be managed to protect existing habitat and to maintain or improved its quality. Management for wildlife habitat also serves to enhance these areas for scenic purposes.

Mainly because of the very steep slopes, the soil in this complex is poorly suited to sanitary facilities and as building sites. Also, in making shallow excavations for basements or other purposes, hard bedrock is encountered. If buildings are constructed, they should be designed to fit the site and preserve the natural landscape while reducing the need for grading and reducing erosion and sedimentation.

This complex is in capability subclass VIIe and woodland suitability group 3f.

1820F—Mahtomedi Variant-Rock outcrop complex, 25 to 60 percent slopes. This complex consists of very steep, excessively drained soils and Rock outcrop on stream valley side slopes. Individual areas are 40 to 75 percent Mahtomedi Variant soils and 10 to 30 percent Rock outcrop. The Mahtomedi Variant soils are on plane to slightly concave, mid and lower back slopes. The Rock outcrop is exposed near shoulder slopes and on upper back slopes. Areas of soil are so intricately mixed



Minnesota State Department of Agriculture
90 West Plato Boulevard, St. Paul, Minnesota 55107

296-8328 (Mason)
Phone: 725-2302 (Hayward)

January 24, 1984

David Childs
St. Anthony City Manager
City Hall
3301 Silver Lake Road
St. Anthony, MN 55418

SUBJECT: Gypsy Moth Infestation in St. Anthony

Dear Mr. Childs:

Mr. Hayward joins me in thanking you for your interest and time spent last Monday discussing the Gypsy moth situation in your City. Convey our thanks to Mr. Hamer as well. Much of the success of the Gypsy moth program will depend upon our ability to work together to solve this serious pest problem.

As mentioned, the Gypsy moth, Lymantria dispar, is one of the most serious defoliators of trees in the nation. This pest was accidentally introduced into Massachusetts in 1869 and has subsequently spread throughout the northeastern portion of the United States and some portions of Canada. At the peak of a recent unprecedented outbreak in the Northeast, 13 million acres of trees were defoliated. Most infestations in Minnesota are likely the result of spread from this massive explosion of insects. It is our goal to eliminate infestations in Minnesota before they become widespread and/or cause noticeable damage.

Our intensive surveys for male Gypsy moths and other life stages have pinpointed a likely introduction site in St. Anthony. We have concluded the infestation, although present for a few years, has not spread significantly. While determining the establishment of the St. Anthony infestation, evidence has emerged which indicates that the biological pesticide (Bacillus thuringiensis) (B.t.) combined with high density trapping are effective in controlling this pest under similar infestation conditions. Therefore, to control the Gypsy moth in St. Anthony, we are proposing to the Commissioner of Agriculture and the U. S. Department of Agriculture that B.t. be applied by helicopter late in May and again early in June 1984, followed by high density trapping. (A map is enclosed showing the proposed 30-acre treatment area and the additional buffer area for notification purposes.)

David Childs, City Manager
January 24, 1984
Page Two

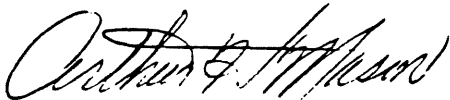
The entire treatment procedure will most likely have to be repeated in 1985 to effect the reduction of the Gypsy moth population to a non-detectable level. It must be realized that this is only a proposal. The final decision rests with the Minnesota Commissioner of Agriculture.

Presently, the State and Federal governments plan to cover nearly all costs of the treatment program. However, we must now work cooperatively to discuss this Gypsy moth situation with affected citizens. We plan to acquaint them with the pest and its potential for damage, discuss control solutions, and certainly address their concerns.

The date, time and place tentatively agreed upon for an informational meeting appear satisfactory: Tuesday, February 14, 7:00 - 8:15 p.m. at the Parkview Community Center Cafeteria.

Hopefully, this letter will provide you with the information needed for a newspaper article relative to the meeting. Inquiries for further information should be directed to one of us.

Sincerely,



Arthur H. Mason, Assistant Director
Division of Plant Industry
Minnesota Department of Agriculture



John Hayward, Officer in Charge
Minnesota
U.S. Department of Agriculture, APHIS, PPQ

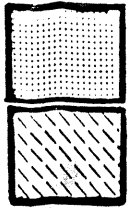
AHM/JH:jml
Enc.

AVENUE

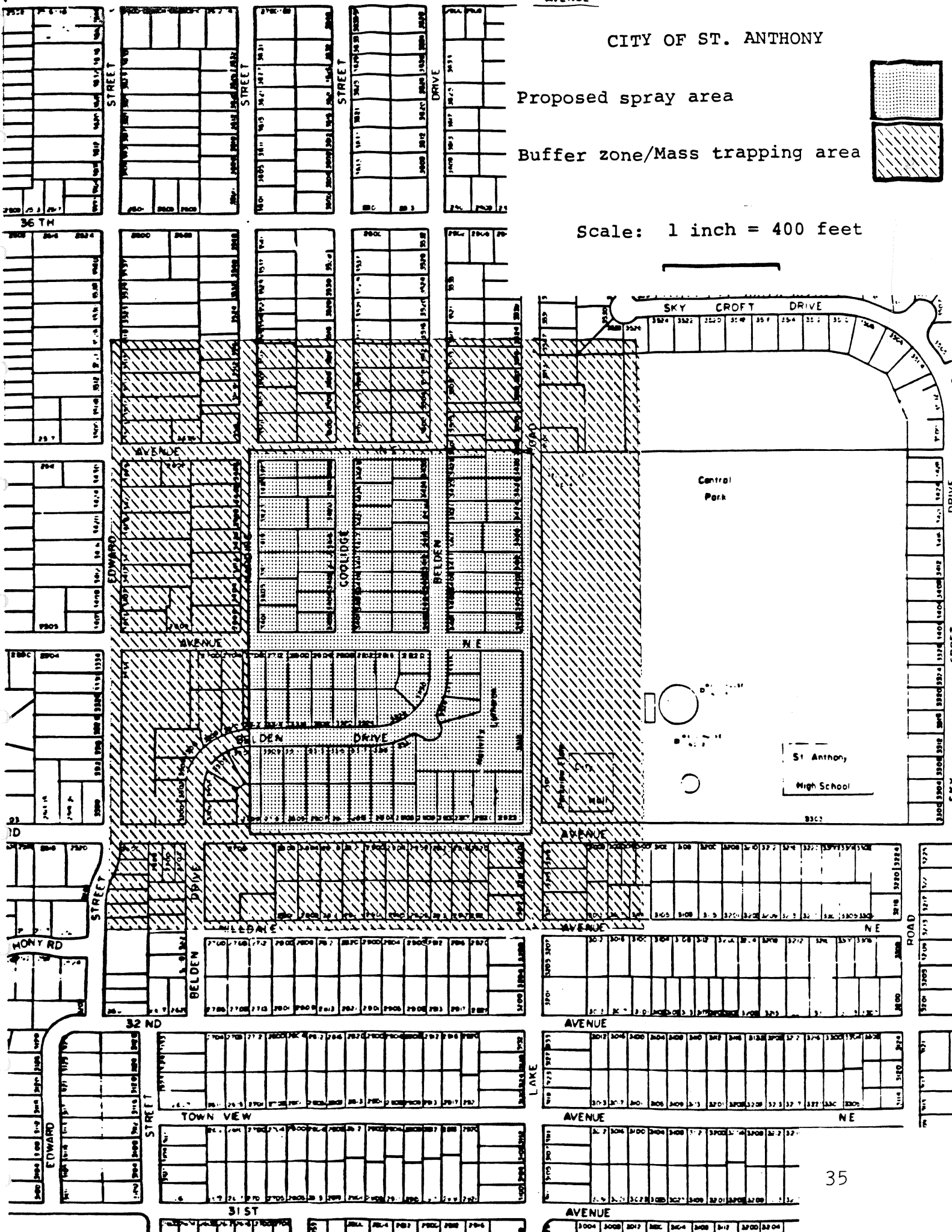
CITY OF ST. ANTHONY

Proposed spray area

Buffer zone/Mass trapping area



Scale: 1 inch = 400 feet



APPENDIX A

GYPSY MOTH PUBLIC INFORMATIONAL MEETINGS

(A-1 - A-22)

NOTICE

GYPSY MOTH PUBLIC INFORMATIONAL MEETING

Monday, February 13, 1984, 7:00 P.M.
City of Stillwater Council Chambers
216 N. 4th Street, Stillwater, MN

Dear Stillwater Resident:

Scientific trapping of male moths, surveys for egg masses and other life stages confirmed the presence of a major economic pest, the gypsy moth, in your community.

The Minnesota Department of Agriculture, the state regulatory authority for pest control, the U. S. Department of Agriculture, in cooperation with your local authorities, have scheduled the above public informational meeting. We want to fully inform you and your neighbors of our findings and to involve you in the control determinations that we consider most urgent.

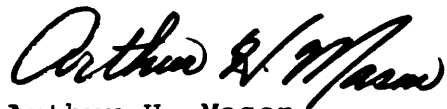
The following options will be discussed at the meeting: a) Do nothing; b) Mass trapping of male moths; c) Use of insecticide; d) Use of biocide.

Our joint proposal is to eliminate the small but significant gypsy moth infestation in your community by using the biocide Bacillus thuringiensis (B.t.). Approximately 32 acres are being considered for treatment this spring or early summer and most likely repeated in 1985. This action is intended to prevent a potentially serious spread of the gypsy moth through our state.

Please try to attend this meeting.

Sincerely,

MINNESOTA DEPARTMENT OF AGRICULTURE



Arthur H. Mason
Assistant Director
Plant Industry Division

296-8328

CITY OF STILLWATER



Jack Shelton
Director
Public Works

439-6121

(Similar notices were sent to residents of Sauk Rapids and Stillwater)

The Gypsy Moth in Sauk Rapids

Proposed Control 1984

Introduction - City - Richard Gronau - Street Commissioner, Park Supt.
Rec. Director
Robert Haarman - City Administrator

Introduction - A. Mason

Introduce: John Hayward, USDA, APHIS; Doree Maser, MDA, Plant Industry
Division

This evening we intend to tell you what the Gypsy moth is all about, what it can mean to you, and what we propose to do about it, now and into the future.

The best introduction we have found on this insect pest is a film developed and produced by Canada Agriculture. The film will tell you about the pest and what it can do.

Film - 15 minutes

As you can see it certainly isn't a pest we want. It is also the worst defoliator in the Nation comparable to no insect in Minnesota any of us are familiar with.

It is an insect under quarantine - there have been regulatory efforts to keep the pest in place since 1912. While the quarantine and regulatory efforts have been most successful in 1979, 80, 81 the most severe, unprecedented outbreak of the pest occurred all along the east coast. In 1979 there were 643,609 acres of defoliation by this pest; 1980, 5,005,389 A.; 1981, 12,872,725 A.; 1982, 8,171,191 A.; 1983, 2,383,368 A. Our problems seem to coincide with this tremendous outbreak situation.

We have been searching for the pest in Minnesota on a regular basis since 1972. Prior to that there were occasional interceptions but no recorded establishment of the pest from them.

Gypsy Moth in Sauk Rapids - #2

In 1980 - 26 moths from 3 counties - First multiple catches, but we had a new and more powerful attractant called plus - lure. Another thing happened - we found egg masses on nursery stock without going into more detail -

1981 - 111 moths in 7 counties - egg mass survey negative

1982 - 105 moths in 5 counties - eggs found in St. Paul & Woodbury

1983 - St. Paul & Woodbury treated with carbaryl (Sevin 4-oil)

300 acres St. Paul 130 acres Woodbury - Trapping located no moths in either area.

- 196 moths in 13 counties - 2 with multiple catches for the second consecutive year - St. Anthony & Stillwater and 31 moths from Benton Co. - 29 Sauk Rapids, 2 Sartell -- surveys found egg masses in St. Anthony, spent pupal cases in Stillwater - egg masses in Sauk Rapids.

Just what can it mean to Minnesota if the Gypsy moth going a foothold spreads and behaves like it does in the east.

Mr. John Hayward will discuss this.

Just what can we do about it.

There are 4 options facing us and the Commissioner at this time - same 4 that faced us last year -

1. Eliminate infestations with chemical insecticides
2. Eliminate infestations with a biocide followed by mass trapping
3. Establish integrated pest management (IPM)
4. Do nothing

We have looked at this site from every angle and are proposing to use the biocide B.t. from a helicopter applied twice - mid to late May, again in early June followed by mass trapping. Repeated again in 1985 if necessary. The MDA, USDA sharing the cost of the program.

