CITIZENS LEAGUE REPORT

A proposal for neighborhood-city cooperation in controlling Dutch elm disease in high-priority locations within the Twin Cities metropolitan area

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SELECTIVE CONTROL
IS THE ONLY WAY
TO PROTECT ELMS

A proposal for neighborhood-city cooperation in controlling Dutch elm disease in high priority locations within the Twin Cities metropolitan area

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SUMMARY

Our strategy can be summarized in these words:

- Selective -- Identify locations where threatened trees are valued most highly and concentrate control efforts there. It's both unnecessary and wasteful to try to protect all trees.
- Small -- Encourage control to be carried out through separate programs in relatively small geographic areas. Don't attempt a single comprehensive control program over the entire area where trees are being protected.
- People -- Let the citizen/residents take the lead. The program serves them. Control won't work without their full cooperation and participation.
- Traditional -- Follow the method of control with a proven record: Get rid of places near valuable trees where beetles can breed, and sever the root systems of adjacent trees. Supplement with other approaches.
- Thorough -- Stress the importance of removing all dead and dying elmwood from a control area. Partial control is almost the same as no control.
- Annual -- Prepare for a long-term battle. Dutch elm and oak wilt diseases can't be eradicated. The same efforts with the same degree of diligence must be repeated year after year for as long as trees are being protected.

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Our central conclusions:

Trees should be protected because they are beautiful and because it makes sense economically to spread the expense of removal over many years.

Although Dutch elm and oak wilt diseases have established strong footholds in the Twin Cities metropolitan area, the battle by no means is lost, particularly if we select our priorities for control carefully.

Top priority areas for control should be (a) individual *elms and oaks* with unique historical qualities or in particularly valuable locations, such as Victory Memorial Drive or Summit Avenue, or the oldest and largest *elms and oaks* within a city; (b) residential areas and parks where *elms* make up a clear majority of shade trees and where their pattern of planting makes them esthetically pleasing; and (c) rural and urban forests and woodlots where *oaks* are dominant.

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Our major recommendations:

State assistance would be increased, but eligibility would be tied to local performance.

Cities would be required to establish priority areas for control as a condition for receipt of state funds.

Diseased trees would be marked with the date by which they are to be cut down.

Citizens could petition if cities don't remove trees on time. Petitions would be relayed automatically to the State Department of Agriculture.

Qualifying neighborhood associations could arrange for removal of public trees not cut down on time, with guarantee of reimbursement of expenses.

Persons who sell, give away or store bark-on elm firewood would be subject to fines and other penalties.

Better technical assistance would be given to citizens on use of Lignasan.

Early decisions would be made on use of selected chemicals.

Tree service firms would be licensed.

Citizens and cities would act before April 1977 to remove remaining dead and dying elmwood from control areas.

Contingency plans for disposal would be provided in case counties do not follow through as instructed.

High priority control areas would receive first priority access to disposal sites.

Cities would replant at least as many public trees as are removed or forfeit state funds.

The broad informal alliance of interest groups in the shade tree disease problem would form, together, a private shade tree protection society to monitor progress in control to carry out public education efforts.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

I. SEVEN THINGS WE HAD TO UN-LEARN ABOUT DUTCH ELM DISEASE.

Over the last five months many of our preconceived notions about Dutch elm disease have been dispelled and, in the process, we have developed a much deeper understanding of the disease and what should be done about it.

1. First, some of us were imagining swarms of beetles flying up the Mississippi River Valley, invading our metropolitan area, attacking every elm tree, and leaving nothing but devastation behind.

   Yes, we have learned that the disease is very serious. It is present throughout the metropolitan area. We will lose hundreds of thousands of elms over the next several years. The disease cannot be eliminated. But there is hope. It is a blight not a plague. Dutch elm disease is not the same as a vision of 1930s-type-locusts blackening the sky and devouring midwestern grain fields. The elm bark beetle behaves quite differently, and to understand and control Dutch elm disease you've got to understand the beetle. It usually doesn't fly very far from its birthplace to infect a healthy elm tree.

2. Second, we had figured that if Dutch elm disease were uncontrolled in some parts of our seven-county metropolitan area, it would be futile to try to control the disease in other parts.

   Nothing could be further from the truth. We *can* control the disease in some parts of the area and not others, and that is precisely the strategy we *should* follow (this leads to our third mis-conception).

3. We thought that if we at least make some minimum efforts to controlling the disease wherever it is identified in our seven-county area, we'd be able thereby to buy valuable time.

   That kind of a strategy, we learned, buys nothing but disaster. There is no such thing as half-hearted control. We must identify high-priority locations and concentrate our resources there, which is the only way to hold back the disease in any part of the seven-county area. If we were to try to save all of our four million elm trees in the region, the job would be so immense--exceeding by far the most optimistic estimate of resources available--that we'd spread our resources too thin and probably save none of our valuable trees.

4. Fourth, we had a feeling that control only could be accomplished through coordinated metropolitan-wide action.

   Yes, there are some significant metropolitan dimensions to the problem, particularly when it gets to finding places to dispose of trees once they're cut down. But it was most revealing to us to learn that the actual carrying out of a control program is intensely non-metropolitan, local and neighborhood, in character. Some localities or parts of localities will control the disease and others won't.

5. Fifth, we believed that the Dutch elm problem was up to government to solve.

   Yes, government involvement indeed is necessary, in fact, critical. But what we failed to comprehend earlier--and what has come through as so central in recent weeks--is that Dutch elm is one problem where government will fail unless it has the wholehearted support and assistance of citizens in the neighborhood.

6. Sixth, we hoped or expected that a thorough Dutch elm disease control program carried out in one or two years would do the job.

   It will, but only for that one or two years. We'll need all the enthusiasm and commitment we can muster year in and year out for as long as our disease-threatened trees are worth saving. There's no quick and easy answer.

7. Seventh, we thought our shade tree disease problem was almost exclusively confined to one kind of disease attacking one species of tree.

   Yes, Dutch elm disease is the major threat today. But it's not our only battle. Another disease is slowly gaining a foothold: oak wilt. The disease is every bit as deadly to the oak as Dutch elm disease is to the elm. Our chances of containing oak wilt are much better, if we take corrective steps.

II. THE NEED FOR ACTION

A. Findings

1. Dutch elm disease became an epidemic in the Twin Cities area in 1976 -- Although first discovered in Minnesota in 1961 in St. Paul (one tree) and near Monticello (seven trees), the disease spread very slowly until about 1974.

   * The loss in the seven-county area in 1976, about 80,000 trees, was almost three times the level of 1975, which itself had been three times the level of 1974, according to the State Department of Agriculture. On a cumulative basis, the seven-county metropolitan area has lost between 2% and 3% of its original elm population of about 4.5 million trees.

* The loss substantially exceeded projections. Informally, state agriculture officials had expected the level in 1976 to be about double that of 1975, not triple.

* About one-third of the metropolitan area loss in 1976 occurred in Minneapolis and St. Paul. Minneapolis lost about 7,100 (about 3% of its original elm population) for a cumulative loss of about 4.5%; St. Paul lost about 16,700 (about 16% of its original elm population) for a cumulative loss of about 22%.

2. Losses in 1977 and subsequent years are projected to be much greater --

* Metropolitan area losses in 1977 may reach 288,000, more than triple the number in 1976, according to a Metropolitan Council staff report.

* The city of Minneapolis projects a loss of 15,000 (about 6% of its original elm population) which would make its cumulative loss about 11%. St. Paul projects a loss of 22,000 (about 22% of its original elm population); which would make a cumulative loss of about 44%.

* If losses continue to accelerate at present rates, fewer than 10% of the region's elms would likely remain after six or seven years, according to the Metropolitan Council.

3. Losses are more severe in some locations than in others --

* Elm losses are felt most severely in areas where elms have particular historical significance or where, because of the pattern of planting, they are esthetically pleasing. Elm was planted almost exclusively as a boulevard tree along urban streets in the Twin Cities metropolitan area which were built up before the mid-1950s. Elm is virtually the only species of tree along boulevards of St. Paul and Minneapolis and in older suburbs. About 80% of the central cities' shade trees are elm.

* Larger elms are more valuable, and their loss is felt more than smaller elms. Although about 56% of the elms in the entire seven-county area are larger than five inches in diameter, about 84% of the elms in Minneapolis and St. Paul and the first ring suburbs fall in this category, according to a consultant study prepared for the Metropolitan Inter-County Council.

* The loss of large elms can be felt particularly where they have shielded older housing units which are more likely to exhibit exterior signs of deterioration.

* In absolute numbers, elm losses may be high in some communities but the impact will not be as great as others because elm is mixed in with other species. A survey conducted by the Minnesota Department of Natural Resources indicated approximately 36 million trees of all kinds are located in the seven-county metropolitan area, with elm making up about 13.6% of the total.

B. Conclusions

1. It's not too late to keep the disease at a tolerable level, in selected locations, if action is taken promptly.

* Although Dutch elm disease has not been adequately controlled so far, there still is a chance to keep its incidence at a manageable level in those parts of the Twin Cities metropolitan area where the elm is valued most highly.

* But unless major steps are taken in 1977, it is unlikely that much more than a mop-up job would remain. The pre-1977 control program is inadequate.

* Dutch elm disease cannot be eliminated. We are going to have to learn to live with the disease, just as we have learned to live with crab grass and dandelions. No part of the Twin Cities metropolitan area is unaffected.

* We should not give up and let the disease sweep through the Twin Cities area as would a tornado. Serious as it is, the disease can be controlled to such an extent that our most valuable elms will remain a major part of this region's beauty for at least 15 years and--depending upon our level of commitment--possibly 25 or 30 years. The critical point will not be the disease rate metropolitan-wide, nor will it be the percentage of trees which still survive. The critical point is which trees are kept alive. In total the trees that are most appreciated for their beauty make up probably no more than 10 to 20% of the total elm population of the metropolitan area.

* While the lives of our most valuable elms can be lengthened, the elms are not immortal. Most of them probably will die of Dutch elm disease before they die of old age. We must come to accept the fact that thousands of elms will die from Dutch elm disease each year, even with the best control program we can devise. Some trees will die even along highly-valued boulevards, such as Summit Avenue. But removal of trees should be seen as an indication that the control program is working, not that we have failed.

