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ENVIRONMENTAL POLLUTION: DISCHARGE OF RAW  
HUMAN WASTES FROM RAILROAD TRAINS

GOVERNMENT

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HEARING

BEFORE A

SUBCOMMITTEE OF THE  
COMMITTEE ON  
GOVERNMENT OPERATIONS  
HOUSE OF REPRESENTATIVES

NINETY-FIRST CONGRESS

SECOND SESSION

JULY 28, 1970

Printed for the use of the Committee on Government Operations



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## CONTENTS

---

	Page
Statement of—	
Blankenship, Dr. E. Bayne, president, Research Products Manufacturing Co.....	46
Cliff, S. Barrie, vice president and general manager, Koehler-Dayton Division, Litton Industries, Inc., Dayton, Ohio, presented by William H. Smyers, Jr., project manager—research.....	49
Edwards, Dr. Charles C., Commissioner of Food and Drugs, Public Health Service, U.S. Department of Health, Education, and Welfare; accompanied by Dr. Albert C. Kolbye, Jr., Deputy Director, Bureau of Foods, Pesticides, and Product Safety, Food and Drug Administration, Department of Health, Education, and Welfare.....	2
Goodfellow, Thomas M., president, Association of American Railroads, presented by R. R. Manion, vice president, operations and maintenance department; accompanied by William Moloney, vice president and general counsel.....	24
Nader, Ralph.....	14
Letters, statements, etc., submitted for the record—	
Cliff, S. Barrie, vice president and general manager, Koehler-Dayton Division, Litton Industries, Inc., Dayton, Ohio: Statement.....	51
Edwards, Dr. Charles C., Commissioner of Food and Drugs, Public Health Service, Department of Health, Education, and Welfare: Letter dated May 4, 1970, re railroad car sanitation.....	9
Goodfellow, Thomas M., president, Association of American Railroads: Data re number of locomotives, cabooses, and passenger-carrying cars equipped with toilets.....	38
Nader, Ralph:	
Letter from M. J. Ryan, Acting Director, Office of Legislative Services, HEW, to Hon. George Murphy, a U.S. Senator from the State of California dated May 8, 1970.....	57
Letter to Secretary of Health, Education, and Welfare Robert Finch dated December 19, 1969.....	16
Petition for rulemaking.....	17
Reuss, Hon. Henry S., a Representative in Congress from the State of Wisconsin, and chairman, Conservation and Natural Resources Subcommittee:	
Correspondence between Hon. Henry S. Reuss and Mr. H. Haverland, Chief, Interstate Travel Sanitation, Division of Sanitation Control, Department of Health, Education, and Welfare.....	20
Correspondence between Hon. Henry S. Reuss and Thomas M. Goodfellow, president, Association of American Railroads.....	27
Letter with attachment from J. Raymond McGlaughlin, National Legislative Representative, Brotherhood of Maintenance of Way Employees dated July 24, 1970.....	59

### APPENDIXES

Appendix I.—“An Inquiry Into the Public Health Hazard of Sewage Disposal From Railway Conveyances,” by Kenneth F. Maxey, M.D., Department of Epidemiology, School of Hygiene and Public Health, the Johns Hopkins University.....	61
Appendix II.—“A Report on Railroad Waste Pollution,” prepared by Monogram Industries, Inc., Venice, Calif., Division, November 1, 1969.....	77

## IV

Appendix III.—Applicable excerpts from Public Health Service Act of 1944, Interstate Quarantine Regulations, and Regulation delegating enforcement of Interstate Quarantine Regulations to Commissioner of Food and Drugs-----	Page 81
Appendix IV.—Excerpts from Order No. R-O-37 of Canadian Transport Commission/Railway Transport Committee, April 2, 1969-----	83
Appendix V.—Agency responses to subcommittee inquiries regarding discharge of wastes from trains-----	84
Appendix VI.—Data supplied by sanitation equipment manufacturers regarding retention facilities-----	101
Appendix VII.—Correspondence with public health authorities-----	119
Appendix VIII.—Correspondence with railway car manufacturers-----	125
Appendix IX.—Additional communications-----	132

## ENVIRONMENTAL POLLUTION: DISCHARGE OF RAW HUMAN WASTES FROM RAILROAD TRAINS

TUESDAY, JULY 28, 1970

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C.*

The subcommittee met, pursuant to notice, at 10 a.m., in room 2247, Rayburn House Office Building, Hon. Henry S. Reuss (chairman of the subcommittee) presiding.

Present: Representatives Henry S. Reuss, Jim Wright, Floyd V. Hicks, Guy Vander Jagt, and Gilbert Gude.

Staff members present: Phineas Indritz, chief counsel; Clement Dinsmore, legal assistant, and Josephine Scheiber, research analyst.

Mr. REUSS. Good morning. The House Subcommittee on Conservation and Natural Resources of the Government Operations Committee will be in order for a hearing on the discharge of human wastes from railroad cars.

Our hearing today concerns the practice by the railroad industry in this country of discharging human wastes, garbage, and other polluting materials from railway cars onto rail rights-of-way. According to the Department of Health, Education, and Welfare about 24 million pounds or 16 million gallons of human wastes are discharged annually from toilets in locomotives and cabooses. About 19,500,000 gallons of untreated concentrated human wastes are discharged from noncommuter passenger cars.

The Surgeon General, who is authorized by law to prohibit the discharge of "excrement, garbage, waste water, or other polluting material" from interstate conveyances, has prohibited such discharges from all airplanes and buses. [The law referred to, the Public Health Service Act of 1944 (58 Stat. 703), as amended (42 U.S.C. 264), is printed in the appendix of this hearing record.]

As to railroads, the Surgeon General has prohibited such discharges from any railway car while it passes over "areas designated by the Surgeon General." However, the Surgeon General has never designated any areas, outside stations or car servicing areas, where the discharge of human excrement or other polluting material is prohibited.

Thus, the Surgeon General's regulations are a declaration of policy that is meaningless as to railroad cars outside of stations and servicing areas. Furthermore, the railroads often fail to prevent waste discharges even within stations and servicing areas.

As long ago as 1946 a study financed by the Association of American Railroads concluded that:

At times and in particular places the disposal of sewage from railway conveyances has been improper in relation to the environment and persons, and, therefore, constituted a nuisance.

Americans today are becoming less tolerant of pollution, ugliness, smells, and other attacks on their sensibilities.

During the past 20 years, there have been significant improvements in methods and equipment for controlling human waste disposal. These improvements have reduced the costs of improving the railroads' practice of discharging wastes directly from trains onto the roadbed. It is time that we reevaluate the railroads' filthy waste disposal systems in light of our new awareness of environmental pollution and the reduced costs of more modern waste disposal systems.

Our first witness will be the Commissioner of Food and Drugs, Dr. Charles C. Edwards, Department of Health, Education, and Welfare, accompanied by Dr. Albert Kolbye, Deputy Director, Bureau of Foods, Pesticides, and Product Safety, the Food and Drug Administration, Department of Health, Education, and Welfare.

Dr. Edwards, would you identify your other associates?

Dr. EDWARDS. Dr. Kolbye and I are the principal witnesses representing the Food and Drug Administration.

Mr. REUSS. And you have, at our request, submitted a prepared statement, which we appreciate, and which under the rule will be made part of the record without objection.

**STATEMENT OF DR. CHARLES C. EDWARDS, COMMISSIONER OF FOOD AND DRUGS, PUBLIC HEALTH SERVICE, U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE; ACCOMPANIED BY DR. ALBERT C. KOLBYE, JR., DEPUTY DIRECTOR, BUREAU OF FOODS, PESTICIDES, AND PRODUCT SAFETY, FOOD AND DRUG ADMINISTRATION, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE**

Dr. EDWARDS. We appreciate this opportunity to be with the members of the subcommittee today to discuss the practice of discharging untreated raw human waste from railroad conveyances, its potential adverse health effects, and the means of remedying such practices.

In the judgment of the Food and Drug Administration, it is neither necessary nor acceptable that this human waste should appear on land proximate to, and, in many instances, within, our cities.

Basic health and sanitary practices demand, and the public is entitled to, an environment free of the surface disposal of untreated human waste.

The authority to regulate the sanitary practices of interstate conveyances is derived from section 361(a) of the Public Health Service Act, as delegated, which authorizes the Commissioner of Food and Drugs, with the approval of the Secretary, to make and enforce such regulations as in his judgment are necessary to prevent the introduction, transmission or spread of communicable disease from State to State. Such a finding must be based on a scientific correlation link-

ing discharge of human waste to "the introduction, transmission, or spread of communicable disease from State to State." These interstate quarantine regulations currently require both aircraft and buses to retain their wastes on board and to dispose of them in an approved manner at properly designated, constructed, and operated servicing areas. Railroad conveyances, including locomotives, cabooses, and passenger cars, are not so restricted and, as you know, dispose of untreated human waste by simply discharging it along the right-of-way. However, toilets must be kept locked when conveyances are at a station or servicing area unless means are provided to prevent contamination of the area or station.

Mr. Chairman, the scientific evidence is not conclusive on the correlation mentioned above. Present disposal practices appear to result in the possible transmission of hookworm, a possible risk of salmonella and shigella transmission, the potential transmission of disease by domestic animals, and present a potential for contamination of water supplies.

On the other side of the issue, however, is the often quoted Maxcy study conducted in 1946, conducted by the Public Health Service, which concluded:

It can, therefore, be stated with reasonable assurance that information at present fails to establish the existence of a public health menace, resulting from the method of disposal of fecal wastes employed by railways.

Further, the National Communicable Disease Center, in May of 1970, took the position that:

Dr. Maxcy's comment are as valid today as they were in 1946.

Very frankly, Mr. Chairman, while I strongly believe the discharge practice to be antiquated, deplorable, and offensive to our sensibilities, I must reluctantly conclude that the evidence required under the Public Health Service Act to link discharge with introduction, transmission, or spread of communicable disease from State to State is not present at this time.

However, Mr. Chairman, we are proposing the following three steps:

First of all, we will publish in the Federal Register a notice of proposed rulemaking requiring that railroad passenger cars, locomotives, and cabooses constructed after December 1971 be fitted with full retention facilities when sanitary facilities are required.

Secondly, we will very shortly publish in the Federal Register a petition submitted by Mr. Ralph Nader, inviting comments and whatever evidence he, the scientific community, or anyone else may have on this matter and on the magnitude and complexity of retrofitting.

Thirdly, we intend to continue our discussions with other Federal agencies having regulatory authority over railroads and with the railroads regarding the complexity of installing retention facilities on existing railroad conveyances having sanitary facilities.

We, at the Food and Drug Administration, are aware that it will be costly to remedy this practice. The figures published by the Association of American Railroads show that there were more than 27,000 locomotive units in service on class 1 railroads [yearbook of Railroad Facts, 1970 Edition, Association of American Railroads, Class 1 Rail-

road—Annual operating revenues of \$5,000,000 or more.] at the close of 1969 [same, p. 68]. The figure included switch engines and type "B" auxiliary road engines which have no toilet facilities. The Association of American Railroads reported that on January 1, 1969, class 1 railroads had some 18,948 locomotive units equipped with toilets. There were approximately 14,400 cabooses in operation. "There were about 12,800 passenger train cars in the service of class 1 railroads at the close of 1969, used in the operation of 3,300 trains. More than 2,800 of these were commuter trains." [Same, p. 63.]

It is estimated that of the total number of passenger cars in operation at the close of 1969, there were approximately 1,037 sleeping cars.

To be sure, a large percentage of these locomotives, cabooses, and passenger cars (excluding commuter cars) have toilet facilities that deliver untreated human waste to the roadbed.

The kinds of facilities now available which retain, or retain and treat, human waste rather than discharge it directly from railroad cars on rights-of-way are of basically four types: The first type is the incineration units—electrical, gas, and oil. The second type is a standard fixture with retention. The third type is the self-contained chemical facility, and the fourth is a self-contained recirculation facility.

In recent years, some lines have installed incineration-type equipment on new locomotives. As you know, the turbo-trains and Metro Liners operating in the Northeast Corridor have retention facilities. The latter has approximately 30 cars in operation.

In addition, a number of Jersey Arrow cars have retention facilities, and we have received word that 10 new Erie Lackawanna passenger cars will have retention facilities. We also have received word that the Long Island Railroad Co. is installing facilities with retention on many of their cars.

The Association of American Railroads has estimated the cost involved in the installation of retention equipment on existing locomotives, cabooses, and passenger carrying railroad conveyances, and the installation of necessary servicing facilities. Due to the many variables involved—for example, types of conveyances, the number of toilets per conveyance may vary from one to 17 or more; kinds and quality of materials used; quantities being purchased; time allowed for retrofitting; and the number, size, and location of servicing facilities—estimating cost is extremely difficult. These cost estimates indicate that for retrofitting to full retention in railroad conveyances, the cost would exceed \$42 million.

During the past 20 years, the population of our Nation has increased by about 35 percent and has concentrated more and more in urban areas. Today, as you know, there are urban areas where it is possible to travel over 100 miles without being outside of heavily populated areas, thus exposing people to the health hazards associated with the discharge of untreated human waste. Concurrently, with this demographic change, our standards of health and sanitation have changed markedly. The public's expectations in the field of waste management will no longer tolerate the practice of dumping waste onto the railroad trackbeds.

Mr. Chairman, in conclusion I wish to emphasize that while the Food and Drug Administration is proposing steps to bring about the

elimination of this method of disposal, we cannot believe that responsible corporations will permit these practices to continue.

Mr. REUSS. Thank you, Dr. Edwards. You referred to the Maxcy study of 1946 as a study made by the Public Health Service.

Dr. EDWARDS. I do not think it was made by the Public Health Service. I think it was funded by them.

Mr. REUSS. It was funded by the railroads or made by the railroads.

Dr. KOLBYE. I think part of the funding was by the railroads.

Mr. REUSS. I have a copy of the 1946 document in front of me. It says quite clearly on its title page: "Association of American Railroads, Operations and Maintenance Department," "Sanitary Research Project Joint Committee on Railway Sanitation," and the letter of transmittal, dated November 8, 1946, is addressed to the Association of American Railroads from Abel Wolman of Johns Hopkins University, the consultant director, who says:

I am enclosing herewith a report just received from Kenneth F. Maxcy \* \* \*. It was prepared in accordance with my directive to Dr. Maxcy under date of January 27, 1946.

It makes quite a difference whether the railroads—which have been depositing these human wastes on our landscape for years—were doing the study, or whether the Public Health Service was doing the study. So your testimony is very critical at that point.

Dr. EDWARDS. That was a mistake on my part, Mr. Chairman. I think, however, that Dr. Maxcy is a very reputable public health—

Mr. REUSS. We will stipulate that he is reputable. The question is whether the culprits were doing the study or whether the public was doing the study. The fact is that the railroads were making the study.

Dr. EDWARDS. You are correct. I stand corrected.

Mr. HICKS. I do not think I understand that, Mr. Chairman. I mean, who is paying is one thing, but if Dr. Maxcy is reputable, are we challenging his study at this point?

Mr. REUSS. Not at this point.

Mr. HICKS. What difference does it make who pays the money? I mean, unless you are saying that somebody is going to be influenced.

Mr. REUSS. It makes a difference to me as to whether a study was made by the Government or whether—

Mr. HICKS. I do not think your implications are called for at all.

Mr. REUSS (continuing). Or whether it was made by the railroads, the people who are depositing this matter.

Mr. HICKS. I resent your implications, Mr. Chairman. When we start off in a hearing like this, right off the bat we are accusing somebody of not acting properly; it is one thing to point out that money was paid by somebody, but I got very definite implications from you that there is some wrongdoing here.

Mr. REUSS. The implication which I meant to convey was that it is material who published this study.

Mr. HICKS. I agree with you.

Mr. REUSS. Dr. Edwards testified that the Public Health Service was responsible for the study. According to my information, that was a perfectly innocent mistake by the witness, but I wanted to correct it, and to me it is material who conducted the study.

Mr. HICKS. Very well.

[The report, "An Inquiry Into the Public Health Hazards of Sewage Disposal From Railway Conveyances," by Kenneth F. Maxcy, M.D., Association of American Railroads, Operations and Maintenance Department, Sanitation Research Project, Joint Committee on Railway Sanitation, November 8, 1946, is printed in the appendix of this hearing record.]

Mr. REUSS. Dr. Edwards, you say on page 3 of your prepared statement that you: "reluctantly conclude that the evidence required under the Public Health Service Act to link discharge with introduction, transmission, or spread of communicable disease from State to State is not present at this time." Is that correct?

Dr. EDWARDS. That is correct.

Mr. REUSS. If it is so—and that, of course, is the question before us—that there is no evidence linking the discharge of fecal matter and the spread of communicable disease, why have you prohibited, as you have, the discharge of waste from airplanes and buses?

[See Interstate Quarantine Regulations, 42 CFR 72.155 and 156, which are printed in appendix III of this hearing record.]

Dr. EDWARDS. Mr. Chairman, I think there is no question that certainly no one would argue the fact that there is a potential hazard. I do not think there is any question about that. There is a potential hazard, whether it be railroads, airplanes or buses.

We have not—and when I say "we," I am talking about the National Communicable Disease Center—been able to substantiate any specific cases in which this particular practice has resulted in a specific epidemic or a particular case; but there is no question about the potential hazard of it, and I think we have to act on the potential, rather than being able to specifically verify what has happened.

Mr. REUSS. Is there any evidence that the discharge of fecal matter from airplanes or buses has caused epidemics?

Dr. EDWARDS. As a matter of fact, fecal matter is not discharged from airplanes, at least to the best of my knowledge.

Mr. REUSS. It was in the early days.

Dr. EDWARDS. In the early days, I think the volume of air transportation was such that it really did not present a real hazard. I think today it would be a totally different matter. I think that is why perhaps it is a totally different matter, even so far as the railroads are concerned, because as I pointed out, our centers of population are becoming larger and larger, and as a result our railroad right-of-ways go through more and more populated areas. The potential is certainly greater today, in spite of the fact that railroad travel is less.

Mr. REUSS. The Public Health Service Act opposes the discharge of waste, which leads to the introduction, transmission, or spread of communicable disease from State to State. What I cannot understand is why you have prohibited such discharge in the case of airplanes and buses, without having, so far as I am aware, any evidence that actual epidemics were caused; and yet you insist that this evidence is necessary to prohibit human waste discharge from trains.

Dr. EDWARDS. I do not think we said that we could not do it. I think we are moving in the direction of prohibiting this discharge. Let me say, too, that the Food and Drug Administration took over this program a little less than 2 years ago, and at that point buses and, as I

understand it airplanes, were included. So I do not know the background as to why one was and the other one was not included. I do not think that any of us at the Food and Drug Administration would argue the potential of this being a hazard.

Mr. REUSS. A hazard—

Dr. EDWARDS. A health hazard.

Mr. REUSS (continuing). Related to the transmission, introduction, or spread of communicable disease from State to State?

Dr. EDWARDS. Right.

Mr. REUSS. We can take it as medically accepted that fecal matter is a very fertile source of the communication of disease; can we not?

Dr. EDWARDS. I think it does, however, have to be put in proper perspective. I think we are allowing a number of things to contaminate the environment in this country that certainly far outweigh what the railroads are doing with human waste. Many of our cities, as you know, are discharging raw human waste into our rivers. I do not mean that two wrongs make a right; but I think it has to be placed in proper perspective, and we certainly categorize this as a very real potential health hazard.

Mr. REUSS. I am glad you said that two wrongs do not make a right, because, if we ever adopted that philosophy in the environmental decade, we would not be able to do anything; would we? For there is always somebody who is polluting something, and if we are prepared to say that if somebody is getting away with it and therefore everybody should get away with it everywhere, we would not make much progress. I sure do agree with you there.

We talked about airplanes and buses. It is a further fact, is it not, that the Government has prohibited the discharge of fecal matter from trains in stations or servicing areas?

Dr. EDWARDS. That is correct.

Mr. REUSS. Again, I think the regulation, timid as it is, is a good one. But if the Maxey report way back in 1946 is right, and if, as you say on page 3:

The evidence required under the Public Health Service Act to link discharge with introduction, transmission, or spread of communicable disease from State to State is not present at this time.

How could the Government legally prohibit the discharge of fecal matter in stations or in servicing areas?

[See Interstate Quarantine Regulations 42 C.F.R. 72, 154, reprinted in the appendix of this hearing record.]

Fecal matter either causes communicable diseases or it does not. I frankly do not see how one can say that its discharge from airplanes and buses anywhere and from trains at stations and servicing areas should be prohibited and yet suggest that outside stations and servicing areas its discharge from trains is all right.

Dr. EDWARDS. I am not certain, Mr. Chairman, of the legality of this. I suspect that this particular regulation by the Public Health Service was never challenged by the railroads, and I suspect that the direction we are moving in will not be challenged, or I would hope it would not be, based, however, not on any specific evidence that we have to demonstrate this relationship, but rather based upon the potential of the particular problem.

Mr. REUSS. Do you have a copy of the 1946 Association of American Railroads Maxcy Report in front of you?

Dr. EDWARDS. I have one right here; yes.

Mr. REUSS. I have looked at the document, and it has 115 footnotes, ranging from Aldrich, J. F., *Modern Railway Sanitation*, to *Zeitschrift für Schweizerische Statistik*, Switzerland, 1865-1888, inclusive.

It seems to me this study is maybe one of the Journal of the American Medical Association's literature studies.

Dr. EDWARDS. It is a review of the literature. I might ask Dr. Kolbye to comment. He has been very much involved in this particular project of the FDA.

Dr. KOLBYE. I believe largely it is review of the literature, but they made a specific effort to determine whether or not there were any epidemics or incidents that were attributable to the practice of discharging human excrement on railroads, and it is my recollection that they did not find anything incident to a particular epidemic.

Mr. REUSS. Is it necessary that we have epidemics and that hundreds of people die before we find that something presents, in the statutory phrase, a situation which can lead to the "introduction, transmission, or spread of communicable disease from State to State?"

Dr. KOLBYE. There is no question that what we have here is an undesirable practice from the public health viewpoint, and steps must be taken to effect some correction.

Mr. REUSS. Is it not also specifically a situation which can lead to the introduction, transmission, or spread of communicable disease from State to State?

Dr. KOLBYE. Potentially, yes.

Mr. REUSS. Reading from Dr. Maxcy's report at page 12, it seems his main conclusion is as follows:

The disposition of feces on the ground or on a railroad creates a "nuisance" in proportion to the extent to which it becomes offensive to the sight of factory and aesthetic sensibilities of people. If there are no people around, it is not a nuisance.

That is a statement worthy of a metaphysician rather than a physician. It does not really go to the question of whether feces can cause the introduction, transmission, or spread of communicable disease; does it?

Dr. KOLBYE. I think it is one thing to classify a problem as a nuisance, which I suspect speaks to the esthetics involved, and another aspect to consider the potential health problems involved. I would prefer not to speak for Dr. Maxcy in terms of how he was using words.

Mr. REUSS. The statute that is before us now does not talk about an aesthetic nuisance; it talks about matter which can lead to the introduction, transmission, or spread of communicable disease; is that not so?

Dr. KOLBYE. That is correct.

Mr. REUSS. Therefore one's metaphysical ideas about whether it is an esthetic nuisance are not really relevant to that question, are they?

Dr. KOLBYE. They are not relevant to the question directly, but certainly I think much of the concern also stems from the esthetics involved, and this is, of course, quite understandable.

Mr. REUSS. Dr. Edwards, in your statement you state: "The Na-

tional Communicable Disease Center in May of this year took the position that 'Dr. Maxcy's comments are as valid today as they were in 1946.' I do not think this subcommittee has seen that document.

Dr. EDWARDS. I would be willing to provide it for the record.

Mr. REUSS. Do you have that now?

Dr. EDWARDS. Yes.

Mr. REUSS. Without objection, we will have a copy made of this for our record and give you back—

Dr. EDWARDS. You may keep that.

Mr. REUSS. Without objection, this will be made part of the record. [The May 4, 1970, letter—from Dr. James O. Mason for Dr. David J. Sencer, Assistant Surgeon General/Director, National Communicable Disease Center, to Dr. Albert C. Kolbye—follows:]

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,  
PUBLIC HEALTH SERVICE,  
HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION,

Date: May 4, 1970

Subject: Statement on Railroad Car Sanitation

To: Dr. ALBERT C. KOLBYE

*Deputy Director, Bureau of Foods, Pesticides and Product Safety, Food and Drug Administration*

(Through Commissioner, Food and Drug Administration; Surgeon General, Public Health Service; Administrator, Health Services and Mental Health Administration).

1. You have asked NCDC to prepare a statement on railroad car sanitation. The statement follows:

"We are in essential agreement that a potential health hazard exists whenever human excreta are deposited above ground. There is a theoretical risk of transmission of salmonellosis, shigellosis or possibly other enteric diseases by means of direct contact or through the vector of flies to persons who work on the railroad rights-of-way or reside near the tracks. There is also the possible transmission of hookworm infection to barefooted children who play on or near the same areas. Additionally, domestic animals can become infected with salmonella and subsequently transmit the infection to humans. There is also the potential problem of the contamination of water supplies by sewage drainage by any of the bacterial or viral enteric disease agents. The fact that outbreaks of these diseases have not been documented may be due to the obvious difficulty of tracing such outbreaks to these sources.

"You may be aware of the excellent study of Dr. Kenneth F. Maxcy conducted in 1946 when railway passenger travel was near its peak. He concluded in a paper entitled 'An Inquiry into the Public Health Hazard of Sewage Disposal from Railway Conveyances' that 'It can, therefore, be stated with reasonable assurance that information at present available fails to establish the existence of a public health menace resulting from the method of disposal of fecal wastes employed by railways. This by no means proves the negative—that such a menace does not exist.' Dr. Maxcy's comments are as valid today as they were in 1946."

2. We believe the practice referred to to be poor public health practice, but would caution against attempting to overcapitalize on the epidemic potential. That potential is slight.

JAMES O. MASON,  
for DAVID J. SENCER, M.D.,  
*Assistant Surgeon General,*  
*Director, National Communicable Disease Center.*

Mr. VANDER JAGT. Mr. Chairman, I would like to return to page 3. Your conclusion, as I understand it, is that there is no scientific evidence linking the discharge of raw human waste by railroads with the spread of communicable diseases. You do not therefore conclude

that you do not have the authority to regulate the discharge of raw human waste by the railroads, do you?

Dr. EDWARDS. No, we believe we have the authority.

Mr. VANDER JAGT. There is no question in your mind that you do have the authority?

Dr. EDWARDS. In our judgment, we are moving in that direction.

Mr. VANDER JAGT. In fact, you suggest publishing in the Federal Register a notice of a proposed rule that railroad passenger cars, locomotives and cabooses constructed after December 1971 be fitted with full retention facilities. Why do you wait until 1971? Is not that in essence saying to the railroad: "Go ahead for the next year and a half and manufacture all the new units that you want without concern about dumping raw human waste"?

Dr. EDWARDS. I certainly appreciate your concern for an effective date of December 1971. We used that date at this point in time because we are not certain whether adequate facilities are available or will be available to outfit the new equipment that is being manufactured.

Mr. VANDER JAGT. As a result of these hearings or other evidence that could be submitted to you, you could be convinced that the facilities are readily available. Would you have any hesitation in moving up the date?

Dr. EDWARDS. If they are readily available, I think the date should be very definitely moved up.

Mr. VANDER JAGT. And there is no question in your mind that you have the authority to do so?

Dr. EDWARDS. Yes; we are pursuing along with that thought in mind.

Mr. VANDER JAGT. As a matter of fact, section 72.154(a) of the Code of Federal Regulations says:

There shall be no discharge of excrement, garbage, wastewater or other polluting material from any land conveyance while such conveyance is passing over areas designated by the Surgeon General.

That would cover the railroads right now; would it not?

Dr. EDWARDS. Right.

Mr. VANDER JAGT. Is my understanding correct, that even though that regulation is on the books, neither the Surgeon General nor anybody else has designated any areas where it cannot be dumped while it is moving?

Dr. EDWARDS. I am not certain that I understand your question.

Mr. VANDER JAGT. As I understand the regulation, it says: "No moving railroad vehicle can be permitted to dump raw sewage from a moving vehicle in areas designated by the Surgeon General where this shall not take place." Is my understanding correct, that neither the Surgeon General nor any other governmental body has designated any such area, so that as the law now stands, there is complete freedom to dump from a moving vehicle wherever the railroad might want to do so?

Dr. EDWARDS. Except as we mentioned, in stations—

Mr. VANDER JAGT. "At outside stations and car servicing areas."

Dr. EDWARDS. I think in general your statement is correct.

Mr. VANDER JAGT. So that a train could be going through the heart

of Chicago or New York, and there is no regulation, even though you have the authority, that would prevent the dumping of wastes?

Dr. EDWARDS. There are local regulations, but I am not certain whether or not the Federal Public Health Service has developed any such regulations.

Mr. VANDER JAGT. Have you studied, Dr. Edwards, or has anyone in FDA studied, the magnitude of the problem that we are talking about? For example, one group has estimated that the dumping of raw human sewage from the engines and the cabooses of freight trains alone amounts to 50 million pounds a year of raw sewage dumped on the tracks. I think an HEW study puts the figure somewhere around 25 million pounds. Is anyone in a position to comment on the magnitude of the problem?

Dr. EDWARDS. Would you like to comment on that, Dr. Kolbye?

Dr. KOLBYE. I just want to say that those figures would not surprise me. I do not know the specific figures, but I think that is in the general ball park.

Mr. VANDER JAGT. You would not be surprised by a study that said the dumping of raw human sewage from engines and cabooses of freight trains alone amounts to as much as 50 million pounds a year?

Dr. KOLBYE. Again I am not familiar with the figures specifically. As to whether I would be surprised, I believe it is a high figure.

Mr. VANDER JAGT. You would not be prepared to rule out the possibility that that figure can be substantiated?

Dr. KOLBYE. That is right.

Mr. VANDER JAGT. And you would not challenge too vehemently an estimate that would put it between 25 and 50 million pounds a year?

Dr. KOLBYE. No.

Mr. VANDER JAGT. In fact, you would not be at all surprised with a figure that was put that way; would you?

Dr. KOLBYE. Yes.

Mr. VANDER JAGT. Did you answer "Yes"?

Dr. KOLBYE. Yes.

Mr. REUSS. Mr. Hicks?

Mr. HICKS. Thank you, Mr. Chairman. I apologize for my earlier outburst.

Mr. REUSS. Not at all.

Mr. HICKS. I want to make clear my feeling that this hearing is not one that this committee should be concerned with. I think, if it is anything, it is wasting our time on problems that not at all as serious as many we could be concerned with.

Mr. REUSS. If we could deal with that point, I think the gentleman has a good sense of proportion, and I would point out that this is one morning's hearing. We do not intend to pursue the matter indefinitely.

Mr. HICKS. Thank you, Mr. Chairman.

Dr. Edwards, while I know that you are not an expert on all the pollution problems that the railroads may have, do you have any thought at all as to the totality of areas where they are involved in pollution in one way or another and how this particular aspect would compare with other aspects, where the railroad industry contributes to environmental pollution?

Dr. EDWARDS. Do you mean air or noise pollution?

Mr. HICKS. Air, noise, weeds, the way that they maintain their property.

Dr. EDWARDS. No, I cannot speak specifically to that question. I certainly feel that this is no greater problem, in terms of the total environmental pollution problem of the railroads than, for instance, the air pollution problem that is created by the diesel equipment for one thing.

Mr. HICKS. Assuming only a limited number of dollars to attack any problem—and I got this idea from reading a statement that one of the railroad people was going to put in—where should it better be spent: On fixing up passenger equipment, serving a declining segment of the public, or should it be spent in other areas, such as air pollution, and I do not know how many others? Further, I certainly would concur wholeheartedly with the idea that new equipment—whether it is started tomorrow, if the regulation could be made that soon—should be just the same as buses and airplanes. They ought not to discharge this material, if for no other reason that it is unsightly and malodorous, and a number of other words that we could use.

When we talk in terms of going back and retrofitting thousands of pieces of equipment, and considering the cost that is involved, considering how that money might better be utilized in some other manner, it seems to me we are belaboring an issue that really is not that important.

Dr. EDWARDS. I certainly cannot speak to the degree of pollution that each of these particular problems create. I think, though, that your point is a good one, and it is a point on which we have had considerable discussion with both the Department of Transportation and the ICC, in terms of developing our own priorities to deal with an industry that obviously has, at this point in time, limited resources.

Mr. HICKS. Those are all the questions I have, Mr. Chairman.

Mr. REUSS. Mr. Gude?

Mr. GUDE. I would just make a comment, Mr. Chairman. My concern is that we will be burdening municipal waste facilities, some of which are already overtaxed. In fact, I am certain there are some rural and small town areas which have no municipal waste treatment facilities at all. We must consider self-contained units on trains which would provide for treatment and disposal of waste. Otherwise, we are not facing up to the problem realistically. We are just moving it from one place to the other. Thank you, Mr. Chairman.

Mr. REUSS. Mr. Wright.

Mr. WRIGHT. Mr. Chairman, I would like to refer to page 2 of Dr. Edwards' statement. In the second paragraph of your statement as contained on that page, you refer to certain disease dangers, potential in the current practice, such as hookworm, salmonella and others. Then, in the next paragraph, you make reference to the Maxcy study, which you characterize as having concluded that: "It can, therefore, be stated with reasonable assurance that information at present fails to establish the existence of a public health menace, \* \* \*". After that, you cite the statement of the National Communicable Disease Center, in May of this year, as somewhat concurring Dr. Maxcy's statement, saying: "Dr. Maxcy's comments are as valid today as they were in 1946."

I am looking at a copy of the memorandum of May 4, 1970, by the

National Communicable Disease Center. I think perhaps the essential point in that statement appears at the beginning of the statement. It says: "We are in essential agreement that a potential health hazard exists whenever human excrement is deposited above ground." It goes on to mention in some detail the various dangers, salmonella, and others, the transmission of hookworm to barefooted children, the possibility that domestic animals can become infected and transmit disease to humans, the potential of contaminating waterpipes by sewage drainage and so forth. Thereafter it makes reference to the Maxcy conclusions of 1946, but immediately prior to the statement that Dr. Maxcy's comments were as valid as they were then, it quotes Dr. Maxcy saying: "This by no means proves the negative—that such a menace does not exist."

You would certainly say, I am sure, that it would be desirable for some form of treatment to be provided, rather than for this waste matter to be dumped on tracks?

Dr. EDWARDS. Absolutely.

Mr. WRIGHT. Further along in your statement on page 6, you estimate the cost for retrofitting to full retention in railroad conveyances at more than \$42 million. Are you familiar with a device perfected by Dr. Blankenship, who will be one of our witnesses today?

Dr. EDWARDS. No, I am not.

Mr. WRIGHT. Are you, Dr. Kolbye?

Dr. KOLBYE. Not by the name of Dr. Blankenship. I am not sure what device you are talking about.

Mr. WRIGHT. You are not aware of what he has proposed?

Dr. KOLBYE. No, sir, I am not.

Mr. WRIGHT. Your agency has made no investigation on it?

Dr. EDWARDS. No, not by that name.

Dr. KOLBYE. I do not know which device you are talking about. Is it possible to be more descriptive?

Mr. WRIGHT. I suspect that he will be quite descriptive. Therefore, you would have no way of arriving at an estimate as to what the cost might be for the installation of the system which he proposes?

Dr. KOLBYE. No.

Mr. WRIGHT. Thank you very much.

Mr. VANDER JAGT. Dr. Edwards, I want to assure you that the committee is aware of the complexity and magnitude of your total efforts and that this is something that has to fit into the total picture. I also am aware of the complexity of regulations and proposed solutions. For one thing, there are all different kinds of railroad cars that we are talking about. The new ones to be manufactured; the ones that are already running; the longhauls; the shorthauls; the wreck trains on which a crew lives basically for 24 hours; and also commuter trains.

We have some commuter trains. There are many in larger metropolitan areas, where the density of population is the greatest, and the possibility of the spread of communicable diseases is the greatest, and some of these commuter trains have runs of only 28-minute duration. In looking at your proposed solution of the three steps that you are going to take, has anyone given any consideration to a very simple regulation that would cover many of our high density areas or on commuter trains of, say, running no longer than 20 minutes' duration, that there

shall be no toilet facilities. Would not that be better than just dumping it raw in the middle of our high density areas?

Dr. EDWARDS. There is no question that this is a possible solution to the commuter type of operation. I think some of the commuter trains, as a matter of fact, are moving in this direction.

Mr. VANDER JAGT. Do you think your agency will give consideration to the possibility of requiring them all to move in that direction?

Dr. EDWARDS. I think either in that direction or the installation of appropriate facilities. I think one of the two has to come about.

Mr. VANDER JAGT. It is true, is it not, that Canada has prohibited the construction of any railroad cars without full retention facilities, as of May 1969?

Dr. EDWARDS. My colleagues tell me that they are referring primarily to cabooses and locomotives.

[See Order No. R-0-37 of Canadian Transport Commission in the appendix of this hearing record.]

Mr. VANDER JAGT. While we still have no regulations?

Dr. EDWARDS. We have none.

Mr. VANDER JAGT. So we are a little bit behind Canada?

Dr. EDWARDS. We are behind, yes.

Mr. REUSS. Thank you, Dr. Edwards and Dr. Kolbye.

Our next witness will be Mr. Ralph Nader. You have submitted a statement, Mr. Nader, which, under the rule, will be received. You may now proceed.

#### STATEMENT OF RALPH NADER

Mr. NADER. Thank you, Mr. Chairman.

I wish to point out that I am appearing in an individual capacity at the present time, not representing any organization's views.

I am grateful for the invitation to testify on the established indulgence by the railroad industry, which is known in mundane contexts as the dumping of raw human waste on the open land. There are those who assert that the Nation suffers from more serious forms of industrial pollution and that the problem before this subcommittee deserves little if any attention. There are clearly more serious forms of pollution. But none show more clearly than this case the raw callousness and open contempt over a long period of time by an industry that has written its own law for over a century. Thus, this railroad excrement practice allows a unique insight into the intransigence of these corporations and the weak, self-demeaning posture of the Food and Drug Administration toward them.

Railroad companies have always dumped raw human wastes on the tracks in accordance with the law of gravity. This was the only law they observed. Disregarded with regular depository abandon are regulations such as 42 CFR 72.154, which provides that toilets be locked while trains are standing in stations or servicing areas unless there is a means available to prevent contamination. The other part of the regulation provides that there shall be no discharge of excrement while trains are passing over areas designated by the Food and Drug Administration. No areas have been so designated, so the provision is a nullity. Unlike buses and aircraft, railroad trains are free, while in motion, to discharge human waste into the environment.

As an example of disregard for this regulation, I would like to submit for the record photographs taken at the Pomona, Calif., railroad station, at the passenger disembarkation area, which indicates the fecal matter that is being deposited in that area. These photographs were taken by a Public Health Service official whose name is H. White Tisdale. I would like to submit these for the record.