Gypsy Moth in Sauk Rapids - #3

The City of Sauk Rapids assisting with notification of residents and whatever traffic control might be needed.

B.t. is a biocide, a bacterial organism quite generally specific to Lepidoptera. It is ingested by the caterpillar, to infect the caterpillar thereby killing it. It is a registered product cleared by EPA and the State for this use. The B.t. is suspended in a solution of mineral oil at 32 BIU - Billion International Units of potency. We would apply 16 BIU/Acre. There is a sticker which will not cause any damage but will be unsightly if not washed off until weathered away. Will be handled appropriate to the label.

Will treat 26 acres with B.t. mass trap 40 Acres - 32 traps/sq. mi.

Questions

GYPSY MOTH PUBLIC INFORMATIONAL MEETING

February 6, 1984 at 6:30 p.m.

City of Sauk Rapids
104 N. Benton Drive
Sauk Rapids, Minnesota 56379

Mr. Robert Haarman started the meeting at 6:33 p.m.

Five council members, 14 citizens, 2 DNR foresters, 2 beekeepers, 1 microbiologist from St. Cloud State University, 1 county extension agent were present.

As an introduction, the gypsy moth film from Canada Agriculture was shown. Art Mason presented historical data on the gypsy moth, John Hayward presented data on the different chemicals that could be used in a control program, and Art Mason concluded the presentation with the Minnesota Department of Agriculture recommendation for the Sauk Rapids spray site. Questions were taken from the floor.

All questions and answers were recorded by Doree Maser.

Q. What has been eating my ash tree?

A. Mason: Ash sawfly.

Q. Is this the formal public information meeting?

A. Mason: Yes.

Q. How was this advertised - I did not receive notification and (DNR) there was no public announcement.

A. Mason: EDB got in the way, press release was ready to go, but got shunted aside. People in the trailer park and surrounding area were notified by mail.

Q. Is there going to be another informational meeting?

A. Mason: No.

Q. Which formulation of Bt is going to be used?

A. Hayward: At present the plans are to use M 32 BIU of potency, 16 BIU's/acre/application.

Q. What is the cost comparison between Bt and Sevin?

A. Hayward: Now they are about the same unless we have to repeat the spray in 1985.

Q. My apple tree was denuded by worms, was it gypsy moth?

A. Mason: No.

Gypsy Moth Public Informational Meeting
City of Sauk Rapids
February 6, 1984

Q. Were there any moths found on the St. Cloud side of the river?

A. Hayward: Yes, one in St. Cloud.

Q. Will the St. Cloud side be notified as their water comes out of the river 1/2 hour down stream?

A. Hayward: Yes they will. Could we talk to you after the meeting?

Q. What kind of precautions do you tell people to take when they are living in the spray area? (council member)

A. Hayward: Turn over pet dishes and stay indoors while spraying is going on. You may want to wash the spreader/sticker off your car.

Q. What effect will the spray have on pets?

A. Hayward: Virtually none.

Q. What type of trapping procedures do you use in the rest of the state?

A. Hayward: Mainly in cities and towns and the routes between them.

Q. How do you choose sites for the traps?

A. Hayward: Where we figure the most likelihood of catching them is (ie. on favored host trees and by high traffic areas such as trailer courts.)

Q. What insects does Bt kill and how does it kill the insects?

A. Mason: It is host specific to caterpillars; it won't kill bees.

Q. Does it damage cars?

A. Hayward: The spray itself - no. It wouldn't hurt to wash your car afterwards.

Q. How much time do we have before the decision of what to spray is going to be made?

A. Mason: The final decision is to be made in mid-March.

Q. Would mass trapping without spraying work?

A. Mason: Not as well.

Gypsy Moth Public Informational Meeting
City of Sauk Rapids
February 6, 1984

Beekeepers Meeting
St. Cloud AVTI

About 15 people attended including Senator Joe Bertram. All questions were answered by Art Mason.

Q. Are you going to use hand sprayers?

A. No. We would have to consider other methods if we are unable to contract with an aerial applicator for one reason or another.

Q. What is the residual effect?

A. Mason: 12-24 hours, more or less depending upon weather.

Q. Why that particular 26 acre tract?

A. Where the moths were found.

Q. What do the gypsy moths eat?

A. About 300 different trees, shrubs and even grasses when the leaves are gone.

Q. What do they look like?

A. Refer to the pamphlet.

Q. What spray is being used out east?

A. Sevin, Bt, Dylox, Orthene.

Q. Are they going to spray for mosquitoes again next year?

A. I don't know. Public Health would have to make that decision at the time.

The Gypsy Moth in Stillwater

Proposed Control 1984

Introduction: City Coordinator, Nile Kriesel

A. Mason: Introduce - John Hayward, Dr. Dharma Sreenivasam

This evening we intend to tell you what the Gypsy moth is all about, what it can mean to you, and what we propose to do about it, now and into the future.

The best introduction we have found on this insect pest is a film developed and produced by Canada Agriculture. The film will tell you about the pest and what it can do.

Film - 15 minutes

As you can see it certainly isn't a pest we want. It is also the worst defoliator in the Nation comparable to no insect in Minnesota any of us are familiar with.

Here to tell you a little about what the pest might be expected to do in Minnesota - Dr. Mark Ascerno, Extension Entomologist, University of Minnesota.

Thank you Mark.

John Hayward, USDA, APHIS will give you a brief summary of the history of Gypsy moth in Minnesota.

Thank you John -- Now, let's look at the site (slides)

There are 4 options facing us and the Commissioner at this time - same 4 that faced us last year.

1. Eliminate infestations with chemical insecticides, carbaryl, sevin 4-oil our choice if this option selected.

2. Eliminate infestations with a biocide followed by mass trapping Bacillus thuringiensis, B.t.

3. Establish integrated pest management (IPM)

4. Do nothing

We have looked at this site from every angle and are proposing to use the biocide B.t. applied twice by helicopter mid to late May, and again in early June. The application would be followed by mass trapping, and repeated again in 1985 if necessary. The MDA, USDA sharing the cost of the program on a 50-50 basis.

We will be looking for the City to help us with whatever traffic control might be necessary and public notification.

I would like to back up just a moment and talk about the pesticides.

The chemical insecticide carbaryl sold under the trade name Sevin is the most commonly used insecticide in Minnesota and the U.S. It is known as a broad spectrum insecticide, one that will kill many different insects and micro organisms. It has an excellent track record, and relatively low toxicity to mammals. It doesn't persist in the environment and when used in accordance with labeled directions is not known to cause any problem to humans. There are some who dispute this but the record is clear. It kills the Gypsy moth in two ways - by contact and ingestion. It was used in Minnesota in St. Paul and Woodbury in 1983 and to the best of our knowledge eliminated the known infestations there.

The biocide - Bacillus thuringiensis is sold under such trade names as Dipel or thuricide and others. While it has not been around or in use as long as Sevin it too has an excellent track record. It has been used in urban areas of Minneapolis in cankerworm control with no major problems encountered; other than handling it. It is quite specific to the larvae of butterflies and moths. However, unlike Sevin, it must be infested or eaten by the larvae to infect and kill it.

We would propose to utilize the 32 billion international units of potency - or 16 BTU/acre/application. We would follow the application with mass trapping - traps baited with the new plus - lure extremely effective pheromone in an attempt to disrupt mating.

Carbaryl and B.t. have the same cautionary label. We shall apply the same precautions of application with whatever the final decisions to the choice of material.

I believe we have talked enough - perhaps now we should answer your questions.

GYPSY MOTH PUBLIC INFORMATIONAL MEETING

February 13, 1984 at 7:00 p.m.

City of Stillwater
216 N. 4th Street
Stillwater, MN 55082

Questions & answers recorded by Dharma Sreenivasam.

Nile Kriesel, City Coordinator, acting as chairman of the meeting, started the meeting at 7:10 p.m. There were 18 in attendance. Breakdown: 3 city officials, 2 state, 1 federal, 1 university, 1 county, 1 CBE, 1 photographer, 1 reporter Stillwater Gazette, 7 citizens including 1 beekeeper.

Arthur Mason, MDA, made introductory remarks.

A 15 minute film on gypsy moth from Canada Agriculture was shown.

Mark Ascerno, Dept. of Entomology, University of Minnesota presented the potential for damage from gypsy moth infestations in Minnesota.

John Hayward, USDA-APHIS, presented a brief history of gypsy moth in Minnesota, its trapping, and the use of plus lure.

Arthur Mason discussed control options such as the use of insecticides, biocides, etc.

Mr. Kriesel than opened the meeting for questions from the public.

Q. Are other neighboring states cooperating in the control of gypsy moth?

A. Mason: All states are surveying for the gypsy moth. All of them are doing something about it.

A. Hayward: In 1983, 6,000-8,000 traps were set in Wisconsin. Control of gypsy moth in Elm Grove, Wisconsin was successful. Illinois used Bt entirely in 1983. Will be doing mass trapping and some ground spraying in 1984. (Trap density: 1 trap every 120 feet.)

Q. Will there be any local inspections (in Stillwater)?

A. Mason: Gypsy moth traps are available to public for purchase. However, for the time being trapping by MDA & USDA will continue. It will be easy to pin point gypsy moth infestations and avoid confusion from traps set by private citizens.

A. Hayward: We intend to set 255 traps in the find area; 32/square mile in the spray area and 16/square mile in the remaining area.

Comment: Mrs. Hubbard, 104 E. Poplar Street, Stillwater, told the group that she moved in from Massachusetts in 1980. She would like someone from MDA to come and check her place. Last fall people were asked to call the Department of Agriculture to inform of any move ins from the eastern states. A friend of Mrs. Hubbard was afraid to call because they thought they might be penalized or hurt their pocketbooks.

A. Mason: Nobody will be penalized. They should tell us so that we can do something about it (like trapping, other controls, etc.).

Q. To what extent are the industries scrutinized? Especially the railroads?

A. Mason: Every infestation so far was carried by a household move, trailers, campers, etc. We have not found any relationship to railroad transport yet.

In time, gypsy moth will get here but if we keep it out now - we will be buying time.

Q. I have 600 colonies of bees. Are you going to inform me? (not just one day before spraying).

A. Mason: We have informed the public well in advance of spray times. We have also informed all beekeepers within the vicinity of spray area well ahead of time. We intend to continue the same practice.

Q. The hairy worms (fall webworm) in the fall, how damaging are they?

A. Ascerno: Fall webworms have a narrow host range. Their occurrence in 1983 happened after many years. They are much less problem than gypsy moth.

Meeting adjourned at 8:30 p.m.

8 November 1983

Harry Peterson, Mayor
City of Stillwater
216 N. Fourth St.
Stillwater, Minnesota 55082

Dick B.

**CITIZENS
FOR
A
BETTER
ENVIRONMENT**

Dear Mayor Peterson:

Your town has recently reported multiple catches of gypsy moths. Such a trapping, although it does not necessarily indicate an infestation, is cause for concern. If you do have an infestation of gypsy moths in your town, you will have to take some action to deal with that infestation. The most common method of treatment is application of the pesticide carbaryl, also known as Sevin. Carbaryl, however, is a toxic chemical. It can harm humans as well as insects. Studies in laboratory animals have linked carbaryl to birth defects, behavioral changes, increased susceptibility to viral diseases, and other chronic maladies. Although use of this pesticide would probably be the course of action suggested by the Department of Agriculture, we would like to bring some safer alternatives to your attention.

We urge that, rather than try to eradicate the moths, Stillwater control the moths by using proven mechanical and biological methods. Pesticides such as carbaryl will kill the moths now in your area. Unfortunately, they will not prevent more moths from moving into Stillwater. Such pesticides will also kill the insects that normally compete with the gypsy moth, thereby helping to keep its numbers down. The experiences of other towns have shown that the gypsy moths will return. Towns such as McHenry, Illinois, that have used safer alternatives to carbaryl have found that the moths can be effectively controlled.

Bacillus thuringiensis (B.t.) and mass trapping are the best known of the safer alternatives to carbaryl. B.t. is a type of bacteria that releases a deadly toxin in the stomach of gypsy moth caterpillars. This toxin will harm only butterflies and moths, in contrast to carbaryl, which is not so selective. Mass trapping works in two ways. A powerful insect sex hormone (a pheromone) is used to lure male moths into the traps. Like most animals, female moths do not breed when there are no males around. The pheromone in the traps also confuse the male moths to such a degree that they have

citizens
for
A
better
Environment

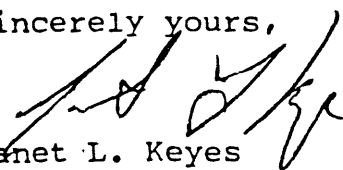
great difficulty finding female moths. If the moths cannot breed, their populations cannot increase.