* Just as Dutch elm disease cannot be eliminated, the disease cannot eliminate the elm. While it will be ill-advised to replant elms along boulevards and in backyards, new elms will continue to grow in wild areas. Perhaps someday a way will be found to eradicate the disease so that young elms again can grow to become stately assets to the region's rural and urban forests.

2. It's worth trying to control Dutch elm disease because of the elm's beauty and because it makes sense economically --

   * Residential streets and parkways lined with elms are, simply, just very beautiful. They lend irreplaceable character to neighborhoods. It would be an absolute tragedy if we failed to take advantage of the opportunity which still is present to gain another decade or two of their presence and, in the process give other types of newly-planted trees the chance to have 10 to 20 years of growth as the elm population is gradually declining.

   * It just makes good practical sense to lengthen the life of the elms. Whether the disease is controlled or not, the money will have to be spent. The only question is when. Dead trees must be cut down. That is very expensive in an urban area. If the disease is not controlled, very high expenses will be incurred in a very short time. With a control program in effect, the expenses can be spaced out over many more years. A U.S. Forest Service study indicates that the total expenses of no control actually exceed the costs of a control program. (See page 20 for more discussion.)

   * We have other reasons for wanting to lengthen the life of the elms, such as the impact of trees on property values, their energy-saving shade in summer, their wind-protection in winter, and their oxygen-producing qualities.

C. Recommendation

We recommend an increase in state grants for the 1977-79 biennium, provided the Legislature enacts sufficient protection so that state funds are used to finance a control program, not a mop-up program.

We further recommend that state grants for subsequent bienniums be reduced or eliminated for those localities where good progress is not made in 1977-79. We believe "good progress" would be made in a given locality if no more than 5% of the original elm or oak population* becomes diseased in the year when the disease reaches its highest incidence in that locality, which means the trees would be phased out over at least a 20-year period. The State Department of Agriculture should be instructed--in its budget request for the next biennium--to recommend a guideline for determining further eligibility for funds.

We believe that state grants-in-aid should be used to help control shade tree disease, not just to help cities pay the expenses of large scale removal. Should control be unsuccessful and if hundreds of thousands of residential shade trees must be removed promptly, we believe that state loans, rather than grants, would be the appropriate state vehicle for assistance.

III. OAK WILT

A. Findings

1. Oak trees dominate the region -- A Department of Natural Resources Survey revealed about twice as many oak trees, 9 million, as elm trees in the metropolitan area. Oak trees are not dominant in the inner suburbs and central cities, but the number is very large in some localities. For example, Coon Rapids has an estimated 1.7 million oak trees, and Burnsville 750,000 oak, according to reports submitted to the State Department of Agriculture.

2. Losses from oak wilt are very low so far -- About 7,900 cases of oak wilt were reported by metropolitan area cities in 1976, 1,000 more than the previous year.

3. Oak wilt spreads mainly by root systems -- Oak wilt is caused by a fungus which develops in the outer sapwood of trees, mainly in the vessels that conduct water and nutrients from the roots to the leaves, according to University of Minnesota plant pathologists. Although the fungus is different, the oak responds just as the elm does to Dutch elm fungus. The oak, in attempting to protect itself from the fungus, produces resins and gums which cut off the tree's water supply, and the tree chokes itself to death.

   The oak wilt fungus can be transmitted by a certain sap-feeding beetle which is attracted to open flesh wounds on oak trees. But this is a small reason for the spread. These beetles do not breed and feed in the same manner as do elm bark beetles; consequently they don't pose the same sort of threat to oaks as the elm bark beetle does to elms.

   Oak wilt spreads from a diseased tree to a healthy tree mainly through the roots of the trees which have grafted together.

   Once an oak tree is infected, there is no known way of saving it. Red or Black oaks are very susceptible and are killed rapidly by the fungus. Bur Oak is slightly resistant, while White Oak is reasonably resistant, according to University of Minnesota plant pathologists.

4. Oak wilt can be controlled by interrupting root grafts -- Spread through root grafts can be prevented by mechanically trenching around infected trees or by injecting a chemical into the ground which kills the roots where they are grafted but doesn't harm the tree, which is the same root graft control as is employed with Dutch elm disease.

5. Region apparently not seriously concerned about oak wilt -- Dr. David French, professor of plant pathology, University of Minnesota, who is perhaps best known as an authority on Dutch elm disease, believes that oak wilt is building a base in this region which could be devastating if action

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* in the control areas

is not taken. He said he has seen a 40-to-80 acre oak forest wiped out in two years, despite the fact that control methods are relatively simple. All that is necessary is to identify the diseased trees and isolate their roots from those of neighboring trees. The loss of the region's oak forests could be more serious, he believes, than the loss of the elm. The elm loss is being felt most severely where the elm has been planted in a pattern. The loss of the oak would be felt by the absence of natural-growing oak forests now located in many parts of the region.

B. Conclusions

1. In our haste to control Dutch elm disease, we are failing to give adequate attention to oak wilt, which could be as serious a mistake as letting the elms die. The oak is probably a more valuable regional resource, because there are so many more of them and because of their dominance in the forest portions of the Twin Cities area. Moreover, oak wilt can be controlled much more easily.

C. Recommendations

Unless otherwise indicated, our recommendations for Dutch elm disease apply equally to oak wilt throughout this report.

IV. THE BASIC CONTROL STRATEGY

A. Findings

1. Dutch elm disease is caused by a fungus for which there is no known cure -- The disease is caused by a fungus which grows in the water-conducting vessels of elms. The tree reacts to the fungus by producing resins and gums to wall off the fungus. However, this action also prevents the circulation of plant fluids, causing the tree to wilt and die. No effective way has been found to eradicate the fungus.

2. Beetles carry the fungus from tree to tree -- Tiny beetles no longer than the height of the letters on this page carry the fungus. There are two types: the European elm bark beetle and the native elm bark beetle. The beetles feed *only* on healthy elm trees, no other tree. The European variety, much more numerous in southern Minnesota, feeds inside the crotch of small branches toward the top of trees. The native variety, less numerous in southern Minnesota but more likely to be carrying the disease, feeds on larger branches 4 to 10 inches in diameter or on the main stem. A beetle carrying the fungus is likely to deposit some of the fungus in the healthy tree while feeding.

3. Environmentally-acceptable chemicals to kill the beetles are not generally used -- Although DDT could kill beetles, it is unacceptable because of its damage to the environment. One chemical, methoxychlor, is somewhat effective in killing the beetle, but has not been widely used in the Twin Cities area.

4. The central control strategy is to eliminate places where beetles can breed -- Since the fungus can't be eradicated and since all beetles cannot be killed, the central control strategy has been to get rid of places where new beetles can be born. Elm bark beetles breed in *only* one place, beneath the bark of dead and dying elmwood. If no places are available for the beetle to breed, then the overall population of beetles can be controlled and, thereby, the spread of the disease. Beetles can survive the winter only beneath the bark of elmwood.

Beetles are attracted to dead and dying elmwood for places to breed. They burrow beneath bark and dig tunnels where eggs are laid. Beetles usually spend the winter in the tunnels in the larval stage or, in the case of the native elm bark beetle, also in the adult stage. Beetles begin to emerge in April, with a second generation possible in later summer. A new generation of beetles can invade a tree, breed, reach adult stage and emerge to infect other trees in as short a period as 20 days.

A tree that recently has been infected with the fungus and is dying becomes a place for beetles to breed. Also dead wood, regardless if the tree had Dutch elm disease, is a breeding site. The wood may be a dead branch on a healthy tree, a dead tree, a stump or a pile of wood such as firewood.

Once a piece of wood has been invaded and colonized with tunnels, it won't be used as a breeding site again.

If no bark is on the elmwood, it won't be invaded as a breeding site. Usually, if wood has been dead for two years the beetle will not invade the wood because it is dried out and because the bark no longer may be affixed tightly to the wood.

5. Beetles usually fly only a short distance from breeding sites to feed -- When an adult elm bark beetle emerges from a breeding site, it will seek healthy trees on which to feed usually within 100 to 300 feet, according to plant pathologists. This means that if Dutch elm disease occurs the same time on many trees in the same small area, the source of infection undoubtedly was some dead or dying elmwood within that small area. From time to time beetles will be blown long distances by wind. (That is essentially how the disease is introduced to a new area.) But infection caused by such beetles will only affect a few scattered trees. They won't cause an epidemic. An epidemic occurs because of a localized infection source.

6. The disease can travel from one tree to the next, when roots have grown together -- Once the fungus has been placed in a healthy tree, it travels very quickly

through the tree's vascular system. By the time a wilted branch is discovered at the top, it is possible the disease already has spread to the roots. Roots of adjacent boulevard trees are particularly susceptible to become naturally fused together because they were planted close to each other and because they are likely to have the same genetic background.

7. If root systems can be separated, the disease will not be transmitted by the roots -- Three methods are used for preventing the spread of the disease through root grafts. A chemical called Vapam is injected into holes in the ground midway between the diseased tree and the adjacent tree. The chemical kills all organic matter in the narrow area where it is inserted, including the common root system. A second method involves digging a trench about three feet into the ground, thereby physically cutting the roots. A third method involves cutting in about three inches all around the trunk of the diseased tree. This is called girdling. It must be done early, before the fungus has spread to the lower part of the tree.

   By the time the disease is discovered in a tree, the fungus already may have traveled to the adjacent tree. Thus plant pathologists advise that a second root-separation take place between the first healthy tree and the next healthy tree, to be doubly safe.

   Plant pathologists advise that treatment should take place two weeks before a diseased tree is cut down. If the tree is cut down before the treatment has time to work, the adjacent tree will suck the fungus from the roots of the diseased tree right into its own system.

   Once interrupted, it takes root systems several years to grow back together. Thus Vapam or trenching techniques may be employed as preventive measure even before diseased trees are discovered. Care must be exercised in using Vapam. It can kill a tree if used improperly.

8. Cities have lagged in getting trees cut down and removed -- Major efforts have been under way in the winter of 1976-77 to cut down and remove all diseased trees that were identified as diseased last summer. As of November 15, 1976, according to reports filed by cities with the State Department of Agriculture, approximately 75,000 diseased trees in the seven-county metropolitan area had been identified, of which approximately 55,000 had been removed, meaning another 20,000 remained to be removed by April 1977, when beetles emerge from beneath the bark. The report filed by St. Paul revealed 6,900 of its 16,688 diseased trees had been removed. The report filed by Minneapolis revealed 4,300 of its 6,000 diseased public trees had been removed. As of late February 1977, both cities still were working on getting the trees taken down and on removing stumps.

