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The Sanitary Fill Method of Refuse Disposal

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IN DISCUSSING the sanitary fill method of refuse disposal, let me make it very plain that we are emphasizing the word *sanitary* in this particular discussion. Recently I read an indictment of the sanitary fill method in which the story was told of a youngster's selling meat he had obtained from the dump. Evidently the gentleman writing the article was unable to distinguish between a garbage dump and a sanitary fill method of disposal.

Because I believe so strongly in the importance of proper public relations, I am going to digress for a moment to mention some of the problems that confronted our city in initiating the sanitary fill method. Frankly, I believe the political and public relations aspect of garbage disposal is fully as important as the technical side. You probably all agree with me on that. The details of the studies made, the furor raised when the recommendation was made that the city operate its own waste disposal department, and the ensuing battle during which four of us city commissioners were sued by the fifth to prevent the municipal operation, make an interesting story, but we have no time to recount it here.

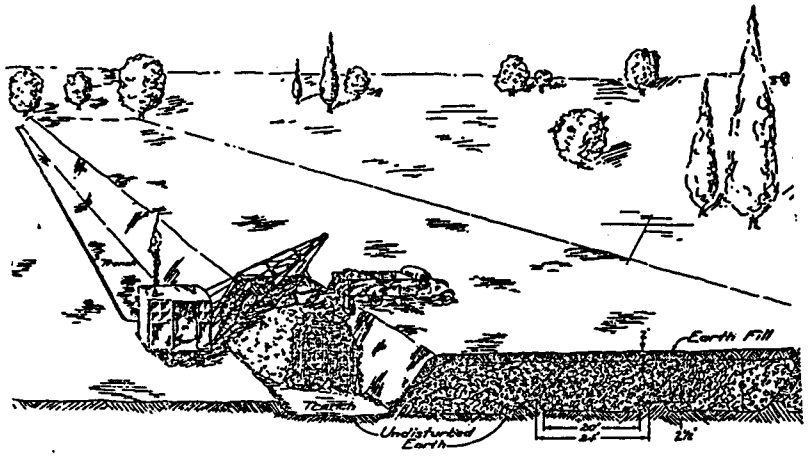
An option had been obtained for 120 acres of farm land lying in a sparsely settled district but within two miles of the city limits. A protest petition was filed with the city commission, signed by people living as far as three miles away from the proposed site. These people could hardly be blamed, for they expected us to dump the garbage in the same manner the old company had for so many years—combining the use of an old, inefficient Dutch oven type of incinerator, which merely warmed up the garbage, and a straight dumping into trenches of garbage from homes located outside the city limits, without covering it. To argue was useless and we didn't try, but immediately laid our plans to use a part of the city sewer farm. However, this location was three miles farther away, necessitating a longer haul.

Since some of you may some day want to begin this system for your city, I will describe a method of getting started, with a perfectly flat field as the disposal site.

Construction of the Fill

A sketch of the plant appears below. Consider the entrance to the fill to be just off the right-hand side or near the lower right-hand corner of the sketch. For the main piece of equipment, a good used one-half yard P. & H. shovel was purchased with a drag line bucket and boom extended to a length of 40 feet.

Operations were begun several hundred feet from the main road rather than immediately adjacent to it. A ramp was constructed



Sanitary Fill at Fresno, California

running up to 3 or 4 feet in height by digging a ditch or trench 3 feet or more in depth and piling the dirt to form the ramp at one side. The trench was from 20 to 24 feet in width and the ramp was wide enough to allow the trucks to swing and back up to dump their loads into the trench.

If you will refer to the sketch again you will see that instead of a dump body a chain laid on the bottom of the truck is pulled by the shovel to move a false tail gate which slides the garbage into the trench. Naturally, a truck with dump body could be used if desired. The shovel then levels off the garbage and compacts it by dropping the bucket on the pile of garbage. Then we are ready to begin covering. A second trench is dug parallel to the first trench and adjacent to it, as shown in the sketch, and the dirt from the second trench is spread on top of the garbage and is compacted by allowing the bucket to drop

on top of the earth covering. The depth of the garbage in these first and second trenches was increased to continue the slope of the ramp until a depth of about 8 feet of garbage was reached. The fill was then leveled off. As shown in the sketch, a compacted and settled cell of garbage is about 6 feet in depth.