You may be able to prevent a serious infestation of gypsy moths by making control of the moths a community-wide effort. Teach the residents of your town where and how to look for egg masses and what to do once they find them (the egg masses can be killed by immersing them in alcohol or soapy water). Residents can also help control the moths by banding trees to catch the caterpillars when they come down the trees to avoid the heat and sun of the day.

We do urge you to now consider the alternatives--the safer alternatives--to the use of pesticides such as carbaryl. The most opportune time to stop an infestation of gypsy moths is before they have established themselves in your town. Biological and mechanical controls will, in the long run, be less expensive and more effective than chemical controls.

We would be happy to provide you with more information or sources of information on these alternative pest controls.

Sincerely yours,



Janet L. Keyes
Researcher
Citizens for a Better Environment

in combination with tree banding and a community moth trapping program in 1980 and 1981. Over 200 gypsy moths had been found in McHenry, but none have been found since this program was carried out.

TREE BANDING

Banding of trees can be used both to monitor for and to control caterpillars. Mature caterpillars (1-2 1/2 inches long) feed in the tree canopy at night. During the day, they descend the tree to seek shelter. A 16-18 inch wide cloth or burlap strip can be tied around the tree trunk at about chest height. The "skirt" which is formed by the folded-over band provides a cool, shady resting area for caterpillars during the day. These caterpillars can be scraped off or removed with a tweezers and placed in a jar of alcohol or soapy water. They may be discarded by flushing them down the toilet, or saved for positive identification.

MOTH TRAPPING

Several gypsy moth traps are on the market. The traps are baited with the female sex attractant, or pheromone, Disparlure. Male moths fly towards the pheromone and are caught on a stickum in the trap. Most commonly, the traps are open-ended cardboard triangles about 3 inches high and 6 inches long, or are quart milk carton-shaped with holes cut in the sides.

Traps are used at a density of 1-50 per square mile, primarily to detect gypsy moths and delimit the area of possible infestation. In high enough numbers (about 2,000 per square mile), traps have also been used to reduce gypsy moth populations and even to achieve eradication, as was done in Appleton, Wisconsin.

Gypsy moth traps are hung 3-5 feet from the ground, near vertical silhouettes such as tree trunks. Certain other procedures must also be followed to ensure trap efficacy. Gypsy moth trapping for control would require 1-2 traps per yard and should be conducted over several square miles. Traps could be distributed by the State, or inexpensively constructed by residents.

Gypsy moth trapping in California should be left to the agricultural agencies or else conducted by citizens only in a well-coordinated community-wide program.

EGG MASS DESTRUCTION

Gypsy moth overwinters in clusters of eggs which are laid on tree trunks, fences, rocks, and outdoor furniture. From August through March, keep your eyes open for the presence of gypsy moth's buffy felted egg masses, which are laid in oblong clusters about 1 1/2 inches long. These small masses of tan hair-covered eggs can be scraped into a jar of alcohol or soapy water and flushed down the toilet or saved for positive identification.

GYPSY MOTH BIOLOGY

ADULTS - The female adult is a white moth about 1 1/2 inches long. Females fly very poorly or not at all. When at rest, their white wings are banded with wavy black lines. Male moths are brownish and somewhat smaller. Males may fly a quarter mile and are attracted to a powerful sex attractant (pheromone) which the female emits. Mating may occur from late spring through the summer, with each female laying a single egg mass containing 100 to 1000 eggs.

EGGS - Gypsy moth egg masses are oblong-shaped and about 1 1/2 inches long. The cluster of eggs is covered by buff-colored hairs from the female which help to protect the eggs through the winter.

CATERPILLARS - The leaf-eating caterpillars hatch from the egg masses in the spring. Newly hatched caterpillars are about a sixteenth of an inch long, blackish, and hairy. The natural spread of caterpillars may occur as they drop from the trees on silken threads carried by the wind. Low-level populations tend not to disperse far. Gypsy moth spreads mainly because of people moving vehicles and outdoor furniture contaminated with egg masses from areas of high gypsy moth populations.

Gypsy moth caterpillars grow in about six stages (instars) with a molt or shedding of their skin every 3-10 days. Second and third instar caterpillars are predominantly black. These stages are most susceptible to pesticides like the caterpillar-specific G.T. disease. Last stage caterpillars are 1 1/2-2 1/2 inches long. They are hairy and brownish-black, and are distinguished by five pairs of blue dots beginning at the head, followed by six pairs of red dots. These late instar caterpillars can be captured by tree banding.

PUPAE - In late spring or early summer, the mature caterpillars enter a resting, or pupal (cocoon), stage. Reddish-brown pupal cases are about 3/4 of an inch long, may be attached to many different outdoor objects, and, like egg masses, are easily transported by unknowing persons. After about two weeks of pupation, the adults emerge and mate.

For More Information On What You Can Do:
CITIZENS FOR BETTER ENVIRONMENT (612) 341-3555

GYPSY MOTH SPRAYING AND YOU

Received at the Public
Information Office - Shiloh
Feb. 13, 1984



citizens
for
A
better
ENVIRONMENT

127 North Seventh Street, Suite 204
Minneapolis, Minnesota 55401



THE GYPSY MOTH PROBLEM

The gypsy moth (*Lymantria dispar*) is a major tree pest in its leaf-eating larval (caterpillar) stage. During years of peak population, it has temporarily defoliated hundreds of thousands of acres of trees in the northeastern United States. While most trees soon re-leaf, some are killed -- particularly those already stressed from disease, old age, or man's abuse. The occasional presence of large numbers of leaf-munching caterpillars or fluttering moths is also annoying, even terrifying, to some people. More insidious is the millions of pounds of pesticide use which has occurred in the gypsy moth's wake.

The gypsy moth is native to Europe, Asia, and North Africa, where its populations are frequently controlled by harsh weather and more than a hundred native parasites, predators, and diseases. Removed from the checks and balances of its native environment, however, the gypsy moth, like many insects, can become a serious pest. Inconspicuous during the first twenty years after its escape from a research laboratory in Medford, Massachusetts, in 1859, the gypsy moth reached its first recorded pestiferous population levels in 1889.

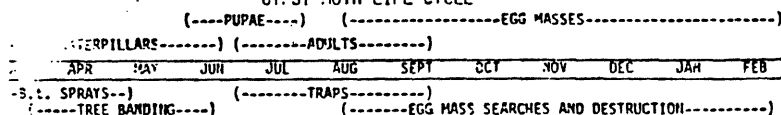
Despite decades of intensive pesticide use, the gypsy moth has continued to spread. Gypsy moth currently inhabits approximately one hundred fifty million acres (about 250,000 square miles) in the northeastern and midwestern United States. Gypsy moths are also being found in increasing numbers and locations in Washington, Oregon, and California. In 1982, gypsy moths were trapped in 32 cities in 14 California counties. Unlike the Medfly, which has not become established in the continental United States, gypsy moth is here to stay.

GYPSY MOTH ECOLOGY

Gypsy moth is an outbreak species. Its populations fluctuate from innocuous to very high levels. Gypsy moth caterpillars noticeably defoliated half a million acres in 1979. A record 12 million acres were temporarily defoliated in 1981. The 1982 population crash is expected to continue its dramatic decline in 1983.

As dramatic as large numbers of gypsy moths are, even during cycles of high populations less than 10% of the insect's 150 million-acre range has been defoliated. Apparent defoliation during most years occurs on less than 1% of the gypsy moth "infested" area. Some gypsy moth habitats have never experienced outbreak populations.

GYPSY MOTH LIFE CYCLE



GYPSY MOTH CONTROLS

Outbreak populations of gypsy moths may feed on a wide variety of plants. Oaks are a primary host and in California provide habitat for many different animals. Oak moths, tent caterpillars, and leafrollers are several oak-eating insects which may sometimes escape their natural controls and cause noticeable defoliation.

Insects normally consume 5-30% of a tree's annual foliage production. This feeding usually does not impair the plant, and may in fact stimulate the tree to grow more. Foliage feeders in the tree canopy increase the availability of sunlight and nutrients to younger, more vigorous trees which must someday replace their maturing parents. Canopy feeding provides for increased understory vegetation important to wildlife such as deer. Foliage feeders are fed on in turn by other organisms such as birds, which may depend on the availability of spring caterpillars to feed their nestlings.

This insect ecology may, however, be of little importance to suburban tree owners who may decide to implement insect controls, or even demand pest eradication.

CONTROL vs. ERADICATION

Gypsy moth programs in the "generally infested" areas of the Northeast and Midwest are designed to suppress gypsy moth populations. Control, or suppression, is an attempt to reduce insect populations below damaging levels. Gypsy moth control has increasingly relied upon use of natural predators and parasites and biological insecticides such as commercially-available insect-specific diseases.

Eradication, on the other hand, means the total elimination of an insect population even if its numbers are below pestiferous levels. Eradication programs rely primarily on repeated applications of chemical insecticides. Eradication cannot succeed against well-established insect populations, even in agricultural situations where highly toxic chemicals are repeatedly applied. Eradication can normally succeed only against low-level populations confined to small areas where the likelihood of reintroduction of the insect is low. Even then it may fail.

Despite the failure of gypsy moth eradication in the eastern United States, the State of California has embarked on a policy of attempting to totally eliminate the gypsy moth. California's "eradication" program is designed to prevent the moth's establishment and thereby prevent pest nuisance, the loss of some favored trees, and the substantial increases in pesticide use which might result.

California is spending millions of dollars each year on a program which includes border vehicle checks, quarantine inspections of the thousands of families moving into the state from generally infested areas, backyard egg mass surveys, and a statewide system of over 20,000 gypsy moth detection traps. California's 1983 eradication plans also call for several ground applications of the broad-spectrum insecticide carbaryl in nine of the 32 cities where gypsy moths were trapped in 1982.

Most environmentalists believe that California's gypsy moth eradication program is doomed to fail. "Eradication" will at most be a costly method of delaying gypsy moth's inevitable establishment. Eradication programs will themselves result in adverse environmental and health effects. Eradication will divert tens of millions of dollars away from other needed programs, including the development of long-term solutions which will be needed in order to reduce the impact of "living with" the gypsy moth.

Environmentalists believe the State should implement less costly, community-based programs which are safer to human health and the environment. Alternative programs are compatible with the State's short-term goal of attempting eradication, and can serve as models for gypsy moth program which will be needed in the long run.

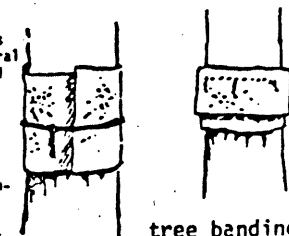
METHODS OF GYPSY MOTH CONTROL AND POSSIBLE ERADICATION

PESTICIDE SPRAYING

Carbaryl (Sevin) is the insecticide most frequently proposed by agricultural agencies for use in controlling or eradicating the gypsy moth. Carbaryl disrupts the normal transmission of nerve impulses. It is quite effective against gypsy moths when either contacted or eaten. Carbaryl is also highly toxic to honey bees. Carbaryl kills many beneficial organisms such as the parasites and predators which help to control oak worms and other pests. Carbaryl's use in San Diego against the Japanese beetle led to severe secondary pest outbreaks which killed plants that carbaryl presumably was applied to protect.

Carbaryl exposure has also caused numerous acute human illnesses and injuries. Laboratory animal studies indicate that carbaryl may cause birth defects, behavioral changes, increased susceptibility to viral diseases, and other chronic maladies. Carbaryl's known and suspected health hazards prompted the Connecticut Department of Health Services to warn homeowners and pest control operators to use B.t. instead.

Bacillus thuringiensis, or B.t., is a bacterial insecticide which is toxic only when eaten by caterpillars. B.t. is superior to carbaryl from both an environmental and a human health perspective. When properly used, B.t. is as effective as chemical insecticides for control of gypsy moth, according to studies by the Pennsylvania Bureau of Forestry. B.t. is not believed to be as effective as carbaryl in eradicating the gypsy moth. It is less persistent than carbaryl, and because it must be eaten by caterpillars in order to take effect, more applications are required when using it in eradication programs.