B. Conclusions

1. Although Dutch elm disease is spread throughout the metropolitan area, we do not believe it is a metropolitan problem in the same sense as water pollution, for example -- Controlling Dutch elm disease is much more like controlling dandelions. It is essentially a local problem, subject to control at the city/neighborhood level. This point is fundamental: if an epidemic of Dutch elm disease occurs in a neighborhood, the source of the infection most likely is within the neighborhood itself. This means that to control the epidemic, the source of infection must be removed from the neighborhood. The beetle normally feeds (and, in the process, infects healthy trees) within 300 feet of its birthplace--the length of a city block. The disease initially is brought into the neighborhood from the outside, probably by beetles blown in by the wind. But the disease increases because of what happens within the neighborhood.

2. Control can succeed in some parts of the metropolitan area and not in others or in some parts of a city and not in others -- There is a widespread myth that if Dutch elm disease is epidemic in one community, trees in a neighboring community automatically are doomed. This myth must be destroyed.

3. We believe it is not practical--and probably it is well nigh onto impossible--to try to control Dutch elm disease in every square mile of every city, village and township and in every forest and river corridor in the seven-county metropolitan area -- If we tried to save all the trees, we'd probably end up saving none of them.

4. We think it is more likely control will be successful if it is decentralized in separate, highly-localized efforts, rather than centralized in one program for the entire metropolitan area. Each control program must be carried out very carefully and thoroughly and is more likely to be effective if the geographic area is not too large.

5. It is critical that priorities be set for control -- Money is limited. Obviously, if money were not limited, then we could do it all, but that is not the case. It is more important to save trees in some areas than in others.

6. We believe the metropolitan area should follow a basic, well-established strategy of controlling Dutch elm disease: eliminating places where the beetle can breed in and near the area where elms are being protected -- The beetle breeds only beneath the bark of elmwood which is dying or dead. The strategy can be carried out in different ways, depending upon location.

   Within the highest priority control areas, we believe the following steps must be taken to carry out the basic control strategy:

-- Identifying and mapping all trees to be protected.

-- Inspecting all trees regularly and thoroughly so that diseased trees can be found as soon as possible. This means no less than every two weeks during the growing season and once a week if possible. Twice-a-year inspection in first priority areas has proven to be inadequate.

-- Immediate root graft control between infected and surrounding trees as soon as the diseased tree is discovered and before it is cut down. Roots of elms can grow together even if trees are up to 60 feet apart. The disease spreads very rapidly to the roots of a tree, almost as quickly as the disease is noticed in the treetops. It then can infect the adjacent tree through root graft, unless the graft is interrupted. (Root grafts, once interrupted, take several years to grow back together. It would be desirable for root graft barriers to be inserted between healthy trees, before infection is detected.) We recognize that root graft control will only be partially effective. Sometimes the disease already will have infected a neighboring tree by the time it is discovered. Or root grafts may be only partially interrupted particularly if roots grow together under streets and sidewalks.

-- Cutting down diseased trees before beetles can breed beneath the bark and permit a new generation of infected beetles to emerge. The minimum time for this to occur is about 20 days. Failure to cut down diseased trees promptly is intolerable, not only because they are potential breeding sites but because of the negative psychological impact on residents.

-- Taking all dead elmwood from trees cut down, whether diseased or not, out of the control area immediately, before a new generation of beetles emerges. This must include the stump, or the stump must be debarked.

-- Trimming dead branches over two inches in diameter from healthy trees. A dead branch on a tree is as much a potential breeding site as a branch on the ground.

7. Control must be thorough to be effective -- Plant pathologists say that at least 90% of the breeding places for beetles must be removed from the area where elms are being protected and that a goal of 95% or higher is needed for control to be really effective. Moreover, anything less than 80% removal does no good at all. This points up the particular urgency for control to be thorough if it is to work. A lackadaisical approach means the disease will take over.

8. Within a control area, the same degree of effort must be applied to all trees, whether privately or publicly owned -- If private owners remove all their dead and dying elmwood promptly but public trees along the boulevard remain standing, the control program can't work. Conversely, if the public trees are removed as quickly as the disease is found, the remaining public trees won't be protected unless the private owners follow through in care of their own trees.

9. The prospects of public-private cooperation succeeding are more likely when the private property owners have taken the lead in a neighborhood and are seeking the city's cooperation -- But such neighborhood-city cooperation sometimes is difficult to attain. Ways must be found for neighborhood activity to trigger a response by the city. On the other hand, if the city is anxious to have a control program and the neighborhood fails to respond, the control program is in much greater jeopardy. While the city can exercise its police power to some extent, there is no way the city can save trees in a neighborhood if the people there don't have a commitment themselves.

C. Recommendations

1. Setting strict priorities on control -- We recommend that the Legislature establish priority areas for control and require cities to identify such areas within a reasonable time or forfeit further state support. A reasonable time would be one or two months. The State Department of Agriculture would determine whether designated control areas are consistent with state law. Funds should be apportioned to the higher priority areas first, and then to the lower priority areas until funds are exhausted. We recommend the following priorities be placed in law:

   -- First, individual trees or selected groups of trees with unique historical qualities (e.g. largest *oaks or elms* in a city) or in particularly valuable locations (e.g. Summit Avenue, Victory Memorial Drive, the Capitol approach area.)

   -- Second, residential areas and parks where *elms* make up a clear majority of shade trees and where their pattern of planting makes them esthetically pleasing and rural and urban forests and woodlots where *oaks* are dominant.

   -- Third, residential areas and parks where elms and oaks may be numerous but are mixed in with and outnumbered by other kinds of shade trees.

   -- Fourth, woodlots within a few hundred feet of residential areas where elms are the dominant tree, followed by woodlots near other residential areas where elms are not dominant and are mixed in with other kinds of trees.

   -- Fifth, elm in woodlots long distances from residential areas. No state funds should be expended in this category nor should owners of such woodlots be required to remove diseased elms from such areas.

2. Establishing standards for inspection -- We recommend no less than twice-a-month inspection of all trees in first and second

priority control areas. We recommend that all trees be indicated individually on maps in first and second priority control areas. Records should be kept, perhaps by neighborhood groups if too expensive for the city, of type and frequency of care. We recommend the Legislature require cities to report their inspection practices in first and second priority control areas in their annual reports to the State Department of Agriculture.

3. Requiring trees to be marked with required date for removal -- We recommend that the State Legislature require that all public and private trees found to be diseased be marked immediately, in large, easily-recognizable painted numerals, with the dates the trees are to be removed. For example, if a tree is discovered to be diseased on May 1, 1977, it would be immediately marked 5-21-77, which would indicate to everyone that the tree is to be cut down by that date.

4. Requiring diseased trees to be marked for root graft control -- We recommend that a readily-identifiable mark be required by the Legislature to be placed on all diseased trees when root graft control has been conducted. It is critical that root graft control measures be taken as soon as possible after the diseased tree has been identified and before it has been taken down.

5. Giving citizens recourse if action is not taken -- We recommend that the Legislature give citizens the right to file complaints with their appropriate city offices in the event that diseased elms or oaks are not cut down or treated with root graft control on time in first or second control areas. A complaint should be in a form prescribed by the state. A copy of the complaint would be required to be sent by the city to the State Department of Agriculture. The Commissioner of Agriculture would be empowered to withhold a portion of state funds from a city's next-scheduled apportionment if the Commissioner felt a city was not carrying out its control program adequately.

6. Assuring adequate support to grass-roots neighborhood control efforts -- Because of the critical importance of a strong, small-area, private-citizen commitment to the success of a control program, we recommend that the Legislature give special recognition to neighborhood shade tree protection associations which meet certain requirements.

   This recommendation is designed specifically to guarantee that control efforts on public trees in a neighborhood be applied with at least as much diligence as the private owners are applying to their own trees.

   To achieve official recognition such an association first would need the agreement of at least 51 percent of the property owners in a given area, not to exceed a certain size, perhaps on the order of 10-30 square blocks. Many already-existing neighborhood associations would be expected to seek recognition as shade tree protection associations.

   Participants would commit themselves to carrying out essential control programs on private property. This would include (a) a pledge to remove diseased trees promptly, (b) a pledge never to store bark-on elmwood (c) a pledge to trim healthy trees regularly (d) a pledge for prompt root graft control around diseased trees, (e) a pledge to fully cooperate and assist elm watch efforts, (f) a pledge to help fertilize and water any new public trees that may be planted along boulevards, plus a program describing how the pledges would be carried out.

   Official recognition would be given by an appropriate state agency, such as the State Department of Agriculture. When officially recognized, a shade tree protection association would be empowered to arrange for root graft control and removal of any public trees in the area covered by the association, if the public agency does not act within the time limit, with a guarantee of reimbursement from the city or the city would forfeit its receipt of state funds.

   Such ability to require removal of public trees would be limited to first and second priority control areas or to areas which meet the criteria for a first or second control priority as determined by the State Department of Agriculture.

7. Encouraging cooperative control efforts at the neighborhood level -- In addition to the ability to require governmental cooperation, a neighborhood shade tree protection association would be able to contract on behalf of its resident/members for a variety of tree services, thereby taking advantage of economies of scale. Whatever arrangements the city may have made for cost-sharing of removal of public trees could be handled through such an association, too.

   We recommend that such associations, when given official recognition, ask their respective city governments--as deemed desirable--for the right to contract for comprehensive tree management services on both public and private trees within their areas, consistent with whatever performance guidelines a city might require. An association could choose to contract with an appropriately qualified private contractor or with city employees.

   An association would be uniquely equipped to arrange for comprehensive tree service programs emcompassing trimming of healthy trees, spraying for insects, interruption of root grafts, removal of trees, replanting and maintenance of new trees and any other services an association felt was needed to protect shade trees in its neighborhood. It even is possible that such an association might be able to experiment with special

incentive arrangements. For example, a neighborhood might contract with a private firm or city employees for a set fee over a period of years. If the numbers of trees that need to be cut down is minimized, then the contracting party's costs would be less, and its net profit, greater. In effect, it could get a "reward" for good control.

8. Organizing city employees for small area control -- To assist neighborhood efforts and to further the concept of carrying out small area control programs, we recommend:

   -- The Legislature should require cities to report disease incidence rates by neighborhood. Such sub-areas would have to coincide with boundaries of any neighborhood shade tree protection associations.