Mr. REUSS. When were they taken?

Mr. NADER. Some time within the last 8 months. I will get you the exact date, or you can ask the Commissioner for the exact date because I am quite sure the Food and Drug Administration can tell you.

(NOTE.—The photographs submitted by Mr. Nader are in the subcommittee files.)

Mr. NADER (continuing with prepared statement). The public health hazard of fecal matter precedes homo sapiens. Animals of yesteryear had an instinctual territorial imperative which they observed in their discharges. Generations ago, public health authorities recognized the certainties and the probable risks of not properly handling the flow of human sewage. In 1967, the Public Health Service summarized what has been known for decades:

Many of the most devastating infectious ailments are the enteric diseases of man and animals. Their agents are commonly excreted, often in enormous numbers, in the feces of infected individuals, and comprise all major categories of pathogens: bacteria, viruses, protozoa, and helminths. The highly dangerous human bacterial agents of typhoid fever and cholera have been responsible for many millions of deaths. They are prevalent in all countries and continue to cause much disease and death in areas existing in both developed and developing countries in which sanitary disposal of human feces has not been achieved. The same problem exists with regard to other disease forms found in feces, especially as a cause of death among infants and children. [Department of Health, Education, and Welfare, Public Health Service, Solid Waste/Disease Relationships, A Literature Survey (1967) at p. 12.]

Some of the specific diseases transmitted by human fecal matter are amoebic dysentery and other protozoal infections, cholera, Coxsackie's disease, infectious hepatitis, poliomyelitis, shigellosis, typhoid and paratyphoid fevers, tuberculosis and worm infestations.

Oblivious to these hazards, American railways are operating some 15,000 passenger cars, 27,000 locomotives and 15,000 cabooses with open toilets, the so-called gravity feed flushing hoppers. Hundreds of millions of pounds of raw fecal matter and liquid sewage is dumped on the tracks every year in stations and over the rails. I might add that Japan, Canada, and the nations of Western Europe are far stricter in present and prospective requirements for their railroads. Sweden, for example, has direct dumping of sewage.

On December 19, 1969, I wrote to the Secretary of HEW, Robert Finch, about this continuing contamination and requested a suitable revision and enforcement of the quarantine regulations. A month later I filed a formal petition requesting the Commissioner of Food and Drug to amend 42 CFR 72.154 to provide in substance that discharge of human excrement and liquid waste shall be prohibited except in circumstances that assure their sanitary disposal. Over 6 months have passed and there has been no reply to this petition by the Food and Drug Administration. I should like to submit both the letter and the petition for the record with your permission.

(The texts of Mr. Nader's letter of December 19, 1969, and the petition, referred to above, follow:)

DECEMBER 19, 1969.

HON. ROBERT FINCH,  
*Secretary of Health, Education, and Welfare, Department of Health, Education,  
 and Welfare, Washington, D.C.*

DEAR SECRETARY FINCH: I wish to bring to your immediate attention some documentation of what must be considered the most blatantly outrageous corporate pollution that your departmental regulations permit to continue unabated. Reference is made to the dumping of raw human excrement directly on railroad rights-of-way, street crossings, stations, watershed, and other land areas.

*The scope of the problem.*—The American Public Health Association lists 27 communicable diseases which could be passed on by raw waste. It is one of the most elementary principles of public health and sanitation that raw feces and urine not be dumped onto the land. Buses and aircraft are required by Public Health Service regulations to retain all wastes and direct disposals are prohibited. Not so with the favored railroad industry. A double standard is at work here. Over tens of thousands of miles of railroad tracks, through railroad stations, over bridges and along reservoirs, railroads are permitted to dump human excrement wholly untreated just as soon as an employee or a passenger relieves himself in the toilet. The only possible restriction on this repulsive corporate practice is contained in 42 CFR 72.154(b) which states that "Toilets shall be kept locked when conveyances, occupied or open to occupancy by travelers, are at a station or servicing area unless means are provided to prevent contamination of the area or station." This regulation has never been enforced; it is outrageously violated and there is no record of any penalty ever being assessed against a railroad. The Surgeon General has not designated any other prohibited areas in the regulations.

Although your Department has long been aware of this dumping of raw sewage; there has been no study conducted about the volume deposited; where deposited in rough percentages; and the consequences. This is not because public health officials are not worried; indeed they are very concerned. Rather, they have been intimidated by the Association of American Railroads which is intent on perpetuating the freedom of enterprise to defecate on open land and in crowded stations.

A very recent study of Monogram Industries, a producer of waste disposal equipment, provides statistics on the extent of the waste volume dumped directly without treatment onto the tracks from locomotives and cabooses. This study was conducted with the knowledge and assistance of the U.S. Public Health Service but has not been made public by any Government agency. PHS's assistance was purely technical and indicated a long familiarity with this major public health hazard. On the most conservative estimate, the Monogram study reports that 30,000 locomotives, and 15,000 cabooses with a total of 45,000 toilets dump 51.5 million pounds of feces per year on the land and the total sewerage output per year is 30.5 million gallons of waste. These figures are based on the most conservative calculations. In addition, there are 17,600 passenger cars which carried 296 million revenue paying passengers in 1968. It can be prudently estimated that the total waste dumped wholly untreated by the railroad industry per year is around 200 million pounds of feces and 90 million gallons of waste.

The general hazards to human health need no elaboration, except to the primitive insensitivities of railroad executives. The last time the railroads tried to whitewash this disease-breeding sewage disposal was in the late 1940's when they attempted to dismiss the problem as (a) inconsequential, (b) subject to air and sunshine purification, (c) the rights of private property which did not need to recognize trespassers. If such responses were crude then, they are even cruder today. Demographic patterns have changed; once rural areas through which railroads passed are now built up residential areas. Easements come closer to the tracks than before. House pets of nearby residents roam the area. More freight trains are in operation. Further, as before, railroad laborers maintaining or replacing track are exposed to human waste material surrounded by flies in their work. Their felt stories of their experiences heap shame and disgrace on company management. Toilets are kept in the filthiest condition by this management which has chosen this way to cut costs. Railroad chiefs rarely make field trips here.

Even the railroads' advanced planning does not take into account the necessity of being toilet trained. Every year there are about 3,000 locomotives and cabooses built and put into operation. Over 98 percent of the toilets in these brand new vehicles are primitive toilets that empty directly onto the tracks. Like their

predecessors they will be a threat to humans, watersheds, and provide animal carriers with their diseased burdens. Japan and the nations of Western Europe have far stricter laws and take greater precautions in practice. In Sweden, direct disposal is banned and retention toilets are required. Some States, such as Pennsylvania and New York, are beginning to show other than verbal concern. But the national remedy belongs inescapably to the Federal Government. Canada has now passed legislation prohibiting direct dumping of human waste and as this law is implemented, it will be felt by five U.S. railroads who operate about 1,200 miles of track inside Canada.

The technical and economic remedies are quite simple and even compatible with the dreams of avarice that are inspiring railroad conglomerates to range far and wide in their acquisitions and downgrade their passenger service. I have made inquiries as to the cost of replacing all existing toilets known as gravity feed flushing hoppers. The minimum costs to refit some 80,000 units for all existing locomotives, cabooses, and passenger cars would be \$3,750,000. This relatively trivial expenditure for an industry, that has shown a net yearly income after taxes from its railway operations of between \$676 million to over \$1 billion during the past 6 years, must be imposed immediately by the effect of new Public Health Service regulations. This expenditure would permit the purchase and installation of retention type buckets with appropriate chemicals in the tank. Disposal would then be accomplished when the trains are at a service station or arrive at their destination.

Even the most superior kind of equipment—a complete, self-contained retention system which recirculates the fluid, disinfects and deodorizes the waste with an electrically driven filter pump—would cost a total of \$35 million for all locomotives, cabooses and passenger cars.

In the list of the foregoing facts, I urge you to immediately initiate the proceedings for revision of 42 CFR 72.154 to prohibit direct disposal onto land or human waste by railroads and establish criteria for sanitary waste disposal procedures that are enforceable. If this requires that you investigate or seek investigation of the Association of American Railroad's collusive lobbying at the Public Health Service, then let such an inquiry be made openly and in public. Unlike other public health decisions, this is not a difficult one to make. The facts are clear; the hazards recognized and banned on other transportation vehicles. Only the railroads remain outside the rule of law. I would hope that you act with firmness and dispatch.

I am forwarding copies of this letter to Mr. T. M. Goodfellow, president of the Association of American Railroads and to Mr. Stuart T. Saunders, chairman of the board of Penn Central. Both of these gentlemen are tidy enough not to expose themselves to the filthy conditions which their policies subject railroad employees and passengers to endure. They will now be asked to concede that corporations are not immune from the standards of decency common to men even if they be railroad corporations.

Sincerely yours,

RALPH NADER.

BEFORE THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE, COMMISSIONER OF FOOD AND DRUGS, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Ralph Nader, Petitioner

PETITION FOR RULEMAKING

Petitioner requests the Commissioner to establish a rule of general applicability for railway locomotives, cabooses and passenger cars, as an amendment to 42 CFR 72.154 to provide in substance that discharge of human excrement and liquid waste shall be prohibited except in circumstance that assure their sanitary disposal. The text of a proposed regulation is appended to this petition.

REGULATORY AUTHORITY

Authority to promulgate such rules is provided by 42 U.S.C. 264. This authority, formerly exercised by the Surgeon General, is now exercised by the Commissioner pursuant to delegation. 34 F.R. 9895 (1969). Regulations similar to that requested in this petition have been promulgated and are in effect for aircraft, 42 CFR 72.155, and highway vehicles, 42 CFR 72.156. The regulation of railways, however,

42 CFR 72.154, merely provides that there shall be no discharge of excrement while trains are passing over areas designated by the Commissioner's predecessor (no such areas have been designated) and that toilets must be locked while trains are standing in stations or servicing areas unless there is a means available to prevent contamination. Unlike buses and aircraft, however, railroad trains are free, while in motion, to discharge human waste into the environment.

#### NEED FOR THE REGULATION

1. Human fecal matter, untreated raw sewage, is a carrier of deadly hazardous human diseases. The Public Health Service has noted:

"Many of the most devastating infectious ailments are the enteric diseases of man and animals. Their agents are commonly excreted, often in enormous numbers, in the feces of infected individuals, and comprise all major categories of pathogens: bacteria, viruses, protozoa, and helminths. The highly dangerous human bacterial agents of typhoid fever and cholera have been responsible for many millions of deaths. They are prevalent in all countries and continue to cause much disease and death in areas existing in both 'developed' and developing countries in which sanitary disposal of human feces has not been achieved. The same problem exists with regard to other disease forms found in feces, especially as a cause of death among infants and children.

Department of Health, Education, and Welfare Public Health Service, "Solid Waste/Disease Relationships, A Literature Survey 12," (1967).

Some of the specific diseases transmitted by human fecal matter are amebic dysentery and other protozoal infections, cholera, Coxsackie's disease, infectious hepatitis, poliomyelitis, shigellosis, typhoid and paratyphoid fevers, tuberculosis and worm infestations. *Id.*, 52-71.

2. The contribution of the American railways to this health hazard is tremendous. In 1968 the railroads carried 295,600,000 passengers and traveled more than 4 billion passenger-miles in 15,100 passenger cars; 95 percent of the cars are equipped with toilets and virtually all are equipped with the so-called gravity feed flushing hoppers. Association of American Railroads, "1968 Yearbook of Railroad Facts" (1969); Railway Age Group Research Reports (to Monogram Industries). There were also in service in 1968, 27,400 locomotives and 15,000 cabooses with similar open toilets. Yearbook, *supra*, Monogram Industries, "A Report on Railroad Waste Pollution" (1969).

The Monogram report cited concluded that toilets on locomotives and cabooses which serve only train crews, not passengers, alone discharge 51.6 million pounds of solid human fecal matter each year; this is flushed with water and is discharged as 30.6 million gallons of raw liquid sewage. One can only guess the quantity discharged by passenger cars traveling 4 billion passenger-miles.

3. In the late 1940's the Association of American Railroads commissioned a series of studies of this problem which, not surprisingly, concluded that it was not a problem of moment for the railroads. Even so, the studies found that enteric organisms were present in railroad track ballast and remained there for several months; that in heavily trafficked areas the number of easily identified fecal deposits (presumably only fresh ones) was 13.3 per mile; and that there was an ascertainable increase in the coliform count in the atmosphere outside and inside the train after a toilet flush. Association of American Railroads, Technical Report No. 6, "Bacteriological Studies of the Effects of Human Wastes From Passenger-Carrying Cars on Railroad Rights-of-Way" (1950).

4. The cost of installing nonpolluting toilets is minimal. Figures on five types of recirculating toilets are \$110 for a manually operated toilet, \$200 for a recirculating flush toilet and for two types of electrically operated recirculating toilet, and \$400 for the most expensive, an air operated recirculating toilet.

For 27,000 locomotives, 15,000 passenger cars and 15,000 cabooses (57,000 toilets), the cost for toilets would be \$11,400,000 at \$200 for a safe, adequate toilet; the cost for toilets would be \$22,800,000 at \$400, for the most expensive. The railroads themselves have estimated the cost of servicing equipment at \$40 per toilet—\$2,280,000, and servicing labor at 30 cents per toilet per day on an assumption that 80 percent are in operation—or about \$5 million per year. (Association of American Railroads, Technical Report No. 7, "Retention of Wastes From Railroad Passenger Cars 24" (1950).

Compare the capital cost with a total railroad investment of \$27.9 billion, and the \$7 million in annual maintenance cost with railroad net income of \$592

million in 1968 and an average of \$712.5 million for the 5 years 1964-68. Yearbook, *supra*.

5. Only four States out of 30 that replied to a letter in inquiry have any State law or regulation dealing with the problem: Arkansas, Montana, South Carolina, and Vermont. There is no information on how successful their regulations have been. But most of the States canvassed, seeing it as an interstate problem, would be eager to support Federal regulation.

Other countries are far ahead of us. Canada now rules all new toilets installed in trains must not dump waste onto the rights-of-way. Canadian Transport Commission, Order No. R-0-37 (April 2, 1969). Japan has adopted a holding tank system for its new high-speed train and Sweden is carrying out a study of the hazards to health caused by open train toilets.

#### CONCLUSION

The discharge of human waste from railroad car toilets exposes the public to serious risk of disease. Rights-of-way pass through many heavily populated areas. Children and animals often pass near railroad tracks. Railroad employees work in many tasks along the right-of-way. Passengers are themselves exposed to contamination of the atmosphere inside the train. All of these are potential carriers of disease or are in danger of contracting diseases borne by organisms found in human fecal matter. There is no longer any excuse for continuation of a practice that is as noxious as it is dangerous to health. A rule in the form appended prohibiting dumping of raw sewage by railroad trains should be adopted forthwith.

WILLIAM A. DOBROVIE,  
*Attorney for Petitioner.*

Filed January 21, 1970.

#### PROPOSED REGULATION

##### AMENDED SECTION 42 CFR 72.154

There shall be no discharge of excrement, garbage, waste water or other polluting material from any land conveyance except at servicing areas provided with sewage system inlets or septic tanks, and in such manner as to insure that there shall be no contamination of the atmosphere, land area or ground water by such discharge.

Mr. REUSS. If I may interrupt you at this moment, Mr. Nader, the testimony of Dr. Edwards did say, on page 3:

We will very shortly publish in the Federal Register a petition submitted by Mr. Ralph Nader inviting comments and whatever evidence he, the scientific community, or anyone else may have on this matter and on the magnitude and complexity of retrofitting.

Were you aware of that response from the Food and Drug Administration before I read it just now?

Mr. NADER. Not until I read it a few moments ago.

Mr. REUSS. Proceed.

Mr. NADER (continuing with prepared statement). However, comments of concern over its inert posture began to flow through FDA. Railroad lobbyists who boasted to their superiors that they had control of the situation began to be concerned over prospects of change.

I might add here, in light of the Commissioner's testimony, that you inquire, Mr. Chairman, as to the professional views of Mr. Harry Haverland, who is in charge of the Interstate Carriers Sanitation Office, U.S. Public Health Service, Cincinnati, Ohio, as well as to making inquiry as to whether any public health officials have gone on record in California against this traditional practice of dumping sewage on the tracks, and whether a professional judgment should be obtained.

[The Chairman's letter of July 30, 1970, to Mr. Haverland, and Mr. Haverland's reply of August 11, 1970, follow:]

HOUSE OF REPRESENTATIVES,  
 CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
 OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
 Washington, D.C., July 30, 1970.

Mr. HARRY HAVERLAND,  
 Chief, Interstate Travel Sanitation Branch, Food and Drug Administration,  
 Department of Health, Education, and Welfare, Cincinnati, Ohio

DEAR MR. HAVERLAND: The Conservation and Natural Resources Subcommittee has been investigating the widespread practice of discharge of raw human wastes from railroad cars, its health and environmental effects, and the means of remedying such practice.

The subcommittee would very much appreciate your professional views on the following matters:

How and to what extent does the discharge of raw human wastes from railroad cars (a) affect public health; (b) contribute to the pollution of surface or ground waters; and (c) cause other environmental effects such as offense to sight and smell, in or near railway stations, and elsewhere.

We would appreciate your early response.

Sincerely,

HENRY S. REUSS,  
 Chairman, Conservation and Natural Resources Subcommittee.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,  
 PUBLIC HEALTH SERVICE, FOOD AND DRUG ADMINISTRATION,  
 August 11, 1970.

Hon. HENRY S. REUSS,  
 Chairman, Conservation and Natural Resources Subcommittee, Committee on  
 Government Operations, Washington, D.C.

DEAR MR. REUSS: Receipt is acknowledged of your letter dated July 30, 1970, requesting my professional views in reference to the discharge of untreated human waste from railroad conveyances.

The following material has been prepared in response to your specific questions on how this practice affects (a) public health (b) water pollution, and (c) the esthetic sensibilities of man:

(a) Throughout the ages, human excreta has been associated with the spread of disease. It has been commonly recognized that when untreated human excreta is deposited above ground, this violates a basic public health principle. In light of this, there is a theoretical risk of transmission of salmonellosis, shigellosis, or possibly other enteric diseases by means of direct contact or the vector of flies to persons who work on the railroad rights-of-way or reside near the tracks. There is also the possible transmission of hookworm infection to barefooted children who play on or near the same areas. Additionally, domestic animals can become infected with salmonella and subsequently transmit the infection to humans. Also it is conceivable that mechanical transmission can occur whereby fecal matter adheres to the animal and is carried into the home.

I believe our concern over the proper disposal of human waste is best exemplified when we discuss the construction of private disposal systems such as the sanitary pit privy. " \* \* \* in which it will be so constructed as to prevent access of flies, animals, and surface water to the vault's contents."

(b) The potential for contamination of water supplies exists through the discharging of untreated human wastes while the conveyances are passing over streams that constitute a direct portion of a watershed or by run-off from the railroad trackbeds. The fact that outbreaks have not been documented may be due to the obvious difficulty of tracing such outbreaks to the source.

(c) During the past 20 years the population of our Nation has substantially increased and is concentrated more and more into urbanized areas. Today, as you know, there are urbanized areas where it is possible to travel over a hundred miles without being outside of urban areas; thus exposing people to the health hazards associated with the discharge of untreated human waste. Concurrently, with this demographic change, our standards of health and sanitation have changed markedly. The public's expectations in the field of waste management will no longer tolerate the practice of dumping waste onto the railroad trackbeds. We have observed during our inspections and have received reports of human waste in railroad yards, stations, and along rights-of-way, in which the public had

direct access to the materials. Certainly, when we are aware of such conditions, appropriate action is taken to correct the violations.

I trust this material will be of assistance to you.

Sincerely yours,

HARRY HAVERLAND,

*Interstate Travel Sanitation Division of Sanitation Control, OC.*

Mr. NADER (continuing with prepared statement).

The industry marshalled its arguments for the status quo—

- (a) Dogs and cats do it; why not railroads;
- (b) Railroads can dump raw waste on their own private right-of-way, if they wish to;
- (c) The amount dumped is negligible in amount and hazard;
- (d) The cost of preventing the dumping is not worth the benefit;
- (e) the tonnage is decreasing as passenger trains and crew sizes decrease;
- (f) Passengers and crews largely take care of their needs before or after boarding trains. Some commuter trains, they say, do not even have toilets.

These arguments strain the credulity of anyone unfamiliar with the essential ingredients of the anticonsumer cult that has characterized railroad company management. Given the premise that railroads dislike their passenger-customers, filthy, reeking toilets assume a function beyond compelling the mere deferral of passenger and crew defecation until detraining. Such repulsive equipment is one more step toward the rejection of passenger traffic pursuant to a discontinuance proceeding before the Interstate Commerce Commission. Even that prostrate agency has officially found railroad practices designed to keep passengers away in order to get rid of the passenger trains. It is true that the railroads have diminished the human waste problem by driving away millions of passengers and forcing the deferral of remaining passenger use of toilet facilities. The problem before the subcommittee today must be viewed in this broader context.

More narrowly, however, the rebuttals can be made as follows, in reference to the points made a few moments ago, to the railroad industry:

(a) Descending to canine and feline comparisons has its own self-evident absurdity. Here it should be noted that human fecal matter contains hazards more serious to human disease spread than dog and cat waste. Moreover, human society long ago ceased judging the handling of its raw sewage by animal comparison. The railroads are herewith invited to join this society.

(b) Private property rights have long ago adjusted to public health regulations. This supersedence is a recognition of the obvious fact that disease bearing hosts do not adhere in their movements to certain property metes and bounds. Also, in the railroad case, it is well known to management that children play along the tracks and that railroad workers are exposed frequently to raw human waste while inspecting or repairing the tracks. I want to emphasize here the occupational hazard to railroad workers.

(c) and (d) Although the amount is decreasing, the solution to preventing all raw discharges is the retention toilet, not the bankruptcy petition.

(e) The cost of installing the minimum requirement retention toilets, materials, and labor, is about \$50 per unit. Simple corporate decency would require such equipment and servicing. Cheap equipment can be used to do the job. No other industry systematically includes primitive, filthy toilet facilities as part of its corporate cost control.

(f) Of course, the worse the toilet facilities, the fewer crew and passengers will avail themselves of that facility.

In calculating the benefits, the industry might begin to recognize that decent facilities are part of a needed policy to attract passengers, rather than the reverse, to solve the problem by driving away passengers.

The overall status of railroad waste disposal reveals a calculated refusal to entertain the broader risks (such as contamination of water supplies) or benefits (such as making trains attractive to customers). In a microcosm of the malaise affecting surface common carriers, this situation etches in dramatic, if dismal, manner the thinking and stature of railroad management over the years. No wonder that this same management has allowed a serious deterioration of safety at the same time it lobbies collusively against modest railroad safety legislation in Congress. With meticulous misfocus, the Association of American Railroads argues against action in this waste problem by citing a NASA study which notes the average human defecation is about 0.33 pounds in weight to counter nonindustry estimates of about 0.75 pounds.

Environmental hazards which are old, known, and cheaply remediable should be curtailed promptly. Our ability to deal with the relatively easily controllable hazards will tell a great deal about our determination to move against the colossal imposition of complex domestic chemical and biological warfare that is inflicting its environmental violence against Americans and their future generations.

I might also add, to put this in perspective, that we should not be deterred by an insidious type of industrial extortion, which says that the fact of decades of neglect, which has reduced the railroad to its present plight, should be any excuse to disregard the minimal investment required to stop dumping raw human waste on the tracks.

The railroad investment narrowly defined in 1968 was \$27.9 billion. Although figures vary on how much it would cost to put the most elementary retention toilets in existing facilities, plus servicing. I do not think that the entire cost would exceed \$15 million per year. Much of the labor is already available, and the existence of retention toilets, which would militate against the need for constant servicing, is also available, and these are all expenses that can be tax expensed.

We are dealing here with a really trivial sum, and the kind of sum which should be expended as a caution and as an example to any other industries who think that they can ladle out 80 years of neglect as a reason for not ceasing herewith this intolerable practice. The point made by the Commissioner at the end of his statement indicates the pathetic abdication, before railroad political power, of the FDA, when he says that against the lesson of history in the railroad industry, that he cannot believe "that responsible corporations will permit these practices to continue."

I must confess to being startled at what was not expected to come from the Commissioner today. All indications from the rank and file

professional manpower at the FDA, particularly in Cincinnati and elsewhere, was that the FDA was going to come forth with a clear-cut amendment requiring the installation of these retention toilets or equivalently performing equipment.

The gap between professional expertise and judgment here and the political judgment of the FDA is obviously quite great. The recommendation to put forward in the Federal Register a proposed rule-making with only prospective effect and to invite comments from the scientific community on an issue that really has already garnered the relevant facts for policymaking is very discouraging. In effect, the testimony amounts to a total surrender to the railroad industry.

I think that it takes a peculiar pressure on an administrative agency for a professional health corps to come up with the kind of testimony that appeared today. There is nothing more established than that there is no redeeming social or economic value whatsoever for allowing an industry alone in this country to continue dumping raw excrement on its tracks and in stations where people congregate. The fact that in 1970 the situation is continuing in its deferred manner indicates that we are not dealing with a public health issue or a scientific issue. We are dealing with a political issue, and I would recommend that the chairman invite the rank and file professional public health people here and ask for their testimony and insure that they will be protected from any kind of demotion or other administrative or regulatory ostracism.

Mr. VANDER JAGT. Mr. Nader, on page 4, subsection (e), you are discussing the cost of installing the minimum requirement retention toilets, material, and labor. You estimate that to be about \$50 per unit. I think we are probably going to hear testimony from the industry before this hearing is over, which will put the estimate at \$1,000 per unit. There is quite a gap between \$50 and \$1,000. On what, Mr. Nader, do you base your estimate?

Mr. NADER. From the suppliers, and I think you should get testimony from the suppliers and document it. Obviously, there is very elaborate equipment that can be put in, and I do not think anybody is calling for that elaborate equipment. We are talking about the minimal equipment that will do the job; in fact, stop the sewage from being dumped in an untreated fashion.

Mr. VANDER JAGT. I think we will also have industry testimony today that the total cost of doing this job will be between \$80 and \$100 million. Would you dispute that figure?

Mr. NADER. I would like to see the breakdowns and I would like to see if this collusive trade association would permit its constituent members to indulge in competitive costing of this kind of practice. I am not interested in what the Association of American Railroads says. I am interested in what each individual railroad says independently, without coordinating these figures through the trade association. I would also like to see the precise cost breakdowns and indications as to whether they are taking into account existing costs or constant costs of labor and service, which, of course, are not to be added as new costs, simply a differential or more intensive use of existing labor.

Mr. VANDER JAGT. So that in your opinion, an estimate of \$100 million to do the job of installation would be an inflated estimate?

MR. NADER. Very inflated. In fact, in 1950 the Association of American Railroads gave figures of servicing equipment and labor of a very, very much lower order of magnitude. Even if you include increases of cost, it is nowhere near that figure.

MR. VANDER JAGT. I was also interested in your relating to this committee the total assets of the railroad industries. I am not much of a mathematician, but if we take the total assets and even the inflated figure, which you allege to be an inflated figure of \$100 million, the cost of doing the job, the total job, would be something like one three-hundredths of 1 percent of the investment. Is that roughly correct, would you say?

MR. NADER. Yes. That is not taking into account certain nonrailroad assets controlled by the same company as well.

MR. VANDER JAGT. So it could be even smaller.

MR. NADER. In reference to that other citation, Congressman, this is Association of American Railroads Technical Report No. 7, "Retention of Waste from Railroad Passenger Cars," page 24, 1950.

MR. REUSS. Mr. Wright?

MR. WRIGHT. I do not have any questions at this point, Mr. Chairman. I think Mr. Nader's statement is very clear.

MR. GUDE. No questions at this time.

MR. REUSS. We will now hear from Mr. R. R. Manion, vice president for operations and maintenance, of the Association of American Railroads. You, too, have a prepared statement, Mr. Manion, which I think was originally prepared for Mr. Goodfellow, the president, to present, but I gather you will present his statement this morning.

MR. MANION. Yes, sir.

MR. REUSS. Without objection, will you now proceed?

**STATEMENT OF THOMAS M. GOODFELLOW, PRESIDENT, ASSOCIATION OF AMERICAN RAILROADS, PRESENTED BY R. R. MANION, VICE PRESIDENT, OPERATIONS AND MAINTENANCE DEPARTMENT; ACCOMPANIED BY WILLIAM MOLONEY, VICE PRESIDENT AND GENERAL COUNSEL**

MR. MANION. Mr. Chairman, Mr. Goodfellow came down with a virus over the weekend, so I am presenting, if you do not mind, his testimony, and I would also like to introduce to you, and have him sit with me, Mr. William Moloney, vice president and general counsel of the AAR. Mr. Goodfellow, as you know, is the president of the Association of American Railroads.

I appreciate this opportunity to appear before you gentlemen and to assure you that we, in the railroad industry, share your interest in the improvement of our environment.

Both our association and our individual railroads have been engaged in antipollution efforts for many years. And we are presently engaged in an industrywide research program designed to eliminate any practices which might contribute to harmful pollution.

You have expressed a concern about health hazards resulting from the release of human waste directly to railroad rights-of-way. This concern is understandable.

We became seriously concerned about it 20 to 25 years ago. At that time, the railroads financed a 5-year study to find out what—if any—pollutant effect resulted from the discharge of waste from our passenger train equipment.

Participating in this sanitation research project were medical, engineering, and mechanical officers of the industry, together with representatives of the U.S. Public Health Service—including its Assistant Surgeon General and Chief of Sanitation.

Consulting director on this project was Dr. Abel Wolman of Johns Hopkins University of Baltimore, an internationally known expert in the sanitation field.

Every aspect of the suspected problem was thoroughly examined by this team. It reported that no evidence was found that sewage wastes from railroad passengers had caused the spread of communicable diseases, and that the bacteria count in railroad ballast, in runoffs from roadbeds, and in the atmosphere of trains, was no greater than in other environments generally not considered to be a health hazard.

I do not know of any development in the past 20 years that would change the conclusions reached as a result of that study. There has been no report of disease from this source, and no indication that water supplies—or other natural resources—have been endangered by contamination from human waste discharged from a railroad car. In fact, the exposure has been greatly reduced since that time.

In view of these facts, I think we should consider the nature of the problem we are talking about. Is it really a matter of public health—or essentially one of esthetics? Certainly, the practice cannot be defended from the standpoint of esthetics. Body wastes—whether human or animal—are offensive to our sight and smell.

We would readily agree with the necessity for prompt action to eliminate a health hazard. But I believe we should consider many factors before reaching a conclusion about measures which achieve purely esthetic results.

Basically, there are three types of railroad equipment from which human wastes are discharged to the private property of the railroads. These are locomotives, cabooses, and passenger train cars. If the railroads were required to change their disposal methods immediately, we would have to convert toilets on each unit to some form of retention equipment. Does a purely esthetic problem warrant this effort—and the cost involved?

To what extent are these facilities used?

Between 1950 and 1968, the number of locomotives and caboose units in service was reduced by about 50 percent. The average trip of crews in freight service in 1968 was 109 miles—requiring about 2½ hours. Local freight train crews make frequent stops at stations or industrial properties where stationary plumbing facilities are available. Engine crews average 3½ hours on trains in passenger service. It seems apparent from these figures that use of on-train toilet facilities by crew members would be negligible.

Intercity railroad passenger service has dwindled considerably—especially on long-distance trains—as indicated by the fact that the average trip is now only 86 miles. Unless this service is taken over by some agency—such as that proposed in legislation now before Congress—it will soon be driven from the scene by economic factors.

Commuter service is expanding, but in 1968 the average commuter trip by rail was only 21 miles. The average time on train was 43 minutes. Certainly, the commuter is not likely to use the train facilities under normal circumstances. In recognition of this fact, toilets are not even provided on some commuter trains or on equipment operated in metropolitan transit systems.

If the railroads are forced to install retention type toilets, what would be involved? Technically, of course, it is possible to convert present facilities on locomotives and cabooses. There are several types of equipment that could be used—incinerating, chemical recirculating and holding tank types. Passenger cars would present great mechanical and structural obstacles to modification. These include the location of trucks, generators and other equipment which would make it difficult to accommodate the necessary tanks. This is especially true with respect to sleeping cars, which may have as many as 17 toilets, it says here, although there are certain types of equipment that may have as many as 30.

What are the economic factors involved?

At the present, about 5 percent of our locomotive fleet, exclusive of switch engines or auxiliary units, is equipped with retention toilets. We would have to convert the toilets on the remaining 18,500 locomotives, at an average of \$1,000 per unit. The total cost would be \$18,500,000. Conversion of facilities on 15,000 cabooses would cost about \$11,000,000. Estimating the conversion costs for passenger equipment is practically impossible because of difficulties I have already described.

If the cost averaged no more than \$1,000 per toilet unit, the total would exceed \$29,398,000. In the data attached to printed copies of this statement, I have explained how we arrived at these figures.

As you can see, the conversion cost would be staggering—especially for an industry whose financial posture leaves much to be desired. But that is only part of the story. The disposal of the waste might prove even more burdensome.

Incinerating units—which a number of carriers have installed on locomotives—do not cause major servicing problems. But maintenance difficulties have been substantial, and crew members have found some units so objectionable they refuse to use them. Also, we could not use incinerating units in cabooses, because there is not enough power available. That means we would have to use chemical or recirculating type equipment—similar to that used in commercial aircraft—in cabooses and passenger equipment.

These require periodic collection of waste material and replenishment of water, disinfectant and antifreeze. This is no problem with airlines because they operate a limited number of units, compared to the total we would have in locomotives and cabooses. In addition, they can schedule planes to permit daily servicing of toilets at a few major terminals. We could not do that. We would have to have service installations at hundreds of terminals scattered all over the country. There are two kinds of equipment that might be used.

First, a mobile unit equipped to collect waste, then discharge it into a sanitary system. This method could be used if adequate sanitary facilities were available. But the equipment would have to be bought

and yards might have to be redesigned to permit access of the mobile unit to locomotives and cabooses. Otherwise, we would have to do a lot of switching at considerable expense and with a substantial loss of time.

The second method would require fixed installations, draining directly into a sanitary system. This probably would cost even more, considering initial installation and operating costs.

No study has been made on any railroad system to find out how many service installations would be needed or the cost involved. We may need as many as 1,500. The average cost might range from \$15,000 upward. That would mean an initial capital outlay of \$22,500,000. The continuing expenses are unknown. But they would be considerable.

In amplifying this statement, Mr. Chairman, I respectfully request that your letters to me [Thomas M. Goodfellow] of January 20 and July 7, 1970—and my replies of March 2 and July 21, 1970—be made a part of the record of this hearing.

Mr. REUSS. And they will so be made part of the record, without objection.

[The correspondence referred to, and subsequent correspondence between Congressman Reuss and Mr. Goodfellow, follow:]

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., January 20, 1970.

Mr. THOMAS M. GOODFELLOW,  
*President, Association of American Railroads,*  
*Washington, D.C.*

DEAR MR. GOODFELLOW: In November 1969, this subcommittee began examination of the problem of human waste disposal from interstate trains. According to a report entitled, "A Report on Railroad Waste Pollution, November 1, 1969" by Monogram Industries, Inc. of Venice, Calif.—a copy of which, I understand, is already in your Association's possession—our Nation's railroads are operating with only the most primitive of human waste disposal systems. That report indicates that over 50 million pounds of untreated human waste are discharged annually from locomotives and cabooses. Although that report does not include any estimate of human wastes discharged from commuter and intercity passenger trains, even greater amounts presumably emanate therefrom. These wastes constitute a significant and avoidable source of pollution of our Nation's watersheds.

We would appreciate your providing to us the following information:

1. A copy of the most recent issue of your association's publication, "Yearbook of Railroad Facts."
2. A copy of the following publications:
  - (a) Your association's technical report No. 6, "Bacteriological Studies of Effects of Human Wastes from Passenger Carrying Cars on Railroad Rights of Way" (1950).
  - (b) Any other reports concerning human waste disposal from railroad cars which you can make available to us, or cite to us.
  - (c) Your association's technical report No. 7, "Retention of Wastes from Railroad Passenger Cars" (1950)
3. (a) Does the Monogram Industries report on Railroad Waste Pollution accurately estimate the quantity of untreated human wastes discharged from locomotives and cabooses?  
(b) If your estimate is different, please state your estimate and the basis thereof.
4. State the estimated quantity of untreated human wastes discharged in 1969 from intercity and commuter passenger cars, and the basis for your estimate.
5. State the estimated total number of miles of railroad right-of-way which:

- (a) are in the United States;  
 (b) cross over a reservoir, waterway or other body of water;  
 (c) pass within 1 mile of any reservoir, waterway or other body of water.
6. Please provide the information requested in tables A and B attached.
7. What do the railroads do to control the effects of the disposal of untreated human wastes from railroad cars onto the roadbed or bridges?
8. Why are the railroads not universally utilizing waste holding systems like those used on buses and airplanes?
9. (a) Please provide estimates of the cost to install a holding tank type disposal system in all railroad cars which lack such a system. Please provide separate estimates for:
- (i) locomotives
  - (ii) cabooses
  - (iii) intercity passenger cars
  - (iv) commuter passenger cars
- (b) please explain the basis for these estimates.
10. (a) Are the railroads presently installing a holding tank type disposal system in the four types of cars listed in question 9 which lack such a system?  
 (b) At what current rate (cars/year) are they doing so?  
 (c) How long will it be before all railroad cars will have such a system?
11. We would appreciate your views and recommendations for reducing or eliminating the discharge of untreated human wastes from railroad cars.

Sincerely,

HENRY S. REUSS,

*Chairman, Conservation and Natural Resources Subcommittee.*

TABLE A.—ESTIMATED NUMBER OF PERSON-DAYS TRAVELED BY ALL PASSENGERS AND CREW DURING 1969 ON RAILROAD CARS

(1)	1. With facilities which release human wastes directly onto roadbed		2. With facilities which retain human wastes for release into municipal sewer systems or septic tanks	
	(a) Without any treatment	(b) With chemical treatment	(3)	(4)
	(2)	(3)	(3)	(4)
A. Locomotives.....	.....	.....	.....	.....
B. Cabooses.....	.....	.....	.....	.....
C. Intercity passenger cars.....	.....	.....	.....	.....
D. Commuter passenger cars.....	.....	.....	.....	.....

Note: Travel on a railroad car during any part of a 24-hour period by a person constitutes a person-day for purposes of this table.

TABLE B.—NUMBER OF RAILROAD CARS IN SERVICE AT END OF 1969

(1)	1. With facilities which release human wastes directly onto roadbed		2. With facilities which retain human wastes for release into municipal sewer systems or septic tanks	
	(a) Without any treatment	(b) With chemical treatment	(3)	(4)
	(2)	(3)	(3)	(4)
A. Locomotives.....	.....	.....	.....	.....
B. Cabooses.....	.....	.....	.....	.....
C. Intercity passenger cars.....	.....	.....	.....	.....
D. Commuter passenger cars.....	.....	.....	.....	.....