Presented at St. Anthony-Parkview
Community Center Cafeteria, 3301
Silver Lake Road, St. Anthony
7:00 - 8:15 p.m. 2/14/84

The Gypsy Moth in St. Anthony
Proposed Control 1984

Introduction: David Childs, City Manager

A. Mason, John Hayward, Mark Ascerno, Dr. Dharma Sreenivasam

This evening we intend to tell you what the Gypsy moth is all about, what it can mean to you, and what we propose to do about it, now and into the future.

The best introduction we have found on this insect pest is a film developed and produced by Canada Agriculture. The film will tell you about the pest and what it can do.

Film - 15 minutes

As you can see it certainly isn't a pest we want. It is also the worst defoliator in the Nation comparable to no insect in Minnesota any of us are familiar with.

Here to tell you a little about what the pest might be expected to do in Minnesota - Dr. Mark Ascerno, Extension Entomologist, University of Minnesota.

Thank you Mark.

John Hayward, USDA, APHIS will give you a brief summary of the history of Gypsy moth in Minnesota.

Thank you John - Now, let's look at the site (slides)

St. Anthony - #2

There are 4 options facing us and the Commissioner at this time - same 4 that faced us last year.

1. Eliminate infestations with chemical insecticides, carbaryl, sevin 4-oil our choice if this option selected.

2. Eliminate infestations with a biocide followed by mass trapping Bacillus thuringiensis, B.t.

3. Establish integrated pest management (IPM)

4. Do nothing

We have looked at this site from every angle and are proposing to use the biocide B.t. applied twice by helicopter mid to late May, and again in early June. The application would be followed by mass trapping, and repeated again in 1985 if necessary. The MDA, USDA sharing the cost of the program on a 50-50 basis.

We will be looking for the City to help us with whatever traffic control might be necessary and public notification.

I would like to back up just a moment and talk about the pesticides.

The chemical insecticide carbaryl sold under the trade name Sevin is the most commonly used insecticide in Minnesota and the U.S. It is known as a broad spectrum insecticide, one that will kill many different insects and micro organisms. It has an excellent track record, and relatively low toxicity to mammals. It doesn't persist in the environment and when used in accordance with labeled directions is not known to cause any problem to humans. There are some who dispute this but the record is clear. It kills the Gypsy moth in two ways - by contact and ingestion. It was used in Minnesota in St. Paul and Woodbury in 1983 and to the best of our knowledge eliminated the known infestations there.

St. Anthony - #3

The biocide - *Bacillus thuringiensis* is sold under such trade names as Dipel or thuricide and others. While it has not been around or in use as long as Sevin it too has an excellent track record. It has been used in urban areas of Minneapolis in cankerworm control with no major problems encountered; other than handling it. It is quite specific to the larvae of butterflies and moths. However, unlike Sevin, it must be ingested or eaten by the larvae to infect and kill it.

We would propose to utilize the 32 billion international units of potency - or 16 BTU/acre/application. The pesticide would contain a sticker to help hold it to the foliage - extending its effective life. We would follow the application with mass trapping - traps baited with the new plus - lure extremely effective pheromone in an attempt to disrupt mating.

Carbaryl and B.t. have the same cautionary label. We shall apply the same precautions of application with whatever the final decisions to the choice of material.

I believe we have talked enough - perhaps now we should answer your questions. While we will be answering your questions and concerns here hopefully you will put them in writing to the Commissioner of Agriculture, 90 W. Plato Blvd., St. Paul, Mn 55107.

QUESTIONS

Conclusion - Call A. Mason 296-8328 or John Hayward 725-2302 should you have any additional questions following this meeting.

GYPSY MOTH INFORMATIONAL MEETING

February 14, 1984 at 7:00 p.m.

City of St. Anthony
Parkview School Cafeteria

Thirty-one people attended including city officials (number does not include State, Federal and University personnel).

Mayor Sundland opened the meeting at 7:05 p.m. The program was the same as in Stillwater. The following questions and answers were recorded by Dharma Sreenivasam.

Q. Why are you recommending a biocide instead of the chemical carbaryl?

A. Mason: We have evidence that Bt has been found to be effective in other states. We believe it will be effective in Minnesota. Also, it is a 2 year program with intensive mass trapping.

Q. Is one (Bt) safer than the other (Sevin)?

A. Mason: Both have similar precautionary labels.

Q. Any bad side effects from spraying?

A. Mason: We advise people to stay indoors during time of spray. All residents are notified by radio, handouts, etc.

A. Hayward: In Wisconsin no cases of side effects were reported. No complaints.

Q. Is there a certain time you usually spray?

A. Mason: The critical time of spray is when foliage is out and the gypsy moth is actively feeding. There will be two sprays 10 days apart. The latter part of the morning might be a good time to spray.

Q. How many days advance notice can you give?

A. Mason: This is extremely difficult. We will be monitoring what is happening in other areas, growing degree days, other insect development, etc.

A. Hayward: Advance notification is difficult. We have to watch and do it in a short time.

Q. How is the spray applied? By truck?

A. Mason: No. By helicopter which gives better precision. Fixed winged aircraft are not suitable.

Q. How long will it take for the spray?

A. Mason: Approximately 15-20 minutes in St. Anthony.

Gypsy Moth Informational Meeting
City of St. Anthony
February 14, 1984

Comment: Mayor Sundland offered help of Girl Scouts on the day of the spraying.

Q. Are there any effects on other vegetation from Bt?

Q. Mason: No visible effects. Bt is very specific to this group of insects.

Comment: One of the audience suggested that people should read the USDA publication "Homeowner and the Gypsy Moth - Cultural practices that the homeowner can do".

Q. What type of program does MDA have to inform/educate the people about the gypsy moth?

A. Mason: Not a great deal of effort at this time. However, if large infestations occur our efforts will be increased.

Q. How about effect of Bt on houses, stucco, outdoor furniture, etc.?

A. Mason: You are unlikely to see any damage.

A. Hayward: All surfaces can be easily washed off.

Q. How big is the problem with RV's parked in residences? Can these carry gypsy moths?

A. Mason: In most cases probably not unless they have travelled to east coast during summer months.

A. Hayward: Campgrounds are being checked. Outdoor furniture should be checked. People moving out of gypsy moth infested states should now carry a certificate attesting that the outdoor furniture, etc. have been checked.

Comment: A representative from CBE - her organization will not oppose MDA this year.

Q. In Wisconsin gypsy moth is eliminated from two towns using mass trapping. Is this true?

A. Hayward: In Appleton the gypsy moth infestation was confined to 5-10 acres and was eliminated. Some of the reasons for the success - winter kill, with Appleton north of 45° latitude, and trapping using the plus-lure. Monona, however, still has gypsy moth infestations.

Q. Is the chemical (Bt) biodegradable?

A. Mason: Absolutely. A sticker is added to extend its life.

A. Ascerno: Bt has about 3 days of residual activity.

Gypsy Moth Informational Meeting
City of St. Anthony
February 14, 1984

Q. Mr. Mason, you mentioned other options. What about parasites and predators from Europe?

A. Ascerno: Parasites and predators take care of only 20% of gypsy moth population.

Q. What are some of the predators?

A. Ascerno: Carabid beetles, USDA publication lists several predators and parasites.

The meeting was adjourned at 8:30 p.m.

APPENDIX B

MEDIA COVERAGE OF GYPSY MOTH

(B-1 - B-8)

Hungry gypsy moth creeps into area

ST. CLOUD DAILEY NEWS

9/16/83

By SHERI BRENDEN
Times Staff Writer

Sauk Rapids has been invaded by an alarming number of insects known to destroy millions of forested acres each year, according to a state agriculture official.

A September check of three bugtraps set in Sauk Rapids revealed a catch of 29 gypsy moths — a Minnesota moth catch second only to St. Anthony in Hennepin County.

"That's a large number, a really large number. It's something of concern," said Dharma Sreenivasam, an entomologist with the Minnesota Department of Agriculture.

During a meeting at St. Regis Corp. in Sartell, Sreenivasam told the Wood Fiber Council, a group of union and non-union employees from Minnesota's five paper and paper board companies, about the pest that could threaten the wood-fiber industry.

Gypsy moths have never been found this far north before, Sreenivasam said. Now, agriculture department officials

“There won't be any visible feeding damage next year, or the following year.”

— Dharma Sreenivasam
Warns of gypsy moth dangers

want to see if the moth's eggs can survive the winter, Sreenivasam said.

"Just catching them does not mean they'll survive," he said. "But with the snow cover we have, we have to have minus 20 (degrees) for 36 hours in order to kill them."

Only one moth was discovered in St. Cloud. Three were trapped in Sartell.

Gypsy moth larvae are voracious eaters. In 1981, they ruined 13 million acres of forest in the eastern part of the country. Their defoliation damage has dropped to 3 million acres so far this year, Sreenivasam said.

Sreenivasam said there is no reason for panic. "There won't be any visible feeding damage next year, or the following year (in Sauk Rapids)" he said.

Department of Agriculture staff members will return to Sauk Rapids in November after the leaves fall to look for egg masses and the possible carrier that transported the pest here, Sreenivasam said.

"Their only movement is because someone moves them from the east coast," he said.

The moth population in Sauk Rapids probably will be monitored for at least two years before any eradication plan would begin, Sreenivasam said. But if many eggs are discovered, more immediate action may be required, he said.

The spraying of two infested neighborhoods in St. Paul and Woodbury this spring stirred a great deal of opposition from residents there who were worried about the effects of the pesticide, Sevin 4-Oil.

"Right now it's quiet on both fronts," Sreenivasam said. "We don't want to brag about it. But this year we have not caught a single moth in the sprayed areas, and we set an intensive number of traps there."

Wood-fiber employees were worried about the type of trees the insect might attack. Aspen forests account for the industries' latest five years of expansion, according to Terry Serie, St. Regis public affairs manager.

About \$600 million has been spent in the Minnesota wood-fiber industry, and 1,000 new jobs have been created because paper mills have been able to capitalize on fast-growing aspen forests, he said.

"It will threaten the oaks first and then move into the aspen," Sreenivasam said. "When they run out of their own favorite food, they go after anything they can get." The larva will chew on conifers after they have finished off broad-leaf foliage, he said.

This area has major timber stands within 50 miles, Serie said.

Sreenivasam advised residents who discover a hairy caterpillar with red and blue spots to bring it to their county extension agent for identification.

"Any hairy creature is not a gypsy moth," he said.



NEWS RELEASE
MINNESOTA DEPARTMENT OF AGRICULTURE
FOR RELEASE (Immediate) September 23, 1983

90 WEST PLATO BOULEVARD
ST. PAUL, MN 55107
PHONE: 612 - 296 - 9310

Last spring's aerial spray campaigns in Woodbury and St. Paul were successful in elimination of the Gypsy moth from those two established infestations, but the same intensive summer long survey that confirmed that, also identified two new potential infestations plus another eight communities on the suspect list, according to Agriculture Commissioner Jim Nichols.

This year's survey and efforts to prevent the establishment of the nation's most destructive forest pest in Minnesota's urban environment confirmed the need to escalate the vigil this fall and for another full year.

The new hot spots are residential neighborhoods in northeast St. Anthony, and near the river bluffs north of downtown Stillwater. A yard-by-yard search of these two areas is scheduled this fall as soon as trees drop their leaves. A cooperative team of specialists will be duplicating the difficult searches of last fall in St. Paul and Woodbury, looking for the always concealed Gypsy moth egg masses this time in St. Anthony and Stillwater. The moths hide the masses in tree bark, lawn furniture, building siding, rocks and landscape timbers, under boats, trailers and other recreation equipment including canvas covers.

Commissioner Nichols said that the new target areas, where the ground searches will start about October 1, are much smaller than those last year when 430 acres had to be inspected. Preliminary data, linking the multiple trappings of male Gypsy moths to household moves within the past three years, gives the search initial four square block targets each in St. Anthony and Stillwater. The egg mass search will help determine what future action may be necessary to control the destructive pest.

The 10,000 traps used in this year's most intensive Gypsy moth survey to date, will be concentrated next year in the communities that have recorded multiple Gypsy moth trappings. No moths were found in 28 of the 40 counties that were trapped this summer.

In addition to the St. Anthony and Stillwater communities, next year's trappings will be intensified in Sauk Rapids, Northfield, White Bear Lake, Apple Valley, Eagan, St. Louis Park, Minneapolis and Mounds View, which had multiple moth catches this year.

Moth Patrol Starts In St. Anthony

by Bill Wagner

A new neighborhood pest has been discovered in St. Anthony. But the city and the U.S. Department of Agriculture are hoping that the unwelcome visitor can be wiped out.