   -- Cities should be requested to divide work forces up by neighborhood or community, irrespective of whether shade tree protection associations have been formed, consistent with economical deployment of personnel and amount of work load.

9. Assuring maximum control at lowest possible cost -- We recommend that individuals, neighborhood associations and cities recognize that the control programs will be particularly challenging because they must be so thorough to be effective. This means that they should adopt cost-effective approaches to stretch dollars as far as possible. They should be free to accept lowest responsible bids from among eligible bidders for trees services. They should not be saddled with procedures that would artifically inflate prices. For example, those adopted recently in St. Paul which require that wage rates paid to public employees also be paid to employees of winning bidders.

10. Make special efforts to dispose of remaining disease elmwood in high priority control areas before early April 1977 -- We recommend that cities and individual citizens undertake a crash program in the remaining few weeks before beetles emerge to rid their high priority control areas of all dead and dying elmwood. We recommend that individual citizens themselves take the bark off any elm stumps in their yards and boulevards before April.

V. THE PARTICULAR PROBLEMS OF ELM FIREWOOD

A. Findings

1. Temptations are strong to store elmwood -- Residents may feel they have a "right" to the wood from trees cut down in their own yards or boulevards. This feeling may be intensified if they have fireplaces in their homes and otherwise must buy their firewood. About one-third to one-half of homes in older cities may have fireplaces.

2. Misunderstanding may exist over threat which firewood presents -- Residents may feel that if the wood came from a tree which was not diseased then the firewood presents no threat. This is not true. Beetles are attracted to breed in dead wood, irrespective of whether it comes from a diseased or healthy tree.

3. Residents may fail to see the significance of storing even a small amount of elm firewood -- It is true that elmwood can be kept over the winter for firewood, so long as it is all burned or otherwise disposed of before beetles begin to emerge in April. But this magnifies the risk of accidental storage, either because some wood was forgotten or because a log rolls under the back porch, for example. A single firewood elm log can be a breeding site for 2,000 or more beetles. Also it doesn't matter if the wood is stored outside in a garage or in a basement. The beetles will find ways to get out when spring arrives.

4. Firewood is a more likely breeding site where beetles can survive the winter -- During the winter a high percentage of beetles normally die. For example, beetles in standing trees have only about a 10% chance of survival. With the particular cold winter of 1976-77, the chance of survival in standing trees above the snow dropped to about 1% or less, according to plant pathologists. However, where wood is covered with snow, the survival rate is much higher, even 30% this past winter, according to plant pathologists. A firewood pile is likely to have a snow cover and, therefore, be more likely to produce beetles in the spring than a standing tree.

5. Elmwood with the bark removed is completely harmless -- Ironically, when the bark is still on the wood, it is an ideal breeding site for beetles, but as soon as the bark is taken off, no place remains for beetles to breed. But removing bark from elmwood is not easy, particularly if the tree has recently been cut down.

B. Conclusions

The temptations to store elmwood are so great and the consequences so severe that we do not believe storage should be allowed, if bark remains on the wood -- We cannot tolerate anything less than complete commitment to removal of elmwood from the control area. Surprisingly, even people who should know better--such as tree service firms and public tree care employees--have been reported to let residents keep wood from elm trees cut down in their neighborhoods. If someone hides elm firewood in a garage, neighbors or city inspectors might not find it, but the beetles will. If however, bark is removed, elm is harmless and can be stored for firewood.

C. Recommendations

Increasing firewood control -- Within a area where Dutch elm disease is being controlled, we recommend (a) stiff fine and revocation of license to any firm which gives away or sells elmwood which has not been debarked. (b) dismissal of any public employee who gives away or sells elmwood which has not been debarked, (c) stiff fine to any private individual who gives away or sells elmwood which has not been debarked (d) a stiff fine to any resident of a control area who refuses to allow the removal of elm logs from his property.

VI. THE USE OF LIGNASAN

A. Findings

Newly-licensed Lignasan is highly popular and highly controversial -- Instant, widespread public interest developed in the Twin Cities area when the Environmental Protection Agency (EPA) in 1976 approved Lignasan as a treatment chemical for Dutch elm disease.

* No central records were kept, but based on reports of firms which sold the chemical, it is possible that 20,000 or more trees were injected in the Twin Cities area in 1976 with Lignasan.

* Lignasan has been applied predominantly on private trees, without public involvement. Reports filed with the Minnesota Department of Agriculture indicated that fewer than 600 trees were injected with Lignasan by governmental agencies in the seven-county metropolitan area in 1976.

* Plant pathologists agree that Lignasan, when applied properly, can keep a tree from becoming infected with the Dutch elm fungus. Holes are punched into the tree and the chemical is injected. But there is widespread controversy over the appropriate concentration of the chemical, where in the tree the injections should be made, when during the year injections should take place, and how frequently a tree should be injected. There does appear to be agreement, however, that chances of success are enhanced if the ground is dug out around the base of the tree and the injections are made in the roots which flair out from the trunk. Also, it is clear that a single treatment does not guarantee protection for more than one year. Trees must be re-injected every year or every other year. Lignasan is not a vaccination.

* When volunteer labor is used, it is possible to reduce the cost of each injection to about $15 or less, but if paid labor is used the cost is likely to be $70 or more per tree for each injection.

* The Elm Research Institute, Harrisville, N.H., will provide a limited amount of the chemical free except for shipping charges to neighborhood groups to treat public trees in their neighborhood.

* Plant pathologists fear that interest in Lignasan diverts public attention from the standard inspection-removal program.

* Lignasan is designed to save specific trees which are highly valued by their owners, in contrast to the established control program of elimination of breeding sites for beetles, which is designed to keep trees alive in general.

B. Conclusions

1. Lignasan supplements--it doesn't replace--the basic control programs -- Because of the large amount of work required on each tree, the use of Lignasan is likely to be successful where special efforts are desired to save particular trees, and mainly where volunteer labor can be utilized. A major program of Lignasan injection on trees in general would be prohibitively expensive.

2. Citizens need proper instruction -- Government should make certain that individuals receive adequate advice and training--which they are not now receiving--on appropriate dosages, frequency, time of year, length of time each injection should take and location on tree where injection should be applied. Government agencies themselves might choose to use the chemical in very selective situations, such as highly-valued trees on public malls.

3. Uncertainty about legal dosages must be removed -- Legal dosages as authorized by the EPA are below the levels used in detailed experiments by the Canadian Forestry Service over the past several years, where some of the most thorough experimentation on Lignasan has taken place. Higher-than-legal dosages were used on some trees in the Twin Cities area in 1976 because the lower dosages approved by the EPA were not deemed sufficient. It is critical that governmental agencies clear up the uncertainty about appropriate dosages before injections begin again this year. Some of the confusion may relate to how frequently a given dosage needs to be repeated.

C. Recommendations

1. Providing technical assistance to citizens on chemical injection -- We recommend that the Legislature require all cities to make it possible for their citizens to obtain information about correct application of Lignasan. We further recommend that the University of Minnesota expand its training courses for commercial firms and neighborhood volunteers on correct procedures for Lignasan application. These courses should be provided in the context of an expanded educational effort involving other Dutch elm control procedures, including inspection

of trees for disease, spraying, identification of elmwood piles, routine trimming, and root graft interruption.

2. Obtaining immediate decision on legal dosages -- We recommend the Minnesota Department of Agriculture obtain a formal decision from the EPA no later than April 1, 1977, on exactly what dosages are permitted and how frequently dosages should be repeated. If it is deemed that the EPA requirements are not adequate for protecting the trees, we recommend that the Department of Agriculture petition the EPA to review its present regulations to determine whether other dosages--specifically those used in Canada--are to be allowed.

VII. THE USE OF OTHER CHEMICALS

A. Findings

1. An environmentally-acceptable chemical, methoxychlor, can be used against the beetle -- Methoxychlor is used in Illinois and, perhaps elsewhere, but we were unable to determine if any Minnesota cities are using the chemical systematically. It may be easier to use in controlling the native elm bark beetle which does not feed more than about 10 feet off the ground than it would be in controlling the European elm bark beetle which flies to the tops of trees. In the northern two-thirds of the state the disease is spread almost exclusively by the native elm bark beetle.

   Some entomologists question the use of methoxychlor because of the large amount of effort required to spray, the likelihood that not all parts of a tree will be sprayed, and the possibility that a beetle will infect a tree anyway before the chemical takes effect and kills the beetle.

2. Some chemicals can render a tree inactive as a breeding site, without requiring that the tree be cut down -- For the last three years the city of Bloomington has been experimenting with a chemical, potassium iodide, on its diseased trees in wooded areas. In such areas it isn't necessary to cut the tree down because a dead tree poses no threat to safety of citizens as does a dead tree in residential areas. The chemical can be applied quickly to a tree, as soon as it is identified, simply by cutting into the wood with an axe and pouring in the chemical. The chemical immediately kills the tree, and within 30-45 days the bark no longer is tight around the wood, so beetles will not breed there. The chemical's legal status is unclear, although it is being used in Illinois. Some communities reportedly are afraid to use the chemical in the absence of specific authorization.

3. Wood preservatives can make piles of wood uninhabitable by beetles -- Certain wood preservatives, such as pentachlorophenol, can be applied to piles of wood, making them inactive as breeding sites for beetles. It may be possible to spray large piles of elmwood prior to ultimate disposal or recovery of the resource value. This step could make certain disposal or recovery options more feasible, because it would even out the flow of elmwood over a longer period of time. It is less certain that it would be environmentally possible to spray household woodpiles.

B. Conclusions

Dutch elm disease is so severe in the Twin Cities area that all possible control avenues need to be explored as quickly as possible. Public and private leaders in control efforts deserve straight advice on what can and cannot be done.

C. Recommendations

1. Obtaining decisions on use of selected chemicals -- We recommend the Legislature instruct the Department of Agriculture to eliminate the uncertainty surrounding the use of several chemicals and to promote those which are acceptable. This means specifically that cities should be informed before July 1, 1977, as to the legality, acceptability and workability of potassium iodide and of wood preservatives. In addition, cities should be advised on the use of acceptable sprays for killing beetles.