In our opinion the depth of the compacted earth covering should be not less than 24 inches and it is just as necessary to cover the side slope thoroughly. By simply cutting the trench deeper it is possible to get as much dirt as needed.

About the time one of the trenches has been filled, a motor patrol grader from the street department runs out to the fill and further levels off the top of the last trench so that the trucks can easily drive on the completed fill, turn, and back onto the last completed trench at the far end of the fill, where a new trench is begun. If there is no motor patrol grader handy, an ordinary drag may be used to good advantage.

There are certain aspects of the job that may involve operating difficulties. It is definitely advisable to grade the top of the fill so as to have quick drainage from the rains. This is not difficult to do. Naturally the system works better in a sandy soil than in a clayey one and you will have more difficulties in locations where you have severe winters. However, rain, snow, and cold have their compensations. Rain would prevent fires in the trenches if it were impractical to cover them immediately.

Because of experiences at other locations I felt that rats would present quite a problem and we were prepared to cope with them. Very shortly before operations began, the state sanitary inspector arrived, at my request, to advise us about rodent control. After studying our proceedings carefully, the inspector stated that by using an earth covering of sufficient quantity and depth we were taking the best possible precautions against rodents. Our experience shows that rats will not burrow through much more than 6 inches of earth and practically never through as much as 12 inches. Ground squirrels and some other small animals may burrow for greater distances and it is wise to watch regularly for their holes so as to keep the rats from having any chance at all to exist at the fill. However, our method of smoothing and dragging covers any such holes promptly, the state inspector makes regular calls, and as far as I know no one has ever seen a rat at our disposal fill.

Public Support Is Secured

After about two and a half years of operation of the fill at the sewer farm the people of this locality were able to see for themselves the highly sanitary type of job we were doing. We had planted quite a number of trees and taken precautions to keep the fill clean and neat. We encouraged visitors and had classes from the schools and college, city engineers, city managers, and other city officials visit the site quite frequently. By means of newspaper advertisements and real estate agents the owners of property of a certain area were invited to submit their property for sale to the city for use as a disposal site. Bids were received on seven or eight different parcels, which were then appraised. In several cases prices were lowered to meet the appraisals, and the best site of the group was selected. Since so many of the property owners in this district offered their land for sale to the city as a disposal site, these persons were then in no position to protest the use of the site selected, as they had three years earlier.

A 90-acre site was purchased and operations were begun as before, beginning the work several hundred feet back from the main road. The present site is only three miles from the city hall, has been in use for two and a half years. The only complaint received came from some people living on a very small farm about a mile away, who said that large rats from our fill were bothering them. This complaint was immediately relayed to the chief sanitary inspector of the state, whose men investigated and found the source of the rats to be in the neighborhood of the small farm and not in the disposal fill.

During this five-year period, we have taken advantage of many opportunities to get publicity in our local press concerning the operations of our waste disposal department. That, together with increased and courteous service, has made the people of this city not only conscious, but proud of the waste disposal system. Instead of being a subject to be hushed up, it has been particularly praised by the housewife, all of which has helped tremendously in the matter of public relations.

Maintenance of the Fill

No separation of refuse is required in Fresno, nor in any of the northern California cities. The refuse as collected includes besides garbage, bottles, cans, papers, and all other miscellaneous refuse including tree and lawn trimmings. A charge is made for this service at the rate of 45 cents a month for one collection weekly of 30 gallons of

mixed refuse, or 80 cents a month for two collections weekly. In addition, one collection monthly is made for the 45-cent customer, and two collections monthly for the 80-cent customer, of all garden rubbish such as prunings of trees and shrubs, grass cuttings, etc. There is no limit to the quantity picked up under this service.This free service, which has reached surprising proportions, was not given by the old company and has resulted in the alleys and vacant lots in the city being kept quite clean.