ASSOCIATION OF AMERICAN RAILROADS,  
 Washington, D.C., March 2, 1970.

DEAR MR. CHAIRMAN: The following information is provided in response to request contained in your letter of January 20, 1970 concerning waste disposal from interstate trains.

1. A copy of the "Yearbook of Railroad Facts", 1969 edition is attached.
2. Copies of Technical Reports No. 6 and 7 are attached.

The Joint Committee on Railway Sanitation, in its study of the disposal of human wastes from railroad passenger cars conducted between 1947 and 1950, prepared eight technical reports. I presume you have selected the two in which you are primarily interested, but if copies of the other reports 2 through 8 are desired they can be furnished. We have no copy of Report No. 1 which was simply a patent search.

3. The Monogram Industries Report grossly overstates the quantity of untreated waste discharged from locomotives and cabooses. Among inaccuracies noted are the following:

*Monogram.*—"There are over 30,000 locomotives and 15,000 cabooses presently in service. Each of these vehicles is fitted with a toilet . . ." "With 45,000 toilets, each discharging five times per day on the right of way, we have . . ."

*Fact.*—On January 1, 1969, class I railroads had 14,426 cabooses and 18,948 locomotive units equipped with toilets (switch engines and type "B" auxiliary road engines have no toilet facilities).

In 1968, the average trip in freight service was 109 miles. Through freights would traverse this distance in about 2½ hours. Local freight runs would require more time but en route crews would work at stations or industrial properties where stationary plumbing facilities were available. Engine crews in passenger service averaged 3½ hours on trains. It is apparent that use by train crews of on-train facilities would be negligible and under no circumstances approximate five times per day per unit.

*Monogram.*—"In addition there are 2,000 new units going into service each year."

*Fact.*—Monogram implies the fleet is being enlarged annually by this number. Actually the number of engine units has been reduced from 27,886 on January 1, 1967, to 27,376 on January 1, 1969, and cabooses from 14,685 to 14,426 during the same period.

*Monogram.*—"Average defecation is approximately 0.75 pounds."

*Fact.*—Studies made, as reported in the Bio-Astronautics Data Book (1964) edited by Dr. Paul Webb, NASA Document SP-3006, reveal the average human defecation weighs 0.33 pounds.

*Monogram.*—Estimates discharges from locomotives and cabooses at 51,637,500 pounds of feces and 24,300,000 gallons of flush liquid per year.

*Fact.*—Monogram acknowledges several different types of toilets are applied to locomotives and cabooses but for their computation assumes the flush hopper type is used on each unit.

No studies to our knowledge have been conducted on this subject. Road train employees spend some time at originating terminals before boarding trains and additional time at destination terminals after detrainning. However, if we were to assume that all time reported as worked by such employees was spent on-train, that use of toilet facilities was equal to that of passengers during the Joint Committee Study referred to, and that every toilet was the flush type, the annual discharge from freight locomotives and cabooses would total 369,662 pounds of solid waste and 10,746,009 gallons of flush water, and would average only 1.76 pounds of solid waste and 51 gallons of water per mile of railroad.

4. The average length of a commutation trip is 21 miles and time on-train 43 minutes. Under these circumstances, only in rare emergencies would toilets be used. At least one carrier has no toilet facilities on commuter trains. Other roads equip only a fraction of their commuter cars with toilets.

Inter-city passengers spend an average of 4 hours 56 minutes aboard trains. Based upon toilet usage determined by the Joint Committee study, discharges from inter-city trains in 1968 would average 0.02 pounds of solid waste and ⅔ gallon of water per day per mile of railroad operated in passenger service.

5. There are approximately 209,000 miles of railroad right-of-way in the United States. No figures are available to indicate the miles of right-of-way which cross over reservoirs or waterways or pass within 1 mile of any such body of water.

6. On January 1, 1969, in addition to locomotives and cabooses listed in paragraph 2, class I roads had 5,555 passenger cars and 2,457 self-propelled rail motorcars (passenger carrying). The statistics do not reveal the number of such units assigned to commutation or intercity service. Neither do we have information concerning types of toilets with which the units are equipped, thus it is impossible to complete tables A and B attached to the inquiry.

7-8. No ill effects are known to result from disposal of human wastes from railroad cars onto railroad right-of-way. The study of the joint committee revealed:

(a) No evidence that sewage wastes from railroad passenger cars have caused outbreaks or epidemics of communicable and enteric disease.

(b) The number of coliform bacteria in railroad ballast, in runoffs from roadbeds and in the atmosphere of moving trains is no greater than in other environments generally considered not inimical to good health.

(c) The amount of fecal solids discharged to the railroad right-of-way from passenger trains is exceedingly small, estimated to average for all passengers in the United States less than 1 ounce per yard of track per year.

On January 1, 1950, at the approximate time the study was completed, class I roads had 50 percent more locomotive units and cabooses than were in use 19 years later. Between 1950 and 1968 the number of employees engaged in freight and passenger road service was reduced 43 percent and total hours which these employees worked was reduced 50 percent. During the same period the number of passengers carried was reduced 39 percent, with substantially higher reduction in intercity service where greater use of toilet facilities would have been made.

As no health hazard from waste discharged from railroad cars existed in 1950, none has developed in the interim period, and the exposure has been greatly reduced, no necessity for installation of other types of on-train toilet facilities has been demonstrated.

9. For installation on locomotives, the incinerator-type toilet is considered preferable to either the chemical or holding tank-type system.

This is due to limitation on space available for the holding tank and also because the incinerator requires little servicing when contrasted with the others. One locomotive manufacturer has quoted a price of \$1,470 to install the incinerator-type toilet on each new locomotive. Another has quoted \$995. On the latter basis, the cost of incinerator toilets on all locomotive units in which toilet facilities are provided would be approximately \$19 million.

One carrier has estimated that installation of holding tank-type systems on cabooses would cost \$611 per unit. The total for 14,426 cabooses would be \$8,814,000.

It is estimated by one carrier that installing two Monogram-type toilets in each passenger car, with exception of sleepers, would cost \$1,675. The total for 5,283 passenger and 2,457 rail motorcars (passenger carrying) would be \$12,960,500.

No system has been developed to permit installations of a single holding tank on a sleeping car. Thus, a separate holding tank for each toilet would be necessary. One carrier which operates sleeping cars, each of which has 17 toilet units, estimates cost of installing 17 Monogram units per car at \$14,833. The total for 272 sleeping cars, on this basis, would be \$4,035,000.

10. On certain types of new passenger equipment purchased, such as the Metroliner, the Turbo Train, and some commuter cars, holding-type disposal systems are being installed. We have no information as to the number of cars so equipped or the rate at which this is being done.

The same is true of a limited number of locomotives and cabooses operated in one State which now requires such installations.

11. As indicated in paragraph 8, we are aware of no adverse effects resulting from present practices, thus have no recommendations for changes to make.

Sincerely,

TOM GOODFELLOW,  
*President.*

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C., July 7, 1970.*

Mr. THOMAS M. GOODFELLOW,  
*President, Association of American Railroads,*  
*Washington, D.C.*

DEAR MR. GOODFELLOW: Thank you for your letter of March 2, 1970. We appreciate the information you sent to us.

1. We note that paragraph 6 of your letter indicates that Class I railroads had 5,555 passenger cars and 2,457 self-propelled passenger carrying rail motor cars in service on January 1, 1969. However, your association's 1969 edition of the "Yearbook of Railroad Facts," indicates on page 63 that there were "15,000 passenger-train cars in service of class I railroads at the close of 1968," namely, 7,088 more passenger cars than listed in your letter. We would appreciate your advising us which figure is correct.

2. Your letter of March 2, 1970, also stated that you could not furnish the number of locomotives, cabooses, and passenger cars which presently do not have retention-type toilet systems. Since we would like to know the approximate total cost to the railroad industry if such toilets were installed in all operating locomotives, cabooses, and passenger cars, I wonder whether you have any suggestions as to how we might obtain this information.

3. Could you provide to us the estimated number of locomotives, cabooses, and passenger cars which will be built during the next 1 to 5 years.

4. We would appreciate receiving 10 copies of the pamphlet entitled "Yearbook of Railroad Facts" (1970 edition if published; otherwise, 1969 edition), which I shall distribute to each member of the subcommittee.

5. Please provide the information requested in the attached table I.

Sincerely,

HENRY S. REUSS,

*Chairman, Conservation and Natural Resources Subcommittee.*

TABLE I.—COSTS AND WASTE RETENTION TIME FOR VARIOUS TYPES OF RAILROAD TOILETS

(1)	Average monthly cost of removing wastes from individual car				Average length of toilet use (in days) before removal of wastes is required			
	Locomotives (2)	Cabooses (3)	Commuter cars (4)	Non-commuter inter-city passenger cars (5)	Locomotives (6)	Cabooses (7)	Commuter cars (8)	Non-commuter inter-city passenger cars (9)
<b>A. Incinerator type toilets:</b>								
1.	La Mere Industries, Inc. "railhead" .....							
2.	Research Products Mfg. Co. "Incinolet" .....							
3.	(List other makes) .....							
4.	.....							
5.	.....							
<b>B. Retention-type toilet using gravity flow:</b>								
1.	Monogram, Inc., Inc. ....							
2.	Koehler-Dayton, Inc. "Train-Lav" .....							
3.	(List other makes) .....							
4.	.....							
5.	.....							
<b>C. Vacuum operated retention-type toilet:</b>								
1.	Duval Chemical Toilets, Inc. ....							
2.	(List other makes) .....							
3.	.....							
4.	.....							
5.	.....							
<b>D. Nonretention type toilets:</b>								
1.	Dry hopper type .....							
2.	Flush hopper type .....							

ASSOCIATION OF AMERICAN RAILROADS,  
Washington, D.C., July 21, 1970.

DEAR MR. CHAIRMAN: The following information is provided in response to your letter of July 7, 1970.

1. The term "passenger train cars" includes, in addition to passenger-carrying cars, other equipment operated in passenger trains such as mail, baggage and express cars. On January 1, 1969, class I line-haul carriers had 6,583 cars of the latter type. When added to the 8,012 passenger-carrying cars mentioned in my letter of March 2, the total approximates the figure contained in the "Yearbook of Railroad Facts."

To the 8,012 figure should be added 765 sleeping cars operated by Pullman Co., prior to January 1, 1969, but which on that date were taken over by the railroads. The total passenger-carrying cars as of the date indicated would thus be increased to 8,777.

Final figures as of January 1, 1970, are not as yet available but a reduction of about 20 percent in the total "passenger train cars" is estimated. By far the major portion of this reduction would be in the nonpassenger carrying category.

2. Since receiving your earlier inquiry we have endeavored to determine the number of locomotives, cabooses, and passenger-carrying cars equipped with toilets. Although data is not complete, the figures below will be of interest.

Class I line-haul carriers own or lease approximately 93 percent of locomotive units in hands of all U.S. roads. On January 1, 1969, as indicated in my letter of March 2, these roads had a total of 27,376 locomotive units. On January 1, 1970, they had 27,034 units of which 7,498 were switch engines or "B" auxiliary power units on which toilets are normally not installed. Of the remaining 19,536 carriers owning 17,730 responded to our inquiry. They reported 14,305 equipped with toilets of the following types:

Nonretention -----	13, 531
Retention:	
Chemical -----	50
Incinerating -----	722
Holding tank -----	2
Total retention -----	774

As you were advised on March 2, class I roads on January 1, 1969, had 14,426 cabooses which represented 95 percent of the total industry caboose fleet. Again, figures for January 1, 1970 are not available, but carriers responding to our inquiry reported ownership or lease of 12,009 cabooses, of which 10,945 are equipped with toilets as follows:

Nonretention -----	10, 863
Retention:	
Chemical -----	55
Incinerating -----	27
Holding tank -----	0
Total retention -----	82

Railroads contacted concerning commuter equipment reported 3,908 cars of which 3,125 had toilets as indicated below:

Nonretention -----	2, 815
Retention:	
Chemical -----	256
Incinerating -----	0
Holding tank -----	54
Total retention -----	310

These roads also indicated ownership of 5,520 intercity passenger train cars of which 4,366 were equipped with toilets. The total undoubtedly includes some non-passenger-carrying cars.

Nonretention -----	4,316
Retention:	
Chemical -----	1
Incinerating -----	1
Holding tank -----	48
Total retention -----	50

3. Based on recent trends, it is estimated that each year during the next 5 years 1,500 locomotive units and 400 cabooses will be acquired.

The outlook for passenger cars is extremely difficult to predict, but we would expect very few intercity cars to be constructed, at least with railroad funds. Conceivably, commutation service will require about 100 new cars each year during the next 5-year period.

4. With this letter, I am sending you 10 copies each of the 1969 and 1970 editions of the Yearbook of Railroad Facts.

Due to the limited experience the rail industry has had to date with retention type toilets, we have been unable to develop meaningful data with respect to service costs requested in table 1. Several railroads are currently conducting tests on various types of toilets but results thus far are inconclusive. This association will participate in the development and testing of toilets which will most effectively serve the needs of all concerned, giving full consideration to the nature and scope of railroad operations and the manner in which equipment is deployed, operated, serviced, and maintained.

If only servicing requirements are considered, it appears at present that incinerating units hold the best prospect for application to locomotives and cabooses. However, from the experience to date, there are several serious problems which it would be necessary to overcome.

Should it be necessary to install chemical recirculating or holding tank types of toilets, the service problems would be immense. While air lines apparently find it possible to service toilet facilities at a minimal number of terminals on a daily basis, it is conceivable that railroads might require service installations at many hundreded locations throughout the country. This would be due to the manner in which locomotives and cabooses are assigned and dispatched. Even though use of on-train toilet facilities would be minimal, service of the equipment would be necessary on a periodic basis, perhaps weekly, at least bi-weekly, depending upon usage. Capital costs involved in the installation of a large number of service facilities can not at this time be estimated. It is believed either of two methods would be required:

1. A mobile unit equipped to collect waste and replenish the flush water, disinfectant, and anti-freeze. Presumably the mobile unit would then discharge the residue into a sanitary system. Major operating problems would thus be posed; it might be necessary to rearrange tracks to permit access by the mobile unit, as well as time and expense in switching equipment to the required location.

2. A fixed installation to which equipment could be moved so that waste material could be drained directly into a sanitary system and the toilet facility recharged. This would involve perhaps even greater expense both for the initial installation and the operating costs in handling the equipment.

Sincerely,

TOM GOODFELLOW, *President.*

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., July 30, 1970.

MR. THOMAS GOODFELLOW,  
*President, Association of American Railroads,*  
Washington, D.C.

DEAR MR. GOODFELLOW: The subcommittee appreciates the testimony presented on your behalf by your colleague Mr. Manion on Tuesday July 28, 1970, when you were unable to appear because of illness. We wish you a speedy recovery.

We would appreciate receiving additional information relating to the following statements in your prepared testimony which Mr. Manion presented at the subcommittee hearing.

1. Statement. "Passenger cars would present great mechanical and structural obstacles to modification [to accommodate new sanitation systems]." (p. 4)

*Question. (a) Please describe these obstacles. (b) Would these obstacles arise in the installation of incineration units (which do not require a retention tank) or recirculation units (which include the retention tank within the toilet facility)? If yes, how?*

2. Statement. "[Installation of retention toilets on locomotives would cost] an average of \$1,000 per unit." (p. 4)

*Question. Please explain how you arrived at this figure, including names of the manufacturers whose price figures are being used and their prices.*

3. Statement. "Conversion of facilities on 15,000 cabooses would cost about \$11 million." (p. 4)

*Question. Please indicate the names of the manufacturers whose price figures are being used and their prices.*

4. Statement. "Incinerating units . . . don't cause major servicing problems. But maintenance difficulties have been substantial . . ." (pp. 4-5)

*Question. Please describe the maintenance difficulties encountered with the incineration type system.*

5. Statement. "[w]e couldn't use incinerating units in cabooses . . . [w]e'd have to use chemical or recirculating type equipment . . . in cabooses and passenger equipment." (p. 5)

*Question. (a) How is the above statement reconciled with the statement in your letter to me of July 21, 1970, that incineration units have already been installed on 27 cabooses? (b) Why can't incineration systems be installed on passenger cars, especially electrically propelled cars?*

6. Statement. "[A]irlines . . . can schedule planes to permit daily servicing of toilets at a few major terminals . . . We'd have to have service installations at hundreds of terminals scattered all over the country." "We may need as many as 1,500 [service installations]." (p. 5)

*Question. Why would hundreds of service installations be necessary, when modern retention tank toilet systems on railway cars can be used for weeks without removal of wastes?*

7. Statement. "The average cost [of a service installation] might range from \$15,000." (p. 5)

*Question. Please explain how you arrived at this figure.*

8. Statement. "The total cost of toilet conversions and installation of facilities to handle retained wastes would run between \$80 and \$100 million." (p. 6)

*Question. (a) Please outline in detail how you have reached this estimate. (b) Did you assume that incineration type systems would not be installed?*

Sincerely,

HENRY S. REUSS,

Chairman, Conservation and Natural Resources Subcommittee.

ASSOCIATION OF AMERICAN RAILROADS,  
Washington, D.C., August 11, 1970.

DEAR MR. CHAIRMAN: We appreciated the opportunity to appear before your committee on July 28, and I am providing below the additional information requested in your letter of July 30.

1. Structure of existing passenger cars, including location of the trucks, generators and other components of such equipment located beneath the car floor would preclude installation of holding tanks due to clearance limitations among other factors. Incinerating or recirculating units pose other problems such as energy source and wiring for electrical incinerators, fuel supply for units burning propane gas or fuel oil, adequate provisions for venting, and space limitations which might require remodeling the toilet-lavatory compartment.

2. We do not have at hand price lists from manufacturers of toilet equipment. Our cost estimates were based upon responses to inquiries directed to our member roads, a number of which have installed various types of the retention facilities which have been discussed. Several roads are currently conducting tests of such toilet units. The company which has applied Incinolet units to the largest number of locomotives advised their cost was \$1,000 per unit. Expense of \$1,200 for a chemical recirculating type was estimated. Another company has installed Monogram units at a cost of \$1,120 each.

3. Conversion of toilet facilities on cabooses is estimated to average \$735 per unit. The companies would purchase in quantity the units necessary, then probably have the modification performed in the railroad shops. Experience thus far has been limited, and accurate cost figure has not been produced. Estimates we have received range from \$655 to \$1,000 for conversion.

4. Although we have indicated incineration units do not cause major servicing problems, this is not to say such problems have not been encountered. It has been found that feces are not always fully reduced to ash, the residue bakes on the toilet bowl, requiring removal by scraping, and that offensive odors are prevalent. Intensive efforts have been made to eliminate the odor problem but thus far without success.

Maintenance problems involving incinerating units stem from failure or malfunction of the heating coils or elements in those units using electrical energy, the difficulties in ignition of units which burn propane or fuel oil, and failure of flame to retain proper adjustment under conditions encountered in movement of freight trains. It has also been found that heat caused seizing of bearings. As a result some companies which have been experimenting with incinerating units now plan to replace them with others of a recirculating type.

5. The statement that it is not possible to use incinerating units in cabooses was not entirely correct. This should have been qualified by the provision that sufficient electrical energy is not available to permit installation in cabooses of those units which consume waste through direct application of electric heat. An incinerating unit utilizing propane or oil fuel could be installed but, for reasons outlined in response to Question 4 has proved unsatisfactory.

6. As mentioned in our statement, no single railroad has conducted a study to determine the number of service installations it would require. Locomotives and cabooses are assigned to and dispatched from hundreds of terminals. Some units traverse entire railroad systems, others now are operated in through-train service over several railroads. The majority, however, are used in service where limited distances are traversed from assigned terminals. For these reasons we envision the necessity of establishing service installations at all terminals to which locomotives and cabooses may be assigned.

7. Estimated cost of \$15,000 per service installation is based on responses received from two of our member roads who have studied their requirements. In certain locations it might be necessary to purchase or construct only a vehicle into which residue could be drained, then transported and deposited in a sanitary sewer system. At other points, it might be necessary to construct sewer lines or other such facilities into which the waste could be deposited. In our opinion, the first requirement is the design and development of efficient units for application to the rail equipment. Until this is done and a conclusion reached as to the type which is most effective, servicing needs could not be any more closely estimated.

8. The total cost of toilet conversions and installation of facilities to handle retained wastes which would run between \$80 and \$100 million was established by totaling the cost of converting locomotives, cabooses and passenger equipment to a retention type device and total estimated cost of service installations as indicated below:

Locomotives -----	\$18,500,000
Cabooses -----	11,000,000
Passenger equipment -----	29,398,000
Service installations -----	22,500,000
 Total -----	 \$81,398,000

It is felt that the total figure of \$81,398,000 would be the minimum cost to the industry and in some areas the cost would be substantially greater. We therefore broadly estimate a cost between \$80 and \$100 million. Our estimate does not rule out the use of incinerator-type systems where applicable.

If you have any additional questions, I shall be pleased to hear from you. However, we believe much additional research and testing will be required to design a thoroughly acceptable method of handling waste disposal.

Sincerely,

TOM GOODFELLOW,  
President.

HOUSE OF REPRESENTATIVES,  
 CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
 OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
 Washington, D.C., August 11, 1970.

Mr. THOMAS M. GOODFELLOW,  
 President, Association of American Railroads,  
 Washington, D.C.

DEAR MR. GOODFELLOW: In your letter to me of March 2, 1970, you stated that "the annual discharge from freight locomotives and cabooses would total 369,662 pounds of solid waste and 10,746,009 gallons of flush water" and that the "discharges from intercity trains in 1968 would average .02 pound of solid and two-third gallon of water per day per mile of railroad operated in passenger service."

The subcommittee would appreciate receiving from you the following information:

1. An estimate of the total waste discharged in 1968 from intercity passenger trains.
2. A detailed presentation of the mathematical computations of your estimates of the waste discharges from (a) locomotives and cabooses and (b) intercity passenger trains.
3. We note that your computation of waste discharged from locomotives and cabooses includes only freight locomotives and cabooses. How many locomotives and cabooses equipped with toilets are used for nonfreight operations?

Sincerely,

HENRY S. REUSS, *Chairman,*  
*Conservation and Natural Resources Subcommittee.*

ASSOCIATION OF AMERICAN RAILROADS,  
 Washington, D.C., August 21, 1970.

DEAR MR. CHAIRMAN: During the 1946-1950 study of human waste discharge from rail passenger cars, conducted by the Joint Committee on Railway Sanitation, it was found the average solid discharge was .258 lbs. per 100 passenger hours, and the water discharge .30 quart per passenger hour. These figures are used in estimating discharges during the year 1968.

In 1968, class I railroads carried 295,500,000 passengers, of whom 203,500,000 were classified as commutation and 92 million as other than commutation. Certain eastern carriers which operate only commutation service consider single trip tickets sold as other than commutation. A review of 1968 statistics revealed this applied to approximately 57,300,000 trips. These should be considered as commutation passengers which would increase the commutation total to 260,800,000. The balance of 34,700,000 should be classed as intercity passengers.

The average trip in inter-city service was 4 hours 56 minutes in duration, and the total time spent on trains by the 34,700,000 intercity passengers was 171,186,666 hours. As a result, waste discharge by passengers from inter-city passenger trains in 1968 is computed as follows:

Solid waste discharge:

Total passenger hours.....	171,186,666
Hundreds of passenger hours.....	1,711,866
Discharge per 100 passenger hours (pounds).....	.258
Total discharge (1,711,866 x .258) (pounds).....	441,661
Discharge per day (441,661 ÷ 365) (pounds).....	1,210
Miles of railroad operated in passenger service.....	58,130
Discharge per day per mile (1,210 lbs. ÷ 58,130) (pounds).....	.02

Water discharge:

Total passenger hours.....	171,186,666
Discharge per passenger hour (quart).....	0.30
Total discharge (171,186,666 x 0.30 qt.) (quart).....	51,356,000
Total discharge in gallons (51,356,000 qt. ÷ 4) (gallon).....	12,839,000
Discharge per day (12,839,000 gal. ÷ 365) (gallon).....	35,175
Miles of railroad operated in passenger service.....	58,130
Discharge per day per mile (35,175 ÷ 58,130) (gallon).....	.6

In estimating waste discharges from locomotives and cabooses it was necessary to make a number of assumptions, as indicated in my letter of March 2. The same assumptions, listed below, would apply to employees on passenger trains.

1. All time on duty was spent on trains (although a substantial percentage of such time was actually in originating or destination terminals, or at intermediate stations or industrial properties on local freight trains).

2. All toilets on locomotives and cabooses were the water flush type, although several other types are also used.

3. Use of on-train toilet facilities by employees would equal that of passengers in the actual study conducted, that is discharge of .258 pounds per 100 hours and .30 quarts of water per hour.

On these premises we calculate discharges from road freight locomotives and cabooses as follows:

Solid waste:

Total hours on duty of freight service employees.....	143,280,122
Hundreds of hours on duty.....	1,432,801
Discharge per 100 hours (pounds).....	.258
Total discharge (1,432,801 × .258 lbs.) (pounds).....	369,662
Miles of railroad operated in freight service.....	209,000
Average annual discharge per mile (369,622 lbs. ÷ 209,000) (pounds).....	1.76

Water discharge:

Total hours on duty of freight service employees.....	143,280,122
Discharge per hour (quart).....	0.30
Total discharge (143,280,122 × .30 qt.) (quarts).....	42,984,036
Total discharge in gallons (42,984,036 qt. ÷ 4).....	10,746,009
Miles of railroad operated in freight service.....	209,000
Average annual discharge per mile (10,746,009 gal. ÷ 209,000) (gallons).....	51

Another problem is presented in attempting to estimate the discharge resulting from the use by employees of toilet facilities on intercity passenger trains. We know the hours on duty of all passenger service employees in 1968, however, it is not possible to separate commutation service from intercity service. For the purpose of this inquiry only we are making the same assumptions listed above and are including all passenger employees in both intercity and commuter service.

Solid waste discharge:

Total hours on duty of passenger service employees.....	21,558,208
Hundreds of hours on duty.....	215,582
Discharge per 100 hours (pound).....	.258
Total discharge (215,582 × .258 lbs.) (pounds).....	55,620
Miles of railroad operated in passenger service.....	58,130
Average annual discharge per mile (55,620 lbs. ÷ 58,130) (pound)	0.96

Water discharge:

Total hours on duty of passenger service employees.....	21,558,208
Discharge per hour (quart).....	0.30
Total discharge (21,558,208 × 0.30 qt.) (quart).....	6,467,462
Total discharge in gallons (6,467,462 qt. ÷ 4) (gallons).....	1,616,865
Miles of railroad operated in passenger service.....	58,130
Average annual discharge per mile (1,616,865 gal. ÷ 58,130) (gallons).....	27.8

I trust that the information above will respond in part to your Question 3. In my letter of July 21, I provided you with the total number of locomotive and caboose units and available information as to the number equipped with toilets. We do not have a breakdown of the percentage of total locomotive units used in passenger service. Cabooses, of course, are used almost exclusively in road freight service although a small number may be used in inter-yard operations in major terminals.

Sincerely,

THOMAS M. GOODFELLOW,  
President.

Mr. MANION (continuing with prepared statement). Thank you, Mr. Chairman. Based on the results of the 5-year sanitation study of 20 years ago—and on the sharply reduced volume of waste since that time—we fail to see that a problem exists. If one should develop, we believe the Department of Health, Education, and Welfare has ample authority to demand corrective action.

The total cost of toilet conversions and installation of facilities to handle retained wastes would run between \$80 and \$100 million. This may not sound like much in today's inflated economy. But every dollar is important to our industry in its present financial circumstances.

We believe this money could produce far more beneficial results if spent in other phases of our industry's antipollution effort. For example, we could use it to conduct studies to find a nonpolluting replacement for toxic diesel engine coolants; for development of improved methods of weed and brush control along rights-of-way; for development of improved procedures for dealing with accidents in which pollutants are spilled, and for the expanded use of rail transportation to remove solid waste from urban environments.

We are sincere in our approach to the subject of environmental improvement. We were sincere in the sanitation study of 20 years ago. We saw no justification then for spending millions of dollars to solve a problem that did not exist. We see even less justification now—particularly under today's circumstances.

(NOTE.—The data appended to Mr. Goodfellow's prepared statement, as read by Mr. Manion, follow:)

#### APPENDIX

##### LOCOMOTIVES

On January 1, 1970, U.S. class I line-haul railroads owned or leased 27,034 locomotive units. This total represents 93 percent of the locomotive units owned or leased by all railroads in the United States. Of the 27,034 units, 7,498 were switch engines or "B" auxiliary power units on which toilets are normally not installed.

Responding to our inquiry were carriers which own 17,730 of the remaining 19,356 locomotive units. They reported 14,305 equipped with toilets, of which 774 or 5 percent were of the retention type. Assuming the same ratio applies to carriers which did not report, 95 percent of the 19,356 units, or 18,358, do not have retention-type toilets.

##### CABOOSES

Class I line-haul railroads on January 1, 1969 owned or leased 14,426 cabooses (ownership figures for 1970 are not yet available) which represents 95 percent of the caboose ownership of all U.S. roads. Owners of 12,009 of the 14,426 responded to our inquiry. They reported 10,945 equipped with toilets of which only 82 or less than 1 percent were of the retention type.

Assuming the same ratio applies to all cabooses owned by U.S. railroads, slightly more than 15,000 are not equipped with retention-type toilets.

##### PASSENGER CARRYING CARS

On January 1, 1969, class I roads had 8,777 passenger-carrying cars, of which 1,047 were sleeping cars (765 of which were taken over on that date from the Pullman Co.).

Carriers responding to a recent inquiry indicated 360 cars were equipped with retention type toilets. No sleeping cars are so equipped. A sleeping car may have as many as 17 toilet units. For purpose of this estimate an average of 14 per sleeping car is used.

Assuming two toilets per passenger-carrying car other than sleeping cars, and 14 toilets per sleeping car, a total of 29,398 toilets are of the nonretention type.

Mr. REUSS. Thank you, Mr. Manion. Dr. Edwards, I want to compare with you the closing paragraphs of both your statement and Mr. Manion's. At the end of your statement, Dr. Edwards, you said, and I quote: "\* \* \* The public's expectations in the field of waste management will no longer tolerate the practice of dumping waste onto the railroad trackbeds.

"Mr. Chairman, in conclusion I wish to emphasize that while the FDA is proposing steps to bring about the elimination of this method of disposal, we cannot believe that responsible corporations will permit these practices to continue."

The last paragraph of Mr. Manion's statement which he read just now, is: "We're sincere in our approach to the subject of environmental improvement. We were sincere in the sanitation study of 20 years ago. We saw no justification then for spending millions of dollars to solve a problem that did not exist. We see even less justification now—particularly under today's circumstances."

In the light of that statement by the Association of American Railroads, do you really believe that they are going to discontinue their practices of dumping waste onto the railroad trackbed?

Dr. EDWARDS. Certainly not by the sound of the last paragraph of the gentleman's statement. However, that does not negate the fact that we are moving ahead and intend, regardless of the railroad's attitude, or their basic position on this, to move ahead.

Mr. VANDER JAGT. Mr. Manion, on page 1 of your statement, in the third paragraph, you say you are presently engaged in an industry-wide research program designed to eliminate any practice which might contribute to "harmful" pollution. Could you tell us how much you are spending per year on that industrywide research?

Mr. MANION. I have a recent paper here. Let me see if I can find it. A recent survey indicated that more than \$35 million had been spent since 1968 by the railroad industry in capital improvements directed toward pollution control.

Mr. VANDER JAGT. That would not be the industrywide research program that you are talking about on page 1, would it?

Mr. MANION. That is part of it, and there are more programs being developed now. This statement goes on to say that in 1970 nearly \$11 million will be spent in operating cost to achieve greater pollution control.

Mr. VANDER JAGT. In operating costs?

Mr. MANION. Yes.

Mr. VANDER JAGT. Well, how much of that figure is dedicated to this industrywide research program designed to eliminate any practices which might contribute to "harmful" pollution?

Mr. MANION. I would say all of it is. And it is being spent by the individual companies within the industry as well as through industry-wide coordinated programs.

Mr. VANDER JAGT. I want to give you an opportunity to clear up what I may have misunderstood.

I thought the \$35 million was the total that was being spent on an industrywide basis to combat pollution if you installed a new device of any kind and included all of your operating costs.

Taking your own statement, "we are presently engaged in an industrywide research program designed to eliminate any practices

which might contribute to harmful pollution," my question is: How much are you spending on that industrywide research program that you referred to?

Mr. MANION. The new program is under development right now. This \$35 million is the money that has been spent during that period on industrywide programs but there are additional programs underway now.

Mr. VANDER JAGT. And it doesn't include the amount that the industry has spent for installation of antipollution devices?

Mr. MOLONEY. Congressman, antipollution of the type they are discussing here, or what do you mean? I am not sure we understand the question.

Mr. VANDER JAGT. Say your research study commission decides that at your depots you want to do something and it costs money to install equipment. It costs money to install equipment to prevent pollution. Is that part of this \$35 million figure you are talking about?

Mr. MANION. Well, that is what the money has been spent for since that period.

Mr. VANDER JAGT. Since 1968?

Mr. MANION. Yes.

Mr. VANDER JAGT. In capital outlay and operating costs, you have spent \$35 million to combat pollution?

Mr. MANION. That is capital outlay.

Mr. VANDER JAGT. All right. Now we are back to our question again. How much did you spend on this industrywide research program designed to eliminate the polluting that you are doing?

Mr. MANION. I guess I don't understand you. That has been spent on industrywide pollution problems. But we are attacking, we are opening up new areas of investigation also.

Mr. VANDER JAGT. Well, let us move on to another point.

You heard Dr. Edwards' testimony concerning raw human sewage on the tracks. FDA takes the position that there is no conclusive scientific evidence that this causes the spread of communicable diseases.

Mr. MANION. All right.

Mr. VANDER JAGT. But there was no doubt in his mind that raw human sewage on open lines is a potential health hazard. It would seem to me since the beginning of time that raw human sewage has been, is now, and always will be, a potential health hazard.

Would you agree with Dr. Edwards in his testimony that raw human sewage on the tracks is a potential health hazard?

Mr. MANION. Well, sir, in the first place, not being a doctor, I may not be able to address myself to that point in the terms of the question.

But in terms of a volume that actually spills on the track and the exposure to the elements, I don't think it can be much of a problem.

The report—the summary report of our study in 1950 indicated that there was less than an ounce per mile per year deposited on the right-of-way.

Mr. VANDER JAGT. That leads us, Mr. Manion, into the subject of allowance. On page 3 you have discussed the amounts of raw sewage dumped on the tracks. In your statement you state that it seems

apparent that use of on-train toilet facilities by crew members would be negligible. You also heard in my questioning of the FDA witnesses, one study that estimates the raw human sewage dumped on the tracks from engines and cabooses of freight trains alone at 50 million pounds a year, and referred to in HEW studies at around 25 million pounds a year.

You heard FDA's responses to that—that they would not be surprised by the estimate that puts the figure at between 25 and 50 million pounds of raw human sewage from cabooses and engines of freight trains.

Do you dispute those figures?

Mr. MANION. I think they are much too high.

Mr. VANDER JAGT. Where would you put the figures?

Mr. MANION. I think we have given a figure here in our letter to the Chairman of March 2, which maybe you have not seen.

We based our estimates of the number of hours that crewmen spend on trains in motion, and we estimated that the annual discharge from freight locomotives and cabooses would total 369,000 pounds of solid waste per year.

Mr. VANDER JAGT. Your statement again was what?

Mr. MANION. That is 369,662 pounds of solid waste, and 10,746,000 gallons of flush water.

Mr. VANDER JAGT. So by the time you put it all together, your estimate is about 500,000 pounds, very roughly speaking, for a ball-park figure.

FDA would not be surprised at the amounts that range between 25 and 50 million pounds. You are quite far apart.

Mr. MANION. We are, we sure are. I think that one of the reasons for that is that the figures they looked at in the first place were not quite realistic from this standpoint.

You take the number of locomotives moving on freight trains. Each freight train may have three or four units—three or four locomotive units on that train. They each have a toilet but only one of those locomotives is being occupied by people, or maybe two. That would be a total of two or three people occupying three or four units.

So all the toilets you have been counting up are not necessarily actually being used.

The other factor is the relative short period of times that these men are moving on trains on our through freight trains. We are not talking about the local freight trains which stop and go, stop and go, all day long.

But with regard to the through freight and passenger trains, the crew members are actually on these trains in motion a relatively short period of time.

It is normal that they would make use of station facilities a great deal more than they would the facilities on the freight train.

Mr. VANDER JAGT. Under the reasoning you have given us, Mr. Manion, isn't that very argument also applied to your cost estimate? That in some of your engines, you wouldn't need any facilities?

Mr. MANION. No, that doesn't follow. Because let me tell you, you take four or five units, freight locomotive units, that are at the head of a train. The next train that goes, the order in which those units

appear on the train may be different; so that any one of those units may be the next unit that is used, or a subsequent time that it is being occupied.

Mr. VANDER JAGT. So your arguments do apply when it comes to estimating the total amount of waste disposed, but they don't apply when applied to estimating the total costs.

Mr. MANION. No, my logic applies in both circumstances, sir.

Mr. MOLONEY. Congressman, it's like this: If you built a hotel and put a bathroom in each room, you would have a certain cost. If you had 50-percent occupancy you would have 50-percent use of the toilets. I think it is that simple.

Mr. VANDER JAGT. All right. Do you have engines that never leave the dockyard or the working yard?

Mr. MANION. Yes; in the total figures quoted, in some of these studies and some of the testimony that you have heard, are included yard engines, switch engines which are not equipped with toilets at all. They are working right at a stationary location. They don't have toilet facilities.

Mr. VANDER JAGT. Do you include those in your total of 18,500 locomotives that would have to be equipped with toilet facilities?

Mr. MANION. We took them out of the totals as Mr. Nader mentioned for instance, and also, we still have some remaining so-called "B" units.

These are locomotives that do not have a crew cab. They are simply power-furnishing units and they were included in the total figures you heard of the total number of locomotive units.

Mr. VANDER JAGT. So you stand by your estimate that the total cost would be \$80 million to \$100 million?

Mr. MANION. We must say that it is an estimate because a relatively few railroads have sufficient experience at this point; and as you notice from this letter that I quoted earlier, a number of railroads are testing now to find out what is the best arrangement, what is the most satisfactory arrangement, and what is the best unit from a servicing standpoint. And they have not developed yet in this country—and I don't think they have even in Canada—the optimum or even what they consider a real good terminal servicing situation.