2. Supporting applied research -- We recommend legislative support for research efforts specifically directed to improving present control methods. This means, for example, better ways of interrupting root grafts, treating diseased trees in woodlots and treating piles of dead elmwood. Results of the research should be made available immediately to the Department of Agriculture or other appropriate agency so that the best possible control methods can be utilized as soon as they are found acceptable. The research should include analysis of Vapam, Lignasan, methoxychlor, potassium iodide, and pentachlorophenol and the possibilities of girdling trees to prevent disease transfer by root grafts.

VIII. AVAILABILITY, ELIGIBILITY OF TREE SERVICE FIRMS

A. Findings

1. Licensing, regulation now spotty, inconsistent -- A spot check of some cities in the Twin Cities metropolitan area indicates that generally tree service firms are subject to few controls. Some cities require licenses; others do not. Cities usually require firms with which they do business to carry property/liability insurance, but coverage varies considerably.

2. Many firms likely to be doing business here -- Based on experience elsewhere widespread removal of diseased trees is likely to result in large numbers of small tree removal firms being formed or coming into the area.

3. Tree removal must be done carefully -- When trees are cut down in residential areas, serious risk exists that houses, lawns, sidewalks and power lines could be damaged. Even more serious is the risk of harm or death to residents.

B. Conclusions

The public needs better protection than it now has. We are not adequately prepared today to protect citizens and property when large-scale removal--which is almost inevitable even under the best control programs--gets going. But we also want to encourage many firms because that will produce competition and hold prices down. We just want to make sure the public is protected.

C. Recommendations

We recommend that all cities be required to license tree removal firms, and that the licenses include minimum property damage/liability coverage provisions.

We recommend that city governments be required to have similar insurance because of their own employees who will be removing trees on public and private property.

We recommend that the Minnesota League of Cities develop a recommended municipal ordinance for its member cities to follow on convenient licensing of tree removal firms.

IX. DISPOSAL OF ELMWOOD

A. Findings

1. Most dead wood is burned or buried -- Prior to 1976, trees were mainly buried. The relatively small number did not impose severe stress on sanitary landfills, according to the Metropolitan Council. But the large increase in 1976 led to a decision by the Minnesota Pollution Control Agency (PCA) to grant temporary open burning permits in about 24 locations in the metropolitan area. A Metropolitan Council report indicates that, of some 52,000 trees for which records were kept in 1976, 42% were burned, 37% landfilled, and 17% processed for wood fiber recovery (chipping primarily and some saw logs). The PCA burning permits expired March 1, 1977. Application must be made again if any permits are to be renewed. It is not clear what PCA policy will be.

   Existing landfill capacity is sufficient to accommodate projected elm tree losses, according to the Metropolitan Council. But the Council points out that landfill disposal is the most expensive form of disposal, and it shortens the life expectancy of metropolitan area landfills for other solid waste.

2. Recycling (resource recovery) of elmwood is likely to increase in 1977 -- The major recycling centers in the metropolitan area in 1976 were two wood chippers operated by Hennepin County government. These chippers are capable of taking trees up to 22 inches in diameter. The chips are sold for wood fiber and mulch, according to a Metropolitan Council report. The two chippers have a combined capacity of about 18,000 tons of trees per year, although one of the two may not be working in 1977.

   A large chipper--100,000 tons capacity, 48-inch trees--now is under construction at the Pig's Eye area in St. Paul, jointly owned by Minneapolis and St. Paul. This chipper is expected to be operational in 1977. Dakota County is planning a sawmill, which, if it becomes operational as planned in 1977, will have a capacity for about 10,000 tons per year.

   The Metropolitan Council estimates that the two Hennepin County chippers, the new Minneapolis-St. Paul chipper, and the Dakota County sawmill will have a capacity to handle 71% of an anticipated 181,000 tons of tree waste in 1977. The remaining waste would be burned or buried.

3. Priorities on disposal currently are unrelated to where elm was cut down -- Currently no distinctions are made on access to disposal sites between elm which may come from a high priority control area or elm which may come from some rural woodlot. Current state regulations require that elmwood be disposed of within 72 hours, regardless of its origin.

B. Conclusions

1. Control of Dutch elm disease and disposal of elmwood are interdependent. Control won't be successful unless the wood is disposed of so it can't breed more beetles. Disposal won't work unless the control program is successful at slowing down the disease so that the disposal program doesn't get flooded with so much wood at one time that it can't be handled.

2. In contrast to the control program, disposal is clearly a metropolitan problem. An individual locality cannot handle the disposal of tree wastes by itself, any more than it can handle disposal of other wastes. Metropolitan leadership is critically needed.

3. The traditional means of disposal in the metropolitan area today are not appropriate or adequate for the long run. Outdoor burning and landfill, the most common types, have limited utility, although neither should be rejected out of hand. Burning reduces the level of air quality but may be acceptable in outlying areas to some extent. Tree waste doesn't damage a landfill or endanger the groundwater to the degree of some other forms of solid waste. But tree waste is very bulky. which reduces a landfill's potential for disposal of other solid waste. Landfill rates for tree wastes are likely to increase, making this option increasingly expensive.

4. Whenever possible the resource value of elmwood should be recovered -- It is possible that recovering the resource potential of elmwood will cost more than whatever price the material might bring on the market. But

if the net cost is equal to or less than other forms of disposal, then resource recovery can be justified.

5. Leadership is needed in identifying more extensive markets for utilization of materials from an elmwood resource recovery operation, particularly as the incidence of Dutch elm disease spreads and more elm trees are cut down. The private sector should be given incentives to make resource recovery an economical alternative to other disposal forms.

6. Elmwood from high-priority control areas must receive first consideration in disposal -- Priorities on disposal should be in line with priorities on control. It is urgent that elmwood which originates in a first or second control area be disposed of promptly. It is less urgent in lower priority control areas, and least urgent in the rural areas where no control program need be in effect.

C. Recommendations

1. Emphasize resource recovery in policy plan -- We recommend that the Metropolitan Council make resource recovery the central element in its policy plan for diseased tree waste removal.

2. Continually review operational capability of county governments in tree waste disposal -- We recommend the Metropolitan Council evaluate the implementation plans for solid waste disposal which it will require counties to submit by July 1, 1977. It is still too early to tell whether greater metropolitan involvement in development plans for disposal facilities is needed. Counties and the private sector still may respond.

3. Prepare contingency plans in case county response is not sufficient -- The consequences of inadequate disposal are too serious for the future of valuable elms in the metropolitan area to be left to chance. We recommend the Legislature instruct the Metropolitan Council's Waste Control Commission to develop a contingency plan for implementing the Council's tree waste policy plan in the event counties are unable to assure adequate facilities.

4. Keep open burning regulations tight -- We recommend the Pollution Control Agency should not consider any request for open burning permits for diseased tree control unless the request also has been considered by the Metropolitan Council.

5. Guarantee elmwood from high-priority areas first access to disposal sites -- We recommend that the State Department of Agriculture adjust its regulations on disposal, so that those parts of the metropolitan area with high-priority control of Dutch elm disease are guaranteed first access to whatever limited disposal sites may be available. As necessary, the 72-hour disposal limit should be eased for elm which may originate in low-priority control areas.

X. RESTORATION

A. Findings

1. Replanting under way -- In 1976, cities in the seven-county metropolitan area replanted about 45,000 trees, according to reports filed with the Minnesota Department of Agriculture. The report filed by Minneapolis indicates 9,500 were replanted, and by St. Paul, 3,050.

2. Considerable controversy exists over the size of tree that should be replanted -- This issue is spotlighted in the different practices followed by St. Paul and Minneapolis. St. Paul replanted with larger, more expensive, balled-and burlapped trees, which were guaranteed for one-year replacement by the nursery which installed them. Minneapolis replanted with smaller, less expensive, bare-root trees, but without the guarantee of free replacement. We were unable to obtain accurate loss-of-tree figures, but officials in Minneapolis estimated a loss of about 15% of the newly planted trees, and St. Paul, about 5%.

3. Trees apparently are in good supply -- The Minnesota Nurseryman's Association reported in late November 1976 that about 150,000 trees were in stock in 10 of the 15 largest nurseries in the state. The Association also reported a surplus of nursery trees in the Chicago area and on the West Coast, although some imported trees are less likely to survive transplanting.

4. Some controversy exists over the plans cities have for replanting -- Foresters for major cities reported that they do follow plans for replanting, and that the type of trees will vary from neighborhood to neighborhood. However, we learned that a major officer in the Minnesota Horticulture Society is concerned that adequate attention to an overall design is not present.

5. The relative priority of replanting in overall Dutch elm control is not clear -- Some persons are advocating that the chief emphasis of a control program should be on the replanting aspect, because the only purpose of control, they say, is to make it possible to phase out the elm gradually, rather than all at once. Others argue that, if too much attention is given to replanting, the control program won't be carried out. There does appear to be agreement, however, that replanting takes time and won't really succeed unless the control program spaces out the removal of elms over a long period of time.

6. As trees are taken down, overall neighborhood appearance assumes increasing importance -- Large boulevard elms, creating an archway down residential streets, can mask effectively other defects in a neighborhood which can become readily obvious when the trees are gone. For example, when elms are gone, the condition of boulevard lawns and the exterior of housing will become more noticeable. Most

of the discussion on restoration has focused on replanting. Very little mention of other aspects of neighborhood appearance has come up.

B. Conclusions

1. Control of Dutch elm disease is incomplete without restoration of the areas which lose their valuable elms. By the same token restoration takes time and won't really succeed unless the control program spaces out the removal of elms over a long period of time.

2. Restoration means replanting trees, but it is not just replanting trees. It involves the overall appearance of the neighborhood when the elm is gone. This means particularly, that lawn and shrub care, house painting and exterior maintenance become increasingly important.

3. Replanting deserves high priority, equal to control. It represents an investment in the future. A much greater commitment to replanting in the region is needed.

4. Careful replanting is critical. It should not be done in the absence of a design plan and a strategy for implementing the plan. Replanting decisions will be with us for maybe 50 to 100 years. Coming generations will have no voice in the decision, but their reactions should be anticipated. It is not clear that adequate design plans have been prepared.

5. Not enough attention has been devoted to care of trees once replanted, such as watering, feeding and protection from vandalism, and what the relative responsibility of private and public parties should be.

C. Recommendation

Require restoration of elm-depopulated areas

1. We recommend that the Legislature:

   * Require, as a condition for receipt of state funds, that a city replant at least as many public trees as are removed in the same year and, to the greatest extent practicable, in the same neighborhood where the trees were removed.