In the fiscal year 1938-39 we collected 110,000 cubic yards of refuse for which a charge was made, and 67,000 cubic yards of the garden rubbish above described, for which no charge was made. These figures are for an average of 13,000 customers. The weight of the mixed garbage and refuse averages about 440 lbs. per cubic yard; the rubbish about 266 lbs. per cubic yard. Most of the rubbish is at least partly combustible and, as it is collected by trucks that do not at the same time haul garbage, we are dumping it at present at the street sweeping department dump and setting fire to it. Inasmuch as this dump has been in operation for thirty years there are no complaints. However, it is not necessary to dump the rubbish there. For several years we dumped it at the sanitary fill, covering it all.

It is very important that no fires be allowed at the sanitary fill, if we are to keep them sightly, odorless, and subject to no complaints.

When we were disposing of rubbish as well as garbage in the depth shown in the sketch, we were covering about six acres a year. At present we have increased the depth of the trenches to 3 to 4 feet, increased the covering when compacted to nearly 36 inches and increased the depth of the garbage, when compacted, to nearly 8 feet. We are now covering four and one-third acres per year.

We are now sowing the top of the old fill at the sewer farm to grain and next year expect to sow alfalfa. It will be better farming land than it was before the fill was started. With the increased coverage at the present fill, the city will have its choice in years to come of putting on another layer of refuse, or using the present 36-inch covering again, and I see no reason why a third layer could not be put down, using the same covering. All the land will be just as good, if not better, farming land than it was at first.

Many persons feel that the soil will be better for farming purposes because of the decomposition of the garbage. However, I do not make this as a point. Temperature tests have been carefully made over the five-year period. They show that the temperature within the fill

rapidly increases after sealing, to the point 20° above the temperature of the surrounding soil. This peak is reached in about ten days, and after thirty days the temperature curve drops and rapidly flattens out until after nine or ten months the temperature is the same as that of the surrounding soil. This would tend to show that complete decomposition has been accomplished in that period of time, which is further borne out by studies showing that all settlement has occurred at the end of the ten-month period.

Further settlement is to be expected if heavy irrigation is used on the fill. In the eastern part of the United States, however, the heavy rains should assist in effecting practically complete settlement within two years.

Test holes dug in that part of the fill now five years old show all of the garbage to be gone except some grapefruit and similar rinds. Near the top of the fill and also near the bottom of the fill where some moisture has had its effect, the tin cans are rusting. Further into the fill the tin cans are still quite shiny and you can read the labels on the cans quite clearly. Newspapers are very legible and no mold is noticeable on the papers or magazines. Probably in localities subject to great rainfall the rusting of cans would extend further into the fill. Mr. John J. Casey, City Engineer of San Francisco, reports the findings in their sanitary fill to be practically the same as ours.

At first we let a contract to a junk dealer to pick over the dumped refuse in the fill. I believe he was to pay the city about $35 a month. He soon complained that our manner of disposal prevented his salvaging any quantity of junk. Also, he soon had the site so cluttered up with boxes of bottles, piles of cardboard and papers, and fenders, that I urged that his contract be canceled, and this was done. It is my belief that if you wish to have a really sanitary fill it is difficult to carry on salvaging operations. If your salvage is of great value I am sure that all of you are ingenious enough to work out a plan for handling it.

Some Data on Costs

You will want to know about the cost of this method of disposal. Including the salary of the shovel operator, all maintenance, repair, and operation costs, and depreciation of the shovel, together with a complete write-off of the purchase price of the land at $125 per acre, the disposal cost is 24 cents a ton. It is not really fair to include a complete write-off of the purchase price of the land, for reasons above stated, but such inclusion keeps our figures on the safe side.