I mentioned, or Mr. Goodfellow's statement here mentioned, several possible conclusions to this.

It would take some study, and some experience to know how many terminals would have to be equipped and to determine the best equipment.

We don't have easily available a situation where you have acres of pavement to run around on as you do in the airports. Our cabooses and locomotives generally are serviced in locations that would not have equipment and facilities to handle all this.

Mr. VANDER JAGT. You are talking, and I have been talking, about units that are already in existence. You don't have any objection to putting adequate sewage retention or some device in all units manufactured after December 1971, when you are manufacturing a new unit?

Mr. MANION. Well, I would say that that is a better approach than trying to retrofit all of our locomotives. Now you say I wouldn't have

any objection, but I still don't know what the cost would be for establishing the terminal facilities.

Anticipating this kind of a question I envision this sort of a problem: Even though we should only install these things on new equipment, you still have to have terminal facilities just to take care of those newly installed units at whatever terminal these locomotives and cabooses would appear.

So our terminal problem would approach the same size of a problem, only equipping new equipment as you would have if you retrofitted.

Mr. VANDER JAGT. You emphasize that your estimate of between \$80 million and \$100 million is only an estimate, and you implied that it could be even higher.

Mr. MANION. Yes.

Mr. VANDER JAGT. Did you also imply that it could be significantly lower?

Mr. MANION. Of course.

Mr. VANDER JAGT. Do you agree with my arithmetic, that, accepting your \$100 million estimate, what we are talking about is 1/300 of 1 percent of the total invested in railroads in America today?

Mr. MANION. I don't know. I didn't look at that, but it occurs to me there may be no relevancy in that kind of a comparison.

Mr. VANDER JAGT. The amount invested compared to the total investment, if it were 1/300 of 1 percent, might have no relevance.

Mr. MANION. That is the way I feel.

Mr. VANDER JAGT. All right. Now you say on page 6 that you believe the money that would be required could get far better results if you spent it in other phases, and you cite other phases.

We may be getting back to the first question, but how much did you spend in these other phases in the year 1969?

Mr. MANION. The only figure I have is that figure since 1968 of \$35 million. I haven't broken it down by these various categories.

Mr. VANDER JAGT. From 1968 until today?

Mr. MANION. Yes.

Mr. VANDER JAGT. The industry has spent \$35 million in the anti-pollution fight; is that correct?

Mr. MANION. That is the figure that has been reported.

Mr. VANDER JAGT. That is a period of about 2½ years, so we are talking about the whole industry spending somewhere around \$14 million a year on the war on pollution; is that correct, according to your own figures?

Mr. MANION. That is right.

Mr. VANDER JAGT. Would it be of any help to the railroads if the requirement was not one that you must provide toilet retention facilities as of now or next month? Would providing help through amortization and rapid depreciation perhaps help? This regulation will be required in December of 1971 or earlier, if we can convince the FDA that the materials are there ready for you now.

Mr. MANION. Well, I probably can't answer that fully. My own feeling is that in the present situation the railroads find themselves in a position that they will get no tax help generally.

Mr. MOLONEY. They will get no tax help; most of them would get

no or little tax benefit from it, and it would all be cash that would have to be generated internally. You are aware of the problems the industry has in trying to raise money.

Mr. VANDER JAGT. But if help were provided?

Mr. MANION. What kind of help do you have in mind?

Mr. VANDER JAGT. Amortization and rapid depreciation, or other devices?

Mr. MANION. That is still cash.

Mr. VANDER JAGT. So, this amortization or depreciation wouldn't be much help to you?

Mr. MOLONEY. Congressman, it's hard to jiggle the tax laws to help a nontaxpayer. If you don't earn enough money to pay tax, the depreciation doesn't help you too much.

Mr. VANDER JAGT. We are delighted to know that when these regulations are in effect, there isn't any amortization or depreciation legislation that would help.

Mr. MOLONEY. If I were a taxpayer it might help. The difficulty is that too many of our industry do not make enough money to pay taxes in the first place.

Mr. VANDER JAGT. I have really just one more question, Mr. Chairman, and I want to make sure that I understand the position of the railroad industry.

It is your position that the raw human sewage on the tracks is not a potential health hazard. Is that correct?

Mr. MANION. I don't believe that is exactly what I said.

Mr. VANDER JAGT. Please clarify it then.

Mr. MANION. I think, as compared to other pollution problems that we have, it is a minimal problem and that we should be spending our available money somewhere else.

Mr. VANDER JAGT. There are bigger problems?

Mr. MANION. Yes.

Mr. VANDER JAGT. But zeroing in on this problem, narrowing it to this significant problem here—unfortunately we can only work on one thing at a time—is it your opinion that raw human sewage on the tracks is a potential health hazard?

Mr. MANION. Again, sir; I am not a doctor and I don't really know whether it is much of a potential health hazard or not. I have worked around railroad tracks all my life, and, except for the esthetics, I never felt concerned about it.

Mr. VANDER JAGT. In other words, your conclusion as an industry is, and I quote from the end of your statement: "We saw no justification then"—and you were talking about 20 years ago—"for spending millions of dollars to solve a problem that did not exist. We see even less justification now—particularly under today's circumstances."

In other words, your position now is that a problem does not exist?

Mr. MANION. That is right.

Mr. VANDER JAGT. In line with that statement, I ask you again, Dr. Edwards, do you think that without extreme prodding from FDA the railroads will voluntarily clean up what you have testified is potentially a health hazard?

Dr. EDWARDS. Well, according to the statement made this morning by the industry, there obviously is a large disagreement here because

we do consider it to be—and again I underline the word—a “potential” health hazard.

In view of today’s population problems and the like, I think we have to move in the direction of correcting this problem.

Mr. MOLONEY. I think part of the answer to that question, Congressman, can be found in the fact that many of the roads today and on much of the equipment being acquired as was said in the Department’s testimony, they are putting holding or treatment facilities on, or they are not putting anything on because they are not needed.

Now if that, of course, is the attitude of the industry in its purchasing today, I think you could expect more than a pure obstinate refusal to cooperate in any way in solving what might be only an esthetic problem.

In other words, I don’t think you could say that we would be completely in opposition. As a matter of fact, I think the Surgeon General, and under the present law the Commissioner, has full authority to deal with this.

And it is a little difficult for us to sit here and tell you just exactly what our position may be or how we would handle something, in what, let us say, will be a hearing and a proceeding before the HEW.

Mr. VANDER JAGT. So you might back off a little bit from your statement, and admit that esthetic problems do exist?

Mr. MOLONEY. As a lawyer, Congressman, I have backed off from a lot of things from time to time.

Mr. VANDER JAGT. Thank you very much. Thank you, Mr. Chairman.

Mr. WRIGHT. Mr. Manion, in your statement you referred to retention equipment on each train and car. You estimate installation cost at perhaps \$1,000 and you speak in terms of treatment stations in the neighborhood of \$15,000 each for collection of this matter.

Are you familiar with the system developed by Dr. Blankenship?

Mr. MANION. I am not sure what kind of a system he has. I am not really aware.

Mr. WRIGHT. Mr. Chairman, this is a bit amazing to me. The Food and Drug Administration had no knowledge of what appears to be a rather innovative approach.

The Association of American Railroads, whom one might think might be aware of it, seems to have no knowledge of it.

I have been aware of it over the past couple of years, and I have known of a system developed by Dr. Blankenship and his associates for this purpose.

I wonder if it would be out of order for me to request that we might get some testimony on this, as we have only 20 minutes left.

Mr. REUSS. I think that is sensible. I would first ask Mr. Gude, do you have any questions?

Mr. GUDE. No.

Mr. REUSS. Dr. Blankenship, would you proceed?

You have a statement on behalf of Research Products Manufacturing Co., which under the rules will be received in full without objection. Now, would you proceed, sir?

STATEMENT OF DR. E. BAYNE BLANKENSHIP, PRESIDENT,  
RESEARCH PRODUCTS MANUFACTURING CO.

Dr. BLANKENSHIP. You ask whether there is a harmful effect on the total environment from the practice of discharging raw human waste from railroad cars, whether the practice should be prohibited, and whether a totally effective remedy may be anticipated.

The practice of discharging directly raw waste from mobile equipment may in some cases or places produce little by way of harmful effects but, unfortunately, in those areas where the effect may be most detrimental, so also are the railroad car density and population density the greatest and city treatment plants the most overburdened and ineffective. The latter—namely, the city treatment plants—will be important in the consideration of effective, remedial equipment.

For the most part, railroads continue to specify a type of direct discharge toilet using either no water and known as a dry hopper, or one designed to be flushed with water but which because of no continuous supply of water becomes also a dry hopper.

In either case, the installation is odorous and unsightly because of adhering human excrement, and thus becomes of questionable hygienic value to railroad operating personnel. Such a toilet does not always discharge even to the ground, but, rather, the raw waste adheres to equipment underpinnings where it creates an onerous condition during equipment servicing by maintenance personnel and possible health hazards within maintenance shops. And we are all aware of the fact that the toilet area on any passenger car is easily located by smell alone.

Should this practice of raw waste discharge be prohibited? The answer to this depends upon two things: What options will be afforded to the railroads and, secondly, will the options actually provide for a better, cleaner total environment?

If the railroads are merely to collect and to transport human waste from their property to public property with little appreciable improvement in the total environment, at very considerable expense to the railroads, then the answer should be no.

The railroads should not be required to save human waste in little receptacles, buckets or even trucks, in order that that waste wind up in a public stream after having joined other partially treated and deodorized sewage from an already overburdened city treatment plant.

This leads to no predictable ending to the waste disposal story, for it simply passes the problem on from railroad to the city, State and Federal authorities, and we simply enlarge the pollution puzzle.

The surface antipollution program of this country may be sorted into three categories:

Existing, fixed installations such as homes and industries served now by treatment systems requiring substantial improvement simply to catch up with present population requirements.

Future, fixed installations will require new methods of waste management, and if not immediately new methods, certainly new locations.

The third category, and the one responsible for our meeting today, is that of mobile equipment. The Congress has already enacted legis-

lation pertaining to certain types of mobile equipment in its marine antipollution bill.

As a pragmatic fact, if the owner of a 24-foot boat is to be prohibited from dumping untreated waste into a public stream, then without a doubt, the railroads are going to be faced with the same type of restrictions.

Why categorize mobile equipment? Because its very mobility precludes the utilization of waste disposal methods usual to a fixed installation, such as the water-flush/treatment plant combination. Mobile equipment, therefore, must have its own specialized waste management methods.

On the assumption that the practice of direct raw waste discharge is indeed onerous and is to be prohibited, is a totally effective remedy available?

Yes, absolutely.

What are the characteristics of such a system?

First, to be totally effective, the system must provide a cleaner, better total environment, not merely improving one phase of it to the detriment of another.

Second, the system must be complete within itself and not dependent upon other disposal systems. It must be an integral part of the mobile equipment itself.

Third, a minimum of servicing and servicing equipment be required. The railroads are not in business to service toilets and cost of servicing must be minimized; otherwise, such costs will surely induce, sooner or later, improper maintenance.

Fourth, the system must enjoy environment freedom, that is, remains effective at any location, however remote, and under any climatic condition, however cold.

What general disposal system satisfies these specifications? "Sanitation by incineration" is the best way of saying it. We use that term to describe our Incinolet electric toilet system which satisfies all of the four points above.

The railroads of this country and Canada have already recognized that now is the time to modernize. Their modernization programs for diesel locomotives and cabooses now show approximately 2,000 Incinolet units in railroad mobile equipment, not to mention fixed installations such as elevated towers, stations and crew housing. The first railroad installation, that is Incinolet installations, was in 1958, the first diesel locomotive installation in 1960 and for caboose 1961.

Fifteen years ago when we were first researching the Incinolet concept, phrases such as "pollution abatement" were not fashionable; we need the more descriptive words such as "nasty" or "filthy." Since we didn't realize how polluted we really were, we designed the Incinolet concept to alleviate conditions of inconvenience or improper sanitation rather than to abate pollution.

In particular, the first Incinolet was installed in B-36 aircraft in 1953. In the Air Force it was called the "blue smoke project," that is, the elimination of human waste in a puff of blue smoke.

We have now even removed the "blue smoke" from the Incinolet, for each of our units incorporates our own catalytic odor control sec-

tion which is quite effective in the removal of objectionable odor during the incineration process.

As a matter of fact, each Incinolet unit is tested with urine prior to approval for shipment, and, of course, we continually research areas of catalysis for improvements in these designs.

Canada has preceded us in the United States by several years in the consideration of toilet facilities for diesel locomotives. In about 1963, a decision was made that required all locomotives of the road-haul class to be equipped with toilets of some kind.

Following a year's test, the Canadian National Railroad, Canada's largest, decided on the Incinolet and has since equipped approximately two-thirds of its locomotives with our equipment. Incinolet withstands the extreme Canadian winter without loss of effectiveness.

What are the principles of the Incinolet and how may they resolve the problems of raw waste discharge. Incinolet is our trade name for our electric incinerating toilet which applies, normally, electric heat to human waste, evaporating urine, dehydrating and igniting solids, finally leaving only an ash, inorganic, odorless, bacteria-free.

The Incinolet may also be supplied to operate from propane as in the case for cabooses.

The ash is accumulated in a removable ashpan located in the bottom section of the unit. The ashpan is easily removed and the ash disposed, frequency of such disposal dependent upon usage and size of ashpan.

Incinolet is serviced at the same time that the locomotive or caboose undergoes periodic inspections. As the ash within the Incinolet is bacteria-free, its disposal may be made almost anywhere.

I have here an ashpan containing ash from eight fecal deposits and 20 urine deposits.

Your examination is invited.

Servicing of the Incinolet is, therefore, possible with minimum equipment, say, a bucket and a screwdriver. Servicing may be completed regardless of location of the caboose or locomotive, even if several miles from a sewerline.

Not only does such servicing not require a sewerline, it also does not require refill water as for the water type toilet nor deodorizing chemicals for the recirculating toilet and macerator-chlorinator toilet.

The foregoing discussion implies the Incinolet for use in locomotives and cabooses only. While past and present railroad applications have been primarily in these two, Incinolet concept is by no means limited to the two. It is altogether feasible to adapt our concept to commuter and passenger cars, for electric power is usually available in both cases.

Finally, does the Incinolet concept satisfy the requirements for a totally effective system? Let us see!

1. Incinolet does provide for a better, cleaner total environment.
2. Incinolet is a complete disposal system and an integral part of the railroad equipment, and independent of other disposal methods.
3. Incinolet requires no special servicing and an absolute minimum of servicing equipment. It also requires no water—no chemicals. Cost of servicing is completely minimized.

4. Incinolet remains completely effective under all conditions of the environment.

Definitely, going electrically is better.

Thank you, Mr. Chairman.

Mr. REUSS. Thank you, Dr. Blankenship.

Our last witness is Mr. Smyers, representing Koehler-Dayton Division of Litton Industries.

We have your very comprehensive statement, Mr. Smyers, and under our rules without objection it will be received in full.

Because the House goes into session promptly at noon today, and we do have the reorganization bill before us, I wonder if you will be willing to summarize—rather than to give in full your statement—bearing down particularly on what Koehler-Dayton's product is and how it does the job?

**STATEMENT OF S. BARRIE CLIFF, VICE PRESIDENT AND GENERAL MANAGER, KOEHLER-DAYTON DIVISION, LITTON INDUSTRIES, INC., DAYTON, OHIO, PRESENTED BY WILLIAM H. SMYERS, JR., PROJECT MANAGER—RESEARCH**

Mr. SMYERS. I think our written statement might help clear up some of the questions that have been brought up here today, Mr. Chairman. In it, we have given a breakdown of the calculations and underlying assumptions for the numbers we've presented. One of the particular things I have noticed here is that there may be a problem of semantics between various testimonies, depending on whether witnesses are speaking of the natural weight of the sewage alone, or the dried weight, or the weight of the sewage plus flush water getting on the tracks.

We calculate that there is an equivalent population of about 50,000 people in effect "living" on the railroads.

Now, the natural weight of the sewage (urine plus feces plus toilet paper only) is about 4 pounds per person per day (about 2 quart's worth). The dried weight of this same sewage (after the moisture has been evaporated) is about  $\frac{1}{4}$  pound per person per day. However, if the weight of the flush water is included on the basis of 7 flushes per person per day, at 1 gallon (8 pounds) per flush, the weight becomes about 60 pounds per person per day. You can see, then, that the 50,000 equivalent population could contribute either 200,000 pounds or 12,500 pounds or 3 million pounds per day, depending on whether we speak of the natural weight, or dried weight, or weight including flush water, respectively.

Before quickly summarizing, I would like to apologize for the absence of our vice president and general manager, Mr. S. Barrie Cliff. His airplane flight was cancelled because of a malfunction this morning and he could not make it.

We do make treatment systems of various types for airplanes, buses, boats, and so on. We are presently making retention systems, and we have 400 of them in railroad trains now.

I should point out that I think the number 15,000 that has been suggested as the numbers of passenger cars which might need retrofitting

with waste handling systems, may include baggage cars which probably should not be counted as candidates for toilet systems. Therefore, 8,000 passenger cars rather than 15,000 might be a good guess, as to the total number that might need treatment systems. (Locomotives and cabooses would be in addition to these passenger cars.)

In our paper, we have tried to determine the relative cost effectiveness of sewage control for different elements of our civilization, such as trains compared to boats and compared to municipalities. I think Mr. Nader is probably underestimating the cost at \$50. Such a figure might be valid for a device which would only store a small number of flushes, and which might have a carry out bucket-type disposal system and would therefore have a high operating cost. A passenger car needs a larger device with a permanently plumbed-in drain and flush system. We expect that the cost to the railroad, counting the car manufacturer's charges, installation, and so forth, for our present type of system is nearer to \$1,000 per toilet.

If you figure operation and maintenance for 10 years and set up a trust fund to provide these costs, you ought to add another \$1,000. So we would estimate something like \$2,000 to purchase, install, and operate a unit for, say, 10 years.

The written testimony explains that this amounts to a cost effectiveness for railroad waste of about \$400 to prevent the equivalent daily waste of one person from reaching the tracks. Such a cost is fairly high if you compare it with a municipal sewerage system where it costs maybe \$65 per person to prevent untreated waste from getting into our waterways.

These numbers are only estimates, any one of which could be off by a factor of 2, but even allowing for such uncertainties, it appears that the cost effectiveness of our present railroad waste retention system needs improvement.

The main plea in our written testimony is a request to try to stay flexible in any legislation that is created, and to allow treatment as an alternative to retention. To help decide how much treatment is needed, we have explained some of the parameters of conventional sewage treatment and noted those which we feel don't have significance to railroad wastes.

We have suggested a set of minimum regulations which we feel might be satisfactory. They would be broad enough that they would leave enough leeway for engineers to come up with creative and innovative types of systems such as Dr. Blankenship's.

I have here some samples of the effluent of a macerator chlorinator, a treatment device we also manufacture. This one shows what would be left on the tracks after a complete fecal flush had been deposited and the water part of the effluent evaporated. This other sample is simply an example of the effluent as it leaves the treatment system.

We do hope you will not restrict legislation to a "retention-only/no-discharge-under-any-circumstances" policy because such a policy would tend to perpetuate high operating costs and would tend to discourage whole new and better treatment solutions to the problem.

Thank you, Mr. Chairman.

(The prepared statement of the Koehler-Dayton Division of Litton Industries, Inc., follows:)

PREPARED STATEMENT OF S. BARRIE CLIFF, VICE PRESIDENT AND GENERAL MANAGER,  
 KOEHLER-DAYTON DIVISION OF LITTON INDUSTRIES, INC., PRESENTED BY WILLIAM  
 H. SMYERS, JR., PROJECT MANAGER-RESEARCH

Gentlemen, we appreciate very much the opportunity to present our views and background information for your consideration.

The Koehler-Dayton Division of Litton Industries has been in the business of supplying sewage waste management equipment for capsulated populations (for boats, trains, planes, etc.) for the past 10 years. We have furnished recirculating retention systems for commercial jet aircraft, among them the Boeing 727, the Douglas DC-9, stretched DC-8, the DC-10, the C5A, and numerous executive aircraft. For those unfamiliar with the terminology, a retention system is a system which holds the waste on board the vehicle, so that it may be pumped out when the vehicle is at rest and the waste can be conducted or transported to a sewage system. In a recirculating system, the liquid part of the sewage is separated from the solids, and after the addition of a colorant, deodorant and bactericide, the liquid part is reused as the flushing medium. The recirculating arrangement saves considerable space and weight for a vehicle which might otherwise need to carry a large supply of fresh flushing liquid. We have supplied several hundred toilets of this type for trains already.

We have built experimental research systems using evaporation of the liquid for further reduction in storage space required for the vehicle, and are now engaged in a research project for the Navy in cooperation with Batelle Institute for a recirculating evaporative system. The system is intended for use on ships with crews of 200 men or so. Our other marine waste handling equipment includes:

1. The Konvert-A-Head, small recirculating retention device which can be attached to an existing marine toilet for use in waterways that have been designated as "no discharge" areas.

2. The MK-9, a small treatment device for recreational watercraft, but not yet in production pending issuance of Federal performance standards. The unit is capable of: eliminating two-thirds of the oxygen demand of the waste, 70 percent of the total nitrogen, 80 percent of the suspended solids, and reducing the bacteria count by over 99.9998 percent.

3. The MK-10, larger treatment device, is intended for ships with up to 10 toilets on them. Commercial versions are priced in the range of \$3,000 to \$5,000 depending on the number of toilets to be serviced.

With this background, then, what constructive information can we supply regarding sewage wastes from rail cars? First, to comment on the various questions that were asked in the letter inviting us here:

1. *How does discharge of raw human waste from rail cars affect—*

(a) *Public health?* We don't really know, but would expect that the public health hazard is relatively small. On the other hand, there are those, such as railroad maintenance personnel, who must of necessity work on and around the railroad beds, and these people should be protected within reason, from unnecessary hazards. It would seem possible, for instance, that when a maintenance crew unwraps their sandwiches for lunch, flies are attracted to the food and there is a chance of contamination if there were raw sewage deposits in the area that had previously attracted the same flies.

(b) *Pollution of ground and surface waters?* We would estimate that all but a miniscule portion of the road beds are probably on gravel and soil such that sewage would typically seep into the ground rather than to become part of the surface water run off system. In addition, data from the 1964 and 1969 "Statistical Abstract of the United States" can be projected and used as follows:

If we project approximately 14 billion passenger miles per year at a projected typical speed of 40 miles per hour, we can calculate that this amounts to:

$$(14 \times 10^9 \text{ pass. mi./yr.}) \times (1 \text{ hr./40 mi.}) \times (1 \text{ day/24 hrs.}) \times (1 \text{ yr./365 days}) = 40,000$$

(equivalent population in effect "living" on the railroads)

For freight trains, if we project 400 million freight train miles per year, assume an average crew of four men and project an average speed of 20 m.p.h., we obtain:

$$(400 \times 10^6 \text{ mi./yr.}) \times (4 \text{ men}) \times (1 \text{ hr./20 mi.}) \times \\ (1 \text{ day/24 hrs.}) \times (1 \text{ yr./365 days}) = 9,000 \\ (\text{freight-train equivalent population})$$

The sum total then, if all train human sewage were deposited directly on the roadbed, would be equivalent to a total population of about 50,000 people or about one-fourth of a tenth of a percent of our country's population (or one person out of 4,000) in effect "living" and depositing sewage on the railroad right of ways. If we made the assumption that this waste was distributed uniformly over the projected 80,000 miles of passenger track (not over the 205,000 projected miles of total track) and the severe assumption that waste elimination will not be decreased while a person is on a train, compared to when he is not on a train. We would then expect that on the average, the daily waste of one person, that is about 200 grams (a little less than one cupful) of feces plus 1,800 milliliters (a little less than 2 quarts) of urine would be deposited daily on each  $80,000/50,000=1.6$  miles of track.

Our estimate is that this concentration of sewage represents a small contribution to the total ground water pollution compared to that which might be expected from wastes of: dogs, birds, rabbits, et cetera, or from the inevitable decay of occasional dead animals themselves, or from the much larger fraction of our population still using septic tanks and even outhouses.

(c) *Esthetic effects?* We don't have any particular information in this question other than just a general feeling that dumping of raw sewage from a train in a station should be prevented by fairly positive means. We can think of several fairly inexpensive solutions to this problem. It would also seem, though the offense is certainly small, that neighbors along the railroad tracks in populated areas should not be offended by unpleasant sights or smells.

2. *Kinds of toilets presently available for railcars are.—*

*Incinerators.*—We know of these types of units but are not familiar with any cases where they are being used on railroads. We do understand that there are both fuel and electric types.

*Recirculating, retention systems.*—We presently are producing this type of toilet for trains.

*Treatment systems.*—There are several types of treatment systems that are not to our knowledge presently being sold for trains, but which might in principle be considered.

(a) *Macerator chlorinators:* Such as our Mk-9. We have two samples of what comes out of a Mk-9, with us today. The tall bottle is the effluent itself. You'll note that it contains a clear liquid at the top and a white powdery substance at the bottom after settling. When the bottle is agitated the entire solution appears milky, but soon settles out again. The short container contains all the suspended solids from the effluent of a complete fecal deposit. That is, it contains the dried residue of everything that can be caught on fine filter paper when a complete fecal flush is treated and then passed through the fine filter paper. An effluent like this could probably be placed right on the roadbed without causing problems, although I'm not sure it represents an optimum solution for trains. It may do a lot more treatment than is needed and I think I would suggest a modified unit that would not use as much chlorine per flush, among other things.

(b) There are several other types of treatment systems which might be considered for railroads, but rather than looking at what we have and see how it could be applied to railroads, I would suggest a reverse approach, namely, let's stipulate what we really need to do to the railroad sewage and then let's design the least expensive device to accomplish that end—more on this later.

3. *We can supply part of the information required for column (2) in this question 3.*—That is, for the number of toilet systems we have supplied. You may need to add these figures to those of other suppliers to obtain the totals for column 2:

Type of car (1)	Retention system by Koebler- Dayton <sup>1</sup>	Retention and treatment system (3)	Neither type system (projected) (4)
1. Locomotive.....	2	(?)	28,000
2. Caboose.....	7	(?)	.....
3. Commuter.....	= 220	(?)	.....
4. Intercity passenger:			
(a) coach.....	103	(?)	8,000
(b) sleeper.....	.....	(?)	

<sup>1</sup> 61 more have been delivered to other countries.

<sup>2</sup> We do not know of any in use.

<sup>3</sup> About 90 more presently ordered but not yet delivered.

Two additional items may be of interest: Generally speaking nowadays, new cars are ordered in pairs by a railroad and a toilet is provided in only one of these cars. Previously, most passenger cars had at least one toilet per car. A major car manufacturer also tells us that all specifications for new cars already contain a requirement for retention toilets. It is significant, therefore, that with just the approximately 400 toilets that we will have supplied, about 5 percent of the 8,000 cars already will have some kind of retention system. Other toilet suppliers will account for another portion of those 8,000 cars, but on the other hand, cabooses have not been included so 8,000 may be a fair estimate for the number of cars without retention or treatment systems today.

4. *Our estimate as to the total costs to the railroad for new car equipment* is in the neighborhood of about \$1,000 per toilet, including installation costs and the handling costs of the car manufacturer. It should be noted that retrofit of older cars may be significantly more expensive. We estimate operating costs of about 8 man-minutes every 3 days for draining and rinsing at a cost of around \$8 per hour depending on equipment burden rates, or \$130 per year. We could raise the estimate to \$150 per year to include electric power and repair costs. The combined equivalent installation and operating costs, assuming 7 percent interest and 10 year life for this type system, would then come to about \$2,000 per toilet. We and others have been considering other type systems where the total cost might be significantly lower.

5. *Should the Commissioner—prohibit the discharge of untreated wastes from railroad trains?*—It is, of course, difficult for us to answer this question objectively, since our company might find an increased market for our products if there were such a prohibition. From the data we have presented previously, it would appear that the ball park cost of retrofitting and operating the approximately 8,000 rail cars needing retention systems, would be in the neighborhood of

$$8,000 \times \$2,000/\text{car} = \$16 \text{ million}$$

and this would be in order to prevent the raw discharge of an equivalent population of 40,000 people or about \$400 per capita waste prevented. This neglects the freight train human waste which is even more expensive to prevent per capita. As a reference comparison, we understand that secondary municipal sewage treatment plant costs are around \$650,000 per million gallons per day (or per 10,000 people served), or \$65 per capita waste prevented. We also understand that the discounted operating costs are fairly small compared to the capital cost, but realize that sewer costs themselves, possibly should be added in, in order to make a meaningful comparison. In any case, it looks as if the present retention system for railroads is a relatively expensive proposition although interestingly enough, a similar analysis made, regarding boat sewage wastes which have recently come under Federal law, indicates a cost of \$900 per capita waste prevented.

There is another consideration; the aspects of sewage treatment that should be required before dumping sewage on a railroad bed are quite different from those which should be required of a boat system or of a municipal system:

*Oxygen demand.*—We do not see that reducing the oxygen demand of the waste is important. The oxygen demand of a fecal deposit will be about the same as that of a small fistfull of dried leaves, and we've seen that we might

expect such a deposit daily on every 1.6 miles of track. (In waterways, the oxygen demand is important because water can only hold around 8 parts per million of oxygen and if it is used up too fast for decomposing organic matter, there won't be enough left for fish to "breathe." Our air conversely has more like 200,000 parts per million of oxygen and there are other much more severe demands on that oxygen that make sewage deposits on railroads quite insignificant).

*Solids.*—The amount of solids again has the equivalent dried weight of a handful of leaves and we cannot think of any reason why they would be significant to a roadbed or to the soil beneath.

*Nutrients.*—The phosphates and nitrates in the sewage, if anything, should be beneficial to the soil. (There is no problem as in waterways where nutrients overstimulate algae growths which in turn use up too much oxygen).

*Bacteria.*—On general principles, it might be worthwhile to require a fairly complete coliform bacteria kill in any sewage deposited on a railroad bed. Municipal sewage treatment plants generally can achieve reductions of more than 99.98 percent, and this might be a reasonable number to use.

*Appearance.*—It would seem that sewage discharged on a railroad bed should first be rendered incapable of offending people by sight or odor.

In summary, our recommendations are as follows:

1. If it is decided that discharge of untreated wastes from railroads should be prohibited, try to leave as many avenues open as possible for engineers to develop inexpensive ways to accomplish just what really needs to be done and no more. Somehow, we must cut the total equivalent cost of the present retention system in order to be more "cost effective."

2. Be sure to allow discharge of sewage meeting whatever degree of treatment is decided as adequate. (Don't get stuck with a "no discharge under any circumstances" policy).

3. Consider whether a simple system that would merely hold the sewage temporarily when the train is stopped and discharge it automatically when the train was going more than 10 miles per hour, would be satisfactory.

4. Allow complete retention with discharge to a municipal system as an acceptable method in any case.

5. Consider the following as a potentially satisfactory standard, sewage from railroad cars shall be deemed treated provided:

- (A.) The coliform bacteria count has been reduced by at least 99.98 percent, and

- (B.) Has not been discharged in a railroad station, and

- (C.) Is not offensive or recognizable as sewage by either sight or odor, and

- (D.) Does not contain deleterious amounts of additives contributed by the sewage processing system.

Thank you very much gentlemen. We appreciate the opportunity to testify and welcome questions both at this time and later, if you wish to contact us by phone or mail.

Mr. REUSS. Thank you, Mr. Smyers.

Your "stay openminded" admonition is a good one, sir.

Mr. Wright.

Mr. WRIGHT. I am impressed both by what Dr. Blankenship has said and what Mr. Smyers has said. I would think that any legislation which we might propound probably should include a requirement that there be a retention system in which untreated waste would be held for later treatment, but with the possibility of treatment of the type described by either or both of these gentlemen.

Dr. Blankenship, you mentioned that the Canadian National Railroad has installed your equipment on approximately two-thirds of its locomotives. What is the cost of installation per unit?

Dr. BLANKENSHIP. The total cost will be right around approximately \$700.

Mr. WRIGHT. \$700 per unit of installation?

Dr. BLANKENSHIP. That includes equipment as well as the installed

costs. Of course, that is retrofitting existing locomotives and of course the two-thirds is on that road haul class, not on the switcher class.

It would be on equipment which already had toilets, and which is hauling over the road.

Mr. WRIGHT. How would that cost differ with respect to passenger cars? What would be the approximate cost?

Dr. BLANKENSHIP. There is a difference in structural aspects to it. Namely, the structure of the car will definitely present different types of problems; whether it be a more costly one is something that I don't know for certain.

Mr. WRIGHT. But the installation—

Dr. BLANKENSHIP. Excuse me, sir, but it would be on the order of \$700 per installation.

Mr. WRIGHT. And this installation performed on the train would obviate the need, then, for the more expensive collection stations that were mentioned in an earlier testimony today, by Mr. Manion?

Dr. BLANKENSHIP. Exactly.

Mr. WRIGHT. There wouldn't be any need for treatment stations at \$15,000 apiece?

Dr. BLANKENSHIP. Yes.

Mr. WRIGHT. That would apply to all of these.

Mr. SMYERS. I think that is an important concept. The operational cost of a retention system is about half of the total cost. It is one of the things that we as suppliers should be working diligently to try to decrease or eliminate.

Dr. BLANKENSHIP. Mr. Wright, one of the problems today in servicing water-flushing toilets is the cost of servicing. Units that they have today, even though they are designed to accept water for cleansing, at least within the cab of the diesel, are not serviced adequately.

You see, the railroads, like all of us in servicing or manufacturing, have problems of labor. We cannot get people we need to service these things for us.

What you need is to emphasize the type of equipment which minimizes service. You do not want to maximize this thing.

The dumping of little buckets, \$50 buckets, that Mr. Nader mentioned is going to cost a tremendous amount of money to service. You cannot service them adequately. Somebody has to carry the bucket.

Mr. NADER. I want to comment on that. There are types of retention toilets, particularly under given conditions of use, that do not require frequent servicing at all.

Again I refer to the Association of American Railroads Technical Report 7, dated in 1950, which states, "The estimated cost of servicing equipment at \$40 for toilet and servicing labor at \$0.30 per toilet per day," and assuming that 80 percent are in operation, the total cost given for these locomotives and cabooses in that year is about \$5 million per year for the servicing and labor, and \$2.2 million for the servicing of equipment.

Mr. WRIGHT. Of course that would assume also that they are adequately serviced. And it would include also the desired frequency.

Mr. NADER. And the frequency is much higher than necessary under given chemical treatment. Taking one of the more inexpensive approaches, which obviously is not as good or clean as an approach as

suggested by Dr. Blankenship, those are the figures that they come up with.

Mr. REUSS. Will the gentleman yield at that point?

Mr. WRIGHT. Sure.

Mr. REUSS. I was delighted to hear that the Food and Drug Administration will shortly publish in the Federal Register a petition looking toward a proceeding whereby all interested parties may present their views. At that forum I would hope that the views on retention, incinerators, and other types of waste disposal systems could be laid side by side and the most efficient and economical method could be determined.

I mention that because this committee is obviously not trying in this brief hearing to make a scientific determination of which method of disposal is best.

I thank you, gentlemen.

Mr. WRIGHT. I would like to ask Dr. Edwards in that connection: Would you not think it advisable in the course of such a hearing to open up for exploration the various systems and methods that may have been developed and may be available? That way they could be adequately compared and the industry, as well as your agency, might have the opportunity to see what can be done and what the relative cost is—not only in installation but in continuous operation and maintenance.

Dr. EDWARDS. Absolutely. Our chief interest would obviously not be in any particular type as long as the particular type used was efficient and would do the job it was supposed to do.

I think this hearing will provide a forum in which some of these various methods can be discussed and some decisions made.

Mr. WRIGHT. Thank you, Mr. Chairman.

Mr. REUSS. Mr. Vander Jagt?

Mr. VANDER JAGT. Thank you, Mr. Chairman, I just have two questions.

First, Dr. Blankenship, the industry says that incinerating units cannot be used in cabooses. As I understood your testimony, if you used propane gas it could in fact be used in cabooses.

Dr. BLANKENSHIP. Yes.

Mr. VANDER JAGT. Have you any experience along this line?

Dr. BLANKENSHIP. We have 100 to 200 in operation.

Mr. VANDER JAGT. They are already in operation?

Dr. BLANKENSHIP. Yes.

Mr. VANDER JAGT. In cabooses?

Dr. BLANKENSHIP. Yes, in the Burlington & Northern Railroad.

Mr. VANDER JAGT. Could you give me a ball park estimate as to what it would cost per unit, including installation, if you were to receive an order to outfit 18,500 locomotives with this unit?

Dr. BLANKENSHIP. Well, I would have to stay pretty close to \$600 or \$700 per unit, so this would be whatever that multiplies out to. It would be a little less than \$12 million.

Mr. VANDER JAGT. A little less than \$12 million. The industry's estimate of the cost of outfitting and installing systems in 18,500 locomotives was \$18,500,000. So your estimate would be about one-third less?

Dr. BLANKENSHIP. Yes, I think so.

Mr. VANDER JAGT. As the gentleman from Texas pointed out, through his line of questioning, that would eliminate the necessity of 1,500 of these \$15,000 service installations.

Dr. BLANKENSHIP. That is right.

Mr. VANDER JAGT. So your estimate of the cost of the total job could wind up a lot closer to Mr. Nader's \$15 million than the industry's estimate of \$100 million, especially if all of us, including FDA, keep an open mind in the subject as Mr. Smyer was urging us to do?

Dr. BLANKENSHIP. I would say that today we would certainly accept an order for \$12 million to equip 18,500 locomotives. There isn't any any question about that. We would do that without hesitation.

Mr. VANDER JAGT. But I am sure you would say that it would be possible to do the job based on just this little comparison that we have gone into.

Dr. BLANKENSHIP. Yes, it is.

Mr. VANDER JAGT. Considerably less than the total of \$80 million to \$100 million that we have received from the industry?

Dr. BLANKENSHIP. Yes.

Mr. VANDER JAGT. Considerably less?

Dr. BLANKENSHIP. Considerably less; yes, sir.

Mr. VANDER JAGT. Thank you.

Thank you, Mr. Chairman.

Mr. REUSS. I have several questions.

Dr. Edwards, on May 8, 1970, M. J. Ryan, Acting Director, Office of Legislative Services for the Food and Drug Administration, wrote to Senator George Murphy of California in response to a request from the Senator. The last two paragraphs of Mr. Ryan's letter read:

The regulation (42 C.F.R. 72.154) as now written does not prohibit the discharge of waste from railroad equipment except in certain definite areas. Since assuming responsibility in this area in 1969, the Food and Drug Administration has proposed a revision of this section.

Such action will impose restrictions similar to those now in existence for airplanes and buses. We will move forward with this proposal as quickly as possible.

