

DISPOSAL OF LIQUID WASTES  
FROM HOLDING TANKS AND SEPTIC TANKS

by

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## APPENDIX I

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### INTRODUCTION

Whatever innovative or modified on-site treatment and disposal alternatives may be adopted to replace failing or malfunctioning systems, septic tank-soil absorption fields will remain the common method of wastewater disposal in unsewered areas. These septic tanks have the potential to generate millions of gallons of sludge annually as a treatment "by product."

Septic tank sludge has typically been disposed of by pumping and hauling to scavenger fields or municipal treatment plants. The contents of holding tanks have been handled under the same rules and the problems of regulation, supervision and servicing of these functions have tended to merge

The importance of periodic sludge removal from septic tanks has received increasing emphasis as a means to prolong soil absorption field life. Concurrently, the number of holding tanks has increased rapidly as the number of unsatisfactory or malfunctioning soil absorption field installations has multiplied.

This paper explores some of the factors influencing the economics of pumping and hauling of these effluents as well as certain alternatives.

### SURVEY AND FINDINGS

A survey has established servicing costs for septic and holding tanks and outlined procedures used in the disposal

of these wastes in order to document present holding and septic tank waste disposal procedures, and to examine use of holding tanks as an alternative liquid waste disposal method.

These wastes must be either dumped into a municipal treatment plant or spread on a field. The individual municipality, however, refuses to allow haulers to dump in the plant. When the hauler dumps wastes on fields, the State Administrative Code does not specify the procedure to be used. There is no governmental field supervision of dumping procedures.

Section H 62.20 (6) (b) of the Wisconsin Administrative Code, which regulates septic tank sludge disposal, has also been interpreted to govern holding tank waste disposal:

(6) MAINTENANCE AND SLUDGE DISPOSAL. (a) Maintenance. Septic tanks shall be cleaned whenever the sludge and scum occupies 1/3 of the tank volume. All sludge, scum, liquid and any other material removed from a private domestic sewage treatment and disposal system is hereafter referred to as sludge.

(b) Sludge disposal. Sludge shall be disposed of as follows:

(1) Public sewer. By discharge into a public sewerage system when practical. The point and method of discharge into the system shall be subject to the requirements of the municipality.

(2) Approved site. By discharge at a disposal site designated by the local governmental authority.

(3) Other. In the absence of a public sewerage system or designated disposal site by one of the following methods:

(a) By burial under 36 inches of earth on the premises on which produced at a distance of at least 50 feet from a well or if on other premises at a distance of at least 500 feet from a place of habitation

provided that there is also at least 36 inches of soil between the buried sludge and the high ground water level or bedrock.

(b) By spreading on land, not used for pasturing livestock or for growing vegetables, at a distance of at least 1,000 feet from a place of habitation or any stream, lake, pond or flowage.

Register, November, 1969  
No. 167

4. Prohibited sites. The sludge shall not be disposed of by discharge into a lake, stream, ditch or dry run or be buried within 50 feet of such watercourses or in a flood plain.

In spreading of the wastes over lands, as permitted in Section H62.20 (1) (f), the rate of application shall not exceed 30 gallons per each 100 square feet of area.

Register, June, 1967  
No. 138 (4)

These dumping restrictions are very general and much depends on the hauler's judgement. Section 6 (b) (2) states that sludge can be disposed of on a site approved by the local government. This section affects only a few haulers since few such sites exist and the code does not require a hauler to use such a site when one is available. Where neither an approved site or a treatment plant is available, Section 6 (b) (3) outlines the requirements for sludge disposal.

The sludge can be buried, although none of the haulers interviewed in several Wisconsin counties disposed of the sludge in this fashion. This apparently is due to the time and expense required to dig and cover an appropriate disposal trench. The time required for disposal directly affects pumping rates and this time-consuming disposal method would greatly increase

the hauler's charge. The hauler who buried his wastes would not be able to compete with haulers who employed another waste disposal method. The regulations do not indicate how often a pit could be used for sludge disposal and extensive sludge disposal might "overload" the soil in a manner similar to that of a failing soil absorption field. Holding tank wastes would be displaced when covered and would force liquid to the surface. The sheer volume of holding tank wastes seems to preclude this disposal method.