Below are some tables which I believe will be of interest. In considering the cost shown, it is well to keep in mind that union scale wages are paid to the shovel operator, truck drivers and helpers, and mechanics. Also, in making a comparison with other types of disposal, such as incineration, reduction, etc., you should remember you add to our figure the cost per ton for hauling the refuse beyond the distance to the incinerator or reduction plant which in most cases is located within the city limits.

Operations were begun October 15, 1934, with 8,400 customers being served, or 54 per cent of the total residences. We borrowed $30,000 from the city water department to commence operations and repaid the loan with 4½ per cent interest in eleven months.

As of June 30, 1939, there were 13,532 customers being served, or 85 per cent of the residences.

Property Accounts

Motor vehicles	$22,804.19
Disposal plant equipment	3,294.11
Field equipment and small tools	1,015.33
Office furniture and fixtures	2,055.92
Buildings and structures	11,534.53
Land	19,075.00
Total	$59,779.08
Less reserve for depreciation	19,074.55
	$40,704.53
Net worth as of June 30, 1939	$56,451.54

Operating Statement

for the Year July 1, 1938, to June 30, 1939

Income		Operating Expense	
Service Revenue	$119,239.68	*Gathering Cost:*	
Paper Sales	3,290.16	Payroll	$61,943.10
Miscellaneous	346.60	Truck Operation	4,279.71
Permits (Swill)	450.00	Truck Maintenance	2,237.99
Total	$123,326.44	Miscellaneous	10,165.13
			$78,625.93
		Disposal Cost:	
		Payroll	$4,272.00
		Operation	2,153.19
		Miscellaneous	805.26
			$7,230.45
		Administration:	
		Payroll	$17,372.90
		Miscellaneous	5,514.62
			$22,887.52
		Total Operating Expenses	$108,743.90

TOTAL COST PER TON OF REFUSE

Gathering	$2.37
Disposal	.22
Administration	.69
	$3.28

Note: For 100 per cent depreciation of land at Disposal Fill add 2c to cost of disposal.

TOTAL REFUSE COLLECTED

Total Tons of Mixed Garbage	24,306
Total Tons of Garden Refuse	8,905
Total Cubic Yards of Mixed Garbage	110,482
Total Cubic Yards of Garden Refuse	66,955

I believe there definitely is a place for incinerator and reduction plants in the study of systems of garbage and refuse disposal. But just as the improvement of incinerators invites further study of their use, so does the improvement of the sanitary fill. In summing up I want to reiterate that I am talking about a *sanitary* fill, and to suggest:

1. That the garbage be covered as soon as possible, and within 24 hours.

2. That not less than 18 inches of earth be used for coverage, on the side slopes as well as on the top.

3. That no burning whatsoever be allowed on the site of the sanitary fill.

4. That visitors be encouraged to visit the fill to observe the work being done, and that you give thought to publicizing the work of this department.

DISCUSSION

JOHN S. FLOCKHART

Principal Asst. Engineer, Bureau of Street Cleaning, Newark, N. J.

IT IS evident from Mr. Vincenz' paper that with the proper degree of care sanitary fill disposal can be successfully practiced.

Because of the relatively low cost of the method, many municipalities fortunate enough to have suitable land within short hauling distance of the collection area have found that when properly controlled the sanitary fill dump is a solution to the disposal problem. The objectionable features such as unsightliness, disagreeable odor, rat and vermin nuisance, and smoke from fires, all of which generally characterize the common dump, are absent. Gone too, are the confusion

and wrangling caused by the salvaging of refuse material by junk dealers during the period of dumping operations. With respect to this latter point, Mr. Vincenz is frank in stating that salvaging interfered with dumping, and so it was stopped.

The Fresno authorities were apparently dissatisfied with the old system of disposing of city wastes and were determined to eliminate the objectionable features. They were fortunate in having land suitable for the sanitary fill method within reasonable hauling distance and in being able to start with well defined ideas of sanitary operation. That they have been successful in their efforts is shown by the results accomplished.