The gypsy moth, one of the country's leading insect destroyer of trees, has been found in small numbers in an area of St. Anthony about two blocks west of the city police station, just off 32nd Ave. and Silver Lake Road. Although, with the cooler weather having now arrived, there is no danger of the moths multiplying, the department of agriculture has already undertaken steps to prevent any possibility of a moth population increase.

John Hayward, an entomologist and an officer for the department of agriculture, told the *Northeast* Oct. 4 that the moths had been discovered incarcerated in several traps placed in the general area just west of Silver Lake Road. Hayward notified St. Anthony City Manager David Childs of the developments, and also told of plans to canvass about 50-100 acres of the city. The task would be performed by employees of both the state and federal departments of agriculture, and its mission would be to collect gypsy moth egg masses and determine how the moths became placed there. According to Hayward, that search would take place in the latter part of October and run through early November.

"It's very essential that we find out where the moths came in."

"It's very essential that we find out where (the moths) came in," said Hayward. He emphasized the importance of "getting the word out to the people so they won't be scared when we go through their yards."

"We'll be knocking on doors, telling the people what we're doing," he noted.

Hayward also said that public information meetings will be held to inform residents of the dangers posed by the gypsy moths, which reside mostly in eastern states such as Pennsylvania, Connecticut and Massachusetts. People have brought the moths to the midwest, he said. Gypsy moths have also been discovered in Stillwater and Woodbury. They usually come into this area by latching onto recreational and camping equipment that has been on long trips, according to the department of agriculture.

The moths trapped in St. Anthony were males captured by means of a sex attractant that smells like the female moths, Hayward said.

According to Hayward, insecticide spraying has historically been used to counteract the pests. But Hayward stopped short of recommending that course of action for St. Anthony. Biological measures are also a possibility, he said, and the control options "should be presented sometime this winter."

Hayward did not say how many moths had been found in St. Anthony, but said the number was so small that no detectable tree foliage has been eaten. The insects have been known to consume voracious amounts of leaves, with some individual moths capable of eating as much as one square foot of foliage per day.

Hayward said the insects are not capable of reproducing during the cold winter months. However, the moths are exceptionally hearty creatures, and many moth egg masses are able to withstand even the severe Minnesota winters. The city and the state and federal employees, though, have until next spring to deal with the insect dilemma.

Childs said, "We've got plenty of time to do something (about the moths). We're happy that (the department of agriculture) is having public meetings. I would expect that the city council would hope that the cure would be biological in nature."

"I guess I'd say in part that scientists and environmentalists are learning to introduce biological solutions to pest control, and to avoid strong chemicals that may be more damaging than the pests they're trying to control," Childs said.

St. Anthony Mayor Bob Sundland said, "I'd have to be certainly assured that (any solutions) they would be using would not have any (adverse) effects on the public. Public hearings must prove this out."



DEPARTMENT OF AGRICULTURE
80 WEST PLATO BOULEVARD
SAINT PAUL MINN 55107

News Release

FOR RELEASE (Immediate) 2-3-84

CONTACTS: Art Mason, MDA (612) 296-3347
John Hayward, USDA (612) 725-2302

Public information meetings, the first this Monday evening, February 6, have been scheduled by Agriculture Commissioner Jim Nichols to present and discuss this year's proposed campaign to eradicate infestations of gypsy moth, the nation's most destructive shade tree pest, in Sauk Rapids, Stillwater and St. Anthony.

Meetings will be held:

February 6, at 6:30 p.m., in City Hall, 104 North Benton Drive, Sauk Rapids;

February 13, at 7 p.m., in Council Chambers, 216 North 4th Street, Stillwater; and

February 14, at 7 p.m., in the Parkview Community Center Cafeteria, 3301 Silver Lake Road, St. Anthony.

Target areas for the 1984 campaign total only 88 acres, one fifth of the 430 acres in St. Paul and Woodbury where chemical applications last year were successful in eradicating potentially disastrous gypsy moth infestations.

However, two of this year's target areas, 26 acres in Sauk Rapids and 30 acres in Stillwater, are immediately adjacent to major public waters, respectively the Mississippi and St. Croix Rivers.

Considering federal recommendations and successful campaigns in such limited areas in other states, Commissioner Nichols is proposing a two year campaign employing aerial applications of a new and improved formulation of the biocide *Bacillus thuringiensis*, B.t., in combination with mass trapping, utilizing 32 special traps per square mile. Also on federal recommendation, the traps this year will be baited with a new and improved gypsy moth attractant.

Reserved as an option for the 1984 and possible 1985 followup eradication campaign is the aerial application of the insecticide carbaryl, used successfully last year to eliminate gypsy moths established in St. Paul and Woodbury.

Public comment offered at the three meetings will be considered by the Commissioner in making a final decision on the 1984 gypsy moth eradication campaign.

Metro/Region Briefing

From staff and wire reports

Meetings set on gypsy moth eradication

The Minnesota Department of Agriculture has scheduled two meetings next week to present the department's proposed plan to eradicate infestations of gypsy moths.

Agriculture Commissioner Jim Nichols said the gypsy moth is the nation's most destructive shade tree pest. A meeting will be held at 7 p.m. Monday in the Stillwater City Council chambers and another will be held 7 p.m. Tuesday in the Parkview Community Center in St. Anthony.

Gypsy moth spray plan studied for 3 areas

By Jeann Linsley
Staff Writer

The Minnesota Department of Agriculture is proposing a spray program to eradicate infestations of gypsy moths in Stillwater, St. Anthony and Sauk Rapids, department officials said today.

Department spokesman Arthur Mason said spraying would be done in May or June, depending on weather conditions.

The department last fall isolated gypsy moth egg masses in the three areas, and has recommended to Agriculture Commissioner Jim Nichols that the infestations be treated with a natural bacteria known as *Bacillus thuringiensis*, or Bt.

The substance would be sprayed from helicopters over a 32-acre area of Stillwater, a 30-acre area in St. Anthony and a 26-acre area of Sauk Rapids, Mason said.

Bt is a natural biological alternative to the pesticide carbaryl, which was used last year to eradicate infestations in St. Paul and Woodbury. Mason said Bt is being proposed this year because the spray areas are closer to water, and Bt would pose less of a threat than carbaryl to water supplies.

Mason said a department survey also has turned up multiple catches of male gypsy moths in Northfield, an area around Apple Valley and Eagan, and in Mounds View. How-

Please see **Moths / 7C**

ever, it isn't certain whether infestations are present in those areas or if treatment would be required.

The spray programs in the three areas will take place while the gypsy moth caterpillars are emerging from their eggs. The insects are most dangerous in their caterpillar stage. The caterpillars feed on leaves of oak and other trees. They also can defoliate evergreen trees. Gypsy moths have defoliated millions of acres of forests in the East.

Last May, the department conducted a controversial aerial carbaryl spraying program to eradicate moths from parts of St. Paul and Woodbury. That program has been pronounced a success by department officials.

But the department still is concerned about trappings of moths in other areas of the state, Mason said. He said surveys last fall have turned up 196 moths in 13 counties in Minnesota. Most have been found in the Stillwater, St. Anthony and Sauk Rapids areas, he said.

"So far almost all of the infestations have been tied to outbreaks in the east. And those outbreaks fortunately have subsided," Mason said.

Public information hearings will be conducted this week in Stillwater and St. Anthony to get input from citizens and local officials on the proposed spraying program. Hearings have been held in Sauk Rapids. Nichols will make a final decision in mid-March.

Moth Spraying Planned for Spring

by Bill Wagner

The federal and state departments of agriculture and the City of St. Anthony have finalized recommendations for safeguarding the community against gypsy moth caterpillars.

Gypsy moths were apparently unknowingly brought to Minnesota from the East Coast attached to vehicles that travelled over those long distances. The insects were discovered in their egg stage last fall. As caterpillars, the gypsy moths ravenously consume foliage.

In other parts of the country, this has resulted, officials say, in large areas where trees were totally defoliated. After two or three gypsy moth caterpillar attacks, leafy trees will die. And evergreens will die after one gypsy moth defoliation.

The problems have caused some states to "quarantine" the agricultural and forestry products of infested states. Minnesota officials are trying to control the moths before such measures are taken against Minnesota products.

At a public information meeting in St. Anthony February 14, residents heard a recommendation to spray a portion of the city in late May or early June, depending on the weather. The recommendation calls for spraying by helicopter, just after daybreak, in the area bounded by 35th Ave. NE, Harding St. NE, 33rd Ave. NE and Silver Lake Road.

The recommendation must be approved by Minnesota Commissioner of Agriculture Jim Nichols.

Federal Animal-Plant Health Inspection Service (APHIS) officer John Hayward, said the spraying would effect a biological killing of several gypsy moth caterpillars in the area, and would be done only with advance public notice. "They'll be told when the helicopter is coming," said Hayward.

The spray would be a substance known as bacillus thuringiensis (b.t.), a biocide that has been found effective in killing the caterpillars and preventing their spread. Art Mason, assistant director of the plant division of the Minnesota Department of Agriculture, said he supports the use of b.t. and that initial feedback from Nichols has been positive. "He indicated today that he most likely would be going with our recommendation," Mason said February 22.

In order to maximize chances of getting all the moths, officials will lure the creatures into a concentrated area by using a sex attractant. This trapping area will extend east-west from roughly one-fourth of the way between Skycroft Drive and Silver Lake Road over to Edward Street.

Mason said that unlike a chemical insecticide, b.t. is bacteria that cause the caterpillars to become ill and die. "It's highly host-specific," he said, noting that only moths and chewing caterpillars seem to be affected by b.t. Other insecticides that could be used would also kill other insects, including honeybees, Mason said.

Will the biocide have any effect on other living things? Mason noted that the b.t. killing of the moth caterpillars would force those creatures that feed on them to look for food outside the sprayed St. Anthony area, but added that there is no evidence of the substance being toxic to other animals, including humans.

Janet Keyes, researcher for the Citizens for a Better Environment (CBE), a national watchdog environmentalist group also endorsed b.t. CBE has been monitoring the way government officials have handled similar gypsy moth problems in Woodbury, Minn., Wisconsin, and Illinois. "It is one of the safest things you can use on gypsy moths," she said. Keyes cited b.t.'s success in a Wisconsin moth situation, and added that she feels comfortable with its use because there has been no tolerance level set for humans by the EPA.

St. Anthony city manager Dave Childs, who had hoped for the biocide moth remedy when the moth egg masses first surfaced in St. Anthony last fall, said, "They're doing what we recommended. I'm comfortable that this is the safest method we could find."

Mason said he could not quote a firm cost figure for the moth operation, but the \$18,000 figure quoted at the public meeting is a "very high figure" that includes staff time. The cost, he said, will be split between the state and federal governments.

Residents will probably notice the spray soon after the operation. "The droplet sizes maybe large enough that they would see them," Mason said. "It has no corrosive materials. It will wash away."

Mason added, though, that a "sticker" will be added to keep as much of the bacteria in one place as possible. The material will wash away, he said, but "it will take more than just a swish of water."

The bacillus breaks down in about three days, depending on weather, according to Mason. While the material has not been found harmful to humans, Mason said it is a good idea to avoid contact with the bacillus as it is being sprayed. It is just a good idea, he said, "not to look up at something coming out of the sky."

Keyes said that the employment of b.t. comes as a result of the successful use of the substance in Wisconsin, and also after the CBE had questioned government officials on the use of carbaryl, a broad spectrum insecticide. Keyes said there is evidence that carbaryl was more likely than b.t. to affect asthma sufferers, and that some studies had indicated that humans could be more susceptible to viral infections more easily after exposure to carbaryl than exposure to b.t.

Mason said there is no evidence of carbaryl causing harm to humans, and added that it was EPA tested and not removed from the market. It is approved for use, he said, "fully as labeled."



DEPARTMENT OF AGRICULTURE
90 WEST PLATO BOULEVARD
SAINT PAUL, MINN. 55107

News Release

FOR RELEASE (IMMEDIATE) April 20, 1984

CONTACT: (612) 296-9310

This year's Gypsy moth eradication campaign for three limited areas of confirmed infestation of the destructive tree pest in Stillwater, St. Anthony and Sauk Rapids will utilize the biological agent Thuricide 48 LV and mass trapping, Minnesota Agriculture Commissioner Jim Nichols announced today.

The decision came after six months of intensive study of national Gypsy moth pest control experiences, consultation with state and federal scientific and regulatory agencies, review of the 1983 Minnesota eradication campaigns in St. Paul and Woodbury, and a series of public information meetings and interested citizen comments.