Part (b), under Section 6 (b) (3) states the sludge can be spread on the land. Land used for sludge disposal can't be used for growing vegetables, pasturing livestock, and must be located 1,000 feet from a body of water or place of habitation. However, these regulations do not specify the permissible concentration of the sludge being spread and sludge could conceivably be repeatedly spread on one scavenger field. The regulations do not specify required waiting time before vegetables can be grown and livestock can be pastured. Field conditions vary according to different dumping patterns, rainfall, specific soil conditions, vegetation, etc. Sludge and liquid wastes could easily run off the field if spread on frozen or saturated fields.

Chapter RD 13 does specify the maximum amount of wastes that can be spread, but does not specify the concentration of or intervals required between applications.

Section 6 (b) (1) states that it is acceptable for sludge to be disposed of in public sewers. The municipality may not allow a pumper to use the plant even if he and the facilities

he services are in the township. This includes treatment plants that may have been partially financed by state and federal funds. Some treatment plants which were operating at 20% capacity did not allow dumpers to release their holding tank wastes or sludge to the treatment plant.

The present Administrative Code cannot effectively rectify these problems without more specifically relating it to the problems concerning sludge disposal. But, strengthening the laws governing sludge disposal will not change disposal patterns unless there are economically viable alternatives for the scavenger. Except for municipal treatment plants and lagoons, there are few places for proper waste disposal when weather conditions keep tanker trucks off the fields during winter, spring thaw, and periods of heavy rainfall. Where haulers deposit sludge when they lack access to fields is still a matter of conjecture. The State requires the waste from holding and septic tanks to be disposed, but the disposal alternatives for the hauler are not specified.

The Administrative Code is currently under review by the State agencies concerned which may result in more stringent selection and supervision of scavenger procedures and practices, and which may distinguish between the disposal of septic tank and holding tank wastes.

There are several alternatives to supplement the present septic and holding tank waste disposal procedures.

- (1) Require municipalities that receive state or federal aid in sewage treatment plant construction to accept

all waste. This would offer many haulers in the state a year-round disposal site, since more small towns are building treatment plants with state and federal aid. However, a bill in the State legislature that would have enabled this type of disposal was recently defeated. The Department of Natural Resources does encourage sewage treatment plants to receive haulers' wastes. However, many municipalities are reluctant to do so since they do not know the effect the sludge will have on their sewage treatment plant.

- (2) System of lagoons throughout the state. Lagoons for disposal of holding tank-septic tank wastes could be located where no treatment plants exist and where septic and holding tanks are concentrated. All maintenance and supervisory costs could be charged against the haulers through a county assessment. These costs may include sewage treatment and disinfection. The office of the county sanitarian could provide the supervisory personnel.

One of the larger haulers in the state maintains two lagoons of his own at a cost of approximately \$2,000 for the first lagoon. Once this lagoon was full, he let it stand until the liquid evaporated or infiltrated into the soil. He then pumped the sludge onto a corn field and constructed a second lagoon.

- (3) Alternative organization-design for holding tank systems. Choices such as individual residence versus community holding tanks have the potential to affect the overall holding tank system and service costs. Certain of these possibilities were considered in the Door County Sewer System Plan\* and with appropriate assumptions regarding usage, service level and system life. Relative cost comparisons were developed as shown in Figure 1.

- (4) Treatment within or before discharge to a holding tank with regular supervision of the system and supervised disposal of wastes.

This last alternative may require the batch treatment of wastes while in a holding tank. Such treatment might include extended aeration, chemical coagulation, disinfection and other steps as indicated. Once the holding tank reached capacity, wastewater flow could be diverted to a smaller tank for a few days to assure a certain minimum treatment of all wastes in the holding tank.