The general subject of the land fill method is attracting a great deal of attention recently, with many articles appearing in current public works and sanitation magazines, both for and against it. The agitation of citizens in one case, that of New York City, has resulted in the matter's being brought into court, and the appointment by the Surgeon General of the United States of a committee of five health experts to study the methods of dumping in Queens County will result in a far-reaching decision as to the health and nuisance aspects of the various systems.

As Mr. Vincenz states, the study of systems of disposal should not be confined to one type. Improvements in incineration, reduction, and land fill will be made, and the choice of the proper type for the particular community depends on the factors encountered.

In considering the cost of the method, both the initial cost of the land and the operating expenditures should be examined and then compared with the costs of other systems. A forward look into the future to visualize the results accomplished and an evaluation of the site or plant at that time will assist in the determination of the system to be employed.

DAVID W. GODAT

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FROM Mr. Vincenz' presentation, it is apparent that this method of disposal is well adapted to the conditions encountered at Fresno, and has resulted in a material saving to the residents of that city.

However, I am still at a loss to understand why I was asked to discuss a paper dealing with the sanitary fill method of disposal. As

you perhaps know, New Orleans is an "incineration city" and has been for the past twenty-three years. This does not mean, however, that we are so prejudiced in favor of incineration as to have no interest in other forms of disposal. However, since my actual experience in disposal has been limited to incineration, my thoughts on the subject of the sanitary fill are purely academic and are, in consequence, based on thought rather than experience.

My primary concept of refuse disposal, regardless of method, is a system or process by which garbage and mixed refuse is positively and completely destroyed in a reasonable time. Let us look at the sanitary fill method to see if this system complies with such a concept.

First, the method depends, if I am correctly informed, on the anaerobic decomposition of the putrescible elements in garbage, to reduce it to a harmless inert ash. It is evident that the rapidity of such decomposition is dependent upon a reasonable admission of air. Garbage, as we all know, is relatively high in moisture content, which runs anywhere from 50 to 65 per cent by volume. Such refuse is also high in volatile matter as is evident from the very strong odor which occurs when such material is left uncovered for any length of time.

As this material decomposes, the water separates out, and, being heavier, should drop to the bottom of the trench, while the volatile gases rise and seek a means of escape. It is evident, therefore, that unless the plant is located in a sandy soil, the accumulated water will soon reduce the covered trench to a sodden mass, impossible to truck over.

As described by Mr. Vincenz, the refuse is compacted by dropping the bucket on it, and subsequently again by the heavy trucks which must cross the earth cover to reach the new trench. Therefore, it would appear that this compacting, so essential to the continuance of the system, must necessarily retard the decomposition of the refuse.

Now, I am going to risk a statement which I am sure will be challenged, but if my arguments are refuted by facts about which I have no knowledge, the resulting interchange of thought will be well worth it to me, and perhaps to you.

I do not think that mixed refuse under such conditions will be totally destroyed in five or even in ten years, and in consequence the surface of the fill will not reach its final compaction for many years. And further, I think that such subsidence will not be uniform if mixed garbage and rubbish are placed in the same trench.

In substantiation of this, I offer the following: when ordinary

mixed garbage and rubbish are incinerated, the resulting ash will weigh anywhere from 15 to 20 per cent of the weight of the original refuse. If, therefore, a ton of mixed refuse were completely destroyed, there would result approximately 400 lbs. of residue. Now, since the weight per cubic yard of mixed refuse is about 400 lbs. per cubic yard, there would be 2000 ÷ 400 or 5 cubic yards to each ton.

For the decomposition of each cubic yard of mixed refuse there would then result $\frac{1}{5} \times 400$, or 80 lbs. of ash. Now, since ash will weigh from 800 to 1200 lbs. per cubic yard (and using 800 lbs. per yard as a measure), the volume of residue per cubic yard of mixed rubbish destroyed would then be $\frac{80}{800}$ or $\frac{1}{10}$ of a yard. Theoretically, therefore, a 10-foot fill would shrink to a depth of 1 foot, if destruction were complete. This is approximately correct.