While the decision reflects a shift from the pesticide used successfully last year, Commissioner Nichols said that the insecticide carbaryl (Sevin) will remain a high priority chemical in future Gypsy moth control and eradication programs in Minnesota.

Choice of the biological agent Thuricide 48 LV for this year's campaign, tentatively scheduled for the last two weeks of May with follow-up aerial applications ten days later, was made because of the limited size of the control areas and their close proximity to major public water resources.

About 100 families reside in each of the target areas: 32 acres in Stillwater, 30 acres in St. Anthony, and 20 acres in Sauk Rapids. All residents of these target areas will receive hand-delivered notices about the aerial applications and proper precautions the day before the actual early morning spraying operations in the respective communities.

In addition to these eradication efforts, the Minnesota Department of Agriculture in co-operation with the U.S. Department of Agriculture will also step up its Gypsy moth monitoring program in the southern half of the state. More than 9,000 specially designed and baited moth traps will be placed by 11 student scientists during late May and early June. Mass trapping will be utilized in those areas where Gypsy moths have previously surfaced in Ramsey, Hennepin, Washington, Scott, Dakota and Rice county communities. These traps have been the key thus far to Minnesota's early detection of Gypsy moth presence.

APPENDIX C

GYPSY MOTH CHRONOLOGY - MINNESOTA

(C-1 - C-12)

GYPSY MOTH

Chronology - Minnesota

- 1969 - April, 3 egg masses and 7 empty pupal cases recovered from a mobile home, Duluth, St. Louis county:
- 1970 - Limited survey - - negative.
- 1971 - One egg mass recovered from a tent trailer, Minneapolis, Hennepin county. Trap placed in the area of the egg mass find - - result negative.
- 1972 - One egg mass recovered from a mobile home, Blaine, Anoka county. One live female gypsy moth recovered from a tent trailer, Cass county.
- 1973 - One egg mass removed from a mobile home, Apple Valley, Dakota county. Five hundred and fifty (550) traps placed in 74 counties - - negative.
- 1974 - Two thousand six hundred and four (2,604) traps placed in 34 counties at a density of 1 trap per 9 square miles - - negative.
- 1975 - Eight hundred (800) traps placed in 36 counties - - negative.
- 1976 - Three thousand fifty four (3,054) traps placed in 39 counties at a density of 1 trap per 9 square miles. One male moth recovered in Hennepin county.
- 1977 - Nine thousand (9,000) traps placed in 34 counties at a density of 1 trap per 3 square miles - - negative.
- 1978 - Ten thousand six hundred and sixteen (10,616) traps placed in 65 counties at a density of 1 trap per 3 square miles. One male moth recovered in Dodge county.
- 1979 - Six thousand one hundred and sixty (6,160) traps placed in 36 counties at a density of 1 trap per 3 square miles. One moth recovered, Dakota county.
- Delimiting survey in Minnetonka township, Hennepin county, 1 male moth recovered.
- Delimiting survey in Eureka township, Dakota county, 1 male moth recovered.
- Delimiting survey in Dodge county --- negative.
- 1980 - Approximately 3,590 traps placed in 24 counties. Trap density at delimiting survey sites 9 per square mile, others placed at 1 per 3 square miles. Three hundred twenty five (325) traps

were placed in the Twin Cities metropolitan area at 1 trap per square mile.

Gypsy moth recoveries were as follows:

Hennepin county	- 10 moths from 7 traps (detection survey)
	3 moths from 1 trap (delimiting survey)
Ramsey county	- 12 moths from 8 traps (detection survey)
Dakota county	- 1 moth from 1 trap (detection survey)

Viable egg masses were recovered from nursery stock shipped to the City of St. Paul from 3 Connecticut nurseries. One hundred seventy seven (177) trees were fumigated at holding yard in St. Paul.

1981 - Four thousand three hundred and ninety three (4,393) traps were placed in 14 counties. General detection survey trap density was 1 trap per square mile in urban areas, 1 per 3 square miles in rural areas. Trap density at delimiting survey sites was as follows: Twin Cities metropolitan area - 16 per square mile; Dakota county - 9 per square mile; Dodge county - 4 per square mile.

Gypsy moth recoveries were as follows:

Anoka county	- 1 moth from 1 trap
Dakota county	- 3 moths from 3 traps
Hennepin county	- 43 moths from 28 traps
Olmsted county	- 2 moths from 2 traps
Ramsey county	- 47 moths from 22 traps
Scott county	- 4 moths from 1 trap
Washington county	- <u>11</u> moths from 8 traps

Total 111

Egg mass survey conducted in the Twin Cities metropolitan area - - negative.

1982 - Two thousand seven hundred and seventy seven (2,777) traps were placed in 6 counties. Trap density was 16 per square mile in 4 square mile areas around each 1981 multiple trap catch except for one site in Dakota county where traps were placed at 9 per square mile for 9 square miles. Additional traps were placed in Minneapolis and portions of Ramsey county at a density of one per square mile.

Gypsy Moth Chronology

Page 3

Gypsy moth recoveries were as follows:

Dakota county	-	3 moths from	1 trap
Hennepin county	-	23 moths from	19 traps
Olmsted county	-	1 moth from	1 trap
Ramsey county	-	53 moths from	22 traps
Washington county	-	25 moths from	7 traps

Total 105

Egg mass surveys revealed 5 viable and 2 spent egg masses in St. Paul, Ramsey county, near the southeast corner of Clarence and East Seventh Street and 7 viable and 2 spent egg masses in Woodbury, Washington county, at the southeast corner of Sprucewood Drive and Sprucewood Court.

1983 - See next page for gypsy moth recoveries.

Egg mass surveys revealed the following:

St. Anthony - 19 egg masses

Sauk Rapids - 3 egg masses

Stillwater - no egg masses but 5 pupal cases were found.

MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION

1983 GYPSY MOTH CATCHES

<u>NO. OF MOTHS</u>	<u>COUNTY</u>	<u>CITY/TOWNSHIP</u>	
2	Anoka	Columbia Heights	(1)
		Andover	(1)
31	Benton	Sartell	(2)
		Sauk Rapids	(29)
41	Dakota	Apple Valley	(25)
		Burnsville	(3)
		Eagan	(6)
		Lakeville	(2)
		Mendota Heights	(4)
		W. St. Paul	(1)
59	Hennepin	Bloomington	(4)
		Golden Valley	(1)
		Minneapolis	(7)
		New Hope	(1)
		Plymouth	(1)
		Richfield	(1)
		St. Anthony	(41)
		St. Louis Park	(3)
1	Mower	Austin	(1)
1	Olmsted	Rochester	(1)
24	Ramsey	Moundsview	(14)
		Roseville	(2)
		St. Anthony	(1)
		St. Paul	(3)
		White Bear Lake	(4)
25	Rice	Northfield	(25)
1	Scott	Shakopee	(1)
3	Stearns	Melrose	(1)
		Sartell	(1)
		St. Cloud	(1)
1	Waseca	Waseca	(1)
7	Washington	Mahtomedi	(1)
		Stillwater	(6)
196			

A detailed list follows.

MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION
PLANT PEST SURVEY & DETECTION
GYPSY MOTH CATCHES 1983

Page 1

COLLECTION DATE	COLLECTION NUMBER	TRAP NUMBER	MOTHS	COUNTY	CITY/TOWNSHIP	LOCATION
08/03/83	MH-17-83	C-282	1	Anoka	Columbia Heights	LaBelle Park, just north of 40th Avenue NE, on tree just west of bottom of steps that lead into woods at southeast corner of park. Just north & west of intersection of 40th Avenue NE and Circle Terrace Boulevard.
08/17/83	PO-04-83	A-74	1	Anoka	Andover	Heather Street NW & Bunker Lake Boulevard NW (County Road 16), west of Heather Street NW and south of frontage road for County Road 16, Poplar tree.
08/18/83	MS-03-83	J-243	1	*Mower	Austin	Southeast corner of 12th Avenue SW and 22nd Street SW, wooded area on the corner, small elm tree SE of intersection
08/10/83	DM-01-83	22	1	Olmsted	Rochester	Hiawatha Court, just off County Road 2, on north side of street, about 1/2 mile east of 1982 catch (1982 catch was at 1551 - 7th Avenue NE).
08/24/83	TK-09-83	H-403	1	Scott	Shakopee	842 Main Street, south edge of yard in trees along fence, south of house.
08/04/83	PG-01-83	L-324	1	*Stearns	Melrose	223 West Third Street South, backyard, on tree south of garage.
08/30/83	PG-06-83	L-432	1	*Stearns	St. Cloud	*200 - 26th Avenue North, ash tree, SW corner of house.
09/01/83	PG-07-83	L-473A	1	*Stearns	Sartell	*NE of intersection of County Road 1 and Edgewater Road, ash tree west of green house with double garage door.
08/12/83	MS-02-83	J-619	1	*Waseca	Waseca	704 - 19th Avenue NE, oak tree east of garage.

*New County Record

MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION
PLANT PEST SURVEY & DETECTION
GYPSY MOTH CATCHES 1983

Page 2

*BENTON COUNTY

<u>COLLECTION DATE</u>	<u>COLLECTION NUMBER</u>	<u>TRAP NUMBER</u>	<u>MOTHS</u>	<u>CITY/TOWNSHIP</u>	<u>LOCATION</u>
08/25/83	PG-03-83	L-133	2	*Sartell	SW of intersection of Ridge Road and High Drive, on oak tree in yard west of bone brick split level house (3 oaks together).
08/25/83	PG-02-83	L-135A	25	Sauk Rapids	Fischer's Garden Mobile Park, SW of County Road 33 and Benton Oaks Drive, trailer park/campground, on spruce tree east of shop building.
08/25/83	PG-04-83	L-134	3	Sauk Rapids	NW of intersection of West Highview Drive and Benton Oaks Drive, east of redwood fence in oak tree. House is blue-gray, wood & brick, two-storied; tree is in east side of yard along tall solid 6-7' high fence.
08/25/83	PG-05-83	L-138	1	Sauk Rapids	NE of intersection of 9½ Street North and 4½ Avenue North, green house & garage, in elm tree west of house, south of garage by lilac bushes.

31

*New County Record

MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION
PLANT PEST SURVEY & DETECTION
GYPSY MOTH CATCHES 1983

Page 3

DAKOTA COUNTY

<u>COLLECTION DATE</u>	<u>COLLECTION NUMBER</u>	<u>TRAP NUMBER</u>	<u>MOTHS</u>	<u>CITY/TOWNSHIP</u>	<u>LOCATION</u>
08/05/83	TLK-03-83	H-571	8	Apple Valley	SE of intersection of 135th St. & Garden View Dr., cottonwood tree by telephone pole.
08/24/83	TLK-11-83	H-571	3		
08/24/83	TLK-13-83	H-571A	2		
08/24/83	TLK-12-83	H-571B	1	Apple Valley	SW of intersection of 135th St. & Garden View Dr., oak tree near brown house.
08/05/83	TLK-04-83	H-572	3	Apple Valley	County Road 38 (Palamino Dr.), E of Hamlet Ave., trap on short, bushy tree with light colored leaves beside bike trail, between 40 mph sign & tennis court.
08/24/83	TLK-14-83	H-572	1		
08/24/83	TLK-15-83	H-572A	1		
08/24/83	TLK-16-83	H-572B	4	Apple Valley	Cottonwood tree W of tree as described above (trap no. H-572 & H-572A).
08/05/83	TLK-05-83	H-574	1	Apple Valley	SW of intersection of Galaxie Ave. & 127th St. W. Private driveway on W side of Galaxie Ave., driveway has square arch made of telephone poles with 2 wooden wagon wheels nearby. Trap is on S side of driveway, just inside arch & W of southern wheel.
08/05/83	TLK-06-83	H-577	1	Apple Valley	E side of Johnny Cake Ridge, S of Sherwood Way, near Gerhardt Lake. Just N of main zoo entrance & N of divided road, 1st place N of zoo on W side of road. Trap is on E side of road across from trees close to road, N of fence & just N of mailbox. Trap is on N tree with white bark.
08/03/83	TLK-01-83	H-549	1	Burnsville	W of I-35, S of Burnsville Pky. Trap on tree across the wire fence along the E side of frontage road, E of sign which you would see when coming from the W. Tree is on curve of frontage road along the W side of I-35.
08/24/83	TLK-10-83	H-549A	1		
08/03/83	TLK-02-83	H-560	1	Burnsville	County Road 11, S of 35E. Trap is on small tree located on curve of County Road 11, S of road; field road with pile of dirt is located near tree, next to grassy area.
08/12/83	TK-06-83	D-810	6	Eagan	1940 Turquoise Trail, ash tree in front yard.
08/12/83	TLK-07-83	H-748	1	Lakeville	E of intersection of 185th St. W & Highway 50 (Kenwood Trail W). E of green house & dental clinic. Trap in large oak tree across from field road, southside.
08/12/83	TLK-08-83		1	Lakeville	Approximately 1.5 tenth of a mile E of trap no. H-748. NW corner of intersection of 185th St. W & Jamaica Path.
08/02/83	TK-01-83	D-392	2	Mendota Hts.	1865 Dodd Road, cottonwood tree in front yard.
08/02/83	TK-02-83	D-394	1	Mendota Hts.	At the end of Dodge Lane (Dodge Lane is S of Hwy. 10, W of Delaware Ave.), on willow tree at junction of driveway & Dodge Lane.
08/12/83	TK-07-83	D-834	1	Mendota Hts.	755 Willow Lane, NW of intersection of Dodd Road & Willow Lane. Maple tree in front yard.
08/02/83	TK-03-83	D-404	1	W. St. Paul	75 Wentworth Ave., maple tree on E side of brick home.

MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION
PLANT PEST SURVEY & DETECTION
GYPSY MOTH CATCHES 1983

Page 4

HENNEPIN COUNTY

<u>COLLECTION DATE</u>	<u>COLLECTION NUMBER</u>	<u>TRAP NUMBER</u>	<u>MOTHS</u>	<u>CITY/TOWNSHIP</u>	<u>LOCATION</u>
08/15/83	CA-01-83	E-6	1	Bloomington	9145 First Avenue South, ash tree on south side of house; house is located on NE corner of 1st Avenue South and East 92nd Street.
08/15/83	TK-08-83	D-339	1	Bloomington	8536 Stevens Avenue South, maple tree in front yard, on south side of driveway.
08/15/83	TK-09-83	D-364	1	Bloomington	650 East 83rd Street, cottonwood tree in front yard. Nearest intersection is Oakland Avenue South and East 83rd Street. (Between Oakland Avenue South & Park Avenue South).
08/15/83	TK-10-83	D-378	1	Bloomington	7920 - 13th Avenue South, locust tree on west side of garage facing East 79th Street. Garage is located on East 79th Street, between 13th Avenue South and 12th Avenue South.
08/25/83	JT-06-83	F-50	1	Golden Valley	7310 Ridgeway Road, ash tree (?) east of house.
08/05/83	MH-17-83	C-663	1	Minneapolis	2 Barton Avenue, SW corner of intersection of Barton Avenue & Malcolm, oak tree near fence, on west side of house.
08/09/83	JT-05-83	310	1	Minneapolis	1009 South Cedar Lake Road, at intersection of Cedar Lake Road & Wayzata Boulevard (Highway 12), south of highway, oak tree on hill north of home
08/16/83	TK-11-83	D-115	1	Minneapolis	4627 Nicollet Avenue South, between East 46th & East 47th, catalpa tree in front yard.
08/16/83	TK-12-83	D-126	1	Minneapolis	4306 Bloomington Avenue South, between East 43rd & East 44th, elm tree in front yard.
08/19/83	MH-23-83	C-305	1	Minneapolis	Public land, small wooded area, poplar tree just northwest of northern most yellow post at end of 16th Avenue Southeast, nearest intersection is 16th Avenue SE and Hennepin Avenue.
08/02/83	MH-11-83	C-360	2	Minneapolis	3214 Cleveland Street NE, north & west of intersection of 32nd Avenue NE and Cleveland Street NE. Cottonwood tree south of house, in west part of back yard near alley.
07/28/83	JT-02-83	F-201	1	New Hope	Wooded area east of 4101 Boone Avenue, southeast of intersection of Boone Avenue and County Road 9, 150 yards south of County Road 9. Oak tree 100 feet east of Boone Avenue.
07/27/83	JT-01-83	F-288	1	Plymouth	12206 County Road 15, from intersection of County Road 15 & County Road 73, follow County Road 15 west .75 mile to house by new development. Oak tree southeast of white house with windmill by road.
08/17/83	CA-03-83	E-175	1	Richfield	6338 Thomas Avenue South, backyard, west of home.

HENNEPIN COUNTY (continued)

Page 5

COLLECTION DATE	COLLECTION NUMBER	TRAP NUMBER	MOTHS	CITY/TOWNSHIP	LOCATION
08/01/83	MH-05-83	C-354	1	St. Anthony	3300 Beldon Drive, NW corner of intersection of Beldon Drive and 33rd Avenue NE. Elm tree in NW corner of backyard, NW of house, near garden.
08/01/83	MH-06-83	C-352	1	St. Anthony	3507 Edward Street, northeast of intersection of Edward and 35th Avenue NE. Cottonwood tree in middle of backyard.
08/01/83	MH-07-83	C-356	1	St. Anthony	2904 - 32½ Avenue NE (Hilldale), west of intersection of 32½ Avenue NE & Silver Lake Road. Maple tree in middle of backyard.
08/01/83 08/04/83	MH-08-83 C-355A	C-355 C-355A	14 5	St. Anthony	3412 Coolidge Street NE, southwest corner of intersection of Coolidge Street & 34th Avenue NE. Maple tree in middle of backyard.
08/02/83 08/11/83	MH-09-83 C-341A	C-341 C-341A	1 1	St. Anthony	3542 Coolidge Street NE, southwest corner of intersection of Coolidge Street & 36th Avenue NE. Maple tree in middle of backyard.
08/02/83	MH-10-83	C-342	1	St. Anthony	3640 Edwards Street NE, southwest of intersection of Edwards Street NE & 37th Avenue NE. Maple tree in middle of backyard.
08/02/83	MH-12-83	C-361	3	St. Anthony	Park area (nursery), south & east of intersection of Silver Lake Road & 36th Avenue. Maple tree in wooded area west of north end of parking area. (Street address would be between 3501 & 3513 Silver Lake Road).
08/02/83 08/04/83	MH-13-83 C-362A	C-362 C-362A	2 2	St. Anthony	2921 - 33rd Avenue NE, just west & north of intersection of 33rd Avenue NE & Silver Lake Road. Oak tree in middle of backyard.
08/02/83	MH-14-83	C-363	1	St. Anthony	3224 Rankin Drive, southwest corner of intersection of Rankin Drive & 33rd Avenue NE. Red maple tree southwest of home.
08/02/83	MH-15-83	C-367	1	St. Anthony	3217 - 32nd Avenue NE, north & west of intersection of 32nd Avenue NE & Rankin Drive. Willow tree in front yard.
08/11/83	MH-20-83	C-834	2	St. Anthony	3326 Beldon Street NE, southwest of intersection of Beldon Street & 34th Avenue NE. Willow tree on north side of backyard.
08/11/83	MH-21-83	C-833	3	St. Anthony	3420 Beldon Street NE, southwest of intersection of Beldon Street & 35th Avenue NE. Willow tree on north side of backyard.
08/11/83	MH-22-83	C-365	1	St. Anthony	3502 Skycroft Drive, west of intersection of Maplewood Drive & Skycroft Drive. Maple tree in middle of backyard.
08/24/83	MH-24-83	C-340	1	St. Anthony	SE of intersection of Beldon Street & 37th Avenue NE. Green house across street from 3630 Beldon Street NE. Tree in middle of backyard.
08/09/83	JT-04-83	322	3	St. Louis Park	4319 Cedar Lake Road (County Road 16), west on Cedar Lake Road from County Road 17 (France Avenue) to dead end, trees and house are off to left of circle. Oak tree N-NW of residence.

MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION
PLANT PEST SURVEY & DETECTION
GYPSY MOTH CATCHES 1983

Page 6

RAMSEY COUNTY

<u>COLLECTION DATE</u>	<u>COLLECTION NUMBER</u>	<u>TRAP NUMBER</u>	<u>MOTHS</u>	<u>CITY/TOWNSHIP</u>	<u>LOCATION</u>
07/27/83 08/10/83	MH-02-83	C-107 C-107A	1 1	Mounds View	2808 Bronson Drive, oak tree northeast of storage shed in backyard.
07/27/83	MH-03-83	C-773	3	Mounds View	3016 Woodale Drive, oak tree 35' southeast of house in backyard.
08/05/83 08/10/83	MH-19-83	C-825 C-825A	7 1	Mounds View	7188 Knollwood Drive, north & west of intersection of Woodale Drive & Knollwood Drive. Oak tree in far west part of backyard (in middle).
08/25/83	MH-26-83	C-106	1	Mounds View	5065 Brighton Lane, northwest of intersection of Brighton Lane & County Road H. Oak tree in backyard in the garden area.
07/29/83	MH-04-83	C-720	1	Roseville	Undeveloped wooded area between 969 & 999 Parker Avenue, east of intersection of Lexington Parkway & Parker Avenue. Willow tree 10' north of road in wooded area half way between two houses.
08/02/83	MH-16-83	C-223	1	Roseville	2177 County Road B, just north & east of intersection of County Road B & Marion Road. Oak tree 25' west of driveway.
08/24/83	MH-25-83	C-330	1	St. Anthony	2701 Silver Lane, tall poplar tree across street and up hill from front door of this house. Tree between Apache parking lot and Silver Lane at top of small hill.
07/26/83	MH-01-83	C-298	1	St. Paul	1359 Brompton Street, on Brompton just north of Doswell. Oak tree on south side of backyard.
08/09/83	DT-03-83	B-557	1	St. Paul	Wooded area on east side of Battle Creek Road, slightly over 5/10 mile south of Upper Afton Road, poplar tree 30 feet into the woods, near pole.
08/26/83	DT-06-83	452	1	St. Paul	2120 Waukon Avenue, apple tree in front yard.
08/22/83	DT-04-83	298	2	White Bear Lake	3799 Van Dyke Street North, birch tree in backyard.
08/22/83	DT-05-83	300	2	White Bear Lake	Wooded area, corner of Lakewood Avenue & County Road F. Oak tree about 7 yards in from fire hydrant.

MINNESOTA DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION
PLANT PEST SURVEY & DETECTION
GYPSY MOTH CATCHES 1983

Page 7

*RICE COUNTY

<u>COLLECTION DATE</u>	<u>COLLECTION NUMBER</u>	<u>TRAP NUMBER</u>	<u>MOTHS</u>	<u>CITY/TOWNSHIP</u>	<u>LOCATION</u>
08/25/83	TK-20-83	H-32	8	Northfield	Go north on Prairie Street to 7th Street East, turn right into golf course parking lot, go to east edge of lot, trap is on 1st tree at NE corner of parking lot, 50' west of street straight north of row of trees between parking lot & gol course.
08/25/83	TK-21-83	H-33	9	Northfield	611 College, 2nd house north of 7th Street, on south edge near street, beside fence.
08/25/83	TK-22-83	H-35	1	Northfield	Purina Drive, Farm Service building to north, a row of small trees to south, trap is on first cluster of cottonwood trees straight south of building.
08/25/83	TK-23-83	767	1	Northfield	Olive-green house on 8th Street, on west side of Linden, between 7th & 8th Streets, trap on large tree close to north end of bushes between house & Linden.
08/25/83	TK-24-83	H-43	1	Northfield	Highway 3 & Greenvale, east side of Highway 3 at dead end of Greenvale just south of telephone pole, south of Greenvale. Trap on tree south of pole.
08/25/83	TK-26-83	H-44	1	Northfield	East of Highway 3 & Water Street, south of St. Olaf Avenue, on Water Street at south end of yellow building, on tree to the east by telephone pole.
08/25/83	TK-26-83	H-45	2	Northfield	Roadside parking lot, on west side of 19, east of Highway 3. North edge of Carelton College, small parking lot, tree west of lot.
08/25/83	TK-27-83	H-46	1	Northfield	East from 19 on first road north of bridge, north of Carelton College. Gravel area on south side, east end of gravel area on big oak tree.
08/25/83	TK-28-83	H-47	1	Northfield	Woods west of cemetery on County Road 79, north of golf course. Tree in corner by southwest corner of cemetery. Tree on north end of cemetery (Oaklawn) entrance, trap in corner trees of woods (NE corner).