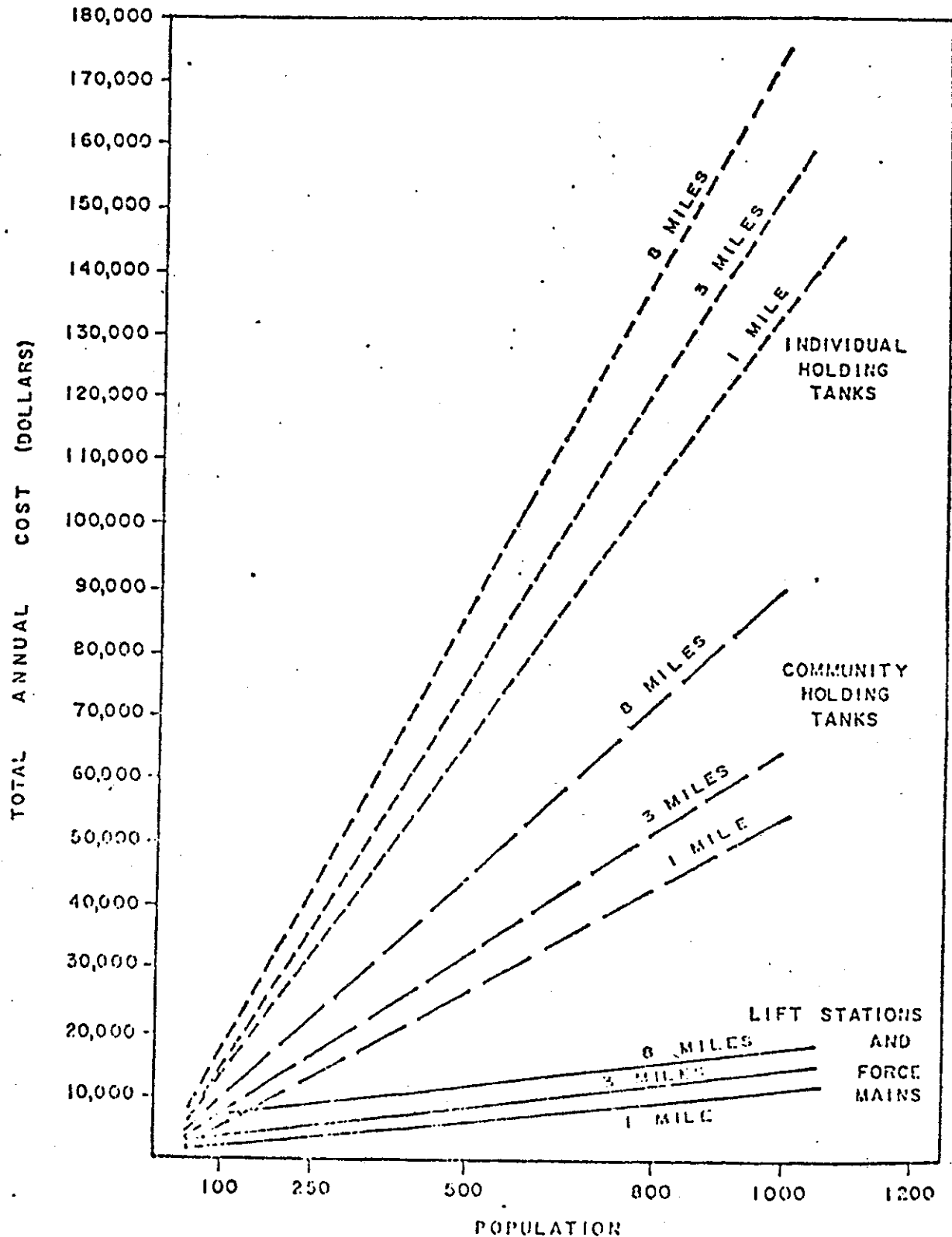
After treatment, a Truck Mounted Pump (TRUMP) would pump out the holding tank wastes. The TRUMP unit would be operated by a certified operator who could check effluent quality. If treatment was satisfactory, the effluent might be discharged to the surface following chlorination and fil-

\*Door County Sewer System Plan by Becher-Hoppe Engineers, Inc., Schofield, Wisconsin (1972).



FIGURE 1

COMPARISON OF COSTS OF VARIOUS SYSTEMS  
OF SEWAGE DISPOSAL FOR SELECTED  
DISTANCES BETWEEN COMMUNITY AND  
TREATMENT FACILITY



tration. If the treatment was not satisfactorily completed, wastes would be hauled to a sewage treatment plant or a scavenger field for final disposal.