Is the position stated by Mr. Ryan on May 8, 1970 still the position of the Food and Drug Administration?

Dr. Edwards. Yes.

(The text of Mr. Ryan's letter of May 8, 1970, follows:)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,  
PUBLIC HEALTH SERVICE,  
FOOD AND DRUG ADMINISTRATION,  
Rockville, Md., May 8, 1970.

HON. GEORGE MURPHY,  
U.S. Senate,  
Washington, D.C.

DEAR SENATOR MURPHY: The Congressional Liaison Office of this Department has asked us to reply to your request of April 1, 1970, enclosing a letter from Mr. George C. Roberts, director, research and development, Monogram Industries, Inc., Venice, Calif., concerning human waste disposal from interstate trains. We sincerely regret the delay in answering your inquiry.

We appreciate receiving this information. We are familiar with the report and have reviewed it in conjunction with our investigation of this matter.

The regulation (42 CFR 72.-154) as now written does not prohibit the discharge of waste from railroad equipment except in certain definite areas. Since assuming responsibility in this area in 1949, the Food and Drug Administration has proposed a revision of this section.

Such action will impose restrictions similar to those now in existence for airplanes and buses. We will move forward with this proposal as quickly as possible.

If we can be of further assistance please let us know.

Sincerely yours,

M. J. RYAN,

*Acting Director, Office of Legislative Services.*

Mr. REUSS. On page 3 of your statement you state that you will publish in the Federal Register a notice of rulemaking "requiring that railroad passenger cars, locomotives, and cabooses constructed after December 1971 be fitted with full retention facilities when sanitary facilities are required."

It is now July. When do you intend to publish that notice in the Federal Register?

Dr. EDWARDS. That notice will be forthcoming within the next 7 to 10 days.

Mr. REUSS. I am glad to hear that.

The phrase, "when sanitary facilities are required," in the sentence I have just read outlining the proposed rulemaking, puzzles me a bit.

What does that mean? Are you going to require sanitary facilities or are you not going to require sanitary facilities?

Dr. EDWARDS. We were speaking earlier of conveyances such as commuter cars where there may not be any sanitary facilities. Thus the installation of retention, where no sanitary facilities presently exist, would not be required.

Mr. REUSS. I see.

Dr. EDWARDS. So we are taking into account the absence of existing sanitary facilities.

Mr. REUSS. That explains that. Thank you.

Mr. Smyers, in your prepared statement you point out that "railroad maintenance personnel, who must of necessity work on and around the railroad beds, \* \* \* should be protected within reason, from unnecessary hazards."

You go on to say if it would seem possible, for instance, that when a maintenance crew unwraps their sandwiches for lunch, flies are attracted to the food and there is a chance of contamination if there were raw sewage deposits in the area that had previously attracted the same flies.

Now, we have here a letter dated July 24, 1970, from Mr. J. Raymond McGlaughlin, national legislative representative of the Brotherhood of Maintenance of Way employees, AFL-CIO, in which he says: "The employees in the maintenance of way and structures department on the Nation's railroads are, probably more than anyone else, more directly concerned with this problem"—by which he means the problem discharge of raw human sewage—"and the means of remedying such practices."

Mr. McGlaughlin's letter continues:

"These employees who are compelled in their work to handle track parts contaminated not only with human waste but with creosoted ties, black oil, weed poisons, poison plants and dead animals—where found on the right-of-way as well—are not furnished suitable washing facilities before mingling with the public on their way home, nor

before eating their lunches, and this, of course, can be expected to contribute to the spread of tuberculosis, infectious hepatitis and other communicable diseases."

[The full text of Mr. McGlaughlin's letter and the attachment thereto follow:]

BROTHERHOOD OF MAINTENANCE OF WAY EMPLOYEES,  
OFFICE OF NATIONAL LEGISLATIVE REPRESENTATIVE,  
Washington, D.C., July 24, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee, Rayburn House  
Office Building, Washington, D.C.

DEAR CHAIRMAN REUSS: We appreciate the opportunity to furnish you with our views regarding the widespread practice of discharge of raw human wastes from railroad cars and its health and environmental effects.

The employees in the Maintenance of Way and Structures Department on the Nation's railroads are, probably more than anyone else, more directly concerned with this problem and the means of remedying such practices.

These employees who are compelled in their work to handle track parts contaminated not only with human waste but with creosoted ties, black oil, weed poisons, poison plants, and dead animals—where found on the right-of-way as well—are not furnished suitable washing facilities before mingling with the public on their way home, nor before eating their lunches, and this, of course, can be expected to contribute to the spread of tuberculosis, infectious hepatitis and other communicable diseases.

At the present time, there are 42 States which have sanitation laws. However, in many of these States the existing law provides the public service of utilities commission with the authority to promulgate reasonable rules and regulations without making it mandatory, and no orders are consequently issued. In others, there are rules and regulations but very little enforcement.

Your efforts to make the railroads a more healthful place to work are deeply appreciated by the employees represented by the Brotherhood of Maintenance of Way Employes and we stand ready to cooperate in any way possible which will enable them to enjoy the standard sanitation facilities which most of us take for granted.

Respectfully submitted,

J. RAYMOND MCGLAUGHLIN,  
National Legislative Representative.

STATES HAVING SANITATION LAWS—JULY 1970

Alabama	Nebraska
Arizona	Nevada
Arkansas	New Jersey
California	New Mexico
Colorado	New York—Rule 42, issued 1960
Connecticut	North Dakota
Delaware	Ohio
Florida	Oklahoma—Rules issued 1964
Idaho	Oregon
Illinois—Order 193 issued 1967	Pennsylvania—Regulations issued 1956
Indiana	Rhode Island
Iowa	South Carolina
Kansas	Tennessee
Kentucky	Texas
Maine—Rules issued 1968	Utah
Maryland	Vermont
Massachusetts	Virginia
Michigan	Washington
Minnesota	West Virginia
Missouri	Wisconsin—Rules issued 1959
Montana	Wyoming

Mr. REUSS. Mr. McGlaughlin's observation seems to be along the line of your own. Do you have any comments on whether this is a real problem for those employees who work on the maintenance of ways?

Mr. SMYERS. Not particularly. I am not a doctor, just an engineer who likes to create things to solve these problems. I was just speculating in my own mind the kind of thing that could happen, and it seems to me that I would surmise the same kind of thing that this fellow has suggested.

Mr. REUSS. Are there any further questions?

Mr. VANDER JAGT. No further questions.

Mr. WRIGHT. I have no further questions.

Mr. REUSS. If not, we want to thank you all for your cooperation and help. The Subcommittee on Conservation will now stand in adjournment.

(Whereupon, at 12:15 p.m., the hearing was adjourned.)

## APPENDICES

APPENDIX I.—“AN INQUIRY INTO THE PUBLIC HEALTH HAZARD OF SEWAGE DISPOSAL FROM RAILWAY CONVEYANCES,” BY KENNETH F. MAXCY, M.D., DEPARTMENT OF EPIDEMIOLOGY, SCHOOL OF HYGIENE AND PUBLIC HEALTH, THE JOHNS HOPKINS UNIVERSITY (TECHNICAL REPORT NO. 2, PUBLISHED BY THE ASSOCIATION OF AMERICAN RAILROADS, OPERATIONS AND MAINTENANCE DEPARTMENT—SANITATION RESEARCH PROJECT, JOINT COMMITTEE ON RAILWAY SANITATION, NOVEMBER 8, 1946)

ASSOCIATION OF AMERICAN RAILROADS,  
OPERATIONS AND MAINTENANCE DEPARTMENT,  
JOINT COMMITTEE ON RAILWAY SANITATION,  
New York, N.Y., November 8, 1946.

Mr. J. C. CAVISTON,  
*Secretary, Joint Committee on Railway Sanitation, Association of American Railroads, New York, N.Y.*

MY DEAR MR. CAVISTON: I am enclosing herewith a report just received from Kenneth F. Maxcy of the School of Hygiene and Public Health of the Johns Hopkins University. It deals with “An Inquiry into the Public Health Hazard of Sewage Disposal from Railway Conveyances.”

This report represents Technical Report No. 2 of the Sanitation Research Project of the Association of American Railroads. It was prepared in accordance with my directive to Dr. Maxcy under date of January 27, 1946.

Very truly yours,

(Signed) ABEL WOLMAN,  
*Consultant Director.*

AN INQUIRY INTO THE PUBLIC HEALTH HAZARD OF SEWAGE DISPOSAL FROM RAILWAY CONVEYANCES

(By Kenneth F. Maxcy, M.D.)

### 1. STATEMENT OF THE PROBLEM

The manner in which land and air conveyances operating in interstate traffic shall dispose of excreta at terminals and yards and from conveyances at stations and en route is set forth in the Sanitation Manual for Land and Air Conveyances adopted and promulgated by the Federal Security Agency as of October 2, 1942 (87). The public health reason given for these requirements is, in brief, that “excreta, improperly disposed of, constitutes a nuisance and a public health menace.” The validity of this generalization is obvious. However, the practical problem in the enforcement of these regulations and in the improvement of current practice is to define as accurately as possible what is meant by “improper disposal” and “public health menace.” Agreement is easily reached upon what constitutes a nuisance and that, wherever created, abatement should be sought. This degree of correction may, however, be insufficient to achieve the second objective, namely, the complete removal of a “public health menace.” For example, the amount of pollution entering a stream may be insufficient to constitute a nuisance and yet may constitute a public health menace because it renders the water unsafe for drinking purposes.

Accordingly, while experiments are in progress to develop better procedures or the disposal of fecal wastes from railway conveyances, it has seemed expedient

to inquire in what manner and to what extent past practices in this regard have constituted a public health menace. The word "menace" used in this connection is interpreted as meaning specifically that conditions were created which were favorable to the transmission and dissemination of the fecal-borne microorganisms which cause human enteric infections and diseases.

A half-century of experience has now accumulated since the hypothetical existence of this menace from railways was recognized. The extent to which it was real and not merely theoretic should be apparent in the sanitary reports and epidemiological investigations published during this period. The result of a search for such evidence will be presented. The hypothesis will then be reexamined in the light of contemporaneous epidemiological knowledge.

## 2. ORIGINAL HYPOTHESIS

The idea that track pollution might be responsible for the dissemination of microorganisms causing enteric infections and disease began to receive attention from sanitarians in the United States about the turn of the century. The possible danger was pointed out particularly in relation to typhoid fever, which was the most important and most accurately identified member of this group of diseases.

The original hypothesis was formulated most completely in an article by Dr. Paul B. Barringer of Charlottesville, Va., entitled "An Unappreciated Source of Typhoid Infection," published in the *Medical Record* of December 19, 1903 (10). Dr. Barringer was concerned with the infection of the road bed of our American railways through the discharges of typhoid patients traveling over the road while in the infective stage. This was before the role of the typhoid carrier had come to be appreciated. Through a series of questionable assumptions based upon the current attack rates from typhoid fever, the number of railway tickets sold annually, and the average mileage traveled per passenger, he estimated that there were 370 cases traveling over each mile of railroad in the U.S. each year. From this he theorized that "in the well drained but cool and moist soil under the ties and ballast of the modern railway road bed, baptized day after day and year after year with the albuminous fluids of human excrement, the *Bacillus typhosus*, once planted in this natural culture medium will live forever, revitalized at intervals by new infection, perhaps, but in the meantime facultative enough to meet seasonal and other changes." Accordingly, he expressed the opinion that the old trunk lines of the United States were already infected for practically their entire length, and that unless some radical change was made in dealing with railway excrement, "the country would ere long be threaded and traversed in every direction by long and narrow but none the less deadly zones of enteric infection, a permanent and ever-growing menace to national health."

To support his contention, Dr. Barringer asserted that many of the cases of typhoid fever in every community which could not otherwise be explained gave a history of some recent connection with the railroad, either living along the line of the road or brought into transient or temporary contact with the road and its influence. He maintained that any practitioner with experience in towns where railroad employees formed any considerable part of the population would tell you that railroad employees are particularly prone to typhoid infection. He reported that an interne in a railroad hospital was responsible for the statement that nine out of 10 cases were track men employed on maintenance of the right-of-way. In considering the modes of infection he pointed out that the source might be (1) water taken in travel, contaminated as a result of "direct infection of streams, brooks, creeks and rivers which pass under the line of the road, or as a secondary consequence to the infection of springs and wells which flow from the area crossed by the infected road bed," (2) "from handling the contaminated ties, earth and dust of the road bed," (3) "constant exposure to the clouds of dust raised by passing trains."

In spite of the lack of convincing evidence, Dr. Barringer's plausible hypothesis received wide acceptance among contemporary sanitarians (Hurty, 1906 (46); Way, 1906 (111); Scattergood, 1919 (89)) and although there were some (Campbell, 1914 (21, 22); Darling, 1914-1915 (30)) who expressed doubt as to its validity, the existence of this sanitary problem was recognized. It was stated in the following words, in a textbook by George C. Whipple on "Typhoid Fever" published in 1908 (112):

"The disposal of water-closet wastes on steamboats and trains is something that demands serious consideration. The pollution of the water of lakes from steamboats passing near a waterworks intake, and the scattering of fecal matter

along the road bed of a railroad, passing over some water-shed used for public supply, are likely to bring disaster. Although the chance of danger may be small in comparison with other causes of typhoid fever, yet the practice is unsanitary and disgusting. In some places trains passing through territory tributary to a waterworks reservoir are compelled to have their closet doors locked. While this prevents contamination of the road bed, the continual damage to the health and comfort of passengers by reason of deprivation of toilet privileges might easily be a more serious matter than the chance damage done to some water supply. The practice is only to be tolerated as a temporary expedient. What is needed is some form of receptacle to be used on the train that will hold the urine and excreta until they can be safely removed at the end of the journey or at some intermediate point. There is certainly ingenuity enough among our railroad men to provide some device that will do this without nuisance to the passengers. The present toilet-room arrangement in the ordinary day coaches is usually an abomination."

### 3. REGULATIONS

The technical problem mentioned by Whipple remained unsolved. The need for improvement was obvious. Regulations intended to secure abatement of the nuisance and to minimize the danger were passed by State governments in this country and abroad. In the United States these were incorporated in a Standard Sanitary Railway Code which was approved by the conference of State and provincial officers of health and recommended to the several States for adoption in 1920 (99). Section 34 of this code provided:

"The toilet rooms in all railway cars shall be locked or otherwise protected from use while trains are standing at stations, passing through cities, or passing over watersheds draining into reservoirs furnishing domestic water supplies, unless adequate water-tight containers are securely placed under the discharge pipe. The State health authority having jurisdiction shall designate the area of watersheds that may be affected by pollution from railroads and shall notify the managing officers of railroads as to the points between which all toilets shall be locked."

The provisions of this code were adopted by the American Railway Association, brought into accord with the Interstate Quarantine Regulations (U.S. Public Health Service), and accepted by some 45 of the States (Beach 1928 (12)) through which railways are operated and maintained. The code was further amended and elaborated in the "Sanitation Manual for Land and Air Conveyances Operating in Interstate Traffic," adopted and promulgated by the U.S. Public Health Service in 1942, to which reference has previously been made (87). It is impossible to fix with any degree of accuracy the time at which these provisions actually became effective (Aldrich, 1932 (1)). The compliance and degree of cooperation varied with railroad companies and with the States through which they operated. It seems reasonable to assume, however, that the corrective measures could have had little, if any, effect upon the "public health menace," generally speaking, until after World War I, that is, about 1920.

### 4. NATURE OF THE EVIDENCE SOUGHT

If the disposal of sewage along railways has been a public health menace, this fact should be indicated by the unusual incidence of typhoid fever from about 1900 up to about 1920 among persons particularly exposed to this source of infection (1) by reason of location of residence in proximity to tracks and terminals, (2) by reason of being employed in work on railways, or (3) by reason of being consumers of a water supply which might be polluted by railways at some point in collection or distribution. In other words, the incidence of typhoid fever among groups exposed to these sources of infection in comparison with other groups living under conditions which were otherwise similar should afford an indication of the magnitude of the danger of track pollution in much the same manner as the incidence of typhoid among the consumers of municipal water supplies was originally used as an index of safety of drinking water.

### 5. SOURCES OF INFORMATION

With this concept in mind, the epidemiological experience with typhoid fever in relation to railway sanitation has been exhaustively reviewed. A list of the references which have been consulted is appended. Under appropriate headings the available indices of all published articles in medical literature have been

searched (29, 47, 48). Where the title suggested that interesting information might be found, an effort has been made to obtain the original text, whether in the English, French or German language. While attention has been primarily directed toward the experience of the United States, consideration has been given to that of other countries, particularly to that of Germany, Switzerland (see reference list) and England (see reference list). In addition to monographs and articles in medical journals, reports of selected health agencies have been covered in some detail (see reference list). To supplement this search through publications, personal inquiries have been addressed to a number of individuals who have been responsible for epidemiological investigations and sanitary surveys in official health organizations over the past 20 to 30 years, in an effort to bring to light pertinent observations which were not available in print.

#### 6. NATURE OF THE EVIDENCE FOUND (1900-20)

(a) *Incidence of typhoid fever among persons living in proximity to railroads.*—The dire prediction made in 1903 by Barringer (10) that the United States would be "threaded and traversed in every direction by long and narrow but none the less deadly zones of enteric infection" along the old railway trunk lines has not been fulfilled. Studies of typhoid in States in this country and abroad have given no indication of such a distribution.

The possibility remained, however, that in limited areas under extreme conditions some evidence might be found that track pollution was a factor in dissemination. If this were true, one would expect to find a tendency toward a focal distribution of "sporadic" or "endemic" cases of typhoid along the railroad right-of-way and adjacent to stations, yards and terminal facilities in towns and cities. If such a distribution were evident in a spot map showing cases or deaths according to residence or better in tables giving attack rates by urban subdivisions, it still might be due to other factors. Frequently the railway lines and facilities are located in the poorer sections of a town where home sanitation, water supplies and domestic sewage disposal may be represented at the lower levels. These conditions would of themselves favor secondary or contact transmission of typhoid. However, if the focal distribution along railways were not evident, then the inference might be drawn that track pollution was relatively unimportant in comparison with other modes of dissemination.

With these concepts in mind, a number of epidemiological investigations into the prevalence of typhoid fever in urban communities have been reviewed (see reference list). Most of these reports were found to be of little value in this connection because of the various limitations in the data as presented. No instance has been discovered in which the investigator specifically considered the possibility that track pollution might influence the distribution of cases by residence. Although there are extensive discussions of the relation of the conditions of domestic sewage disposal in and around cities to the prevalence of typhoid, no particular attention has been given in such studies to disposal on railroads. Nevertheless, in a few of the reports examined the data were presented in sufficient detail to be of some use in this connection.

The disease was carefully studied in the District of Columbia over a series of years. The first report submitted by the Medical Society of the District of Columbia, June 14, 1894 (82), contains a map showing the deaths from typhoid fever, 1888-92, inclusive. During the years 1906, 1907, and 1908, officers of the U.S. Public Health Service conducted a detailed epidemiological investigation, the results of which were incorporated in Public Health Bulletins 35, 44, and 52 (84, 85, 86). The distribution of cases by residence is shown in these reports for each of the summer months during this 3-year period. In addition to this, there is included in the 1908 report not only a map but a particularly noteworthy table which gives the population and incidence of typhoid fever in each vital statistical district (table V, page 33). In all of these reports, the maps show the Pennsylvania and the Baltimore and Ohio Railroads entering and leaving the city from the northeast and northwest, with railroad yards and terminal facilities. In similar manner, the Richmond, Fredericksburg & Potomac, and the Southern Railways are shown entering from the south, with separate yards and terminals until construction of the Union Station was completed about 1908.

From careful examination of these maps and tables, there was no apparent tendency for cases to be particularly numerous in the residential areas adjacent

to the railways, yards, and terminals in the District of Columbia during a period of years when typhoid was widely prevalent. A similar inference may be drawn from the examination of the map showing the distribution of typhoid fever cases, by location of residence, in Richmond, Va., in 1907 and 1908, from the study made by Levy and Freeman (65) (after personal conference with Dr. Freeman regarding this interpretation).

Less useful in this connection are other reports of epidemics in cities and towns—Omaha, Nebr., 1909–10; Williamson, W. Va., 1909–10; Mankato, Minn., 1911; and the small outbreaks in towns in Massachusetts studied by Sedgwick and his colleague from 1890 to 1903. Although maps showing the location of cases by residence are included, the distribution was primarily determined by the common medium of dissemination, the contaminated water or milk supply. The residual cases were proportionately insufficient in number, and the information insufficient to afford indication of the possible role of track pollution in secondary spread.

In summary, this review of epidemiological investigations of urban typhoid, with particular reference to the location of cases by place of residence, has failed to reveal any definite indication that the incidence of typhoid fever among persons living in proximity to railroads, terminals, and yards is greater than among persons living under conditions otherwise similar but in other parts of the same community.

(b) *Incidence of typhoid fever among railway employees.*—Failure to find evidence of increased incidence of typhoid fever among persons living in proximity to railroads might be attributed to the lack of a mechanism for conveying pathogenic microorganisms from the polluted road bed to the adjacent homes, as, for example, by the common housefly. If, however, such dangerous pollution existed, railway employees could hardly escape exposure to it, especially section "hands" engaged in work on the tracks along the right-of-way, and laborers engaged in cleaning passenger cars in the terminal yards.

It is obvious that laborers maintaining the right-of-way are exposed by direct contact with railroad ties, etc., to contamination of hands and clothing. Without thought of cleanliness and with no facilities for washing immediately available, they eat sandwiches and other foods which are grossly contaminated by their dirty hands. It has been customary for years to switch passenger cars which have been in use to certain designated locations in the yards for servicing. One of the first procedures is to flush out all toilets onto the tracks. Such locations, where pollution is concentrated, become offensive to sight and smell, and the rock and sand ballast of the roadbed becomes saturated with sewage. Car cleaners are exposed in their daily work to a filthy environment.

It would be expected, accordingly, that railway employees engaged in these activities would have a special occupational hazard from enteric infections. Some indication of an increased risk ought to be found in the attack rates from typhoid fever among these occupational groups, as compared with others living in the same communities and similar with respect to age and economic status.

The search which was made for such comparisons was disappointing. Nowhere were data found which were satisfactory for the purpose. The nearest approach was some material from the Industrial Department of the Metropolitan Life Insurance Co., which was analyzed by Louis I. Dublin (32, 33). The accompanying tabulations, taken from these studies, afford a comparison of the relative importance of typhoid fever as a cause of death in various occupational groups, among which are "Railway Enginemen and Trainmen" and "Railway Yard and Track Workers." In the experience here presented, there was no indication that white males engaged in these occupations suffered a greater proportionate mortality from this disease than did white males of equivalent ages engaged in other designated occupations. It is to be noted, however, that the comparison is a limited one. The numbers are small and refer only to fatal cases. The percentage attributed to typhoid fever depends upon the frequency of other causes of death. For example, since the proportion of deaths due to accidental causes is considerably larger among railway employees than among certain other occupations, the proportion attributed to typhoid fever would be correspondingly smaller. Finally, and perhaps most important, information is not given as to whether the men engaged in these various occupations were comparable with regard to their conditions of living and of community exposure to typhoid fever.

TABLE I.—PERCENTAGE OF DEATHS ATTRIBUTED TO TYPHOID FEVER AMONG WHITE MALES, ACCORDING TO OCCUPATION, FROM THE EXPERIENCE OF THE METROPOLITAN LIFE INSURANCE CO., INDUSTRIAL DEPARTMENT, 1922-24: BY LOUIS I. DUBLIN, PH. D. (BULL. NO. 507, U.S. DEPARTMENT OF LABOR, BUREAU OF LABOR STATISTICS, GOVERNMENT PRINTING OFFICE, WASHINGTON, 1930)

Occupation	Ages 15 years and over		Percentage of deaths during age period (years)					
	Number	Percent	15 to 24	25 to 34	35 to 44	45 to 54	55 to 65	65 and over
Railway enginemen and trainmen.....	2	0.3			0.6			0.8
Railway track and yard workers.....	9	.3	1.9	0.4	1.2			.1
Bakers.....	4	.7	4.3	1.4		0.8		
Compositors and printers.....	3	.3	.7	1.2				
Farmers and farm laborers.....	47	1.0	7.6	1.8	.9	1.0	.3	0.1
Iron foundry workers.....	6	.5	3.7		.5	.4	.3	
Laborers.....	44	.4	3.0	1.4	.3	.2	.1	
Machinists.....	32	.7	2.4	1.1	.5	.4	.1	
Textile mill workers.....	42	1.2	6.0	2.1	1.2	.7		
(Others) <sup>1</sup> .....								
All occupations.....	597	.6	2.6	1.0	.5	.3	.1	

<sup>1</sup> For sake of brevity other classifications have been omitted.

TABLE II.—PERCENTAGES OF DEATHS ATTRIBUTED TO TYPHOID FEVER AMONG WHITE MALES, ACCORDING TO OCCUPATION, FROM THE EXPERIENCE OF THE METROPOLITAN LIFE INSURANCE CO., INDUSTRIAL DEPARTMENT, 1911-13<sup>1</sup>

Occupation	Ages 15 years and over		Percentage of deaths during age period (years)					
	Number	Percent	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 and over
Railway enginemen and trainmen.....	26	2.7	4.9	3.3	3.5			
Railway track and yard workers.....	29	1.5	6.2	4.1	1.3	1.2	0.2	
Bakers.....	14	2.1	7.0	5.0	4.0	.7	.6	0.7
Compositors and printers.....	22	2.1	3.2	4.5	1.8	.6		
Farmers and farm laborers.....	53	1.4	9.2	5.1	1.9	.7	.8	.3
Iron molders.....	29	1.8	7.2	4.0	2.9			.3
Laborers.....	113	1.1	6.3	3.0	.7	.9	.3	.2
Machinists.....	72	2.3	6.8	3.2	1.8	.8	.4	
Textile mill workers.....	55	2.3	6.8	5.8	1.3	1.5	.8	
Others <sup>2</sup> .....								
All occupations.....	1,390	1.5	5.2	2.7	1.4	.8	.4	.2

<sup>1</sup> By Louis I. Dublin, Ph. D. (Bulletin No. 207, U.S. Department of Labor, Bureau of Labor Statistics, Government Printing Office, Washington, 1917).

<sup>2</sup> For sake of brevity other classifications have been omitted.

Many of the reports of epidemiological investigations of typhoid fever made in Germany, England, and North America (see reference list) include an analysis of cases by occupation. Unfortunately, these tabulations give no estimate of the total number of persons engaged in each occupation in the particular population at risk; therefore, attack rates cannot be calculated and compared. So far as one can judge from general knowledge, there appears to have been no excess among those engaged in work on railways. There is one possible exception to this statement. In a study of the "Origin and Prevalence of Typhoid Fever in Boston in the Year 1909," by Donald Gregg (41), 12 out of 73 cases among occupied persons were railway employees. Whether or not this unduly high proportion has any significance is not apparent from the accompanying text.

It might be expected that the medical departments of railroad companies would have made an analysis of the causes of hospitalization, which would afford some indication of the frequency of typhoid fever among different classes of employees, but no such study has been discovered.

In summary this inquiry has failed to find acceptable scientific evidence of an unusual incidence of typhoid fever among persons employed in railway work, as compared with other groups living in the same communities under conditions which are otherwise similar, during the period under consideration.

(c) INCIDENCE OF TYPHOID FEVER AMONG CONSUMERS OF WATER SUPPLIES WHICH MIGHT BE POLLUTED BY RAILWAYS.—Contamination of water supplies by

the disposal of fecal wastes along railways could occur in either of two ways. In the first place, there is possibility of drainage through cinders, rock, and soil to an adjacent spring or well located near the roadbed. Second, there is the possibility that this drainage along railways may enter streams, brooks, creeks, or rivers, or that direct contamination might occur by discharges from trains in passage over trestles and bridges. Medical literature has been reviewed for outbreaks of typhoid fever which might be attributed to such sources. Two episodes reported previous to 1920 have been found which are of interest in this connection. One illustrates the possible pollution of a well water supply resulting in a small focal outbreak. The other illustrates the possible pollution of a public water supply giving rise to an epidemic of considerable proportions in the population of a city.

(1) Excerpt from: "Annual Report, State Board of Health of Massachusetts, 1907," page 501. (6)

"During the latter part of September it came to the knowledge of the State inspector of health, district No. 2, that typhoid fever existed in the village of Somerset, and a careful investigation was immediately instituted, which disclosed the fact that 12 persons had been seized between September 8 and 23, and five more came down with the disease before the inquiry terminated in October. Of the 17 victims, seven were children under 10 years of age, two were housekeepers, two were bridge workers, and the others were workmen in various trades.

"It was learned that prior to the outbreak, in August and early September, there had occurred among the 30 workmen on the upper and lower bridges of the New York, New Haven & Hartford Railroad, between Somerset and Fall River, frequent cases of illness, marked by headache, nausea, vomiting, and diarrhea, and that at one time about a half of the men had left the work on account of sickness. Most of the men boarded in houses scattered throughout the village.

"It appeared probable that the initial case of infection among the workmen occurred about the middle of August, and that this man, whose occupation was that of day draw-tender, had the walking type of the disease. Previous to the village outbreak, a resident whose occupation was that of night draw-tender was stricken. The day draw-tender lived in the house of the man who produced milk for public sale, and the night draw-tender was himself a milk producer. It is perhaps more than a mere coincidence that 12 of the 17 village patients were consumers of the milk sold from these two places; but proof that the milk had been specifically contaminated is lacking. Investigation of the water supply at the lower bridge and in various parts of the village showed gross pollutions by sewage. During August bridge workmen used water of the well at the railroad station, adjoining the premises of the night draw-tender above mentioned. As the water acquired bad odor and taste, its use was discontinued, and then recourse was had to another well between the tracks in front of the station. This well was not protected from surface drainage, and hence it is possible that it may have been polluted by the discharges from the closets of passing trains. . . .

"The conditions found on the premises where cases of the disease occurred were in the main exceedingly unsanitary, overflowing cesspools and privy vaults in close proximity to wells being the rule, with barnyards and pigpens in unusually filthy state.

"Whether the infection was due to polluted water, or to contaminated milk, or to both, could not be determined."

(2) Excerpt from: Whipple, George C. Typhoid Fever: Its Causation, Transmission, and Prevention. John Wiley & Sons, New York, 1908. (Pp. 145-149. (112))

#### *"The Scranton epidemic"*

"Scranton is a coal-mining and manufacturing city of about 119,000 inhabitants in the eastern part of Pennsylvania. Until December 1906, it had had a fairly satisfactory typhoid fever record. The water-supply of the city was taken chiefly from impounding reservoirs on Roaring Brook, south of the city, and delivered to the city by gravity. The main storage basin, known as Elmhurst Reservoir, had a capacity of about 1,400 million gallons, or nearly 50 days' supply. From it the water flowed through an open stream several miles long, to what is known as No. 7 Reservoir, the starting-point of the city mains. No. 7 Reservoir had a capacity of about 100 million gallons, and the distance from inlet to outlet was only about 2,000 feet. Provision was made for carrying the water direct from the Elmhurst Reservoir to the city, if desired, without passing through No. 7 Reservoir, and the pipes were so arranged that any excess of water in Roaring Brook

could be diverted and stored in Scranton Lake, or on a neighboring watershed, for use during the summer. The Roaring Brook supply in 1906 furnished the greater part of the 30 million gallons per day used by the city. The other supplies, also impounded surface waters, were not concerned in the epidemic, and need not be considered.

"Until the last of October, 1906, the Roaring Brook water was delivered to the city by allowing it to flow through the No. 7 Reservoir, but at that time this reservoir was cut off, and the water was furnished direct from Elmhurst, being taken from a point near the bottom.

"Although thought to be of good quality, the water supply was open to contamination at various points. Roaring Brook flowed through the center of Moscow, a village of about 800 people, only a mile above Elmhurst Reservoir, and the borough of Elmhurst bordered the brook below the reservoir. The main lines of the Delaware, Lackawanna & Western Railroad crossed and recrossed the brook, thus offering opportunities for contamination with excrement dropped from the passenger coaches or deposited by laborers along the track.

"In some way or other the Elmhurst Reservoir became infected with typhoid bacilli during the latter part of November 1906, but, although diligent search was made by the State department of health, the origin of the infection was not discovered. But that the water was infected was made clear by the statistics of the epidemic and by the analyses which were made of the water.<sup>1</sup>

"The use of this infected water gave rise to an epidemic which extended over the months of December, January, and February, and which resulted in 1,155 reported cases and 111 deaths during this time. The progress of the epidemic is shown by the following figures:

Week ending—	Reported typhoid cases	Week ending—	Reported typhoid cases
December 8, 1906.....	14	January 12, 1907.....	74
December 15, 1906.....	70	January 19, 1907.....	45
December 22, 1906.....	368	January 26, 1907.....	36
December 29, 1906.....	269	February 2, 1907.....	11
January 5, 1907.....	189		

"The epidemic began the first week in December, 1906. On November 15th, there had been a heavy snowstorm, and this was followed by rains on the 18th and 21st, and on December 3rd, 6th, 10th, and 15th, one or more of which may have been the means of washing the infectious matter into the reservoir. The Elmhurst water was shut off on December 15th, and the city supplied from Lake Scranton; and soon after, the epidemic began to subside. The typhoid fever in the city occurred almost exclusively among the users of Elmhurst water."

Among other reasons, these two episodes are of interest in that they illustrate the doubtful character of the evidence connecting track pollution with the contamination of water supplies. In these situations there are almost an infinite number of possibilities with regard to the source of the contamination. Without more definite proof the implication of track pollution is no more than a surmise. For example, with regard to the first episode, open wells and springs are obviously subject to contamination by the handling and soiling of the containers which are used for dipping out the water. In the second episode—the Scranton epidemic—it was noted that Roaring Brook was open to contamination at various points, and particularly that it flowed through the center of a village of about 800 people. In both instances it is highly questionable whether the pollution entering from track pollution by trains was not infinitesimal in comparison with that entering from other sources.

In summary, this review of reports of water-borne outbreaks of typhoid fever occurring prior to 1920 has failed to reveal an instance in which the contamination of the water supply could reasonably be attributed solely or principally to disposal of fecal wastes by railway trains directly into streams in the catchment area or into storage reservoirs, or indirectly into ground waters by flooding or seepage.

#### 7. EVIDENCE IN THE PERIOD 1920-1945

When an hypothesis is as plausible as the one which is here under consideration—namely, that the method of disposal of fecal wastes employed by railways

<sup>1</sup> It is believed that in at least one sample of this water, the typhoid bacillus was positively identified.

(Editorial Note: Details regarding the bacteriological techniques employed are not given. It is questionable whether the methods used for the identification in 1906 would be acceptable today.)

without restraint of regulations up to about 1920 created a public health menace—it is disconcerting to find little in the way of supporting evidence in a large recorded experience. Granting that the search through medical literature and sanitary reports was reasonably thorough, and accepting that the incidence of typhoid fever is a valid index of the safety of the sanitary practice, at least two explanations may be offered: (1) that the menace existed but was not apparent to investigators during a period when the disease was widely distributed and innumerable channels for the transmission of typhoid fever were open; or (2) that the hypothesis is in some degree or to some extent faulty.

With regard to the first possibility, it is pertinent to inquire into what has happened since 1920. Although in that year the sanitary code was adopted requiring the locking of toilet rooms on all railway cars standing in stations or passing over watersheds, and so forth, adequate enforcement was difficult to obtain because of the human factors involved. It is safe to say that although the practice was improved somewhat by the regulation it was by no means a satisfactory solution. If a public health menace existed prior to 1920, it has continued to be operative in some degree since that time. It is only necessary to inspect the track areas in the terminals and yards of the larger cities, where passenger cars are serviced and cleaned, to be convinced that track pollution still occurs at certain times and places to a degree sufficient to create a definite nuisance and, therefore, possibly a menace also.

During the past quarter-century, with the general improvement in sanitation in the United States, the incidence of typhoid has continued to decline until it has practically disappeared from many cities and towns. An endemic prevalence has been maintained only in limited areas where the insanitary conditions were favorable to its survival. As the disease retreated within narrower limits, it became more conspicuous since it was regarded as an outstanding problem in preventive medicine. Health authorities were impelled to thoroughly investigate its occurrence in small epidemics or its persistence in limited foci. The search for sources of infection and the effort to correct insanitary practices which still permitted its dissemination became intensified. Under these conditions it has become increasingly improbable that an occupational or place hazard, or an important source of contamination of water supplies would long remain undiscovered by a well organized State, city or county health department.

With the continued pollution of tracks, especially about terminals and yards, the possibility remained of dissemination of typhoid to families living in close proximity and to railway employees. If this had constituted an insanitary condition particularly favorable to transmission, it might be expected that these areas would have been the last from which the disease disappeared. Reports of the persistence of such foci are conspicuous by their absence.

In like manner, if disposal of fecal wastes by passing trains had constituted an important source of pollution of water supplies, it might be expected that as other sources were excluded or minimized, this would become conspicuous in the causation of outbreaks. Gorman and Wolman (40) have assembled in a monograph an analysis of 470 water-borne outbreaks in the United States and Canada for the 17-year period 1920-1936, inclusive. The report is not limited to water-borne outbreaks involving public water supplies, but includes many outbreaks resulting from contamination of semipublic and private water systems in schools, institutions, industrial plants, camps, summer resorts and private premises. It includes not only the outbreaks of typhoid fever, but also of jaundice, of amoebic and bacillary dysentery, and of diarrhea due to other agents. The information available was carefully analyzed with regard to the points where pollution of water supply systems occurred. Nowhere in this experience was there an instance in which an outbreak was attributed to pollution of surface water by passing trains, nor is there any consideration given to this possibility.

It can, therefore, be stated with reasonable assurance that information at present available fails to establish the existence of a public health menace resulting from the method of disposal of fecal wastes employed by railways. This by no means proves the negative—that such a menace does not exist. It is reasonable to assume, however, that this practice has in the past been a relatively unimportant route of dissemination of the pathogenic microorganisms which cause the commonly recognized enteric infections.

#### 8. RECONSIDERATION OF THE HYPOTHESIS

This conclusion logically raises a question as to the validity of the original hypothesis and as to whether or not it should be modified to some extent in the

light of the experiences and advances in knowledge of the past half-century. Perhaps the fallacy lies not so much in the principal contention as in the tendency to make sweeping generalizations, to give undue emphasis to the relative importance of one possible route of dissemination of enteric infections when many other more direct routes exist, and, accordingly, to make dire predictions which are not justified. Without pausing to point out in detail errors in the facts upon which Barringer (10) based his premises in 1903, the subsequent course of events alone is sufficient proof that his arguments were more eloquent than scientific. The ideas which he, Whipple, and others, advanced in this early period have nevertheless largely influenced thinking on the subject of railway sanitation since that time.