25

*New County Record

MINNESOTA DEPARTMENT OF AGRICULTURE
 PLANT INDUSTRY DIVISION
 PLANT PEST SURVEY & DETECTION
 GYPSY MOTH CATCHES 1983

Page 8

WASHINGTON COUNTY

<u>COLLECTION DATE</u>	<u>COLLECTION NUMBER</u>	<u>TRAP NUMBER</u>	<u>MOTHS</u>	<u>CITY/TOWNSHIP</u>	<u>LOCATION</u>
08/04/83	PO-03-83	A-372	1	Mahtomedi	96 Hickory Street, west of Highway 244, North of driveway, oak tree SE of home.
08/04/83	PO-01-83	A-711	1	Stillwater	Highway 95 north of business district, 1/4 mile south of wayside rest, on basswood tree south of triangular "No Passing Zone" sign.
08/04/83	PO-02-83	A-707	5	Stillwater	South of 408 Broadway, west of road on embankment, oak tree. North dead end of Broadway, north of St. Croix Avenue.

APPENDIX D

**BIOLOGICAL INSECTICIDE THURICIDE 48LV
AND PLYAC SPREADER-STICKER INFORMATION**

(D-1 - D-5)

THURICIDE® 48LV

AQUEOUS CONCENTRATE FOR
AERIAL OR GROUND APPLICATION

SPECIMEN LABEL

ACTIVE INGREDIENT:

Bacillus thuringiensis Berliner, potency

12,000 International Units

(at least 18 million viable spores) per milligram* 2.4%

INERT INGREDIENTS 97.6%

*Equivalent to 12.0 billion International Units per quart. 100.0%

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUTIONARY STATEMENTS

Hazards to Humans: Avoid inhalation or contact with eyes or open wounds.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Suspension must be shaken or stirred before use. Pour the recommended amount of THURICIDE 48LV into the required volume of water in the spray tank. Agitate as necessary to maintain suspension. Do not allow diluted sprays to remain in the tank for more than 72 hours. THURICIDE 48LV is formulated to provide desirable coverage and stickability on leaf surfaces. Additional adjuvants, spreaders, or stickers may be added but are not essential.

Ground Application:

Use adequate water to obtain good foliar coverage. Wet foliage but do not allow excessive runoff. Apply the recommended per-acre rates of THURICIDE 48LV. Use the following suggested amounts of water:

- 100 gallons with high gallonage hydraulic sprayers
- 10 gallons with mist blower

Aerial Application:

Apply THURICIDE 48LV at recommended rates by air either alone or as a spray mix diluted with water. Spray volumes of 32-128 ounces per acre are recommended. Best results are expected when THURICIDE 48LV is applied to dry foliage with a calibrated aircraft capable of obtaining droplet sizes below 300 microns and preferably in the range of 50-150 microns.

RECOMMENDATIONS

Thorough coverage is essential when using THURICIDE 48LV. Use the lower rates for light to moderate infestations. Use the higher rates against heavier worm infestations.

Pest	Ounces per Acre	Directions for Use
Spring and Fall cankerworm	11-22	Apply when leaf expansion reaches 40%-50% as infestation warrants. If eggs hatch over a long period of time or if reinfestation occurs, spray about 14 days after first application. For gypsy moth control where a single application is planned, apply at least 32 ounces of THURICIDE 48LV per acre.
Elm spanworm	11-22	
Tent caterpillars	11-22	
Gypsy moth	22-44	
Spruce budworm	16-44	Apply when most larvae are 3rd-4th instar. Also consider the opening of the bud cap to ensure foliar exposure.
Douglas fir tussock moth	11-22	Apply after eggs have hatched and early instar larvae are feeding on exposed foliage.
Jack pine budworm	11-22	
Bagworm	11-22	
California oak moth	11-22	
Western tussock moth	11-22	
Fruit tree leafroller	11-22	
Mimosa webworm	11-22	
Redhumped caterpillar	5-16	
Fall webworm	5-11	
Pine butterfly	16-32	

STORAGE AND DISPOSAL

STORAGE: Store in a cool place. Activity may be impaired by storage at temperatures above 90°F.

DISPOSAL: Thoroughly clean and rinse empty drum with water and remove labeling. Rinsate should be disposed of by burial.

NOTICE: Sandoz, Inc. makes no warranty, express or implied, including the warranties of merchantability and/or fitness for any particular purpose, concerning this material except those which are contained on this label.

NET _____ GALS.

LOT _____



EPA EST. NO. 36299-CA-1

EPA REG. NO. 11273-42

Sandoz, Inc., Crop Protection, 480 Camino Del Rio South, San Diego, CA 92108

SANDOZ, INC.
CROP PROTECTION



480 CAMINO DEL RIO SOUTH
SAN DIEGO, CALIFORNIA 92108
(619) 298-4343

IMPORTANT NOTICE

Sandoz is pleased to announce the acquisition of Zoecon Incorporated of the United States and Canada. Effective November 15, 1983, all Zoecon and Sandoz Crop Protection Division personnel, facilities and products will be combined under the Zoecon, Inc. name. Zoecon will be a wholly owned subsidiary of Sandoz Ltd. with major offices in Palo Alto, Calif. and Dallas, Texas.

THURICIDE^R forestry formulations will continue to be important products in the Zoecon product line. A. Temple Bowen will continue to handle government sales as the THURICIDE Forestry Sales Manager for the United States and Lon Seymour will remain as product manager. THURICIDE will be manufactured at our plant in Wasco, Calif. under the supervision of Tom Freaney.

As of November 15, Sandoz, Inc. Crop Protection in San Diego will be moved to the Zoecon location in Palo Alto, Calif.

The new address and phone number for THURICIDE are:

Zoecon Corporation
Crop Protection Division
425 Sherman Avenue
P.O. Box 10975
Palo Alto, CA 94303
(415) 857-1130

All government bids and tenders should be sent to Mr. Lon Seymour at our Palo Alto, Calif. address.

Copies of the new THURICIDE 32LV and THURICIDE 48LV labels are enclosed for your information. For more information regarding these products, please contact one of the Zoecon sales representatives listed below:

Lon Seymour
480 Camino Del Rio South
San Diego, CA 92108

Temple Bowen
23 Sherbrook St.
Augusta, Maine 04330

Dick Schneider
8048 Lincoln Way West
P.O. Box 243
St. Thomas, PA 17252

Paul Bystrak
R.R. #2
Box 137
Berrien Springs, MI 49103

We are looking forward to providing you with the quality product and service that has long been a tradition with Sandoz Ltd. and will now continue under the Zoecon banner in the United States and Canada.



Hopkins PLYAC[®]

NON IONIC SPREADER-STICKER

FOR INCREASED EFFECTIVENESS OF INSECTICIDE, FUNGICIDE, REPELLENT AND WEED KILLER SPRAYS

Principal Functioning Agents:

Emulsifiable A-C[®] Polyethylen⁺ and Octyl phenoxy polyethoxy ethanol^{*}

Constituents ineffective as spray adjuvant 72.5%

©Plyac is a Registered Trademark of Hopkins Agricultural Chemical Co.

+U.S. Patent No. 3,060,163

©⁺ A-C is a Registered Trademark of Allied Chemical Corporation.

*U.S. Patent No. 2,976,210

CALIF. REG. NO. 2393-50002 AA

DIRECTIONS

FOR GENERAL USE IN SPRAY MIXTURES

Use 2 to 4 ounces per 100 gallons of spray mixture. Rates as high as one pint per 100 gallons may prove advantageous when used with non-selective weed killers. Add PLYAC to the spray tank with good agitation, after all other spray materials have been added, when the tank is about $\frac{3}{4}$ full.

In Concentrate Sprays — Use 2 to 4 fluid ounces per acre on field crops such as cotton, forage, grain, and row crops.

With Cotton Defoliants — Use $\frac{1}{2}$ to 1 pint per acre, depending on size of plants.

Cattle Spray and Dip Treatment — Use 4 to 8 ounces of PLYAC per hundred gallons of spray or dip mixture. PLYAC should be added to the spray or dip tank after all other insecticides have been added and the tank is $\frac{3}{4}$ full.

FOR USE IN BULB DIPS

Tulips — To improve appearance of tulip bulbs by holding on the skins, use 1 part PLYAC in 5 parts water. After bulbs have been dug, dried for about 2 days, and graded — then dip for several seconds into stock tank containing PLYAC solution, take out, and drain. Then place bulbs back on drying trays and return to drying rooms.

Gladiolus — For treatment of corms that are to be stored, soak for 15 to 30 minutes in a solution containing 5 pounds Captan 75 W, 2 pints Parathion EM-2 emulsifiable concentrate, and 3 quarts PLYAC immediately after cleaning and grading. The PLYAC will form a film which will hold the

chemical dip on the corms. NOTE: For use of Captan and Parathion, follow the directions and precautions given on the label for each of these products.

FOR USE WITH RABBIT AND DEER REPELLENT

To protect fruit trees, shrubs, ornamentals and nursery stock from rabbits and deer, mix 1 quart of PLYAC with 1 quart of THIRAM 42-S in 2 quarts of water. Spray twigs and foliage to be protected with a heavy coating. If heavier deposits are desired reduce the amount of water in the mixture. Make treatments before animal damage is expected.

NOTE: For these and additional uses of THIRAM 42-S as a repellent follow the directions and precautions as directed on that label. Do Not use on plant parts that are to be used for food or feed.

NOTICE OF WARRANTY

Follow directions carefully. Timing and method of application, weather and crop conditions, mixtures with other chemicals not specifically recommended, and other influencing factors in the use of this product are beyond the control of the seller. Buyer assumes all risks of use, storage or handling of this material not in strict accordance with directions given herewith.

STORAGE

This product cannot be readily poured if stored below 30°F. However, freezing has no adverse effects on the quality of the product.

NET CONTENTS

CODE 1 2 3 4 5 6 7 8 9 (10-79)



BOX 7532

MANUFACTURED BY

Hopkins

agricultural chemical co.

55 GALLONS
(208.175 LITERS)

D-4

• MADISON, WISCONSIN 53707

Use of Plyac® Non Ionic Spreader-Sticker to Increase Residual Effectiveness of Livestock Sprays and Dips

PLYAC is a spray adjuvant intended for use with pesticide sprays and dips. It is a specially formulated co-polymer which gives a more even dispersion of chemicals as well as functioning as a deposit builder. Used with insecticides, fungicides, bactericides, it improves both residual and initial effectiveness as well as, in certain cases, increasing the intervals required between retreatment.

LIVESTOCK SPRAYS. PLYAC is particularly effective in livestock sprays because quantities as low as 4-8 oz./100 gal. of spray solution will form a water resistant coating on the hide which will prevent rain or other contact with water from removing the spray application.

DIP TANK TREATMENTS. Use of 4-8 oz. of PLYAC per 100 gal. of dip solution will ensure penetration of insecticides to the hide and upon drying will form a weather resistant coating providing long residual protection to the animal. To ensure compatibility in dip solutions, fill tank three-quarters full and add all other materials to the tank. Mix thoroughly. Add PLYAC and fill tank while mixing. PLYAC forms a stable emulsion which ordinarily requires little or no additional agitation.

RESIDUAL FLY SPRAYS. Use of 2-4 oz. of PLYAC per 100 gal. of spray mixture will increase residual effectiveness of fly sprays on and around barns and other livestock areas.

TOXICITY. The basic ingredient of PLYAC is considered to be non-toxic and has been approved for use in coating food containers where the material may come in direct contact with foods. The Environmental Protection Agency (#121.2517-33FR627) stated that materials of this type could be safely used as a component of food contact articles.

Use of rates in excess of those on the product label is not recommended. While small quantities of PLYAC will enhance the performance of many pesticides, use of rates in excess of those on the label may, in some cases, reduce the effectiveness of certain materials.

PLYAC® U.S. Patent Nos.
2,976,210
3,060,163

Preparation of Residual Whitewash Sprays

With the high cost of whitewash sprays for sun shield protection on fruit and nut crops, coupled with short residual life, a test program was initiated to develop a superior whitewash using Plyac® spreader-sticker as an adhesive.

Several years of field tests in California have shown this material to be equal or superior to other commercially available materials.

To prepare 100 gallons, combine the following materials with good agitation:

20 lbs. lime
20 lbs. calcium carbonate - finely ground
10 lbs. aluminum sulfate
4 fl. oz. Plyac® spreader-sticker

The Plyac® concentration may be increased to as much as 16 oz. if desired for increased permanence.

APPENDIX E

GYPSY MOTH SUPPRESSION AND ERADICATION PROJECTS

FINAL ENVIRONMENTAL IMPACT STATEMENT

(FEIS) (Federal Register, Volume 49, No. 58, March 16, 1984)

(See Separate Document)