Proper maintenance of this holding tank treatment system would be assured by checks on effluent quality made by the TRUMP operator and by the filtration applied to the pump discharge. The homeowner would have an incentive to maintain the treatment unit since an improperly functioning system would result in the substantially higher disposal charges required to haul out the holding tank contents. It is anticipated that TRUMP disposal of properly treated effluent could be done for a nominal fee of perhaps ten dollars monthly.

SERVICE COSTS BY HAULERS

Pumping charges levied by haulers in the Fox River Valley ranged from \$.0075 to \$.022 per gallon. The average charge levied by the 15 haulers interviewed was \$.01 per gallon. The costs varied according to the size of tank to be pumped, regularity of pumping accessibility of the tank and availability of disposal areas. Some haulers felt they had to continue to service their regular customers at a loss. Pumping charges did not decrease appreciably when a hauler had more than one tanker.

A hauler who had four trucks felt that costs to the hauler increased with operation of several tanks, i.e., no economies of scale were realized by multiple tanker operators. After one tanker, marginal cost started to increase, though costs were still less than marginal revenue. Though haulers make a profit after one tanker, the lowest pumping charge can be made by the hauler with one tanker. The hauler cited wages, vacation and unemployment benefits as additional costs of hired labor which reduce his profit margin below the per unit profit realized by a self-employed hauler.

A hauler may mistakenly equate maximum per unit profits with maximum total profit. After the most efficient point (one tanker), costs will increase at a faster rate than marginal revenue, but total net revenue will increase until marginal costs equal the marginal revenue. A hauler can profitably expand up to this point.

## SUMMARY OF INTERVIEWS

### Milwaukee County

Milwaukee County haulers service Milwaukee and the surrounding counties. The city of Milwaukee has three points in the north, west, and southern sections of the city where waste can be dumped into the sewers. A hauler pays \$100 per year per truck for the right to dispose of his waste in this manner.

The largest hauler in the state is located in Milwaukee County. His radio dispatched trucks regularly cover a five county area and his trucks have gone as far as Superior to pump sludge from sewage treatment plants. The fleet has four semi-trailers; two with a 6,000 gallon capacity and two with a 5,000 gallon capacity, two tandem trucks with a 3,000 gallon capacity each, and a 1500 and 1600 gallon truck. They do industrial and sewer cleaning as well as servicing holding and septic tanks. A minimum charge of \$20 is made to service small holding tanks (1,000 to 1,500 gallons). A 3,000 to 4,000 gallon tank is serviced for \$.01 per gallon. A 5,000 to 10,000 gallon tank can be serviced from \$.0062 - \$.0075 per gallon.

### Kenosha County

After conversations with personnel at the State Department of Natural Resources and the Kenosha County

Sanitarian's Office, three haulers were interviewed.

The hauler with the smallest capacity has one 1500 gallon tanker. He charges \$25-30 per 1500 gallon load or \$.016 - \$.02 per gallon. The same pumping charge is made for septic tanks, \$5 more if digging is involved. He feels that it requires the same time to service a holding tank or a septic tank. This hauler dumps the waste on his farm and on neighboring farms. He recently sold much of his farm land, there has been at least one time when he dumped wastes in a roadside ditch. It is not known if his dumping site meets the State's requirements for proper dumping conditions.

The second hauler has two 1200 and 3100 gallon tankers. He charges from \$.0075 - \$.015 per gallon to pump a holding tank. He charges the lower rate to a few commercial establishments with 10,000 gallon tanks that he regularly services. His average charge is around \$.01 per gallon. He charges \$30-\$35 per load to pump septic tanks if no digging is required. No matter how favorable the conditions, this pumper did not think he could charge less than \$.0075. The truck pumps freeze during the winter as he travels to and from jobs.

The third hauler has three tankers, one of which has a 3200 gallon capacity. He charges \$.01 per gallon for 2000 gallons or more. He seldom charges less than this, and never charges less than \$.0075 per gallon. The

charges range up to \$.017 per gallon. He services an area within a 25 mile radius of his home and maintains two lagoons on his farm property for waste disposal. These lagoons are approximately 10 feet deep and have a 10 foot radius. When one lagoon is filled, he lets it stand until the liquid evaporates. He then pumps the sludge out and bulldozes it onto a nearby field. He maintains these lagoons at an estimated cost of \$2,000 per year, which included land, installation, pumping, a service road, and maintenance costs.