The principal public health reason given for certain pertinent provisions in the Sanitation Manual for Land and Air Conveyances (87) promulgated in 1942 is well established. In essence it is that "excreta improperly disposed of constitutes a nuisance and a public health menace." As with all generalizations, there is need for precise definitions of the terms and a realization that such words as "improper" and "menace" contain a wide range of subjective interpretation. Modern sanitary science requires that so far as current knowledge permits such terms be given precise and definite meaning in relation to a specific set of conditions.

The disposition of feces on the ground or on a railroad creates a "nuisance" in proportion to the extent to which it becomes offensive to the sight, olfactory and aesthetic sensibilities of people. If there are no people around it is not a nuisance. It becomes a "public health menace" to the extent that conditions are afforded for direct or indirect transfer of fecal particles, and the pathogenic microorganisms which may be present, to the mouth and alimentary tract of people. To be more precise, the magnitude of the *menace* created is determined by a series of factors in a particular locality, population, and time, such as the frequency of cases or carriers excreting a specific microparasite, its ability to survive under the external conditions which are imposed, opportunities for transference from soil, soiled objects to hands or otherwise to food and drink, and the susceptibility status of the persons exposed to infection. If no susceptibles are exposed, it cannot be a menace. Without elaborating further upon the point, it is obvious that the terms "nuisance" and "menace" are not necessarily synonymous; a nuisance may exist without being a menace, and vice versa. Furthermore, it should be emphasized that both terms are relative not only to the surrounding environment, but also to the exposed persons. Correspondingly, it follows that what constitutes a "proper" or safe method of disposal is relative and must be interpreted with reference both to environment and *persons*.

How these concepts may be applied to the problems of railway sanitation may best be brought out by specific illustration. Very early in the history of its development in the United States, it was appreciated that one of the principal hazards of infection with typhoid and other enteric pathogens originated in the drinking water which was served to employees and traveling public. In a vast majority of instances, the railway company was not responsible for the pollution of the water supply. It was, however, providing an extension of the distribution system so that the polluted supplies of cities, towns, and villages reached a much larger number of *consumers* than otherwise would have been exposed to infection. The correction of this hazard was of untold value in the establishment and promulgation by the U.S. Public Health Service of the standards for drinking water used on interstate carriers. These standards in turn served as an effective tool in the improvement of municipal supplies all over the country.

Second in importance only to water supply as a hazard was the inadequate provision for toilet and hand washing facilities in passenger cars and railway stations. Where toilets were filthy and insanitary, the railway companies provided an ideal place and mechanism for the rapid and direct transfer of fecal-borne microorganisms from one individual to contaminated objects and to the hands and food consumed by another. It took many years to bring about improvement of sanitary facilities. Much still remains to be done. Even today the toilets on passenger cars and in stations remain the most important focal point of transfer and dissemination of the microorganisms causing human enteric infections and diseases, not only because of the environmental conditions, but also because of the opportunities for "contact."

Compared with these two, the hazard created by the disposal of untreated fecal wastes on the road bed is of much lower order. Scattered in this external environment, the chance that any pathogenic fecal microorganisms will survive until effective contact with a new human host can be made is greatly reduced.

In the first place, it will be recalled that Barringer theorized to the effect that "in the well-drained but cool and moist soil under the ties and ballast of the modern railway bed, baptized day after day and year after year with the albuminous fluids of human excrement, the *Bacillus typhosus*, once planted in this natural culture medium will live forever, revitalized at intervals by new infection, perhaps, but in the meantime facultative enough to meet seasonal and other changes." The scientific observations and experiments which have accumulated over the years since have proved beyond question that this conception was erroneous. The longevity of typhoid bacilli and other related organisms is not indefinite (13). Exposed to an external environment, and particularly to the effects of sunlight and drying, they tend to die off with a rapidity varying with the particular species of microorganism and the physical, chemical and biological conditions. The facts which have been established and which are available in any of the standard textbooks on bacteriology need not be reviewed in detail here. For the purposes of this discussion, it will suffice to state that they support certain pertinent generalizations. In fecal particles deposited on the surface of metal, wood, concrete, rock ballast, etc., and exposed to drying and sunlight, this group of microorganisms die in a few hours. Typhoid bacilli mixed with soil to a depth of one-fourth inch and exposed to the full rays of the sun may be completely destroyed in 24 to 48 hours. In soil at greater depths or in the interstices of rack ballast, cinders, and sand, with proper conditions of moisture and darkness these microorganisms may survive for longer periods of time, even up to months,—but the point should be emphasized that in this more protected environment, even though they survive a longer period of time, their chances of reaching a new human host before they perish are infinitely smaller.

The second limitation on the hazard of track pollution in comparison with that of drinking water and toilets is that the number of persons exposed to contact is infinitely smaller. The risk to passengers is almost negligible. The possibility of dissemination by dust particles arising from the road bed has no scientific support. Contact exposure with the road bed is practically limited to railway employees. The frequency of such person-exposure is greatest where employees are concentrated about terminals, yards, and stations, and decreases with the scatter of employees along railways in suburban and rural areas. There are long stretches of track in remote districts where the exposure would be limited only to a section gang engaged in maintenance work. The gravity of the public health menace created by disposal of fecal wastes would vary accordingly.

There still remains to be considered the potential danger of pathogenic microorganisms of the enteric group surviving to reach drinking water supplies through the discharge of fecal wastes from conveyances en route, in spite of the regulations now in effect (87) and such special measures as may be taken to protect water works (73). As methods for the procurement and distribution of safe water supplies have been developed in this country, it has become increasingly apparent that there are practical and economic limitations in the extent to which surface waters can be protected from pollution at their source. To quote from the Drinking Water Standards of the U.S. Public Health Service (1943), "it can hardly be considered as a safe rule to admit any water to a public supply without chlorination as a minimum safeguarding treatment in view of the present increased hazards of chance contamination resulting from the extension of recreational and migratory travel to many hitherto inaccessible places." If it be accepted that all surface waters are exposed to the chance of contamination from time to time, and that the disposal of fecal wastes by passing trains and by track drainage is only one among many possible sources, then safety must be sought in the design and operation of water works and in the quality of the finished product after appropriate treatment. The public health menace will then be insignificant because of the remote possibility that pathogenic microorganisms in fecal wastes discharged from passing trains will survive natural purification processes and the sanitary safeguards of satisfactory drinking water supplies to reach the consumers.

In view of these considerations, there appears to be good reason for modifying the original hypothesis and the concept of railway sanitation which trace their origin to it. At times and in particular places the disposal of sewage from railway conveyances has been improper in relation to environment and persons and, therefore, constituted a nuisance. This has not created a hazard which can be measured in terms of increased incidence of enteric disease. Facts now available support the conclusion that this practice had been relatively unimportant in comparison with many other factors in the environment which are responsible for the maintenance and dissemination of enteric infection and disease in human

communities under the conditions which have existed in the United States. There remains a possibility that there is a danger below this threshold of measurement. Even this theoretic possibility can be reduced to insignificance by technical improvements in methods of disposal which are now well within the realm of practical achievement.

## REFERENCES

- (1) Aldrich, J. F.: Modern railway sanitation. Internatl. Jour. Med. & Surg. 1932, 45: 151, 196.
- (2) Annual report of the city of Basel, Switzerland, 1900-1945.
- (3) Annual report of the city of Bern, Switzerland, 1900-1945.
- (4) Annual report of the city of Zurich, Switzerland, 1900-1945.
- (5) Annual report of the Indiana State Board of Health, 1901, 1903, 1904, 1905, 1907, 1909, 1911, 1912, 1914 (not published in consecutive years).
- (6) Annual report of the Massachusetts State Board of Health, 1892-1920.
- (7) Annual report of the Ministry of Health, London, England, 1920-1937.
- (8) Annual report of the Surgeon General of the United States Public Health Service, 1913-1916.
- (9) Annual report of the Chief Medical Officer of the Ministry of Health, London, England, 1920-1934.
- (10) Barringer, P. B.: An unappreciated source of typhoid infection. Med. Record, 1903, 64: 971.
- (11) ———: An unappreciated source of typhoid infection. Virginia Med. Semi-Monthly, 1903-04, 8: 501.
- (12) Beach, S. C.: Applied railway sanitation, Illinois Med Jour, 1928, 54: 304.
- (13) Beard, P. J.: Longevity of *Eberthella typhosus* in various soils. Amer Jour Pub Health, 1940, 30: 1077.
- (14) Beck, M. and Ohlmüller, W.: Die typhus-epidemie in Detmold in Herbst, 1904. Arb. aus dem Kaiserl. Gesundheit., 1906, 24: 138.
- (15) Bracken, H. M., Bass, F. H., Wesbrook, F. F., Whittaker, H. A. and Hill, H. W.: The Mankato typhoid fever epidemic of 1908. Jour. Inf. Dis., 1911, 9: 410.
- (16) Bradford, T. B.: Railway sanitation and the sanitary privy. Railway Surg. Jour., 1912-1913, 19: 96.
- (17) Bulletin of Hygiene, London, England, 1926-1945 (before 1926 issued as Tropical Disease Bulletin).
- (18) Bulletin du Service Federal d'Hygiene Publique, Switzerland, 1920-1945.
- (19) Bunn, W. H.: The Salem, Ohio, typhoid epidemic: A clinical report. Jour. Amer. Med. Assn., 1921, 76: 1159.
- (20) Cammaert, C. A.: Over typhoïed en typhoïedenting in het vluchttoord te Hontenisse (Typhoid among Belgian Refugees in Holland.) Nederlandsch. Tijdschr. v. Geneesk., Amsterdam, 1916 (March 4). (Abstract: Jour. Amer. Med Assn., 1915, 66: 1361.)
- (21) Campbell, A. E.: Public Health and Railroad Sanitation. Railway Surg. Jour., 1912-13, 19: 61.
- (22) ———: Public health, railway sanitation and hints to railway officials. Chicago Med. Recorder, 1914, 36: 7-15.
- (23) Chapin, Charles V.: The sources and modes of infection. John Wiley and Sons, New York, 1916.
- (24) Clarke, Anna C.: Railroad sanitation. Hahnemannian Monthly, 1912, 47: 117.
- (25) Conradi, H.: Zur Frage der regionären Typhus-Immunität. Klin. Jahrbuch, 1907, 17: 273.
- (26) ———: Wann steckt der Typhusranke an Deutsche Med. Wochenschr., 1907, 33: 1684.
- (27) ———: Über die Kontagiosität des Typhus. Klin. Jahrbuch, 1907, 17: 297.
- (28) ———: Ein Verfahren zum Nachweis spärlicher Typhus-bazillen. Muench. Med. Wochenschr., 1908, 55: 1523.
- (29) Cumulative Index: 1927-1945. The American Medical Association Chicago, Illinois.
- (30) Darling, J. B.: Railroad sanitation and the railroad sanitarian. Railway Surg. Jour., 1914-15, 21: 151.
- (31) Dowling, Oscar: Some factors in railway sanitation. South. Med. Jour., 1917, 10: 811.
- (32) Dublin, L. I.: Causes of death by occupation. Bull. U. S. Bureau of Labor Statistics, No. 207, Industrial Accidents & Hyg. Series, Govt. Print. Off., Washington, March, 1917.

- (33) Dublin, L. I. and Vane, R. J., Jr.: Causes of death by occupation. Bull. U. S. Bureau of Labor Statistics, No. 507, Industrial Accidents & Hyg. Series, Govt. Print. Off., Washington, February, 1930.
- (34) Frost, W. H.: The water supply of Williamson, W. Va., and its relation to an epidemic of typhoid fever. Hyg. Lab. Bull. 72, Govt. Print. Off., Washington, November, 1910.
- (35) Fornet, W.: Statistisches über den Typhus und die Typhusbekämpfung im Südwesten des Reiches. Arb. aus dem Kaiserl. Gesundheit., 1912, 41: 448.
- (36) Frank, L. C.: The control of traffic sewage. Jour. Sociol. Med., 1916, 17: 140.
- (37) Freeman, A. W.: Typhoid fever and municipal administration. Public Health Reports, 1917, 32: 642.
- (38) Frosch, P.: Die Grundlagen und ersten Erfahrungen in der modernen Typhusbekämpfung. Klin. Jahrbuch, 1907, 17: 115.
- (39) Gay, F. P.: Typhoid fever considered as a problem of scientific medicine. The MacMillan Company, New York, 1918.
- (40) Gorman, A. E. and Wolman, Abel: Water-borne outbreaks in the United States and Canada and their significance. The American Water Works Association, New York, 1939.
- (41) Gregg, Donald: Origin and Prevalence of Typhoid Fever in Boston in the year 1909. Annual Report State Board of Health Massachusetts, 1910, No. 134, 602.
- (42) Griffith, Frederic: Device to overcome a sanitary defect on railroads. Amer. Medicine, 1906, 11: 473.
- (43) Havens, Leon C.: The bacteriology of typhoid, salmonella and dysentery infections and carrier states. (Edited by Kenneth F. Maxcy) The Commonwealth Fund, New York, 1935.
- (44) Hume, A. M.: Something about railroad sanitation. Railway Surg. Jour., 1910-11, 17: 154.
- (45) Hunt, C. J.: Bacillary dysentery. A contribution to the study of epidemiology. Jour. Amer. Med. Ass., 1912, 59: 919. (Abstract: Trop. Dis. Bull., 1912, 1: 185.)
- (46) Hurty, J. N.: Railway sanitation. Ohio Sanitation Bull., 1906, 10: 5.
- (47) Index-Catalog, Surgeon General's Office, U.S. Army, Washington, 1900-1945, inclusive.
- (48) Index Medicus, 1900-1926. Carnegie Institution of Washington, D.C.
- (49) Interstate Quarantine Regulations of the United States, Misc. Publication No. 1, Govt. Printing Office, Washington, D.C., 1916.
- (50) Jordan, E. O. and Irons, E. E.; The Quincy (Illinois) typhoid epidemic. Jour. Inf. Dis., 1913, 13: 16.
- (51) Kayser, Henrich: Ueber die Art der Typhusausbreitung in einer Stadt. Muench. Med. Wochen., 1909, 56: 1066.
- (52) Kinnaman, C. H. and Beelman, F. C.: An epidemic of 3,000 cases of bacillary dysentery involving a war industry and members of the Armed Forces. Amer. Jour. Pub. Health, 1944, 34: 948.
- (53) King, W. G.: Applied hygiene in the tropics. Trop. Dis. Bull., 1915, 6: 515. (Disinfection of railway carriages, page 531.)
- (54) ———: Applied hygiene in the tropics. Trop. Dis. Bull., 1919, 14: 341. (Rapid plague spread by railways, page 354.)
- (55) ———: Applied hygiene in the tropics. Trop. Dis. Bull. 1915, 6: 515. (Sewage disinfection on railways, pages 574-575.)
- (56) Kirchner, M.: Über den heutigen Stand der Typhusbekämpfung. Klin. Jahrbuch, 1907, 17: 433.
- (57) ———: Die neue Organisation der bakteriologischen Seuchenfeststellung in Preussen. Berliner Klin. Wochen., 1908, 45: 341.
- (58) Kister, J.: Verbreitung von Typhus durch Abfallstoffe. Archiv. für Hygiene, 1928, 100: 1.
- (59) Klinger, P.: Über neuere Methoden zum Nachweise des Typhusbazillus in den Darmentleerungen, Arb. aus dem Kaiserl. Gesundheit., 1906, 24: 35.
- (60) ———: Die Untersuchungen der Strasburger bakteriologischen Anstalt für Typhusbekämpfung in der Zeit vom 1 October 1903 bis 30 September 1905. Arb. aus dem Kaiserl. Gesundheit., 1907, 25: 214.
- (61) ———: Epidemiologische Beobachtungen bei der Typhusbekämpfung in Sudwesten des Reichs. Arb. aus dem Kaiserl. Gesundheit., 1909, 30: 584.

- (62) Koch, Robert: Die Bekämpfung des Typhus. Vortrag gehalten in der Sitzung des wissenschaftlichen Senats bei der Kaiser Wilhelms Akademie am 28 November 1902. Veröffentlichungen aus dem Militärsanitätswesen, 1903, 21: 22 pages.
- (63) Konradi, D.: Typhus bacillen im Brunnenwasser. Centralbl. f. Bakt., Parasit. und Infekt., 1904, 35: 568.
- (64) Ledingham, J. C. G. and Arkwright, J. A.: The carrier problem in infectious diseases. Longmans, Green and Company, New York, 1912.
- (65) Levy, E. C. and Freeman, A. W.: Certain conclusions concerning typhoid fever in the south, as deduced from a study of typhoid fever in Richmond, Va. Old Dominion Jour. of Med. & Surg., 1908, 7: 1.
- (66) Lumsden, L. L.: Report on an outbreak of typhoid fever at Omaha, Nebr. (1909-1910). Hyg. Lab. Bull. 72, Government Printing Office, Washington, November, 1910.
- (67) ———: Report on an outbreak of typhoid fever at Des Moines, Iowa, in 1910. Public Health Reports, 1911, 26: 63.
- (68) ———: Report on an outbreak of typhoid fever at Lincoln, Nebr., in 1911. Public Health Reports, 1912, 27: 793.
- (69) Manual of recommended water sanitation practice accompanying United States Public Health Service Drinking Water Standards, 1942. Pub. Health Reports, 1943, 58: 83.
- (70) Matthes and Gunlach: Eine Trinkwasserepidemie in R. Arb. aus dem Kaiserl. Gesundheit., 1906, 24: 83.
- (71) Matthes and Neuman: Eine Trinkwasserepidemie in S. Arb. aus dem Kaiserl. Gesundheit., 1906, 24: 116.
- (72) Morales, E. G., Doull, J. A. and Haygood, M. F.: Typhoid fever in Knoxville, Tenn., with special reference to findings in a sanitary census conducted through the schools. Amer. Jour. Pub. Health, 1928, 18: 752.
- (73) Myott, E. B.: Filtration of railroad track drainage along a municipal water supply reservoir. Amer. Jour. Pub. Health, 1932, 22: 1298.
- (74) Nichols, H. J.: Carriers in infectious diseases. A manual on the importance, pathology, diagnosis and treatment of human carriers, with a section on carriers in veterinary medicine by R. A. Kelsner. Williams and Wilkins Company, Baltimore, 1922.
- (75) Occupational Hazards in the Operation of Sewage Works. Manual of Practice No. 1, Federation of Sewage Works Association, 1944.
- (76) Olbrich, Karl: Die Typhusepidemie in G. (Landkreis Strasburg, Elsas) im winter 1903-04. Arb. aus dem Kaiserl. Gesundheit., 1906, 24: 159.
- (77) Public Health Service Drinking Water Standards. Public Health Reports, 1943, 58:69.
- (78) Reed, W., Vaughan, V. C. and Shakespeare, E. O.: Report on the origin and spread of typhoid fever in U.S. military camps during the Spanish war of 1898. Office of the Surgeon General, Govt. Print., Off., Washington, 1904, volume 1.
- (79) Report of the Committee on Railway Sanitation. Amer. Med. Assn. Bull., 1911-13, 7-8: 151.
- (80) Report of Investigations of the Typhoid Fever Epidemic, Minneapolis, 1935. Publ. by Minnesota Department of Health.
- (81) Report of the Local Government Board on Public Health and Medical Subjects. London, England, 1909-1920, inclusive. (After 1920 issued as Annual Report of Ministry of Health.)
- (82) Report on Typhoid Fever in the District of Columbia, submitted by the Medical Society of the District of Columbia to the Committee on the District of Columbia of the U.S. House of Representatives, Govt. Print. Office, Washington, 1894.
- (83) Robertson, D. G. and Taylor, G. H.: Inquiry into the morbidity and mortality statistics of the employees of the New South Wales Government Railways and Tramways during the year 1924 and of the Victorian Government Railways during the years 1922, 1923 and 1924. Commonwealth of Australia, Department of Health, Division of Industrial Hygiene, Service Publication No. 3, 52 pages.
- (84) Rosenau, M. J., Lumsden, L. L. and Kastle, J. H.: Report on the origin and prevalence of typhoid fever in the District of Columbia. Hyg. Lab. Bull. No. 35, U.S. Public Health and Marine-Hospital Service, February, 1907. Govt. Print. Off., Washington.

- (85) Rosenau, M. J., Lumsden, L. L. and Kastle, J. H.: Report No. 2 on the origin and prevalence of typhoid fever in the District of Columbia (1907). Hyg. Lab. Bull. No. 44, U.S. Public Health and Marine-Hospital Service, May, 1908. Govt. Print. Off., Washington.
- (86) ———: Report No. 3 on the origin and prevalence of typhoid fever in the District of Columbia (1908). Hyg. Lab. Bull. No. 52, U.S. Public Health and Marine-Hospital Service, October, 1909. Govt. Print. Off., Washington.
- (87) Sanitation Manual for Land and Air Conveyances. Pub. Health Reports, 1943, 58: 157.
- (88) Sawyer, W. A.: The disease carrier on train and steamboat. Jour. Sociol. Med., 1916, 17: 131.
- (89) Scattergood, J.: Railroad sanitation. Internatl. Jour. Surg., 1919, 32: 251.
- (90) Scheller, R.: Beiträge zur Typhusepidemiologie. Centralbl. für Bakt., Parasit., und Infekt., 1908, 46: 385.
- (91) Sedgwick, W. T.: Annual Reports to the Massachusetts State Board of Health, 1892.
- (92) ———: Investigations of recent typhoid fever epidemics in Massachusetts. Twenty-fourth Annual Report of the State Board of Health of Massachusetts, 1892.
- (93) ———: The Lowell epidemic of typhoid fever in 1890-91. Twenty-fourth Annual Report of the State Board of Health of Massachusetts, 1892, page 667.
- (94) ———: An investigation of an epidemic of typhoid fever in Somerville, due to infected milk. Twenty-fourth Annual Report of the State Board of Health of Massachusetts, 1892, page 726.
- (95) ———: On an epidemic of typhoid fever in Marlborough, apparently due to infected skimmed milk. Annual Report of the State Board of Health of Massachusetts, 1894, page 765.
- (96) Sedgwick, W. T. and Chapin, W. H.: An investigation of an epidemic of typhoid fever in the City of Springfield in July and August, 1892, due to infected milk. Twenty-fourth Annual Report of the State Board of Health of Massachusetts, 1892, page 715.
- (97) Sedgwick, W. T.: Typhoid fever: A disease of defective civilization. Introductory Essay to "Typhoid Fever: Its Causation, Transmission and Prevention" by George C. Whipple. John Wiley and Sons, New York 1908, pages xxiii-xxxvi.
- (98) Seige and Gundlach: Die Typhus-epidemie im W. im Herbst 1903. Arb. aus dem Kaiserl. Gesundheits., 1906, 24: 77.
- (99) Standard Railway Sanitary Code. Supplement No. 46 to the Public Health Reports, May 16, 1924. Govt. Printing Office, Washington, 1924.
- (100) Terry, C. E.: Fly-borne typhoid fever and its control in Jacksonville, Fla. Public Health Reports, 1913, 28: 68.
- (101) Thierry, Henry: L'hygiene des Chemins de fer. L'Hygiene Generale et Appliquée, 1906, 1: 715.
- (102) Thrush, M. C.: The value of sanitation as applied to railway and other large corporations, with special reference to the public welfare. Med. Review, 1913, 62: 357.
- (103) Thrush, M. C.: The value of sanitation as applied to railway and other large corporations, with special reference to the public welfare. Jour. Amer. Med. Assn., 1913, 61: 1286.
- (104) Transactions of the 17th Annual Conference of State and Territorial Health Officers with the United States Public Health Service. Public Health Bull. No. 105, January 1920. Govt. Print. Off., Washington.
- (105) Tropical Disease Bulletin, 1900-1926, inclusive. (After 1926 issued as Bulletin of Hygiene.)
- (106) Uhlenhuth, Olbrich and Messerschmidt: Typhusverbreitung und Typhusbekämpfung im Felde. Med. Klinik, 1915, 11: 149.
- (107) Vaught, C. H.: Railway sanitation. South. Med. Jour. 1915, 8: 309.
- (108) Veldee, M. V.: An epidemiological study of typhoid fever in six Ohio River cities. Pub. Health Reports, 1931, 46: 1460.
- (109) Von Drigalski: Ueber Ergebnisse bei der Bekämpfung des Typhus nach Robert Koch. Centralbl. f. Bakt., Parasit., und Infekt., 1904, 35: 776.
- (110) Ward, R. V.: Causes of death by occupation. Canadian Pub. Health Jour., 1930, 21: 462.

- (111) Way, J. H.: Remarks on railway sanitation, with special reference to the dangers of present methods of disposing of human excreta, and suggestions for improvement. *Charlotte Med Jour.*, 1906, 29: 80.
- (112) Whipple, G. C.: Typhoid fever: Its causation, transmission and prevention. John Wiley and Sons, New York, 1908.
- (113) White, Alexander R.: Railway sanitation. *Canadian Pub. Health Jour.*, 1935, 26: 148.
- (114) Wilson, Harold: Some risks of transmission of disease during the treatment, disposal and utilisation of sewage, sewage effluent and sewage sludge. A paper presented for discussion by the South African Branch of the Institute of Sewage Purification (unpublished).
- (115) *Zeitschrift für Schweizerische Statistik*, Switzerland, 1865-1888, inclusive (discontinued.)

APPENDIX II.—“A REPORT ON RAILROAD WASTE POLLUTION,” PREPARED BY MONOGRAM INDUSTRIES, INC., VENICE, CALIF., DIVISION, NOVEMBER 1, 1969

(NOTE.—The photographs in the following report have not been included in this hearing record.)

FOREWORD

Monogram Industries, a leader in sanitation systems and their development, has conducted a study of the existing practices of human waste management employed by the railroads.

The evaluation considered the technical means of waste disposal, effects of environmental contamination, and the review of regulations and laws governing these practices.

This report summarizes the results of the study and has been prepared to educate and inform those who are interested in arresting the general degradation of our environment.

1.0 INTRODUCTION

The human waste pollution of our environment by railroads is widespread and of significant magnitude. This study has analyzed the practices, equipment, and laws which permit the primitive method of directly dumping raw human wastes on railroad right-of-ways, street crossings, stations, watersheds, etc.

It has been repeatedly stated that passenger trains and service has been and will be downgraded in number and quality until such time as high-speed interurban “metroliner” or equivalent equipment is developed or proved to be economically feasible. Therefore, in keeping with the conservative nature of this report, the waste contribution to the environment from passenger trains has been completely omitted from analysis. The study was limited to pollutants discharged from locomotives and cabooses in the movement of freight.

There are over 30,000 locomotives and 15,000 cabooses presently in service. Each of these vehicles is fitted with a toilet which permits direct discharge of waste to the track/roadbed. A conservative estimate of the quantity of raw human wastes so deposited is over 50 million pounds annually.

In the course of analysis and in particular when the magnitude of this pollution was estimated, all State health departments within the continental limits were contacted relative to existing or pending legislation controlling these practices. The results of these contacts has shown that little or no interstate coordination has existed and in many cases no interest was exhibited in the overall problem.

A request was sent to each State health department in an attempt to ascertain whether their particular State had existing laws pertaining to the dumping of raw sewerage on the tracks by railroads. A question was also raised regarding planned legislation or the existence of any groups interested in this problem. All States recognized that the proper authority fell within the U.S. Public Health Service's Interstate Quarantine Regulations. Several States had vague laws which they felt could pertain to this situation although these laws were not being used or enforced. Some State health departments were not aware of laws in their own State which specifically dealt with this situation.

Canada was also solicited as to legislative status regarding this matter and it was learned that regulations were recently enacted which prohibit direct discharge of wastes from locomotives and cabooses.

In conclusion, it can be stated that railroads are contributing to extensive and continuing pollution of our environment through direct discharge of wastes to roadbeds and tracks. The primitive and unacceptable nature of this practice is recognized by several States and certainly Canada. Apparently, several States have or will have taken strong positions opposed to this practice and as such will restrict interstate carriers in direct dumping in the State where laws or regulations have been enacted. In any case, all involved parties including States, railroad companies, etc. have expressed an opinion to the effect that Federal legislation should be enacted to establish a uniform code to control this practice.

## 2.0 RAILROAD SANITARY PRACTICES

Railroad sanitary practices can be said to comply with existing regulations, that is Public Health Service Regulations (part 72). Which, for reference purposes is as follows:

*PHS-IQR 72.141 "Disposal of Human Wastes"*

(a) At servicing areas and at stations where land and air conveyances are occupied by passengers, the operations shall be so conducted as to avoid contamination of such areas and stations by human wastes.

(b) Toilet wastes shall be disposed of through sanitary sewers or by other methods assuring sanitary disposal of such wastes.

*PHS-IQR 72.154 "Railroad Conveyances; Discharge of Wastes"*

(a) There shall be no discharge of excrement, garbage, waste water, or other polluting material from any land conveyance while such conveyance is passing over areas designated by the Surgeon General.

(b) Toilets shall be locked when conveyances occupied or open to occupancy by travelers are at a station or servicing area unless means are provided to prevent contamination of the area or station.

The regulations as described above apply to the control of waste disposal from railroad conveyances.

The regulations dealing with aircraft and highway conveyances are far more explicit:

*PHS-IQR 72.155 "Air Conveyances; Discharge of Wastes."*

There shall be no discharge of excrement or garbage from any air conveyance except at servicing areas approved by the Surgeon General.

*PHS-IQR 72.156 "Highway Conveyances; Discharge of Wastes."*

There shall be no discharge of excrement, garbage or waste water from a highway conveyance except at servicing areas approved by the Surgeon General.

A brief review of the foregoing regulations shows that double standards are used for railroads and other means of transportation. If railroads can directly dump raw human excrement on the land, why is it required that buses and aircraft retain all wastes? Direct disposal of wastes would certainly be less expensive and simpler in equipment requirements. Of course, the answer to the foregoing question is obvious, wastes can not be directly dumped by a highway or aircraft conveyance because to do so would introduce mass pollution of water sheds, food supplies, living space, and so forth, with an attendant increase in biological hazard. The railroad industry appears to be exempt from compliance with these practical requirements set forth for other like industries.

When questioned regarding the continuation of this primitive practice, the railroads refer to the dwindling number of passenger trains in service each year, and that to comply with proper regulations would require a substantial retrofit of existing passenger cars. Analysis shows the foregoing to be true. However as the number of passenger trains diminishes, the number of freight trains increases. Each year sees gains posted in freight miles by nearly all railroads. Every year 2,000 new locomotives and cabooses enter service. The average useful life of a locomotive is greater than 30 years, and each is equipped with a primitive direct dumping toilet system. It is difficult to think that in the year 2000 A.D. man will continue to defecate directly on the railroad tracks.

## 2.1 EQUIPMENT DESCRIPTION

There are several types of existing equipment, all of which empty directly onto the tracks. For the sake of simplicity we shall only discuss the one which is used most frequently. It is a flushing hopper type with a single pan actuated by a foot lever. Its operation is accomplished by an additional water tank placed above the hopper. The toilet is flushed by a gravity feed method when the foot lever is actuated. The foot lever also actuates the pan which opens in the bottom of the toilet, letting sewerage flow through a chute onto the tracks. This piece of equipment is referred to as a gravity feed flushing hopper.

In the United States there are two major manufacturers of locomotives. It is estimated that they manufacture between 2,000 and 2,300 locomotives switchers, etc., a year. All are equipped with toilet facilities, it is estimated that over 90 percent of these empty directly onto the tracks.

There is one caboose manufacturer in the United States who produces approximately 350 cabooses a year. They represent themselves to be the largest single manufacturer of cabooses in the United States. The 350 cabooses which they yearly produce represent only 50 percent of the total cabooses fabricated in the United States. Other carbuilders and some railroad companies build the remaining 50 percent. All cabooses have toilets and more than 95 percent of these empty directly onto the tracks. This means that over 750 cabooses a year are built containing toilets which empty directly onto the tracks.

A few railroads have accepted retention-type systems on recently manufactured interstate and commuter passenger trains. Examples include the Metroliners, Jersey Arrows, and the high-speed train of the Northeast Corridor. Although these steps are important in solving the overall general problem of pollution they do not solve the deficient practices currently being built into new and existing locomotives and cabooses.

It has been noted by officials of the USPHS that the conditions in the immediate area of the toilet (reference fig. 2-6) often become littered with trash, adding to the unsanitary condition of the situation.

## 2.2 RAILROAD OPERATIONS

With the support and coordination with the local USPHS representative a survey was conducted in various areas of southern California for overt signs of pollution of rail right-of-way by direct dumping of sewerage.

Although railroad toilets are generally marked with notices requesting that "toilet be flushed after each use, except when train is standing in station" it was rarely observed. All toilets surveyed were not locked at any time at any station.

Figure 2-7 shows a new railcar toilet compartment. In the course of our survey the major rail centers and yards in the East were visited and inspected. The general condition of toilet compartments was so bad as to be nearly unbelievable. In some instances no toilets were even installed, and in nearly every case none were maintained. This practice alone, notwithstanding other railroad problems, makes America's railroads among the most archaic in the world.

Figure 2-8 shows evidence of sewerage at a rail crosswalk and figure 2-9 shows waste deposits at the passenger loading platform at a major station. Figures 2-10 and 2-11 show random evidence of waste pollution resulting from direct dumping of raw wastes.

## 3.0 TECHNICAL ANALYSIS

The foregoing review of existing railroad sanitary practices generally applies to passenger and freight operations alike. The following technical analysis has been prepared to attempt to conservatively estimate the magnitude of waste emission from freight operations only and purposely excludes passenger train contribution to contamination.

### 3.1 DATA

The following data are offered in support of the technical analysis.

(a) total number of operating toilets:

Locomotives (1 toilet each).....	30,000
Cabooses (1 toilet each).....	15,000
Toilets dumping directly on tracks.....	45,000

In addition there are 2,000 new units going into service each year. These units have been omitted from the analysis.

(b) There are five defecation uses per day per vehicle when in service.

(c) Average defecation approximately 0.75 pounds.

(d) Each train averages four to five crewmembers which change each 125 miles.

(e) In 1968 there were 430 million freight train-miles covered.

### 3.2 ANALYSIS

With 45,000 toilets, each discharging five times per day on the right-of-way we have

$$45,000 \text{ toilets} \times 5 \text{ times per toilet} \times 0.75 \text{ lbs feces per time} = \\ 168.75 \times 10^9 \text{ lbs feces per day or } 168,750 \text{ lbs feces per day}$$

However the freight moves, on the average of 360 days per year then 168,750 lbs feces per day  $\times$  360 days per year = 51,637,500 lbs feces per year.

Of course, with each flush we use 3 gallons of water hence the total sewerage output in gallons is:

$$\frac{51,637,500 \text{ lbs feces per year}}{8.2 \text{ lbs per gallon}} + 225,000 \text{ flushes per day} \times 360 \text{ work days per year}$$

or

$$6,297,256 \text{ gallons feces per year} + 8,100,000 \text{ flushes per year} \times 3 \text{ gallons per flush}$$

$$6,297,256 \text{ gallons feces per year} + 24,300,000 \text{ gallons flush liquid per year}$$

or

$$30,597,256 \cong 30,600,000 \text{ gallons waste per year}$$

#### 4.0 CONCLUSION

The present pollution rate due to the railroad practice of dumping raw wastes is large and must be deemed unacceptable. The threat of disease and degradation of water sheds and property is not only implied but is occurring today through this practice.

Many States in this country recognize the magnitude of the problem and have taken independent action to restrict rail operations within their jurisdiction. The need for Federal standards is ever more important, because if left unchecked each State will enact legislation which will create numerous discrepancies in operational railroad requirements and a morass of interstate interfaces.

The Canadian Department of Transportation has enacted legislation which prohibits this primitive practice. Currently five major U.S. railroads operate over 1,200 miles of road within Canadian borders. Apparently it is possible that Canada could force American railroads to "clean-up" this practice before carrying international freight into that country.

In conclusion, it should be stated that this country lags behind many other nations in control of wastes and in particular wastes borne of railroad operations and it's about time something is done to stop it.

APPENDIX III.—APPLICABLE EXCERPTS FROM PUBLIC HEALTH SERVICE ACT OF 1944, INTERSTATE QUARANTINE REGULATIONS, AND REGULATION DELEGATING ENFORCEMENT OF INTERSTATE QUARANTINE REGULATIONS TO COMMISSIONER OF FOOD AND DRUGS

(A) APPLICABLE EXCERPTS FROM THE PUBLIC HEALTH SERVICE ACT OF 1944.

42 U.S.C. 264

(a) The Surgeon General, with the approval of the Secretary, is authorized to make and enforce such regulations as in his judgment are necessary to prevent the introduction, transmission, or spread of communicable diseases from foreign countries into the States or possessions, or from one State or possession into any other State or possession. \* \* \*

42 U.S.C. 271

(a) Any person who violates any regulation prescribed under sections 264-266 of this title \* \* \* shall be punished by a fine of not more than \$1,000 or by imprisonment for not more than 1 year, or both.

(B) APPLICABLE EXCERPTS FROM PUBLIC HEALTH SERVICE REGULATIONS

Sec. 72.141 *Disposal of human wastes:* (a) At servicing areas and at stations where land and air conveyances are occupied by passengers the operations shall be so conducted as to avoid contamination of such areas and stations by human wastes.

(b) Toilet wastes shall be disposed of through sanitary sewers or by other methods assuring sanitary disposal of such wastes. All soil cans and removable containers shall be thoroughly cleaned before being returned to use. Equipment for cleaning such containers and for flushing nonremovable containers and waste carts shall be so designed as to prevent backflow into the waterline, and such equipment shall be used for no purpose connected with the handling of food, water or ice.

(c) All persons who have handled soil cans or other containers which have come in contact with human wastes shall be required to wash their hands thoroughly with soap and warm water and to remove any garments which have become soiled with such wastes before engaging in any work connected with the loading, unloading, transporting or other handling of food, water or ice.

Sec. 72.154 *Railroad conveyances; discharge of wastes:* (a) There shall be no discharge of excrement, garbage, waste water or other polluting material from any land conveyance while such conveyance is passing over areas designated by the Surgeon General.

(b) Toilets shall be kept locked when conveyances, occupied or open to occupancy by travelers, are at a station or servicing area unless means are provided to prevent contamination of the area or station.

Sec. 72.155 *Air conveyances; discharge of wastes:* There shall be no discharge of excrement or garbage from any air conveyance except at servicing areas approved by the Surgeon General.

Sec. 72.156 *Highway conveyances; discharge of wastes:* There shall be no discharge of excrement, garbage or waste water from a highway conveyance except at servicing areas approved by the Surgeon General.

(C) PUBLIC HEALTH SERVICE—CONSUMER PROTECTION AND ENVIRONMENTAL HEALTH SERVICE

*Statement of organization, functions, and delegations of authority*

Transfer of the milk, food, and interstate travel programs from the Environmental Control Administration to the Food and Drug Administration.