   * Require cities to report survival rates of newly planted trees annually in their reports on shade tree disease control.

   * Require cities to prepare plants for replanting with a guarantee of advance consultation and comment by horticulture interests, urban designers, and neighborhood groups.

   * Impose a fine at least equal to the cost of the damage on persons convicted of mutilating newly-planted trees.

2. We recommend that cities:

   * Identify, early, neighborhoods most likely to be severely affected by the absence of elm shade trees, and propose other programs which can be coordinated with replanting. This should include, for example, priorities on the use of rehab loan and grant funds and large-scale house painting.

   * Call on individual householders to assist in maintenance of newly planted trees.

   * Contract with qualified neighborhood organizations for maintenance of newly planted trees.

   * Plant both the larger balled-and-burlapped trees and the younger bare-root trees and keep records as to the cost and survival rate of each, to determine the most cost-effective way of replanting.

3. We recommend that neighborhood associations:

   * Take the initiative in proposing replanting designs for neighborhoods and take other steps to improve neighborhood appearance.

   * Offer to assist in the maintenance of city-owned trees within their areas.

XI. PUBLIC AWARENESS AND UNDERSTANDING

A. Findings

1. Public interest in Dutch elm disease has increased in direct proportion to the incidence of the disease -- In 1976 public interest in Dutch elm disease became higher than ever before. Large red paint marks were used to identify diseased trees, and, because so many trees on streets and parkways were discovered, the public naturally became more aware. In addition, private property owners in many localities were increasingly saddled with special assessments to pay for the expenses of removing their own condemned, disease elms. Dutch elm disease was reported to be a No. 1 campaign issue in many legislative races. Business involvement increased, particularly through one bank's sponsorship of a major public education program and through business sponsorship of elm clean-up efforts in various parks. The Governor's office called on the National Guard to assist cities in removing their trees.

2. But warnings had been sounded for the better part of two decades -- As early as 1957, before the disease was even discovered in Minnesota, Dr. David French of the Unviersity of Minnesota was calling for action. Nearby states' elms were being destroyed in the 1950s and 1960s.

   The Citizens League in its 1967 report on the establishment of the Metropolitan Council citied the experience in Des Moines, Iowa, as an example of failure to carry out an adequate control program. The report recom-

mended the Metropolitan Council be charged with setting standards for control of Dutch elm disease and oak wilt in the Twin Cities metropolitan area. But the League largely ignored the issue between 1967 and 1976.

3. Not clear if high public interest will be sustained -- If, in fact, the Twin Cities area is successful in curbing the rapid spread of the disease, then trees will remain alive longer. It is possible the result would be a drop of public support for a control program. Syracuse, N.Y., for example, had a first-rate control program from 1957 to 1964, but then public support waned, the disease took over, and almost all elms died.

B. Conclusion

Unfortunately, although public *awareness* is high, public *knowledge* of what to do about the problem is woefully inadequate. Misinformation may be worse than no information at all. We must find a way to get correct information conveyed to the public and to public leaders.

C. Recommendations

Improving public education of the diseased tree problem.

1. We recommend the Legislature set aside a significant portion of state funds to finance improved public education, with the provision that a portion of the education funds be earmarked as matching funds to qualifying private groups.

2. We challenge the broad, informal alliance of interest groups in the shade tree disease problem to form, together, a private state Shade Tree Protection Society. These interest groups include nurseries, tree service operators, horticulture and garden interests, plant pathologists, entomologists, park boards, city councils, neighborhood groups and private citizens. Such a society should monitor, continuously, progress being made in implementing a good shade tree disease control program in this state and report to the Legislature on the progess being made. The Legislature will need a non-governmental group which keeps tab on shade tree disease control. Such a group would be eligible to apply for state funds for public education.

XII. A LAST WORD OF CAUTION

A one-time crash program of diseased tree control won't do the job. We will be fighting Dutch elm disease and oak wilt for as long as there are elms and oaks worth saving in this region.

If our cities do a thorough job of Dutch elm control in 1977, so as to reduce the number of beetle breeding sites to a minimum, we can't afford then to sit back and relax. Such an experience will demonstrate only that the disease can be controlled. The disease will always be with us. Only the highest degree of commitment to control in those areas where our shade trees are most valuable will do the job.

It won't be easy to be effective in any one year, let alone 15 to 20 years in a row, but that is the commitment which is required.

DISCUSSION OF RECOMMENDATIONS

1. What is the essence of the Dutch elm control strategy proposed in this report?

Keep it small. That is, the Twin Cities metropolitan area is much too large to be considered one control area. No single control area need be larger than the borders of a city, and many cities should have separate control programs operating within their borders.

Much of the metropolitan area need not be in any control area. Little benefit--but probably a great deal of grief--will result from inspecting, marking and cutting down elms in farmers' wood lots several miles from the nearest residential area or park where elms are being protected. In one suburban township-turned-city a farmer four miles from the nearest subdivision simply bulldozed his entire woodlot after being faced with repeated expense to remove diseased elms. Theoretically, it makes some sense to remove breeding sites wherever they are found, but the cost of such a program far exceeds any conceiveable benefit that would result.

Some cities or parts of cities may not have the will to follow through with a good control program, even though they would benefit. If a community doesn't want to have a control program of its own, no outsiders will be able to do the job instead.

So, we're likely to end up with several relatively compact "islands" of control in a sea of disease. Within such islands every conceiveable breeding site will be sought out and removed, quickly. People will know exactly which trees they want to protect and maintain almost constant surveillance. At the first sign of infection, they'll remove the diseased tree and act to protect trees nearby. (If caught early enough, before 5% of the crown of the tree has begun to wilt, radical pruning of the diseased branches even may save the tree.)

To be sure, an area which is trying to protect its elms is going to be affected by disease-carrying beetles coming in from the outside. Eventually, almost all elms probably will die of Dutch elm disease, but the local residents will have been able to spread their removal expense over a longer period of time, gotten a head start on replanting, and received the benefit of the beauty of their elms for another decade or two.

2. Is it too late to be able to control Dutch elm disease in the metropolitan area?

No, unless we're talking about control everywhere in the seven counties. The real test of control won't lie in the total number of diseased trees. It is very possible that the most pessimistic projections will come true, with losses continuing to skyrocket until the vast majority of elms are gone. But, we must not be deceived by these numbers. The key test of control lies in whether the highly-valued elms in selected locations throughout the metropolitan area are protected. The total number of elms in this category is likely to be a small percentage of the total in the region.

3. What are the chances of success, even if only in selected locations as this report recommends?

We're not sure. We can't over-estimate the critical importance of a thorough control program, which means getting rid of diseased and dying elmwood throughout the control area as soon as it is found. This must be repeated year after year. It won't be easy. In fact, a risk exists that public support may wane at the very time it needs to be maintained.

But also we must not under-estimate the commitment of our cities and their citizens. Control has worked in other parts of the nation. It can work here. If the events of 1976 proved anything, they proved that people care about their elms and want to keep them alive as long as possible. The changes of success will be enhanced if people realize early enough that money will have to be spent whether or not there is control.

4. What was the effect of the severely cold weather in the winter of 1976-77?

Probably severe enough to give localities in this area a second chance to have an effective control program. In a normal winter, about 90% of the larvae in bark of standing trees not covered by snow don't survive. Because of the severe cold this past winter, plant pathologists at the University of Minnesota were able to find almost no surviving larvae above the snow line. But wood that is covered with snow has provided enough protection so that a very large crop of beetles is expected to emerge in April.

5. How would state funds be apportioned to cities?

We are recommending that cities satisfy several requirements to be eligible for state funds: (a) priority control areas would have to be identified, consistent with guidelines in state law (b) diseased trees would have to be removed promptly (c) a control program would have to be reasonably successful for a city to continue to qualify for funds (d) replanting must be a major part of the city's control program.

Beyond these requirements we did not specify any formula for distribution. We reviewed briefly--and have no basic quarrel with--the recommendations from the State Shade Tree Advisory Committee that the state pay 50% of each city's shade tree disease control expenses, for privately-owned and publicly-owned trees. If the state appropriation is not large enough to pay 50% of the expenses, a lower percentage would be derived, with each city then receiving that same percentage of its expenses.

Early in the 1977 Legislature it was not yet clear whether state funds would be made available in advance or if cities would be reimbursed for actual expenses incurred (the method used in apportionment of funds in the 1975-77 biennium.) One proposal being seriously examined was to pay each city one-fourth of its projected annual allotment at the beginning of each quarter. Adjustments in subsequent quarter allotments would be made based on actual expenditures in the previous quarter.

6. Who should pay for removal of trees from private property?

We leave that decision up to the individual city. Currently, in some cities the private owner picks up the total cost; in other cities the public picks up the total cost, and in still other cities a combination of public and private funds is used.

Some of us believe that the public should pay the total amount because, as a result, citizens would be more willing to report their neighbors' diseased trees. Also private trees are an asset to an entire neighborhood.

Others of us are cautious about committing too much public money for removal of private trees, because expenses could become so high as to drain funds from control programs elsewhere.

The state of Minnesota now will pay one-half of whatever public funds a city commits to assist in removal of private trees. This form of cost-sharing acts as an incentive for the public to assume at least a portion of the expense of removal of private trees.

7. Would renters as well as homeowners be able to join neighborhood shade tree protection associations as recommended in this report?

Yes. We did not discuss all the details of such associations. Renters clearly would be able to file complaints if trees are not being removed on time. Renters also could participate in all forms of voluntary control in the neighborhood, such as checking on firewood piles and keeping an eye on trees for signs of disease. A renter could not commit the property owner to carry out certain control measures on his own property, but this should not be necessary for a shade tree protection association to receive official recognition from the state.

8. Is it likely that shade tree protection associations would be formed in many neighborhoods?

Yes. In 1976 cooperative action was taken in several neighborhoods in the Twin Cities area, specifically for the purposes of Lignasan injection. Neighbors would get together to buy the equipment and chemical cooperatively and to help each other inject the trees. It is natural to expect that these beginning efforts would mature into more comprehensive tree care programs. Moreover, greater motivation to protect trees exists at the neighborhood level than anywhere else. Even before this report was issued in early 1977 we were made aware of grass roots neighborhood control groups being formed.

9. What is the reason citizens and neighborhood organizations would be given special recognition in diseased tree control?