#### Sheboygan County

The city of Sheboygan and most of the towns with municipal treatment plants in the county will not let haulers dump waste into their treatment plants. The plant in Sheboygan is carrying a maximum load at the present. All waste is then dumped on fields. There are approximately 15 holding tanks in use and approximately 10 of these are installed in commercial establishments.

A hauler with a 1,000 gallon tanker charges \$25-\$30 per load if it is within 25 miles of his home. The same charge is made for pumping septic tanks. The price ranges from \$.025-\$.030 per gallon.

A hauler with a 1500 gallon tanker felt he had to make \$15 per hour. This averages out to \$.015 per gallon depending on where he can dump and where the tank is located.

Another hauler with a 1500 gallon tank charges \$15 per load to pump a holding tank if the tank is within 10 miles of his home. If he had more than one load per tank, his per gallon cost remains the same. He feels it only takes a few minutes to redrop the hoses. Septic tanks are pumped for \$25 if no digging is involved.

#### Door County

There appears to be no permanent residential homes using holding tanks. All tanks are used by either seasonal cottages or commercial establishments. Three out of the four haulers in the county service holding tanks.

One of the haulers has a 1100 gallon tanker. He charges a fixed price of \$11 per load, up to a 12-mile radius from his home, or \$.01 per gallon. If he travels over 12 miles, the price increases slightly. He spreads all waste on farm fields.

A hauler who has been in the business less than a year has a 850 gallon tanker and charges \$.12 per gallon up to a 20 mile radius. They are not sure if this is the proper price. They charge \$20 per load for septic tank pumping. All of the serviced waste is pumped in farmers' fields.

Another hauler has a 1500 gallon tanker. He charges \$15 per load for servicing holding tanks. This breaks down to \$.01 per gallon.

Winnebago County

The city of Oshkosh does not let haulers use the treatment plant to discharge wastes. A hauler has a 1300 gallon tanker and two smaller ones. He charges \$25 for a 1300 gallon load, or \$.01 per gallon. He charges less if there is more than one load per tank. The same charge is levied for septic tank pumping.

Another hauler has a 1200 gallon tanker. He charges \$25 the first load and \$20 for each additional load. This amounts to \$.022 and \$.016 per gallon respectively. If he pumped a large tank (10,000 gallons) his rate would go down to around \$17 per load after the first load.

Fond du lac County

The hauler has a 850 gallon tanker which services three holding tanks. All of these tanks are located within five miles of his home. He charges \$25 per month, and each holding tank generates an average of 1,000 gallons of waste per week. This breaks down to approximately \$.01 per gallon.



## CASE STUDY OF CLARK COUNTY EXPERIENCE

Clark County has been expanding their holding tank program. Four holding tanks were installed in 1971 and twenty-one were installed during 1972. Of the 25 holding tanks installed, eleven holding tanks are installed in permanent homes, eight in seasonal homes, and six in commercial and combined establishments. The increasing number of these units is a result of reduced actual and proposed costs.

Ten thousand gallon tanks are being recommended. These tanks can be completely installed for \$1,000, a cost that compares favorably with the cost of pre-made tanks. A 6,678 gallon tank has a delivery price of \$1,067.82.

One hauler in the county feels he can haul holding tank waste from a 10,000 gallon tank, under the best of conditions, for approximately \$.0027 per gallon or \$27 per servicing. The best of conditions refers to contiguous land for dumping, with soil that will support the servicing truck. The charge could go up to \$.007 per gallon (\$70 per servicing) under adverse conditions and/or where a regular service contract is not used. Assuming an average waste flow of 50 gallons per day per person of liquid waste, cleaning costs would amount to:

Proposed Servicing Costs

Number of Persons	Cost Per Gallon		Cost Per Day		Cost Per Year	
	Low	High	Low	High	Low	High
1	\$.0027	\$.007	\$.14	\$ .35	\$ 51	\$128
3	.0023	.007	.35	1.05	128	383
5	.0032	.007	.80	1.75	300	639

These cost figures pertain when there are sufficient holding tanks in the county to employ a hauler full-time. This assumption is coupled with the hauler's assumption that rates around the state are high because other haulers are equating holding and septic tank rates and do not differentiate between the time needed to clean each. Holding tank draining and spraying can be done faster because the wastes are largely liquid.