Part 3 (Consumer Protection and Environmental Health Service) of the statement of organization, functions, and delegations of authority of the Department of Health, Education, and Welfare (33 F.R. 19044-54 dated Dec. 20, 1968) is amended to transfer the milk, food, and interstate travel sanitation program and the Environmental Control Administration to the Food and Drug Administration.

[34 F.R. 9895, June 26, 1969.]

APPENDIX IV.—EXCERPTS FROM ORDER NO. R-O-37 OF CANADIAN  
TRANSPORT COMMISSION/RAILWAY TRANSPORT COMMITTEE, APRIL 2,  
1969

LOCOMOTIVE AND CABOOSE SANITATION FACILITIES REGULATIONS

\* \* \* \* \*

TOILET FACILITIES

8. All new locomotives and new cabooses to be used in road service on and after May 1, 1969, shall be equipped with suitable toilet facilities.

9. Subject to section 11, every company shall, on or before May 1, 1974, install suitable toilet facilities in—

(a) All locomotives that are in road service unless the design thereof precludes such installation; and

(b) Cabooses that are in road service; when such locomotives and cabooses are being rebuilt, remodeled, upgraded, or undergoing heavy repairs.

10. Toilet facilities installed pursuant to sections 8 and 9 shall be of such type and construction that human waste will not be dumped on the roadbed of the railway or on any part of the rolling stock.

11. Toilets of the outside flush or dry hopper type that are suitable for year-round operation, may continue to be used in a locomotive or caboose when such facilities were installed in that locomotive or caboose prior to May 1, 1969.

\* \* \* \* \*

APPENDIX V.—AGENCY RESPONSES TO SUBCOMMITTEE INQUIRIES  
REGARDING DISCHARGE OF WASTES FROM TRAINS

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., January 19, 1970.

HON. WALTER J. HICKEL,  
*Secretary of the Interior,  
Department of the Interior, Washington, D.C.*

DEAR MR. SECRETARY: In November 1969 this subcommittee began examination of the problem of human waste disposal from interstate trains. According to a report entitled "A Report on Railroad Waste Pollution, November 1, 1969," by Monogram Industries, Inc., of Venice, Calif. (copy enclosed), our Nation's railroads are operating with only the most primitive of human waste disposal systems. That report indicates that over 50 million pounds of untreated human waste are discharged annually from locomotives and cabooses. Although that report does not include any estimate of human wastes discharged from commuter and intercity passenger trains, even greater amounts presumably emanate therefrom. These wastes constitute a significant and avoidable source of pollution of our Nation's watersheds.

We would appreciate your providing to us the following information:

1. (a) Does the Monogram Industries report on railroad waste pollution accurately estimate the quantity of untreated human wastes discharged from locomotives and cabooses?
- (b) If your estimate is different, please state your estimate and the basis thereof.
2. State the estimated quantity of untreated human wastes discharged last year from intercity and commuter passenger cars, and the basis for your estimate.
3. State, to the best of your information, the total number of miles of railroad right-of-way which—
  - (a) Are in the United States;
  - (b) Cross over a reservoir, waterway, or other body of water; and
  - (c) Pass within a mile of any reservoir, waterway, or other body of water.
4. (a) State the estimated quantity of human waste, released from all types of railroad cars onto bridges or roadbeds, which enters navigable and interstate waters.
- (b) Please explain the basis for your estimate.
5. Do you believe railroads can utilize waste holding systems such as those used on buses and airplanes? If not, state your reasons.
6. Describe any efforts made by your agency to encourage the railroad industry to utilize the holding tank type waste disposal system.
7. Please provide the information requested in tables A and B (attached).
8. Please state your recommendations for reducing or eliminating the discharge of untreated human wastes from railroad cars.

Sincerely,

HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee.*

U.S. DEPARTMENT OF THE INTERIOR,  
OFFICE OF THE SECRETARY,  
Washington, D.C., February 9, 1970.

HON. HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, Washington, D.C.*

DEAR MR. REUSS: This is in further response to your letter of January 19, 1970, pertaining to the problem of human waste disposal from interstate trains.

In regard to your first question, we have reviewed the information in the report on railroad waste pollution prepared by Monogram Industries and have discussed the data presented with the Association of American Railroads. The methodology used in estimating the quantity of untreated human wastes discharged from locomotives and cabooses appears to be sound. The quantity of wastes, however, appears to be high. Information developed for the National Aeronautics and Space Administration indicates that the amount of solid human waste produced per man per day is 0.33 pound rather than the 0.75 pound noted in the study. The total quantity of solid waste produced should be 22,720,500 pounds per year instead of the 51,637,500 pounds per year estimated in the report.

In regard to your questions 2 through 4 we have discussed the problem of toilet facilities on passenger trains with the Federal Railway Administration of the Department of Transportation and with the Association of American Railroads. During these discussions we determined that some of the newer passenger cars are equipped with recirculating and/or retention type toilet facilities but that the older equipment discharges directly to the track while the train is in motion. There is no information available on the number of each type of passenger car in use or the amount of untreated waste being discharged from these cars. There are approximately 209,000 miles of railroad line in the United States, but there is no estimate available as to how much of this mileage crosses over or passes within a mile or any reservoir, waterway or other body of water. For this reason, it is also impossible to estimate the quantity of human waste released from railroad cars which enter the navigable or interstate waters. To obtain this information would require a lengthy and extensive study of Geological Survey maps and other information.

In regard to your question 5, we believe that waste holding systems similar to those used on aircraft or busses could be used on railroads. The Federal Water Pollution Control Administration has informed me that they have a considerable amount of information available on waste retention systems for use aboard watercraft. A similar type of installation could be used in railroad cars. In addition, railroads have the advantage of the availability of ample power so that it might be possible to use even more compact systems now under development.

In regard to your question 6, I have been informed that the Federal Water Pollution Control Administration has not been in contact with the railroad industry on matters concerning the type of toilet facilities to be used on trains. The regulation of railroad sanitary facilities falls within the authority of the U.S. Public Health Service.

The information requested in your question 7 is presented in the enclosed charts. These summarize the research and development projects being undertaken by the Federal Water Pollution Control Administration for the development of holding or treatment systems for watercraft and other modes of transportation. It can be seen that approximately \$133,000 were allocated to this work during fiscal year 1969 and \$260,000 are being allocated during fiscal year 1970.

In regard to your question 8, the Department of the Interior recommends that the railroads be asked to replace all straight-through toilet facilities with recirculating or nondischarge systems as quickly as possible. If a voluntary arrangement is not worked out it may be desirable to suggest suitable legislation to make this mandatory.

I appreciate the opportunity to comment on your letter. Please let me know if I can be of any further assistance to you.

Sincerely yours,

CARL L. KLEIN,  
*Assistant Secretary of the Interior.*

TABLE A.—FWPCA RESEARCH AND DEVELOPMENT PROJECTS FOR DEVELOPMENT OF HOLDING SYSTEMS, OR METHODS OF TREATMENT, FOR HUMAN WASTES FROM SHIPS, WATERCRAFT AND OTHER MODES OF TRANSPORTATION, FISCAL YEAR 1970

Contractor or grantee <sup>1</sup>	Brief description of project	Amount allocated	Applicability of expected project results to problem of waste disposal from railroad cars <sup>2</sup>
General Electric, 3198 Chestnut, Phila., Pa.	Phase I—Complete characterization of waste (kitchen and toilet). Phase II—Electrocoagulation of sewage.	\$227,928	Not possible.
General Dynamics, Groton, Conn.	Waste impoundment, compaction and disposal to shore facility.	32,719	Do.
Total		260,647	

<sup>1</sup> Including FWPCA in-house projects.<sup>2</sup> Rate as: definite, possible, or not possible.

TABLE B.—FWPCA RESEARCH AND DEVELOPMENT PROJECTS FOR DEVELOPMENT OF HOLDING SYSTEMS, OR METHODS OF TREATMENT, FOR HUMAN WASTES FROM SHIPS, WATERCRAFT AND OTHER MODES OF TRANSPORTATION FISCAL YEAR 1969

Contractor or grantee <sup>1</sup>	Brief description of project	Amount allocated	Applicability of expected project results to problem of waste disposal from railroad cars <sup>2</sup>
Uniroyal, Inc., Research Center, Wayne, N.J.	A flexible (collapsible) container and system of filters. The container is low cost, plastic and throw-away.	\$34,272	Possible.
Underwater Storage Inc.	Waste generated aboard a small vessel retained in holding tank. Disposed by pumping out at shore connection.	99,000	Do.
Total		133,272	

<sup>1</sup> Including FWPCA in-house projects.<sup>2</sup> Rate as: definite, possible, or not possible.

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS  
Washington, D.C., January 20, 1970.

Mr. GEORGE STAFFORD,  
Acting Chairman, Interstate Commerce Commission,  
Washington, D.C.

DEAR MR. STAFFORD: In November 1969 this subcommittee began examination of the problem of human waste disposal from interstate trains. According to a report entitled "A report on railroad waste pollution, November 1, 1969,"<sup>1</sup> by Monogram Industries, Inc. of Venice, Calif. (copy enclosed), our Nation's railroads are operating with only the most primitive of human waste disposal systems. That report indicates that over 50 million pounds of untreated human waste are discharged annually from locomotives and cabooses. Although that report does not include any estimate of human wastes discharged from commuter and inter-city passenger trains, even greater amounts presumably emanate therefrom. These wastes constitute a significant and avoidable source of pollution of our Nation's watersheds.

We would appreciate your providing to us the following information:

1. Please send to us 2 copies of each regulation, circular, or general directive issued by your Commission concerning the release of untreated human wastes from railroad cars.

2. (a) Does the Monogram Industries report on railroad waste pollution accurately estimate the quantity of untreated human wastes discharged from locomotives and cabooses?

(b) If your estimate is different, please state your estimate and the basis thereof.

3. State the estimated quantity of untreated human wastes discharged last year from inter-city and commuter passenger cars, and the basis for your estimate.

4. Please provide the information requested in tables A, B, and C attached.

5. State, to the best of your information, what railroads do to control the effects of the disposal of untreated human wastes from railroad cars onto the roadbed.

6. State the total estimated number of miles of railroad right of way which:

(a) are in the United States;

(b) cross over a reservoir, waterway or other body of water;

(c) pass within a mile of any reservoir, waterway or other body of water.

7. State, to the best of your information, the quantity of human waste deposited per mile of right of way.

8. (a) Do you believe railroads can utilize waste holding systems such as those used on buses and airplanes? If not, state your reasons.

(b) What is your Commission's estimate as to the cost of installing a holding system for human wastes in all railroad cars presently not so equipped. Please provide separate estimates for:

(i) Locomotives,

(ii) Cabooses,

(iii) Intercity passenger cars, and

(iv) Commuter passenger cars.

(c) Please explain the basis for your estimates.

9. Please state your recommendations for reducing or eliminating the discharge of untreated human wastes from railroad cars.

Sincerely,

HENRY S. REUSS,

*Chairman, Conservation and Natural Resources Subcommittee.*

TABLE A.—ESTIMATED NUMBER OF PERSON-DAYS TRAVELED BY ALL PASSENGERS AND CREW DURING 1969 ON RAILROAD CARS

(1)	1. With facilities which release human wastes directly onto roadbed		(3)	2. With facilities which retain human wastes for release into municipal sewer systems or septic tanks
	(a) Without any treatment	(b) With chemical treatment		
	(2)			(4)
A. Locomotives.....	.....	.....	.....	.....
B. Cabooses.....	.....	.....	.....	.....
C. Intercity passenger cars.....	.....	.....	.....	.....
D. Commuter passenger cars.....	.....	.....	.....	.....

Note: Travel on a railroad car during any part of a 24-hour period by a person constitutes a person-day for purposes of this table.

TABLE B.—NUMBER OF RAILROAD CARS IN SERVICE AT END OF 1969

(1)	1. With facilities which release human wastes directly onto roadbed		(3)	2. With facilities which retain human wastes for release into municipal sewer systems or septic tanks
	(a) Without any treatment	(b) With chemical treatment		
	(2)			(4)
A. Locomotives.....	.....	.....	.....	.....
B. Cabooses.....	.....	.....	.....	.....
C. Intercity passenger cars.....	.....	.....	.....	.....
D. Commuter passenger cars.....	.....	.....	.....	.....

TABLE C.—NUMBER OF RAILROAD CARS MANUFACTURED DURING CALENDAR YEAR 1969

(1)	1. With facilities which release human wastes directly onto roadbed		(3)	2. With facilities which retain human wastes for release into municipal sewer systems or septic tanks
	(a) Without any treatment	(b) With chemical treatment		
(1)	(2)	(3)	(4)	
A. Locomotives.....				
B. Cabooses.....				
C. Intercity passenger cars.....				
D. Commuter passenger cars.....				

INTERSTATE COMMERCE COMMISSION,  
Washington, D.C., February 3, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee,  
House of Representatives, Washington, D.C.

DEAR CHAIRMAN REUSS: This is in response to your letter dated January 20, 1970, enclosing a report entitled "A Report on Railroad Waste Pollution," prepared by Monogram Industries, Inc. of Venice, Calif. The report indicates that over 50 million pounds of untreated human waste are discharged annually from locomotives and cabooses; and you requested my views, information, and data relative to the report and the problem of human waste disposal from interstate trains.

I am sorry but I am unable to fully comply with your request, since the Interstate Commerce Act does not vest this Commission with jurisdiction over railroad activities such as presented here; and as a result thereof, we do not maintain information or data in connection therewith.

To the extent possible, I offer the following comments and information in accordance with the numerical series of requests set forth in your letter:

(1) Because of a lack of jurisdiction, the Commission has not promulgated regulations or issued directives relative to this matter.

(2) (a) I do wish to comment on the data offered in support of the report's analysis and computation of the 50-million-pound figure (see pages 13 and 14). The total number of operating toilets is shown as 45,000, based upon 30,000 locomotives (one toilet each) and 15,000 cabooses (one toilet each). Apparently, it is assumed that a crew is assigned to each of the locomotives when operating. This assumption is not correct, since it is a general practice to operate a train with multiple engine units (average of three per train), consisting of only one engine crew. In addition, the figure of 30,000 locomotives probably includes switch engines, the latter of which are not usually equipped with toilets; and if so equipped, are seldom utilized.

It is my understanding that effective January 1, 1970, there was a total of 27,376 locomotives, which included 6,271 switch engines.

(b) Based upon the above assumptions, the estimated quantity would be reduced considerably.

(3) We do not have information to enable a quantity estimate of untreated human wastes discharged from railroad passenger cars.

(4) We do not have the data requested in tables A, B, and C concerning waste discharge facilities on railroad equipment.

(5) It is my understanding the railroad industry generally attempts to eliminate or reduce public exposure to discharged wastes, but I am not familiar with the specific controls which are utilized or encouraged.

(6) (a) The aggregate length of roadway or right-of-way of all line-haul railroads in the United States was estimated to be 209,000 miles on December 31, 1968.

(b) and (c) We do not have information relative to the proximity of railroad rights-of-way and reservoirs, waterways, or other bodies of water.

(7) I am unable to estimate the quantity of human waste deposited per mile of right-of-way.

(8) (a) I believe railroads could utilize wasteholding systems; but (b) I cannot estimate the cost to provide such facilities on railroad equipment. Possibly you may be able to obtain this information from the Association of American Railroads, 1920 L Street, N.W., Washington, D.C. 20036.

(9) I am unable to offer a recommendation for reducing or eliminating this problem because of a lack of meaningful information and data. Possibly you may desire to bring this matter up with the Public Health Service, Department of Health, Education, and Welfare, which has jurisdiction over railroad sanitary practices.

I share your concern that these wastes are a source of pollution to the Nation's watershed. However, in view of the present financial condition of the Nation's railroads, and the serious decline in passenger service recently, I believe it would be appropriate to consider a means of aiding the carriers in reducing or eliminating the discharge of such wastes if the Federal Government adopts such a policy.

Sincerely yours,

GEORGE M. STAFFORD,  
*Chairman.*

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,  
PUBLIC HEALTH SERVICE,  
FOOD AND DRUG ADMINISTRATION,  
*Rockville, Md., April 22, 1970.*

HON. HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, Washington, D.C.*

DEAR MR. REUSS: Secretary Finch asked me to reply to your letter of January 20, 1970, concerning human waste disposal from interstate trains. I regret the delay in this reply.

A report on this matter is attached. If I can be of further assistance, please let me know.

Sincerely yours,

CHARLES C. EDWARDS, M.D.,  
*Commissioner of Food and Drugs.*

Enclosure.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,  
PUBLIC HEALTH SERVICE,  
FOOD AND DRUG ADMINISTRATION—BUREAU OF COMPLIANCE,  
*Cincinnati, Ohio, August 29, 1969.*

U.S. GOVERNMENT—MEMORANDUM

To: All regions.

From: Division of Sanitation Control, Office of Control and Guidance.

Subject: Discharge of wastes from railroad conveyances.

With the increased interest in the above subject, every effort should be made when making dining or passenger car inspections to note and bring to the attention of appropriate railroad officials any contamination along terminal tracks or in servicing areas, or if toilet rooms are in noncompliance with section 72.154(b) of the Interstate Quarantine Regulations. We recently learned that Canada and the Commonwealth of Pennsylvania have passed laws and/or regulations requiring retention of human wastes on trains.

(S) FRANK W. MACKISON.

REPORT OF THE FOOD AND DRUG ADMINISTRATION REGARDING THE LETTER FROM CONGRESSMAN HENRY S. REUSS, CHAIRMAN, CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE, DATED JANUARY 20, 1970, CONCERNING HUMAN WASTE DISPOSAL FROM INTERSTATE TRAINS

The following information is provided in response to your specific questions:

Question: 1. Please send to us two copies of each regulation, circular, or general directive issued by your Department concerning the release of untreated human wastes from railroad cars.

Answer: 1. Enclosed are two copies each of the following:

- (a) Interstate Quarantine Regulations, 42 CFR, part 72.
- (b) Handbooks on Sanitation of Railroad Passenger Cars, PHS, 95; and Railroad Servicing Areas, PHS No. 66.
- (c) Memorandum to regional offices dated August 29, 1969, subject "Discharge of Wastes From Railroad Conveyances."

Question: 2. (a) Does the Monogram Industries report on railroad waste pollution accurately estimate the quantity of untreated human wastes discharged from locomotives and cabooses?

Answer: 2. (a) No.

Question: 2. (b) If your estimate is different, please state your estimate and the basis thereof.

Answer: 2. (b) The Monogram method of calculation makes liberal use of estimations. We have adjusted several of their values which we felt were in error and recalculated the amount of waste discharged. However, we also calculated the amount of waste by a second, and we believe, more scientific method.

From the Sixth Edition of Municipal and Rural Sanitation by Ehlers and Steel (page 104), we find that 83 grams of feces and 970 grams of urine are produced per day per capita.

$$\text{Converting, } \frac{83 \text{ gm. feces}}{454 \text{ gm./lb.}} \times \frac{970 \text{ gm. of urine}}{454 \text{ gm./lb.}} = 2.33 \text{ lb. waste/day/capita}$$

Now, of the 620,000 persons employed by the railroad industry, only 165,000 are involved in the actual operation of trains. Assuming that all 165,000 work daily, we can calculate their waste output as:

$$2.33 \text{ lb. waste/day/capita} \times 165,000 \text{ capita} = 383,000 \text{ lb./day}$$

However, this figure is the total daily output, whereas only 1 to 4 hours are spent on the train, therefore:

$$383,000 \text{ lb./day} \times \frac{4 \text{ hours}}{24 \text{ hours}} = 63,800 \text{ lb./day}$$

On a yearly basis, assuming each man works 360 days:

$$63,800 \text{ lb./day} \times 360 \text{ days/year} = 23,000,000 \text{ lb./year}$$

This figure agrees fairly closely with our estimate of the amount waste using the Monogram method.

$$23,000,000 \text{ lb. waste/year} = 24,300,000 \text{ lb. waste/year}$$

Our calculations using the Monogram approach and our reasoning for changes in values is presented below.

(1) First, the total number of operating toilets does not accurately reflect the number in actual daily use. Although there are 30,000 locomotives, each does not have a five-man crew. On the average it takes 3.1 locomotives per train. (Some trains may involve as many as eight locomotives.) This means that on any given train not all toilets will be used, since some of the locomotives will not have any crewmen on them. In addition, some locomotives are power units only and have no toilet facilities. Reduce the 30,000 value by 15,000.

(2) The figure of five defecation uses/day/vehicle when in service is high. Not every unit will be in use 360 days/year, nor will the unit receive five "visits" a day, since the crewmen are only on the train from 1 to 4 hours. Reduce this value by 2.  $30,000 \text{ toilets} \times 3 \text{ times} \times .75 \text{ lbs. feces}^*/\text{time} = 67,500 \text{ lbs.}$

$$67,500 \text{ lbs.} \times 360 \text{ year} = 24,300,000 \text{ lbs./year}$$

(3) The value of 3 gallons for flushing water is for the type of commode found in domestic use. The railroad toilet does not use this much water. The railroad commode uses 1.6 quarts of water/flush.<sup>1</sup>

$$\begin{aligned} & \frac{24,300,000 \text{ lbs. waste/year}}{8.2 \text{ lbs/gallon}} + 3 (30,000) (360) \frac{(1.6)}{4.0} \\ & = (2,960,000 + 13,000,000) \text{ gallons waste/year} \\ & = 16,000,000 \text{ gallons waste/year} \end{aligned}$$

You will note that Monogram's calculation for flush gallonage is off by a factor of 10. It should be (using Monogram's figures) 243 million for a total value of approximately 250 million gallons waste per year.

\*The .75 pounds of feces is not technically correct. Only .25 pounds is feces while .50 pounds represents liquid. If the actual amount of feces dumped is desired, the 24,300,000 figure must be adjusted to 8,100,000 lbs. feces/year.

<sup>1</sup> Report on an investigation into the use of railway passenger car toilets and the nature and quantity of the toilet wastes, AAR, March 1947, p. 7.

*Question 3. State the estimated quantity of untreated human wastes discharged last year from intercity and commuter passenger cars, and the basis for your estimate.*

*Answer 3.* 19,500,000 gallons of untreated human waste in 1968.

*Explanation of estimate*

We have excluded commuter cars since their short runs make the amount of waste discharged from them insignificant from a quantitative viewpoint. In addition, many commuter cars operate only intrastate and therefore would not be subject to the interstate quarantine regulations.

This value was calculated in 1948 after quantitatively determining the amount of waste generated per passenger-hour.<sup>2</sup>

24,300,000,000 = passenger miles in coaches

11,000,000,000 = passenger miles in parlor/sleeping cars

38.1 = average train speed in miles/hour

0.3 = quarts of waste generated per passenger-hour in coaches

0.6 = quarts of waste generated per passenger-hour in parlor/sleeping cars.

$$\frac{24.3 \times 10^9}{38.1} + \frac{11.010^9}{38.1} = 6.37 \times 10^8 + 2.89 \times 10^8 \text{ passenger-hours}$$

$$\frac{(6.37 \times 10^8)(0.3)}{4} + \frac{(2.89 \times 10^8)(0.6)}{4} = 4.8 \times 10^7 + 4.3 \times 10^7$$

$$= 91,000,000 \text{ gallons of human waste}$$

The amount of waste generated per passenger-hour should not change appreciably. Assuming that the average train speed has not changed significantly and determining that in 1968,

7,559,000,000 = passenger miles in coaches<sup>3</sup>

1,178,000,000 = passenger miles in parlor/sleeping cars<sup>3</sup>

calculated passenger hours as,

$$\frac{7.559 \times 10^9}{38.1} + \frac{1.178 \times 10^9}{38.1} = 1.97 \times 10^8 + 3.09 \times 10^7 \text{ passenger-hours}$$

then

$$\frac{(1.97 \times 10^8)(0.3)}{4} + \frac{(3.09 \times 10^7)(0.6)}{4} = 1.48 \times 10^7 + 4.65 \times 10^6$$

$$= 19,500,000 \text{ gallons of concentrated sewage (untreated waste)}$$

*Question 4. Please provide the information requested in table A attached.*

*Answer 4. See completed table A attached.*

*Question 5. State, to the best of your information, what railroads do to control the effects of the disposal of untreated human wastes from railroad cars onto the roadbeds?*

*Answer 5.* When trains are in the station or at servicing areas for any length of time, soil (waste collecting) cans are placed under discharge pipes to collect any waste material which may be discharged from the toilets. Passengers are cautioned by means of placards or signs posted over each toilet unit to not flush toilets when trains are in the station. In addition, conductors often lock the door to toilet rooms while trains are in the station. When trains are underway, no effort is made by the railroads to prevent the discharge of waste onto the railroad trackbeds.

The exception to the above would be the Metroliner and the TurboTrain operating in the northeast corridor. These trains were designed and now operate with waste retention facilities which are serviced at designated servicing areas. In addition, several railroad companies have installed retention facilities on some equipment, however, we believe this has not been extensive.

<sup>2</sup> A Study of Railway Passenger Traffic and Its Relation to Quantities of Toilet Wastes, AAR, February 1950, p. 21.

<sup>3</sup> Yearbook of Railroad Facts, 1969 edition, AAR, p. 38.

Question 6. State, to the best of your information, the total number of miles of railroad right of way which: (a) are in the United States:

Answer 6. (a) Mileage owned on December 31, 1968<sup>4</sup>

<i>Running tracks, passing tracks, crossovers, etc.</i>	
Miles of road.....	178, 834
Miles of second main track.....	17, 397
Miles of all other main tracks.....	1, 674
Miles of passenger tracks, crossovers and turnouts.....	21, 224
Way switching track.....	21, 988
Yard switching track.....	43, 636
Total all tracks.....	<sup>5</sup> 284, 753

<sup>5</sup> Excludes 175 miles in Canada.

6. (b) cross over a reservoir, waterway or other body of water and

6. (c) pass within a mile of any reservoir, waterway or other body of water.

6. (b) and (c)—We are not aware of a railroad track passing over a reservoir per se. In addition, we have no information available in this office which would permit us to respond to these questions.

7. (a) Do you believe railroads can utilize waste holding systems such as those used on buses and airplanes? If not, state your reasons.

7. (a) Yes.

7. (b) What is your Department's estimate as to the cost of installing a holding system for human wastes in all railroad cars presently not so equipped?

7. (b) We have not attempted to estimate the cost of installing waste holding systems on railroad cars, since the installation cost will vary greatly, depending on the car type and its undercarriage structure. For example, a sleeping car could require up to eight retention tanks, or one large retention tank with an elaborate piping system. In addition, maintenance and operating cost will be a significant factor in the total cost of this system.

8. (a) What is your Department doing to encourage the research, development, and installation of treatment or holding devices for handling the disposal of human wastes from railroad cars?

8. (a) During the design and construction stages of the metroliner and the turbotrain, the PHS worked with the Department of Transportation and the builder to assure that adequate and sanitary waste retention facilities were provided on these trains. In addition, we are now working with our legal staff to revise the Interstate Quarantine Regulations to prohibit the discharge of human wastes from trains (copy attached).

8. (b) State the amount (if any) of funds allotted by your Department for such R. & D. work during the 5 fiscal years 1966-70.

8. (b) No funds have been expended for R. & D. work in this area during the past 5 years, under either in-house or through contracts or grants.

8. (c) Describe briefly each R. & D. projects.

8. (c) Not applicable in light of (b) above.

8. (d) Describe the extent to which your efforts on such R. & D. projects are coordinated with the Federal Water Pollution Control Administration's effort to develop waste treatment systems for ships and watercraft.

8. (d) Not applicable in light of (b) above.

9. (a) Does discharge of human wastes on the railroad right-of-way without treatment constitute one of the "methods assuring sanitary disposal of such wastes" within the meaning of section 72.141(b) above?

9. (a) Section 72.141 (b) refers to the disposal of wastes which are collected while the train is at servicing areas and stations. It would not apply to trains while they are underway. The discharge of toilet wastes to the trackbeds from the train while it is located in a servicing area or station would not constitute a satisfactory "method of assuring sanitary disposal of such waste" within the meaning of 72.141 (b). As indicated by table B there have been several violations of this paragraph.

<sup>4</sup> Source: Eighty-Second Annual Report on Transportation Statistics in the United States for the year ending Dec. 31, 1968, pt. 1, Railroads, table 160, Interstate Commerce Commission, Washington, D.C.

<sup>5</sup> Excludes duplication on account of jointly owned mileage.

9. (b) Please provide a list of the areas which have been designated as areas where there is to be "no discharge of excrement, garbage, waste water or other pollution material" according to section 72.154 (a).

9. (b) To the best of our knowledge no regulatory agency has ever requested the Surgeon General to designate areas where there is to be "no discharge of excrement, garbage, waste water or other polluting material", therefore, the Surgeon General has not designated such areas.

Question: 10. Please furnish the information requested in table B attached.

Answer: 10. See completed table B.

Question: 11. Please state your recommendations for reducing or eliminating the discharge of untreated human wastes from railroad cars.

Answer: 11. We would recommend that all wastes, garbage, and other polluting material be retained aboard the car until it can be disposed of in a sanitary manner at an approved location.

CHARLES C. EDWARDS, M.D.  
Commissioner of Food and Drugs.

Ten attachments.

TABLE A.—ESTIMATED NUMBER OF PERSON-DAYS TRAVELED BY ALL PASSENGERS AND CREW DURING 1969 ON RAILROAD CARS

(1)	1. With facilities which release human wastes directly onto roadbed		2. With facilities which retain human wastes for release into municipal sewer systems or septic tanks
	(a) Without any treatment	(b) With chemical treatment	
	(2)	(3)	(4)
A. Locomotives.....	Unknown.....	Unknown.....	Unknown.
B. Caboose.....	Unknown.....	Unknown.....	Unknown.
C. Intercity passenger cars.....	91,583,000 <sup>1</sup>		700,000 Metroliner; 57,000 Turbotrain (1969). <sup>2</sup>
D. Commuter passenger cars.....	Unknown.....	Unknown.....	Unknown.

<sup>1</sup> Total number of passengers traveling intercity or 31 percent of all rail passengers traveling in 1968-69 data.

<sup>2</sup> Source: Railway Age, the transportation weekly, Jan. 26, 1970, p. 11.

Note: Travel on a railroad car during any part of a 24-hour period by a person constitutes a person-day for purposes of this table.

TABLE B.—ACTIONS BY DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE AGAINST ALLEGED VIOLATIONS OF 42 C.F.R., SECS. 72.141 AND 72.154 DURING FISCAL YEARS 1965-70

(1) Name of defendant	(2) Nature of violation	(3) Date of violation	(4) Nature of enforcement action	(5) Statutory authority for enforcement action taken	(6) Result(s) of enforcement action
1. Chicago & Northwestern Ry.	Human feces noted throughout yard.	Jan. 23, 1969, California Coach yard, Chicago, Ill.	Conditions discussed with division superintendent on Jan. 23, 1969. Company notified by copy of inspection report. Directed to clean yards and discontinue flushing toilets to ground.	72.141	Letter of Feb. 4, 1969, from company indicating corrections have been made.
2. Chicago & Northwestern Ry.	Human feces discharged in station area.	Jan. 25, 1969, Northwest Station, Chicago, Ill.	Company notified by copy of inspection report of violation and directed to keep toilet rooms closed while in station.	72.141 and 72.154	Pending, next routine inspection scheduled early 1970.
3. Illinois Central RR.	Human feces, toilet paper, spilled garbage littered track area.	Aug. 17, 1966, Weidon coach yards, Chicago, Ill.	Company notified by letter on Jan. 26, 1969, of violation and discussed with company on Jan. 30, 1969.	72.141 and 72.154	No recurrence of problem observed on subsequent inspection.
4. Illinois Central RR.	Human feces being flushed to the track.	Jan. 23, 1969, Weidon coach yards and station, Chicago, Ill.	Company president notified of violation by letter of Dec. 15, 1967, and discussed with local representative at time of inspection on Dec. 14.	72.141	Letter of Jan. 30, 1969, from senior vice president, operation, indicated most violations have been corrected. Weather conditions hampering complete compliance.
5. Chicago & Western Indiana RR.	Toilet wastes discharged to ground.	Dec. 14, 1967, Dearborn station, Chicago, Ill.	Company notified by letter of Feb. 8, 1968, from company president indicating corrections have been made.	72.141 and 72.154	Letter of Feb. 8, 1968, from company president indicating corrections have been made.
6. Chicago, Burlington & Quincy RR. Co.	do	Oct. 5, 1966, 14th St. coach yard.	Company notified by copy of inspection report on Oct. 13.	72.141	Letter of Oct. 26, 1966, from company indicating violations have been corrected.
7. Pennsylvania RR. Co.	do	July 29, 1965, 12th St. coach yards, Chicago, Ill.	Company notified by copy of inspection report and by letter (Aug. 16, 1965), of violations.	72.141	Letter from vice president and general manager indicating condition has been corrected.
8. Atchison, Topeka & Santa Fe RR.	Human feces on ground.	May 11, 1964, Fort Madison, Iowa.	Company notified of violations on June 1, 1964 by copy of inspection report and/or letter.	72.141 and 72.154	No recurrence of problem observed during subsequent inspection.
9. Illinois Central RR.	do	Sept. 13, 1966, Sioux City, Iowa.	Company notified of violations on Dec. 20, 1966 by copy of inspection report and/or letter.	72.141 and 72.154	Do.
10. Atchison, Topeka & Santa Fe RR.	do	May 20, 1966, Newton, Kans.	Company notified of violation on July 27, 1966 by copy of inspection report and/or letter.	72.141 and 72.154	Do.
11. Chicago, Burlington & Quincy RR.	Dirty soil containers.	Nov. 15, 1966, Minneapolis, Minn.	Company notified of violation on Nov. 15, 1966 by copy of inspection report and/or letter.	72.141	Do.
12. Milwaukee RR.	do	Dec. 2, 1964, Minneapolis, Minn.	Company notified of violation on Dec. 2, 1964 by copy of inspection report and/or letter.	72.141	Do.

13. St. Paul Depot.....	Human feces on ground..	Oct. 18, 1966, St. Paul, Minn.....	Company notified of violation on Oct. 18, 1966 by copy of inspection report and/or letter.	72.141 and 72.154.	Similar condition noted Dec. 19, 1967.
14. St. Paul Depot.....	do.....	Dec. 19, 1967, St. Paul, Minn.....	Company notified of violation on Dec. 19, 1967 by copy of inspection report and/or letter.	72.141 and 72.154.	No recurrence of problem observed during subsequent inspection.
15. Northern Pacific RR.....	Dirty soil containers.....	May 11 1965, Staples, Minn.....	Company notified of violation on May 11, 1965, by copy of inspection report and/or letter.	72.141.....	Do.
16. Kansas City Terminal Co.....	Human feces on ground.....	Aug. 4, 1966, Kansas City, Mo.....	Company notified of violation on Aug. 12, 1966, by copy of inspection report and/or letter.	72.141 and 72.154.	Response from company, Sept. 12, 1966, indicating corrective action has been completed.
17. St. Louis Terminal Co.....	do.....	Oct. 26, 1966, St. Louis, Mo.....	Company notified of violation on Nov. 7, 1966, by copy of inspection report and/or letter.	72.141 and 72.154.	Response from company, Nov. 16, 1966, indicating corrective action has been completed.
18. St. Louis Terminal Co.....	do.....	May 26, 1965, St. Louis, Mo.....	Company notified of violation on May 26, 1965, by copy of inspection report and/or letter.	72.141 and 72.154.	Response from company, July 19, 1965, indicating corrective action has been completed.
19. St. Louis Terminal Co.....	do.....	Dec. 7, 1964, St. Louis, Mo.....	Company notified of violation on Dec. 17, 1964, by copy of inspection report and/or letter.	72.141 and 72.154.	Response from company, Dec. 23, 1964, indicating corrective action has been completed.
20. Frisco RR.....	do.....	June 30, 1966, Springfield, Mo.....	Company notified of violation on July 7, 1966, by copy of inspection report and/or letter.	72.141 and 72.154.	Response from company Aug. 18, 1966, indicating corrective action has been completed.
21. Frisco RR.....	do.....	Aug. 17, 1967, Springfield, Mo.....	Company notified of violation on Sept. 8, 1967, by copy of inspection report and/or letter.	72.141 and 72.154.	Response from company Sept. 28, 1967, indicating corrective action has been completed.
22. Union Pacific RR.....	do.....	June 10, 1967, North Platte, Nebr.....	Company notified of violation on June 15, 1967, by copy of inspection report and/or letter.	72.141 and 72.154.	No recurrence of problem observed on subsequent inspection.
23. Chicago, Burlington & Quincy RR.....	do.....	Feb. 27, 1968, Omaha, Nebr.....	Company notified of violation on Feb. 27, 1968, by copy of inspection report and/or letter.	72.141 and 72.154.	Do.
24. Milwaukee RR.....	Dirty containers.....	Oct. 17, 1969, St. Paul, Minn.....	Company notified of violation on Jan. 8, 1970, by copy of inspection report and/or letter.	72.141.....	Response from company, Jan. 24, 1970, indicating corrective action has been completed.
25. St. Paul Union Depot.....	Human feces on ground.....	Oct. 23, 1969, St. Paul, Minn.....	do.....	72.141 and 72.154.	No response from company. Pending, next routine inspection scheduled early 1971.
26. Great Northern RR.....	Inadequate containers.....	Nov. 4, 1969, St. Paul, Minn.....	do.....	72.141.....	Pending, next routine inspection scheduled early 1971.
27. Kansas City Terminal Co.....	Human feces on ground.....	July 2, 1968, Kansas City, Mo.....	Company notified of violation on July 15, 1968, by copy of inspection report and/or letter.	72.141 and 72.154.....	Similar condition observed on Sept. 24, 1969.
28. Kansas City Terminal Co.....	do.....	Sept. 24, 1969, Kansas City, Mo.....	Company notified of violation on Oct. 10, 1969, by copy of inspection report and/or letter.	72.141 and 72.154.....	Pending, next routine inspection scheduled late 1970.

See footnotes at end of table.

TABLE B.—ACTIONS BY DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE AGAINST ALLEGED VIOLATIONS OF 42 C.F.R., SECS. 72.141 AND 72.154 DURING FISCAL YEARS 1965-70—Cont.