We want to give maximum assurance that a city will respond when its own residents are committed to protecting their shade trees. And, if a city is unable to respond, we think the residents themselves need the tools to do the job. Therefore, we are recommending that any citizen be allowed to file a complaint, with the guarantee a copy of the complaint would be sent to the state, if any diseased tree is not cut down on time. In addition, we are recommending that neighborhood associations which meet certain requirements would be able to contract for removal of public trees if the city is unable to respond, with a guarantee of reimbursement. It is possible a neighborhood association never would have to take such action, but the power to act would be available if needed.

Diseased tree control is, fundamentally, a program to help the people living closest to the elms. It is not just another public works employment program.

BACKGROUND

I. Dutch elm disease in the United States.

Dutch elm disease originally was discovered in northern France in about 1918 or 1919, according to David French, professor, plant pathology, University of Minnesota.

Dutch elm disease was first detected in the United States in Ohio in 1930, although it is thought that the disease probably was brought from France via imported elm logs in 1926 or 1927.

By 1959, the disease had expanded to Indiana, Illinois, Pennsylvania, Kentucky, Tennessee, Iowa, Missouri, Kansas, Wisconsin, Maryland, West Virginia, Delaware, New York, New Hampshire, Vermont, Massachusetts, Maine, Quebec and Ontario.

The first case of Dutch elm disease in Minnesota was reported in St. Paul in 1961. That same year seven cases also were reported near Monticello. The first four cases in Minneapolis were reported in 1963.

For the first several years, losses were very low. For example, from 1961 through 1967, fewer than 10 cases were reported each year in Minneapolis and St. Paul.

The disease is confined mainly to the southern one-third of Minnesota, although scattered cases have been reported throughout the state.

The biggest increase in incidence in both St. Paul and Minneapolis has occurred in the last three years. For example, St. Paul went from 585 reported cases in 1973 to 1,594 in 1974; to 2,682 in 1975, and to 16,688 in 1976. Minneapolis went from 235 reported cases in 1973 to 937 in 1974; to 1,628 in 1975, and to 7,100 in 1976.

II. Shade tree population in the Twin Cities metropolitan area.

Approximately 36 million trees of all types are located in the seven-county metropolitan area, according to a survey conducted by the Minnesota Department of Natural Resources.

A study conducted by National Biocentric, Inc., for the Metropolitan Inter-County Council (MICC) divided the seven-county area into five strata: urban (central cities and first ring suburbs), suburban (other suburbs), river corridor, rural, and small towns.

About 2.6 million trees, or 7.2% of all trees, are located in the urban strata; another 6.4 million (17.8), suburban; 7.5 million (20.8%), river corridors; 18.7 million (51.9%), rural, and .8 million (2.2%), small towns.

Approximately 4.9 million trees, about 13.6%, are elm, and 9.1 million, about 25.3%, are oak, according to the National Biocentric study.

Within each of the various strata, the distribution of elm and oak varies widely. For example, 43% of the trees in the rural area are oak, and only 10%, elm; within the urban area, 22% are elm and only 3%, oak.

Oak and elm trees in the urban and small town strata tend to be larger, according to the National Biocentric study. The study revealed that 84% of the elms in the urban stratum and 88% in the small town stratum are five inches or more in diameter, which is considerably higher than the percentage in suburban, river and rural stratas.

About 71% of the elms over 24 inches in diameter are located in the urban stratum, according to National Biocentric.

Standardized forestry inventory techniques were used in developing the metropolitan tree-population estimates.

The actual number of trees, by type, within individual cities or parts of cities, is not reliably known throughout the metropolitan area. Cities and counties are required to report elm and oak populations to the Department of Agriculture, but their methods of counting vary widely, according to a January 1977 report by the Metropolitan Council.

III. Projections of disease incidence.

If pre-1977 control practices continue, the Metropolitan Council projects that disease incidence in the seven-county metropolitan area will increase very rapidly over the next three years, reaching a loss of approximately 22% of the original elm population in 1980 alone, which would be about 1 million elms in that year. Only a residue of elms would remain after 1985, according to this projection.

Under an improved program, the maximum percentage loss would be 6.3% in 1989, according to the Council report.

Under what the Council calls the "best practicable control," losses would be 3.7% of the original elm population in the peak year, about 1997.

Based on elm losses in the last three years, the Metropolitan Council projects a loss of 288,000 elms in 1977, more than three times the loss in 1976. Approximately 152,000 of those trees would actually be identified and removed, the Council projects. In 1980, assuming pre-1977 control practices, approximately 600,000 trees would be identified and removed out of about 1 million actually diseased, according to the Council report.

The Metropolitan Council projections are similar to those made by National Biocentric, Inc., in a report prepared for the Metropolitan Inter-County Council in September 1976, except that the Metropolitan Council projections show losses accelerating faster than the National Biocentric report. The Metropolitan Council projections were able to take 1976 losses into consideration, which were much more severe than originally expected. Because it was prepared earlier, the National Biocentric projections were based only on losses through the year 1975.

Both the Metropolitan Council and the National Biocentric projections concern the entire urbanized portion of the metropolitan area. The reports did not project losses by city or neighborhood.

Although metropolitan-wide disease rates can be--and probably will be very high, it still will be possible for locations within the metropolitan area to have much lower disease rates, depending upon the degree of control.

In fact, it is likely that only a small percentage of the total elm population in the seven-county metropolitan area falls within high-priority control areas.

Consequently, the only meaningful loss rates are those which apply to specific locations where control programs are in effect.

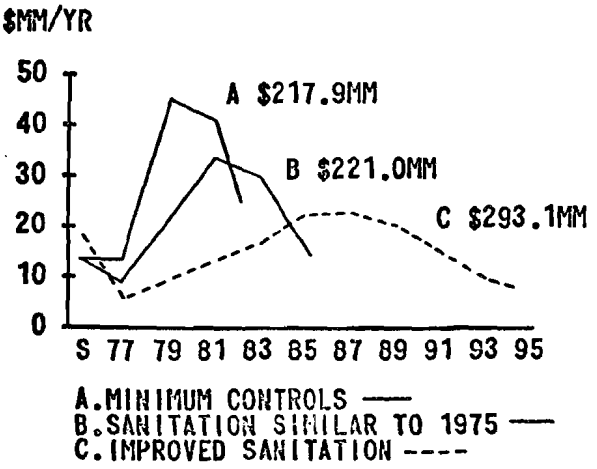
IV. Projected expenses.

Two recent studies indicate that heavy expenses will be incurred with or without a Dutch elm control program. Both studies agreed that the peak expenditures for a single year would be significantly higher under a no-control program. Regardless of the control program, trees die and must be removed from residential areas before branches fall off and cause property damage or harm to persons. One study projected that total expenses over a period of years would be slightly less under a no-control program; the other study projected that total expenses would be higher with no control.

One study was conducted by Thomas A. Rusin, who at the time was a commercial banking officer for the First National Bank of Minneapolis. Rusin since has left that position and more recently was employed at Onan Corporation. Rusin conducted the study for a Dutch elm disease conference sponsored by the bank in the fall of 1976.

Rusin projected total expenses in the seven-county metropolitan area at $217.9 million without any control; $221.0 million, minimum control, and $293.1 million, improved control. Under the no-control scenario, expenses reach about $45 million in the peak year; under minimum control, about $33 million, and under improved control, about $23 million.

PROJECTED YEARLY COSTS
COMPARISON



Rusin's study was based on losses as projected by National Biocentric, Inc., in a study for the Metropolitan Inter-County Council in September 1976.

The other study was conducted by the U.S. Department of Agriculture Forest Service, Northeastern Forest Experiment Station, Upper Darby, PA, in 1976. That study did not provide expenditure estimates for specific locations; instead it estimated the cost of control and disposal over a 15-year period for a hypothetical area with 1,000 trees. With no control, the cumulative cost was projected at $132,000; with varying degrees of control, the cumulative cost was projected between $49,000 and $111,000.

V. Present state laws and regulations.

In 1974 the Minnesota Legislature required that municipalities in the seven-county metropolitan area adopt shade tree control practices, consistent with rules and regulations of the Minnesota Department of Agriculture. This was the first involvement by the state in shade tree disease control.

In 1975 the Legislature expanded the state's involvement. It authorized $800,000 for the two years ending June 30, 1977, in state matching funds to cities for removal of diseased shade trees from residential property. These funds may be used only to help cities subsidize the expense of removal of trees from private property. They may not be used for removal of trees from public property. The state will reimburse a city for 50% of whatever a city agrees to pay for removal of private trees. For example, if a city requires the property owner to pay one-half the cost, with the city paying the other one-half, then the state will help the city with its one-half. As a result, the property owner would pay one-half, the city, one-fourth, and the state, one-fourth.

On the other hand, if a city pays the entire cost, then the state pays one-half, and the net cost to the city is one-half.

Or if the city requires property owners to pay the entire cost, without any city share, the state will not share either.

Approximately 47 cities in the metropolitan area in 1976 were sharing at least some of the expense of removal of trees from private property, thereby qualifying the city for state aid, according to reports filed with the State Department of Agriculture. Another 92 cities in the metropolitan area had no city cost-sharing, thereby forfeiting state assistance. Minneapolis was not involved in cost-sharing in 1975 or 1976. St. Paul was not involved in 1975 but became involved in 1976. Reportedly, the city of Minneapolis forfeited its state funds because of the need to devote city dollars to the control program on city-owned trees. We understand that in 1977 Minneapolis will assume part of the expense of removing private trees and, thereby, become eligible for state matching funds, should they be made available for the next biennium. The city of Minneapolis will require the property owner to pay the first $150 of removal expense ($75 for senior citizens), with the city picking up the balance, of which the state would then pay one-half. In St. Paul the city picks up the entire expense of private tree removal, for which the state reimburses 50%.

The 1977 Legislature is considering a governor's budget request for more than $20 million in state matching funds to cities for Dutch elm control in the biennium ending June 30, 1979. A State Shade Tree Advisory Committee to the Commissioner of Agriculture had recommended a $45 million program. Both proposals urge that the state matching funds be used to help cities with all shade tree disease control expenses, whether for public or private trees. Essentially state funds would be apportioned according to the size of local budgets.

Cities in the seven-county metropolitan area reported total Dutch elm control expenditures in 1976 at $4.8 million. These cities project their total expenditures in 1977 at $14.9 million. The cities of Minneapolis and St. Paul, combined, account for more than two-thirds of the projected expenditures for 1977. Each are projecting 1977 expenditure levels in excess of $5 million. This represents almost a tripling of expenditures by Minneapolis in 1977 over 1976, and more than a five-fold increase by St. Paul.