Currently, holding tanks are being serviced at an average charge of \$10 per load, which breaks down to \$.01 per gallon for tanks of 1,000 and 2,000 gallons. A commercial home tank is being serviced for \$500 per year.

Some people in the county feel that these pumping charges will decrease as more larger tanks are installed. An increase in the number of tanks that require service will increase the number of jobs every time the truck goes on the road. Since the hauler feels he must make \$10 per hour, this implies that it presently takes him one hour to service each holding tank. If he could add another tank each time he took the truck out, costs per tank would

decrease. The hauler estimated it would take him two hours to drain and spread the wastes from a 10,000 gallon holding tank if wastes could be spread on contiguous land. If traveling time was three hours, the cost would be \$.005 per gallon. If he could service another 10,000 gallon tank in the same run the servicing costs for each tank would be reduced by \$5 per hour.

<u>Changes in Cost From Additional Units</u>			
<u>Total Traveling Time to Service</u>	<u>Number of Additional 10,000 gallon tanks</u>	<u>Service Cost Per Tank</u>	<u>Service Cost Per Gallon</u>
3 hours	1	\$50	\$.005
3 hours	2	\$50	\$.005
1 hour	1	\$40	\$.004
1 hour	2	\$36.50	\$.0037
1 hour	4	\$34	\$.0034

The figures in this table assume contiguous land is available for spreading or that the land is located such that draining and spreading takes two hours and that traveling time for one job is three hours. The rates stated for holding tank servicing in Clark County are estimates and other factors not considered here may increase costs.

The increasing rate at which holding tanks are being installed in the last two years indicates that there will be enough holding tanks to result in reduced servicing costs due to economies of size. It does not appear,

however, that cost reductions will bring the service charges down to the proposed level. Service charges never fall below \$.0075 per gallon. In the Fox River Valley counties there are a large number of holding tanks presently in operation. Lower costs are the exception, and the average servicing charge is \$.01 per gallon. Competition in these areas keeps the servicing charges at a minimum. There are many full-time pumpers and municipal treatment plants in the area that will accept holding tank wastes. These costs have been derived from 20 years servicing.

Clark County has several disadvantages in comparison with counties in the Fox River Valley. These disadvantages may prevent a reduction in servicing charges to the proposed \$.0027 per gallon or even \$.0075 - \$.01 per gallon. Winter disposal of holding tank wastes is more difficult since the county is in the snow belt and is largely rural. These factors could increase the servicing time during winter months and decrease the available dumping areas; a problem that would increase as the number of holding tank installations increased. It does not seem possible to reduce service costs under these conditions, although limited experience with holding tanks by local haulers could result in some cost miscalculations.

Certain ideas were put forth to solve some of the traditional disposal problems. One of these proposals

would require municipal treatment plants to accept all waste for treatment (see following section).

Another proposal would turn parcels of county owned land into lagoons. These strategically located lagoons could reduce hauling distances and could offer dump areas that would shorten hauling distances. State and counties could more easily regulate and ensure proper waste disposal. A charge that reflected the county's maintenance costs could be assessed against the hauler, and would be passed on to the homeowner.

Inauguration of these proposals would assure proper waste disposal. But reductions in servicing costs would not appear to be significant since costs still average \$.01 per gallon in those counties where county municipal plants now receive holding tank wastes.

Three owners of holding tanks were interviewed and had the following comments:

1. Home: He felt that the initial installation was faulty (pre-fabricated unit, 1,000 gallons) and that a crack in the tank allows ground water to seep in. He does not think the plumber is capable or he just does not want to fix the unit. He had no other complaints and has experienced no odor. He is very happy with the cleaning service.
2. Commercial-home: They have had no problems with odor or servicing. There are no complaints about the system.
3. Commercial: No complaints about the workings or servicing of the system. He is displeased that he could not put in a 10,000 gallon poured concrete tank. At the time he had to go to a steel tank to achieve 3,000 gallons capacity, and felt the costs were prohibitive.