The fact that test holes dug five years after the fill was placed disclosed unrusted tin cans, and papers whose print was still quite legible is, of course, evidence, that decomposition was only partial. It is probable, however, that all putrescible material, dangerous to health and offensive to the senses, did decompose within that period. The other, or so called inoffensive material may, therefore, be said, to be merely buried and not in any sense disposed of.

If the sanitary fill is used to dispose of tree prunings and other bulky material such as bed springs, old stoves, auto fenders, and such noncombustible rubbish, it would appear that this would have to be deposited in a separate trench so as to prevent further unequal settlement.

Digressing a moment, there are several other interesting items which arise in my mind in connection with the use of the sanitary fill, and upon which I should like further enlightenment. First, what disposition is made of dead animals such as dogs, cats and mules?

Second, what disposal service is afforded to stores and business establishments whose production of noncombustible trade waste is larger than the limited quantity collected by the city?

In conclusion it appears to me that the sanitary fill method is limited to areas where loose sandy soil is available and where rainfall is not too plentiful. It appears further that such a method is not positive and does not completely destroy the refuse, but merely affords a place where decomposition of putrescible material proceeds slowly and where other objects are just buried from sight beneath the ground. Some of these will ultimately decompose while other noncombustible matter such as metal, bottles, glass, and so forth, will remain buried

for an unknown time. Such a method is not to my mind comparable with incineration, reduction, and the other older forms of modern disposal.

MR. VINCENZ: From what Mr. Godat has said, this decomposition that has occurred is the reason we got such strong odors when we opened up the sealed part to excavate. However, that was nothing but the gas escaping from the decomposition that had taken place and did not mean that it was still decomposing.

I am not going to argue about the settlement over a hundred-year period, and certainly no one would want to build a large structure on that fill without adequate foundation. However, we believe that this disposal method is quite satisfactory for our purposes.

San Francisco has a population of about 700,000, their weight of mixed garbage runs almost exactly the same as ours, and their charges are higher. The garbage is hauled to a railroad yard, dumped into gondolas, and taken to the sanitary fill which is eight miles out of the city. They are dumping about 25 feet deep and making a good coverage. Because they are bucking rock their cost is higher than ours, running around 50 to 55 cents a ton.

MR. G. R. THOMPSON (Detroit, Mich.): What do you do about the rat breeding menace?

MR. VINCENZ: I mentioned before that we do not have any rats. Our complete coverage prohibits rats from coming through. We have never seen a rat on the fill.

MR. A. PAV (Berwyn, Ill.): We are troubled with gas explosions. Do you have anything like that?

MR. VINCENZ: No, we do not. I think if you will put on more coverage you will get away from it. We keep that gas in by use of a drag.

MR. E. J. CLEARY (New York, N. Y.): There is another factor in regard to the rat menace. I believe Mr. Vincenz mentioned at one time that the temperature in his fill increased 20°, but in New York City they have a temperature increase at a depth of six feet of 140°. In some places it is over 212° and steam comes out of the test holes. I think a rat wouldn't find that a good place to live.

However, New York City is not content with that and has hired the outstanding rat authority to make a study of the whole rat problem. The whole question of fill in New York City hinges upon that report. Also, New York University is cooperating with the city in making a thorough study of the land fill operation. They are

making a gas analysis, studying temperature, bacteria, and the other factors involved. They are also making a study of the amount of coverage needed to take care of the decomposition adequately.

New York does not seal the front, but I notice that Fresno makes an air-tight seal. That additional compaction helps to drive out the air that might be there and accelerates decomposition—which is not as fast as one might expect, particularly for such things as cellulose and rags. That is why if you dig that up later you may find papers and rags and other material of that nature.