VI. Experience elsewhere.

* "Since 1961 when Dutch elm disease was first found in Fredericton, New Brunswick, strict adherence to a sanitation program (prompt removal of dead and diseased trees and periodic pruning of healthy trees) has held losses to 5.3% of an initial elm tree population of almost 6,000 trees (0.4% annually). By comparison, 60% of the trees are dead or dying from the disease in four areas without sanitation." Plant Dis. Reptr. 60: 336-338, April 1976.

* "The municipal programs in Illinois for the control of Dutch elm disease continue to be effective. In many cities annual parkway elm losses for 15 years have averaged less than 2% of the original elm population." Plant Dis. Reptr. 56: 460-462, May 1972. In a follow-up phone conversation in February 1977, Dennis Ceplecha, forester for the city of Evanston, Illinois, (which still has 13,000 of its original 18,000 parkway elms, after fighting the disease for almost 20 years), reported that control programs are continuing to be effective in many Chicago area suburbs and in some selective locations within the city of Chicago, such as Grant Park.

* Syracuse, N.Y., has been cited frequently as an example of the benefits of good control and the consequences of abandonment. Frank Kelly, commissioner of parks and recreation for Syracuse, reported at a Dutch elm disease conference in Minneapolis in September 1976 that Syracuse saw losses mushroom from one tree to 1,000 trees in a four-year period ending in 1957. Then strict control measures were instituted, which remained in effect for six years. During that time losses were held to less than 2% annually of the original elm population. Then in the mid-1960s the control program was abandoned and five years later more than 90% of the elms were gone. Kelly said main reasons for abandonment were a state Attorney General's opinion rescinding the authority of cities to remove trees on private property with public money and the fact that public support for the control program evaporated.

* In all cases where control has been successful, the basic elements are similar--prompt identification and removal of breeding sites for Dutch elm beetles. This means identification and removal of all dead and dying elmwood from the vicinity of the area being controlled.

COMMITTEE ASSIGNMENT

When the threat of Dutch elm disease became widely visible in the Twin Cities area in the summer of 1976, the Citizens League Board of Directors amended its research program for 1976-77 to add a project on shade tree disease and to give the project higher priority than all others already approved for research in 1976-77.

A Shade Tree Disease Committee was formed to review the consequences, governmental and non-governmental, if nothing were done beyond existing control efforts. The committee was instructed to concentrate mainly on organizational and financial questions. The committee was asked to review the relative roles and capabilities of the private and public sectors in finance and organization, the distribution of responsibility among different levels and units of government, the process by which priorities are set for different strategies for coping with the disease, the source and amount of public funds and priorities on use of funds, geographic and by type of program.

COMMITTEE MEMBERSHIP

A total of 36 persons volunteered to serve, of whom 13 did not attend at all or dropped out after the first few weeks.

The 23 remaining members were: (asterisk) indicates the member participated actively in the committee deliberations) Solveig Premack*, chairman; Harold J. Anderson*, Sandra Berthene*, Lewis Bloom*, Duane Bojack*, Eugene Coulter*, Tom Crocker*, Karla Ekdahl, John Finn, Will Gove*, Vance Grannis, Jr.*, Ruth Hauge*, F. S. Hird*, Charles Howard*, Richard Manning*, Susan Marrinan, Peter Olin*, Valdemar Olson, Cynthia Rasp, Lawrence Sawyer*, Robert Shrum*, Don Sodman, and Donald Willeke*. In addition, William Schilling of Public Service Options participated regularly as a consultant to the committee. The committee was assisted by Paul Gilje and Paula Werner of the Citizens League staff.

COMMITTEE PROCEDURES

The committee began its work October 19, 1976, and held its final meeting, at which time the report was approved for submission to the League Board of Directors, on February 24, 1977.

A total of 19 meetings were held, almost all of them 2½ hour evening meetings. The committee alternated its meeting locations between St. Paul and Minneapolis, to be convenient for as many members as possible. Detailed minutes were taken of all meetings. A limited number of extra minutes are available on request at the Citizens League.

From mid-October until the end of December the committee obtained extensive orientation to the Dutch elm disease problem from respected authorities both in the Twin Cities area and elsewhere. The committee met with city and suburban foresters, plant pathologists, private tree service firms, governmental officials and others.

The committee was fortunate to begin its work about one month after a major Dutch elm disease conference sponsored by the First National Bank of Minneapolis. A transcript and summary of the conference was very helpful to the committee for background and for understanding issues in controversy.

The committee held its first meeting in the offices of KTCA-TV and viewed special programs on Dutch elm disease which had been produced by KTCA and WCCO.

Following is a list of documents and reports which were particularly useful to the committee:

"Dutch Elm and Oak Wilt Diseases in the Twin City Metropolitan Area," prepared for the Metropolitan Inter-County Council by National Biocentric, Inc. September 1976.

Transcript of Dutch Elm Conference sponsored by First National Bank of Minneapolis. September 1976.

"The Dutch Elm Disease," Agricultural Extension Service, University of Minnesota, 1974.

"Oak Wilt Disease," Agricultural Extension Service, University of Minnesota, 1974.

"Shade Tree Disease Control Activities--1975," Minnesota Department of Agriculture, 1976.

"Study of Regional Tree Waste Disposal and Utilization Systems," Metropolitan Council, January 1977.

"Dutch Elm Disease Projections for Five Cities in Minnesota," R. D. Shrum and D. W. French, 1976.

"Dutch Elm Disease Facts and Figures," Gary W. Botzek, Office of Senate Research, State of Minnesota, October 1976.

"Dutch Elm Disease Control: Performance and Costs," USDA Forest Service Research Paper NE-345, 1976.

"Municipal Control of Dutch Elm Disease in Illinois Cities," Plant Disease Reporter, May 1972.

"Sanitation: A Practical Protection against Dutch Elm Disease in Fredericton, New Brunswick," Plant Disease Reporter, April 1976.

"Insuring an Orderly Transformation of our Urban Forests," report of State Shade Tree Advisory Committee, 1976.

Certain staff members for the Department of Plant Pathology, University of Minnesota; Minnesota Pollution Control Agency, Metropolitan Council, Metropolitan Inter-County Council, city of Minneapolis, city of St. Paul, and Minnesota Department of Agriculture were extemely helpful in providing the committee with assistance both during and between committee meetings. Without their help this report would not have been possible.

Members and staff took a three-hour bus tour of Minneapolis and St. Paul, Bloomington and Fort Snelling in mid-October.

Following is a list of resource persons who met personally with the committee:

John Berends, Minnesota Department of Agriculture

Mary Blomquist, National Biocentric, Inc.

Larry W. Brokke, L & B Tree Service

James Brooks, Minnesota Department of Natural Resources

Lloyd Burkholder, forester, city of St. Paul

William Cass, forester, city of Maplewood

David DeVoto, forester, Minneapolis Park Board

James Dinerstein, research staff, Minnesota Senate

Donald Farb, environmental planning division, Metropolitan Council

David W. French, professor of plant pathology, University of Minnesota

Peter Gove, (then) director, Minnesota Pollution Control Agency

Peter Grills, administrator, shade tree disease control program, Minnesota Department of Agriculture

Michael Hunter, lumber broker, North American Veneer Corp.

Thomas L. Jahnke, Hennepin County Park Reserve District

Thomas Karl, arborist, city of St. Paul

Edward Kondo, Canadian Forestry Service (long-distance telephone hookup)

Donald Murray, Wright Tree Service, Inc., Des Moines, Iowa

Katherine Phillips, Elm Research Institute, Harrisville, N.H. (long-distance telephone hookup)

Robert Piram, Dutch elm disease control director, St. Paul

Glenn Ray, secretary, Minnesota Horticulture Society

Thomas Rusin, formerly with First National Bank of Minneapolis

Rich Sandberg, Minnesota Pollution Control Agency

Dennis Sederholm, executive vice president, West Suburban Chamber of Commerce

James Shipman, Metropolitan Inter-County Council

Glen Shirley, forester, city of Bloomington

Robert Shrum, assistant professor of plant pathology, University of Minnesota

Ward C. Steinstra, professor of plant pathology, University of Minnesota

Gordon Swanson, vice president, Minnesota Nurserymen's Association

THE CITIZENS LEAGUE

. . . formed in 1952, is an independent, nonpartisan, non-profit, educational corporation dedicated to improving local government and to providing leadership in solving the complex problems of our metropolitan area.

Volunteer research committees of the CITIZENS LEAGUE develop recommendations for solutions to public problems after months of intensive work.

Over the years, the League's research reports have been among the most helpful and reliable sources of information for governmental and civic leaders, and others concerned with the problems of our area.

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—6 to 10 major studies are undertaken each year.

—Each committee works 2½ hours per week, normally for 6-9 months.

—In 1974 over 250 resource persons made presentations to an average of 25 members per session.

—A fulltime professional staff of 6 provides direct committee assistance.

—An average in excess of 100 persons follow committee hearings with summary minutes prepared by the staff.

—Full reports (normally 25-50 pages) are distributed to 1,000-3,000 people, in addition to 4,000 summaries provided through the CL NEWS

Citizens League NEWS

—Published twice monthly, except once a month in June, July, August & December.

—Provides reader with general information, original data and League analysis on public affairs issues.

Information Assistance

—The League responds to many requests for information. Substantial amounts of staff time are devoted to explaining local developments to out-of-town visitors, providing background information to the news media, and serving as resource speakers to community groups.

Community Leadership Breakfasts

—Minneapolis Community Leadership Breakfasts are held each Tuesday at the Grain Exchange Cafeteria, 7:30-8:30 a.m., from September to June.

—St. Paul Community Leadership Breakfasts are held on alternate Thursdays at the Pilot House Restaurant in the First National Bank Bldg., 7:30-8:30.

—An average of 35 persons attends the 55 breakfasts each year.

—The breakfast programs attract good news coverage in the daily press, radio and, periodically, television.

Question-and-Answer Luncheons

—Feature national or local authorities, who respond to questions from a panel on key public policy issues.

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—A Public Affairs Directory is prepared following even-year general elections, and distributed to the membership.

Public Affairs

—Members of League study committees have been called on frequently to pursue their work further with governmental or non-governmental agencies.

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