MR. L. E. DEMPSEY (Greensboro, N. C.): If you do have a fire how do you put it out?

MR. VINCENZ: With water. We have an old well near by with an electric hook-up on it. We pump an irrigation ditch to the site and flood it.

MR. DEMPSEY: Our dump is a half mile outside the city and every time I attend one of these conventions our dump gets on fire. It is 10 to 40 feet deep and we put ashes and automobile bodies and everything that won't burn in there and cover it with ashes. Unfortunately, we don't have a water line to the dump. When it catches on fire, the fire gets underneath and by the time we get a hose there the fire has a pretty good start. The only way we have been able to put it out is by moving the dump with a steam shovel.

MR. W. E. ROSENGARTEN (Ardmore, Pa.): We spread our burnable material on top and set fire to it once every three days, pushing the burned material over the top. We have been doing that for the past ten years.

MR. A. W. XANTEN (Washington, D. C.): I suggest that you make your ditches a little more shallow, so you will have less opportunity for fire.

MR. G. M. BOWERS (Richmond, Va.): We have had the same trouble as Mr. Dempsey but now no dump can be established until a water connection is put in. The dump is kept under constant supervision with definite responsibility. It is now a well controlled dump.

MR. R. L. ANDERSON (Winnetka, Ill.): Mr. Vincenz described the sanitary fill in a warm climate and all of the other places where I have heard of it have been in mild climates. What is your reaction to the establishment of a fill in a cold climate where there is frost all winter?

MR. VINCENZ: I realize my lack of experience in that connection and believe that someone else more familiar with it should answer

that question. However, I should imagine that you might be able to turn the snow and rain to your advantage.

MR. G. E. HESSELBACHER (Elkins Park, Pa.): We have a number of township dumps and we had a volunteer fire department to fight dump fires. After some experience in that connection we found that the volunteer firemen didn't like the job, and since I placed the chief of the fire department on the dumps there have been no fires to fight.

MR. C. D. WARNER (Detroit, Mich.): We used to have a lot of fires, but in the last two or three years we have cut up the automobile bodies, large cans, drums, and material of that kind, and we have not had any fires.

MR. JOHN S. FLOCKHART (Newark, N. J.): We rely on the same things as the gentleman from Richmond, and those are an adequate water supply and supervision—the two things that control dump fires.

When we established a central dump it was necessary for us to protect that dump in every way possible. At the present time we are collecting from 4,000 to 4,500 cubic yards of material every day and hauling it two and one-half miles from the center of the city. In order to protect the dump we have water lines to it, and with W.P.A. assistance we have built macadam roads so that we have easy access to them. The mains are about 6,300 feet apart so that wherever we are dumping we have adequate water protection.

Because the dump is very large it is necessary for us to have a watchman there at all times, and he takes care of any fires that develop. However, if the fire gets beyond control the firemen are called out. Up until two years ago they did not like to bring their apparatus down there, as it was very expensive. Since these roads were built, thirty to forty acres have been regraded and converted into baseball fields. We are also planting shrubs and trees and transforming it into a park.

We have a different type of fill than that developed in Fresno, and for that reason I was much interested in Mr. Vincenz' paper. I was wondering just how he could do it out there, but with the explanation of the sandy soil and the amount of rainfall it has been made more clear to me.

Our initial fill is six to eight feet and then we compact that material to about four feet with a ten-ton tractor.

MR. DEMPSEY: What do you take on the dump?

MR. FLOCKHART: We take everything with the exception of trade waste and that means ashes, garbage, and trash. We have not had occasion to take any automobile bodies as they are all taken to the private dump. We don't accept them.

MR. BOWERS: We found it particularly hard to fight fires or to reduce the number of fires when we had a dump of considerable height, say of about forty feet. We now go to the bottom and work up in terraces, filling six or eight feet and working back and up. We never let our dump get a long slope, because when we did that we had dump fires. However, as I stated before, we have overcome all of our fires by supervision and an adequate water supply.