(1) Name of defendant	(2) Nature of violation	(3) Date of violation	(4) Nature of enforcement action <sup>1</sup>	(5) Statutory authority for enforcement action taken	(6) Result(s) of enforcement action <sup>2</sup>
29. St. Louis Terminal Co.	Can washer out of order.	May 13, 1969, St. Louis, Mo.	Company notified of violation on May 13, 1967, by copy of inspection report and/or letter.	72.141	Facility to be closed June 1, 1969. No longer used for servicing equipment.
30. St. Louis Terminal Co.	do.	Apr. 23, 1968, St. Louis, Mo.	Company notified of violation on Apr. 23, 1967, by copy of inspection report and/or letter.	72.141	Similar condition noted on May 13, 1969.
32. Union Pacific RR.	Human feces on ground.	May 20, 1968, Omaha, Neb.	Company notified of violation on May 20, 1968, by copy of inspector's report and/or letter.	72.141 and 72.154	No recurrence of problem observed on subsequent inspections.
33. Northern Pacific.	Improper disposal of human waste, soil containers not emptied.	Dec. 18, 1964, Butte, Mont.	Company notified of violation on Dec. 21, 1964, by copy of inspectors report and/or letter.	72.141	Inspection on May 26, 1965, revealed no recurrence of problem observed.
34. Union Pacific.	Waste from private pull-man compartments being flushed to ground.	Jan. 13, 1966, Green River, Wyo.	Company notified of violation on Mar. 14, 1966, by copy of inspector's report and/or letter.	72.141 and 72.154	No recurrence of problem observed on subsequent inspections on Mar. 17, 1967.
35. Northern Pacific RR.	Appeared that in the past some of toilets on the train were flushed while the train was in station.	May 24, 1966, Livingston, Mont.	Company notified of violation by copy of inspection report and/or letter, June 3, 1966.	72.141 and 72.154	Inspection on Apr. 13, 1967, with no recurrence of problem observed.
36. Northern Pacific RR.	Improper disposal of wastes from private cars.	Nov. 10, 1966, Missoula, Mont.	Company notified of violation by copy of inspection report and/or letter, Nov. 23, 1966.	72.141 and 72.154	Inspection on Oct. 29, 1967, with no recurrence of problem observed.
37. Denver & Rio Grande Western RR.	Improper disposal of wastes.	Nov. 16, 1966, Grand Junction, Colo.	Company notified of violation by copy of inspection report and/or letter, Nov. 29, 1966.	72.141 and 72.154	Letter dated Dec. 27, 1966, from company stating corrective action was taken.
38. Union Pacific R.R.	Toilet wastes being discharged to ground.	July 5, 1967, Salt Lake City, Utah.	Company notified, July 24, 1967, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154	Inspection made on Nov. 25, 1969, with no recurrence of problem observed.
39. Union Pacific R.R.	Occasional discharge of toilet wastes from cars in the station and private cars.	Sept. 25, 1967, Cheyenne, Wyo.	Company notified, Oct. 5, 1967, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154	Letter of Nov. 1, 1967, from company stating corrective action was taken. Inspection on May 28, 1968, with no recurrence of problem observed.
40. Northern Pacific RR.	Toilet wastes discharged in the depot area.	Oct. 24, 1967, Missoula, Mont.	Company notified, Nov. 22, 1967, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154	Local railroad representative stated at time of inspection waste would be cleaned up after servicing train. No date of recurrence of problem was observed.
41. Northern Pacific RR.	Soil cans not being used effectively to collect all wastes from toilets on private cars.	Jan. 15, 1968, Billings, Mont.	Company notified, Feb. 16, 1968, by copy of inspection report and/or letter directed to correct condition.	72.141	Inspection on Dec. 13, 1968, with no recurrence of problem observed.

42. Union Pacific RR..... Soil cans were not being used effectively. Idaho. May 23, 1968, Pocatello, Idaho. Company notified Sept. 19, 1968, by copy of inspection report and/or letter directed to correct condition. 72.141..... Inspection on Oct. 8, 1969, with no recurrence of problem observed.
43. Union Pacific RR..... Do. May 24, 1968, Green River, Wyo. 72.141..... Inspection on Oct. 2, 1969, with no recurrence of problem observed.
44. Denver & Rio Grande Western RR..... Discharge of human wastes to the ground in the station area. Jan. 10, 1968, Grand Junction, Colo. Company notified Jan. 15, 1968, by copy of inspection report and/or letter directed to correct condition. 72.141 and 72.154..... Letter dated Feb. 26, 1968, from company stating corrective action was completed.
45. Union Pacific RR..... Human waste material from business car on tracks. Dec. 12, 1969, Denver, Colo. Company notified Jan. 9, 1970, by copy of inspection report and/or letter directed to correct condition. 72.141 and 72.154..... Waste cleaned up during day of inspection.
46. Northern Pacific RR..... Toilet rooms not locked, toilets flushed onto track. June 3, 1969, Livingston, Mont. Company notified July 11, 1969, by copy of inspection report and/or letter directed to correct condition. 72.141 and 72.154..... Contaminated area cleaned up during inspection.
47. Union Pacific R.R..... Improper use of soil cans. Human waste draining onto ground from business cars. May 21, 1968, Nampa, Idaho. Company notified June 24, 1968, by copy of inspection report and/or letter directed to correct condition. 72.141..... Corrective action taken during inspection. Inspection on Oct. 10, 1969, indicated no recurrence of problem observed.
48. Denver & Rio Grande Western railroad..... Human waste material on ground in station area. Jan. 10, 1968, Grand Junction, Colo. Company notified Jan. 15, 1968, by copy of inspection report and/or letter directed to correct condition. 72.141 and 72.154..... Letter dated Feb. 26, 1968, from railroad stating corrective action was taken. Inspection on November 18, 1969 with no recurrence of problem. No reply from company as of Feb. 2, 1970.
49. Union Pacific R.R..... Human waste on ground surface from business cars. Dec. 12, 1969, Denver, Colo. Company notified Jan. 9, 1970, by copy of inspection report and/or letter directed to correct condition. 72.141 and 72.154..... Area cleaned up at time of inspection.
50. Northern Pacific RR..... Toilet rooms not locked in station and toilets were flushed. June 3, 1969, Livingston, Mont. Company notified July 11, 1969, by copy of inspection report and/or letter directed to correct condition. 72.141 and 72.154..... See item No. 53.
51. Atchison, Topeka & Santa Fe RR.<sup>3</sup>..... Improper use of soil cans on pullman cars. Evidence that soil cans were not installed rapidly enough when trains arrived at the station. Aug. 11, 1964, T. & S.F. Station Grand Canyon National Park, Ariz. Company notified Aug. 18, 1964, by copy of inspection report and/or letter directed to correct condition. 72.141 and 72.154.....
52. Atchison, Topeka & Santa Fe RR.<sup>3</sup>..... Soil cans not emptied, cleaned, or stored properly. Oct. 24, 1964, A. T. & S.F. Station, Grand Canyon National Park, Ariz. Company notified Nov. 12, 1964, by copy of inspection report and/or letter directed to correct condition. 72.141..... Do.
53. Atchison, Topeka & Santa Fe RR.<sup>3</sup>..... Do. July 29, 1965, A. T. & S.F. Station Grand Canyon National Park, Ariz. Company notified Aug. 19, 1965, by copy of inspection report and/or letter directed to correct condition. 72.141..... Railroad service discontinued at this station.
54. Union Pacific RR..... Toilet paper and feces noted on platform. May 11, 1966, UP Depot, Yermo, Calif. Company notified May 17, 1966, by copy of inspection report and/or letter directed to correct condition. 72.141 and 72.154..... Pending, next routine inspection mid-1970.
55. Southern Pacific RR..... Toilet wastes discharged to ground at various track areas. July 15, 1966, West Oakland Coach Yard, Oakland, Calif. Company notified July 19, 1966, by copy of inspection report and/or letter directed to correct condition. 72.141..... No recurrence of problem observed on subsequent inspection.

See footnotes at end of table.

TABLE B.—ACTIONS BY DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE AGAINST ALLEGED VIOLATIONS OF 42 C.F.R., SECS. 72.141 AND 72.154 DURING FISCAL YEARS 1965-70—Cont.

(1) Name of defendant	(2) Nature of violation	(3) Date of violation	(4) Nature of enforcement action <sup>1</sup>	(5) Statutory authority for enforcement action taken	(6) Result(s) of enforcement action <sup>2</sup>
56. Southern Pacific RR.....	Toilets had been flushed on the track in several places at some dis-	June 1, 1966, SP station, Bakersfield, Calif.	Company notified June 7, 1966, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154.	Company employee began cleaning up area during inspection. No response from company.
57. Southern Pacific RR.....	Toilets had been flushed on track at station.	Dec. 19, 1967, SP station, Santa Barbara, Calif.	Company notified Dec. 17, 1967, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154....	Repeat of similar violation observed May 17, 1966. Pending, next routine inspection scheduled for late 1970.
58. Union Pacific RR.....	Toilets from trains had been flushed on tracks.	May 11, 1966, UP depot, Yermo, Calif.	Company notified Jan. 9, 1968, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154....	Similar conditions noted during inspection on Dec. 18, 1969. Pending, next routine inspection scheduled for late 1970.
59. Atchison, Topeka & Santa Fe RR.....	Toilets had been flushed on tracks and cross-walks.	Dec. 27, 1967 A.T. & S.F. station, San Bernardino, Calif.	Company notified Jan. 27, 1969, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154....	Similar conditions noted during inspection on Dec. 18, 1968. Inspection scheduled, March-April 1970.
60. Union Pacific RR.....	Evidence that toilets were flushed on tracks at station.	Dec. 18, 1968, UP depot, Yermo, Calif.	Company notified Aug. 6, 1969, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154.	No recurrence of problem observed on subsequent inspection.
61. Atchison, Topeka & Santa Fe RR.....	Toilet waste discharged from private car onto tracks.	June 18, 1969, A.T. & S.F. depot, San Diego, Calif.	Company notified Jan. 27, 1969, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154....	Similar conditions noted during inspection on Dec. 27, 1967. Inspection scheduled for March-April 1970.
62. Atchison, Topeka & Santa Fe RR.....	Toilets being flushed on tracks.	Dec. 18, 1968, A.T. & S.F. station, San Bernardino, Calif.	Company notified Jan. 27, 1969, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154....	Company representative indicated a program would be established for cleaning tracks.
63. Atchison, Topeka & Santa Fe RR.....	Evidence that toilets have been flushed on tracks at station.	Dec. 19, 1968, A.T. & S.F. station, Needles, Calif.	Company notified Jan. 21, 1970, by copy of inspection report and/or letter directed to correct condition.	72.141 and 72.154....	Letter of Feb. 10, 1970, from company indicated they are working on an approach to have all toilets locked prior to train arrival in station.
64. Great Northern RR.....	Toilet wastes along track in front of terminal.	Dec. 31, 1969, railroad terminal, Everett, Wash.	Violations noted on inspection report and discussed with local railroad representatives. Copy of inspection report and/or letter submitted to representative and company office directed to correct condition.	72.141 and 72.154.	Conditions as noted during inspection usually cleaned up promptly; or response from company indicating corrective action has been completed.
65. Seaboard Airline RR.....	Improper disposal of toilet wastes in station area or coach yard.	Nov. 30, 1964, railroad station, Wildwood, Fla.	.....do.....	72.141 and 72.154.	Do.
66. Atlantic Coast Line, Seaboard Airline, Southern Railroad, Florida East Coast RR.....	.....do.....	Dec. 14, 1964, Union Station, Jacksonville, Fla.	.....do.....	72.141 and 72.154.	Do.
67. Seaboard Airline RR.....	.....do.....	Dec. 17, 1964, railroad station, Wildwood, Fla.	.....do.....	72.141 and 72.154.	Do.

68	Southern RR	do	Jan. 25, 1965, railroad station, Memphis, Tenn.	do	72.141 and 72.154	Do.
69	Seaboard Airline RR	do	Feb. 27, 1965, coach yard, Miami, Fla.	do	72.141	Do.
70	Atlantic Coast Line	do	May 25, 1965, Waycross, Ga.	do	72.141 and 72.154	Do.
71	Atlantic Coast Line	do	June 16, 1965, coach yard, Tampa, Fla.	do	72.141	Do.
72	Southern RR	do	Aug. 3, 1965, railroad station, Memphis, Tenn.	do	72.141 and 72.154	Do.
73	Atlantic Coast Line, Seaboard Airline, Southern Railway RR, Florida East Coast RR	do	Oct. 28, 1965, Union Station, Jacksonville, Fla.	do	72.141 and 72.154	Do.
74	Atlantic Coast Line, Seaboard Coast Line	do	Nov. 18, 1965, railroad station, Savannah, Ga.	do	72.154 and 72.141	Do.
75	Louisville & Nashville RR	do	Railroad station, Montgomery, Ala.	do	72.154 and 72.141	Do.
76	Atlantic Coast Line, Seaboard Coast Line	do	Mar. 10, 1966, Union station, Tampa, Fla.	do	72.141 and 72.154	Do.
77	Atlantic Coast Line, Seaboard Coast Line	do	June 3, 1966, Union station, Tampa, Fla.	do	72.154 and 72.141	Do.
78	Atlantic Coast Line, Seaboard Coast Line	do	Oct. 18, 1966, railroad station, Savannah, Ga.	do	72.154 and 72.141	Do.
79	Atlantic Coast Line, Seaboard Coast Line	do	Nov. 22, 1966, Union Station, Tampa, Fla.	do	72.141 and 72.154	Do.
80	Southern RR	do	Apr. 13, 1967, railroad station, Spartanburg, S.C.	do	72.154 and 72.141	Do.
81	Southern RR	do	May 10, 1967, railroad station, Nashville, Tenn.	do	72.154 and 72.141	Do.
82	Illinois Central RR	do	June 12, 1967, railroad station, Jackson, Miss.	do	72.141 and 72.154	Do.
83	Seaboard Airline RR	do	July 7, 1967, railroad station, Willwood, Fla.	do	72.154 and 72.141	Do.
84	Seaboard Airline RR	do	Nov. 27, 1967, railroad station, Willwood, Fla.	do	72.141 and 72.154	Do.
85	Seaboard Airline RR	do	Nov. 28, 1967, Coachyards, Miami, Fla.	do	72.141	Do.
86	Southern RR	do	Dec. 20, 1967, railroad station, Nashville, Tenn.	do	72.141 and 72.154	Do.
87	Southern RR	do	Apr. 30, 1968, railroad station, Birmingham, Ala.	do	72.141 and 72.154	Do.
88	Southern RR	do	Oct. 8, 1968, railroad station, Chattanooga, Tenn.	do	72.141 and 72.154	Do.
89	Louisville & Nashville RR	do	Jan. 14, 1969, railroad station, Birmingham, Ala.	do	72.141 and 72.154	Do.
90	Illinois Central RR	do	May 13, 1969, railroad station, Jackson, Miss.	do	72.141 and 72.154	Do.
91	Southern RR	do	Nov. 29, 1969, railroad station, Knoxville, Tenn.	do	72.141 and 72.154	Do.

See footnotes at end of table.

TABLE B.—ACTIONS BY DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE AGAINST ALLEGED VIOLATIONS OF 42 C.F.R., SECS. 72.141 AND 72.154 DURING FISCAL YEARS 1965-70—Cont.

(1)	(2)	(3)	(4)	(5)	(6)
Name of defendant	Nature of violation	Date of violation	Nature of enforcement action <sup>1</sup>	Statutory authority for enforcement action taken	Result(s) of enforcement action <sup>2</sup>
92. New York, New Haven, & Hartford RR. Co. <sup>3</sup>	Track bed areas have deposits of human wastes.	Apr. 9, 1964, South Boston passenger car yards, Boston, Mass.	Company notified of violation on Apr. 17, 1964 by copy of inspection report and letter directed to correct condition.	72.141	No recurrence of problem observed during subsequent inspection.
93. New York, New Haven, & Hartford RR. Co. <sup>3</sup>	Toilet and human wastes discharged to ground.	Nov. 23, 1965, South Boston passenger car yards, Boston, Mass.	Company notified of violation on Dec. 13, 1965 by copy of inspection report and letter directed to correct condition.	72.141	Letter from company indicating deficiencies will be corrected.

<sup>1</sup> Nature of enforcement taken (with respect to improper disposal of waste material from trains). The action taken generally includes discussing the violation(s) observed with the local railroad representative at the time of the inspection and directing him to institute corrections. Frequently, this is done before the completion of the inspection. Copies of the inspection report are submitted to the local representative. Usually a copy of the inspection report and a letter outlining the violations observed and corrective measures to be taken are forwarded to the headquarters of the company involved. In those cases where the company is requested to respond regarding the correction of any violation, the response has been received indicating the violations observed have been corrected. In addition, conferences have been held with executives of violating companies to discuss measures for more effective control of waste discharge from railroad equipment.

<sup>2</sup> Results of enforcement action—Generally, conditions noted during the inspections have been corrected upon notification or request by the inspecting agency, which may be the public health service or a State or local health department. Control measures instituted by railroad companies include more effective use of soil containers and clean up of areas contaminated by discharge of human waste from the train.

<sup>3</sup> This area is no longer in operation.  
<sup>4</sup> Violations are listed by regions as received with following breakdown: Items 1-7, region V; 8-25, region VI; 26-50, region VII; 50-64, region VIII; 65-91, region IX; 92-93, region I.

Note: No violations reported for regions II, III, and VII.

APPENDIX VI.—DATA SUPPLIED BY SANITATION EQUIPMENT  
MANUFACTURERS REGARDING RETENTION FACILITIES

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., May 12, 1970.

Dr. E. BAYNE BLANKENSHIP,  
President, Research Products Manufacturing Co.,  
Dallas, Tex.

DEAR DR. BLANKENSHIP: The Conservation and Natural Resources Subcommittee is investigating the human waste disposal practices of the railroad industry and the possible means of remedying the results of these practices.

Your supplying the subcommittee with the following information will be very helpful to our investigation:

1. Please send literature describing precisely:

- (a) the operation of your product, the Incinolet;
- (b) the extent to which your product reduces the weight of human waste received;
- (c) the disease carrying characteristics of the ash produced by incineration; and
- (d) the recommended means of disposal of this ash after its removal from the Incinolet system.

2. The names and addresses of the major suppliers of human waste treatment systems (i.e., toilet systems which treat wastes to some degree) to the railroad industry.

3. The cost of the various models of the Incinolet system.

4. The cost of installing the Incinolet systems in:

- (a) new
  - (i) locomotives
  - (ii) cabooses
  - (iii) commuter cars
  - (iv) noncommuter inter-city passenger cars
- (b) now in-service
  - (i) locomotives
  - (ii) cabooses
  - (iii) commuter cars
  - (iv) noncommuter inter-city passenger cars

Include, of course, in the installation cost estimates for in-service railway cars and locomotives, the cost of removing the existing toilets.

Sincerely,

HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee.

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RESEARCH PRODUCTS MANUFACTURING CO.,  
Dallas, Tex., May 27, 1970.

Mr. HENRY S. REUSS,  
Chairman, House of Representatives,  
Conservation and Natural Resources Subcommittee,  
Washington, D.C.

DEAR MR. REUSS: Thank you very much for your letter of May 12, 1970. I have delayed the answer in order to put together various information which you have requested.

I am enclosing herewith several brochures along with installation data and other information. While the brochures may describe models no longer in production having been replaced by improved versions, the general operation and

advantages of the Incinolet concept remain the same. In particular, I have outlined on a single sheet some of the advantages of our newest Incinolet model for railroad application, Model "S". Only recently announced, Model "S" has already been specified for all of the new diesel locomotives for Santa Fe.

In answer to your specific questions, I have the following:

1. (a) The operation of the Incinolet is described in the enclosed literature. Basically, the Incinolet accepts waste within its incinerator chamber where waste is reduced to the inorganic portion with combustion products traversing the catalytic odor reducer to remove objectionable odor.

(b) Human waste is reduced approximately to 5 percent of its original weight.

(c) The ash produced by incineration is bacteria-free. See the enclosed report from the Ontario Research Foundation.

(d) Disposal of the ash following its removal from the Incinolet is by the most convenient means; namely, means available for disposal of trash, floor sweepings, etc. in virtue of its bacteria-free composition.

Volume of the residue ash is only a few percentage points of the total original waste volume.

2. With regard to the major suppliers of human waste treatment systems for the railroad industry, we have knowledge of only one other group and that would be La Mere Industries, Walworth, Wis., manufacturers of the "Destroilet", furnished primarily for caboose application.

3. Incinolet models for the railroad industry include Model "S" for diesel locomotives and Model GC-IV for cabooses. The first being all electric and the second a gas-fired model. Both are priced at \$499.

4. The cost of installing the Incinolet either in new locomotives or cabooses is estimated to be approximately \$200, making a total cost in the neighborhood \$700. These figures are at least second hand to us from our sales agents in the field.

(b) We have equipped approximately 1,000 in-service locomotives for the Canadian National. Installation time is estimated to be 6-10 hours. Caboose installations are on the same order.

Modification of existing Incinolet units is necessary for more satisfactory application to commuter and inter-city passenger cars. Assuming availability of electric power in these cars, the Incinolet concept offers substantial advantages over the chemical or storage/holding tank concept.

I hope the enclosed is of help to you. Be assured of our interest in providing whatever information which we have and which you may require.

Sincerely yours,

E. BAYNE BLANKENSHIP, Ph.D.,  
*President.*

Enclosure.

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C., July 6, 1970.*

Dr. E. BAYNE BLANKENSHIP,  
*President, Research Products Manufacturing Co.,  
Dallas, Tex.*

DEAR DR. BLANKENSHIP: Thank you for the information supplied in your letter of May 27. Your response to the following additional inquiries will be of further help to the subcommittee.

Please advise as to:

1. The capital cost of the Incinolet model which your company manufactures for use on commuter and noncommuter intercity passenger cars.

2. The cost of installing such system in:

(a) new—

(i) commuter cars

(ii) noncommuter intercity passenger cars.

(b) Now-in-service—

(i) commuter cars

(ii) noncommuter intercity passenger cars.

3. The usual length of time (in days) your company's toilet system can be used on:

- (a) cabooses and
- (b) noncommuter, intercity passenger cars before removal of wastes is required.

4. (If possible) the actual or probable average monthly cost to the railroads of removing wastes from your company's toilet system installed in the four types of cars (locomotives, cabooses, commuter cars, and noncommuter, intercity passenger car).

Sincerely,

HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee.*

RESEARCH PRODUCTS MANUFACTURING Co.,  
 Dallas Tex., July 15, 1970.

HON. HENRY S. REUSS,  
*Chairman, House of Representatives, Conservation and Natural Resources Subcommittee, Washington, D.C.*

DEAR MR. REUSS: Thank you for your letter of July 6, 1970, in regard to various aspects of the Incinolet application to railroad cars, cabooses, and locomotives.

In response to your questions I offer the following:

1. Capital cost of an Incinolet model developed for use on commuter cars and other passenger cars having a service density of 30 or more passengers per toilet will be from \$700 to \$800 per unit.

Capital cost for an Incinolet model serving four or five persons such as might be required in the intercity sleeper car, would be approximately \$500.

Modification and development of the Incinolet concept will be needed to satisfy the requirements of commuter and passenger car service.

2. Installation costs in new commuter and passenger cars is estimated from \$100 to \$200 more than the cost of installing a water flush direct dumping system.

The same costs now in-service equipment is estimated \$200 to \$300.

3. Only dry, inorganic ash remains from the incineration process, Incinolet being a complete disposal system. Ash accumulates at the rate of one tablespoon per fecal deposit and one teaspoon per urine deposit approximately. The total amount of ash which may be accumulated prior to emptying the ashpan is determined by the design or volume of the ash receptacle and that volume will be considered larger for commuter service than for caboose or locomotive service.

The frequency of emptying the ashpan is practically determined by the service requirement of other components of the railroad equipment, that is, if a 30-day inspection interval is required for the caboose, then the Incinolet ashpan should be emptied every 30 days.

The same will generally apply for the commuter or passenger car application. The Incinolet should be designed to accommodate the ash accumulation appropriate to the service period between equipment inspections, say, weekly or fortnightly.

4. The total costs of servicing any railroad toilet depends upon several factors: Cost of necessary support equipment, man-hours for servicing and final disposition of the waste, as well as the frequency of the removal.

Incinolet offers a distinct advantage in all these departments:

First, as to support equipment, no extensive gathering equipment such as pipe, tank wagons, pumps, valves, and so forth, is required; only a bucket and screwdriver comprise such equipment.

Second, 5 man-minutes should be adequate for removal and final disposal in the nearest garbage can.

Third, frequency of removal has already been discussed, but assuming twice monthly removal, total time for each Incinolet unit is 10 man-minutes.

If a man-minute cost 8 cents, cost per month per Incinolet unit is 80 cents.

Although not responsive to your questions, I suggest we broaden our viewpoint of the problem of railroad waste disposal and inquire into the effects on the total environment and not just on railroad property when we retain or store the waste without incineration. Ignoring factors of cost, the major question should be:

*What finally happens to those retained wastes if not destroyed in situ?*

It probably pollutes a stream somewhere because it goes through overburdened, ineffective sewage treatment systems. The retention or storage system does not

prevent pollution, it merely changes the location of the pollution, that is; from railroad property to public property. In other words, the retention system provides only an option as to where the pollution is to take place.

Complete pollution control from railroad cars, locomotives, and cabooses will be accomplished only by means of a disposal system integral with and developed for railroad equipment.

Thank you very much for your continuing interest and I shall welcome your further comments.

Sincerely yours,

E. BAYNE BLANKENSHIP, Ph. D.,  
*President.*

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HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C., May 12, 1970.*

Mr. GEORGE C. ROBERTS,  
*Director, Research and Development,  
Monogram Industries, Inc.,  
Los Angeles, Calif.*

DEAR MR. ROBERTS: Thank you for your letter of April 21 commenting upon others' comments regarding your report, Railroad Waste Pollution.

Your responses to the following additional inquiries will be very helpful to our further investigation of railroad waste disposal practices:

1. (a) Does your toilet installation cost estimate of \$50—given on page 1 of your April 21 letter—include the cost of removing any existing toilet facility?
  - (b) If not, what is that cost of removal?
  - (c) Does the cost of installation vary significantly with the type of car into which your toilet system is installed?
2. What is the cost of your pneumatic flushing toilets for railway cars?
3. Please supply literature describing in detail:
  - (a) The operation of your product;
  - (b) The extent to which your product treats the waste received; and
  - (c) The percentage of water recirculated after each use.
4. The names and addresses of the major suppliers of human waste treatment systems—that is, toilet systems which treat wastes to some degree—to the railroad industry.

Sincerely,

HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee.*

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MONOGRAM INDUSTRIES, INC.,  
RESEARCH AND DEVELOPMENT CENTER,  
COMMERCIAL SANITATION PRODUCTS,  
*Los Angeles, Calif., June 3, 1970.*

Re Correspondence May 12, 1970.

Hon. HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee,  
Rayburn House Office Building.*

DEAR CHAIRMAN REUSS: This memorandum is in response to the inquiries contained in your referenced correspondence.

#### A. Toilet Installation Costs

The \$50 cost estimate for the installation of a recirculating toilet includes removal of existing facilities. This low cost estimate is based on the simplicity and ease of removal of a direct dumping toilet. Recirculating toilets have been designed by both Monogram and others to interface directly with existing floor penetrations so as to insure minimum difficulty in installation.

Cost of installation for a recirculating toilet can vary between railroad car body types. The differences are minimal as cars fall into two categories; i.e.: cabooses and locomotives. Due to standardization and a limited number of manufacturers, consistency in configuration is maintained in each category. If one considers other classes of railroad cars; such as passenger coaches or Pullman class vehicles, the installation costs could vary significantly.

### B. Pneumatic Toilet Costs

We are currently marketing our pneumatic flushing toilet for rail installation in the cost range of \$400 to \$500 per unit.

### C. Toilet Description

Enclosed for your further review is a brochure describing some of the characteristics of our recirculating assembly.

In essence, the toilet is a self-contained holding tank which includes a pneumatically operated flush pump to cleanse the bowl after use. A small amount of precharge water is placed in the toilet prior to initial use. To this precharge a volume of chemical dye disinfectant is added. The amount of chemical is sufficient to control wastes to the maximum capacity of the toilet. The pneumatic flush pump contains a special filter which separates the liquid and solid portions of the wastes. Filtered, disinfected and dyed aqueous waste solutions are used to flush the bowl after each use. Approximately one gallon of liquid is recirculated for each flush. With regard to Item 3C of the referenced memo, the percentage of water recirculated after each use changes as additional wastes are added to the toilet. For example, if the precharge is three gallons, and one gallon is recirculated, then the liquid used in the flush initially would be 30% of the total. The maximum capacity of the toilet when completely filled to the top of the bowl is 14 gallons. However, liquid wastes will begin to appear in the bottom of the bowl when the total volume exceeds 11 gallons. It is our policy to recommend servicing of the toilet when it reaches this volume of collect wastes. Based on the foregoing, when the toilet is full, the amount of wastes recirculated with each flush approximates 9 percent.

Waste treatment is accomplished within the holding tank to the degree that biological growth is inhibited, and odor-causing sources are controlled. The holding tank concept is only a means of retaining wastes until such time as disposal is accomplished through sanitary sewers. Hence, no further requirement for waste treatment exists.

Eventually, advanced systems will be created to completely dispose of these waste materials. Characteristics of these systems will include greatly extended meantime between servicing and an acceptable effluent.

### D. Major suppliers of toilet systems

There are perhaps 25 or 30 suppliers of waste treatment toilets that may be used on board rail vehicles. Because there are virtually no regulations controlling the direct discharge of waste from these trams, the number of companies selling such systems to the railroad industry are very few. This does not imply that such systems are not available. It does, however, point up the fact that proper legislation is required to stop industrial pollution. Voluntary compliance with good sanitation practices by the railroads is virtually nonexistent.

Principle suppliers to the industry included, but are not limited to the Kohler-Dayton Co. of Dayton, Ohio, who manufacture both recirculating and advanced waste management systems, and the Thetford Co., Ann Arbor, Mich. To the best of our knowledge, these companies, including Monogram, are the principles in the field that are attempting to market retention and treatment facilities to the railroad industry. Again, it should be pointed out that many other companies have equipment that could provide waste treatment for railroad vehicles, but, due to railroad attitudes toward change, these companies have taken a more passive role.

It is my understanding that a hearing is scheduled with Commissioner Edwards of the FDA and Robert Finch sometime in June to discuss the implementation of the revised Interstate Quarantine Regulations—IQR's. It is believed that this meeting will be held between FDA-HEW and members of the American Railroad Association. We have recently learned that IQR's associated with the regulation of these practices (72.154) have been revised to reflect the no direct dumping requirement, and have been endorsed by FDA and PHS medical and other personnel. However, due to the amount of attention involving the subject it has found its way to Mr. Finch's office for disposition. The foregoing is mentioned in passing as you may find this hearing of interest.

If there is any additional assistance we can provide, please don't hesitate to call.

Very truly yours,

GEORGE C. ROBERTS,  
Director, Research and Development.

## REPLY OF MONOGRAM INDUSTRIES, INC., TO THE HONORABLE HENRY S. REUSS

The following statements are in reply to topics Nos. 2 and 4 of the Honorable Henry S. Reuss' letter of inquiry dated July 2, 1970.

## TOPIC NO. 2

Kinds of toilet systems now available which retain human waste for subsequent disposal at a designated and suitable disposal site.

As I am sure this distinguished group of gentlemen realize, the bucket, or static chemical toilet, is the most basic of waste retention equipment. It constitutes no more than a suitable pail-type container with a seat mounted to the upper rim and a lid or cover (as with a trash can) to preclude splash and spill during movement to a disposal site. This type of static toilet usually requires a combination of water and deodorant chemical sufficient in level to totally submerge deposited waste in order to control malodor.

This type of static bucket toilet is quite common in many recreational travel trailers, motorbuses, and, for that matter, piston-type aircraft manufactured prior to the introduction of jet aircraft. The size and configuration of this style toilet is wide and varied, but the end result is always the same: (1) A container judged to be adequate in capacity to handle the number of passengers involved; (2) an austere toilet seat; (3) some sort of a cover, and (4) a chemically treated liquid in the tank, referred to as a precharge, sufficient in volume to submerge the waste contents of the tank.

The above-described unit, however, soon became unacceptable, particularly with the introduction of jet air travel, which brings us to the answer to the above-mentioned question. What kinds of retention toilets are available?

1. Mechanically operated, flushing toilet, which is manually actuated and draws potable water from a storage tank, either by gravity or under pressure, circulates the same over the surface of a toilet bowl fixture and, in turn, deposits flush water and waste into a remotely located waste holding tank. This system is typically found in use aboard pleasure boats or self-contained travel trailers.

2. Mechanically operated, manually actuated, flushing toilet, portable. This type usually has no permanent attachments to vehicle structure. It always requires an amount of water as precharge. These units incorporate a pump that is manually actuated by hand and is designed to recirculate the water in the above-the-floor holding tank, through the toilet bowl, and back to the holding tank. This type of unit is known as self-contained. Servicing, or emptying, is accomplished by removing the unit from the vehicle.

3. Combustion-type toilet. Either electrically, gas, or oil fired, this type of unit is designed to burn wastes deposited in a firebox or burn chamber, which is usually an integral part of the toilet fixture. The burn cycle of this type unit is generally manually operated and not always cycled after each use. No deodorizing chemical is used with this type of unit.

4. Self-contained, electrically operated, fully automatic, flushing toilet. This unit is similar to that described in No. 2 above, except that its' design incorporate a timing device that automatically controls the flushing cycle for a predetermined length of time, and is permanently installed in the vehicle. Chemically treated water is drawn by a pump, through a filter, and circulated around the toilet bowl, washing waste into the self-contained holding tank. Actuation is accomplished by pressing a button or lever wired to the timer, permitting electricity to operate a motor, which is coupled to the pump. A deodorizing chemical is used with this type of unit and is intended to control odor during the recirculating cycle, as well as present an acceptable appearance to the recirculated water.

5. Self-contained, pneumatically operated, fully automatic, flushing toilet. This unit is identical in functional characteristics to that described in No. 4 above, except that compressed air is required for operation rather than electricity. It should be mentioned, at this point, that the pneumatically operated, flushing toilet is a revolutionary new approach to retention type toilet systems, developed by Monogram Industries specifically for the surface transportation industry.

Monogram pioneered the development of electrically operated, retention type toilet systems more than 12 years ago for use aboard commercial jet aircraft. The pneumatically operated unit departs radically from the heretofore standard electrically operated systems, and offers substantial improvements in performance and reliability while reducing installation, operation, and maintenance costs.

The experience and knowledge gained by Monogram over this period of time have gone into the design of the pneumatic system, and have resulted in a simple—one moving part—reliable—monthly service—inexpensive toilet system.

#### TOPIC NO. 4

Capital, installation and operating costs of retention type toilet systems for the entire railroad industry and per car.

(a) Equipment cost will vary, depending on the type of unit selected. (See items 1 through 5 in reply to topic No. 2 of H. S. Reuss' letter dated July 2, 1970.)

(b) Installation cost will vary, depending on where the equipment is installed, i.e., at the vehicle manufacturer on new equipment, or at the operating line's own shops—retro-fit of existing equipment.

(c) Operating cost will vary, depending upon the design sophistication of the unit selected and the functional efficiency thereof.

Therefore, to present cost data as accurately as possible, the following figures are based on the pneumatically operated, fully automatic, recirculating, flushing toilet, model 12800-001, as manufactured by the Venice Division of Monogram Industries, Inc., Venice, Calif., and the information obtained from railroads who are using and servicing this particular unit.

#### LOCOMOTIVES AND CABOOSES

Cost of No. 12800-001, \$440 each; installation cost—material and labor, \$50 to \$60 each; operating or service cost, requires servicing monthly; 3 gallons of water, 1 pack of DG-19 chemical, \$0.50 per pack. Approximately one-fourth man-hour per toilet.

#### PASSENGER CARS (ALL TYPES)

Average cost of toilet, \$550 each to \$600 each; installation costs, \$100 each, approximately; operating costs, requires servicing weekly or bimonthly, depending on frequency of use. Same cost per toilet as locomotive and caboose, \$0.50+one-fourth man-hour.

In order to get figures of costs for the railroad industry as a whole, the above costs would have to be coupled with the figures obtained from the Association of American Railroads on total number of types of cars.

The following replies to the questions posed in the Honorable Henry S. Reuss' letter dated July 6, 1970.

1. Installation cost of Monogram's toilet system—pneumatically operated—in both new and existing equipment.

##### A. Toilet assembly:

Locomotives and cabooses, \$440 each.

Commuter cars, passenger cars, and so forth, \$550/\$600 each.

##### B. Plumbing and miscellaneous hardware:

We do not know how much the original equipment manufacturer charges the customer railroad to install our retention toilet system on new cars. Retrofitting existing locomotive and caboose equipment in the railroads' own shops is estimated to be \$50 to \$60 per installation. Retrofitting commuter cars is also estimated to be \$50 to \$60, although this must be multiplied by the number of toilet compartments per car. Additionally, a sleeping car often has several roomette-type compartments with a toilet in each; some of these are in relatively hard-to-get-at locations, from an underframe plumbing standpoint. In this type of case, we have no experience and would, therefore, hesitate to estimate installation costs. It seems practical, however, to recommend that consideration be given to a passenger car design that allows for a separate lavatory compartment in this type of car similar to those used on motorbuses and commercial jet aircraft.

2. Length of time (in days) Monogram's system can be used between servicing on:

Locomotives, 30 to 90 days; cabooses, 30 to 90 days; commuters, 7 to 14 days; and sleepers, 2 to 7 days.

##### 3. Probable monthly servicing cost:

Locomotives and cabooses, \$.50 chemical +  $\frac{1}{4}$  man hour; commuters, \$2 chemical + 1 man hour; and sleepers, \$7 chemical + 4 man hours.

NOTE.—Servicing costs are extremely variable, as this cost is related directly to frequency of service. The above should be considered reasonable estimates that can be used in planning over-all service procedure cost, which historically differs from one operator to another.

HOUSE OF REPRESENTATIVES,  
 CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
 COMMITTEE ON GOVERNMENT OPERATIONS,  
 Washington, D.C., May 15, 1970.

DUVAL CHEMICAL TOILETS, INC.,  
 Jacksonville, Fla.

GENTLEMEN: The Conservation and Natural Resources Subcommittee is investigating the human waste disposal practices of the railroad industry and the means of remedying the results of such practices.

We request, and would appreciate, your furnishing to us the following information:

1. Please send literature describing in detail the operation of the human waste disposal system which your company manufactures for the railroad industry.

2. Please advise us as to:

- (a) The cost of this system;  
 (b) The cost<sup>1</sup> of installing it in the following types of railway cars:

(i) New:

- (a) Locomotives;  
 (b) Cabooses;  
 (c) Commuter cars;  
 (d) Noncommuter intercity passenger cars.

(ii) Now-in-service:

- (a) Locomotives;  
 (b) Cabooses;  
 (c) Commuter cars;  
 (d) Noncommuter intercity passenger cars.

3. Please advise us as to the name and address of any trade association which represents manufacturers of sanitary equipment for the railroad industry.

Sincerely,

HENRY S. REUSS,  
 Chairman.

DUVAL CHEMICAL TOILETS, INC.,  
 Jacksonville, Fla., May 20, 1970.

Hon. HENRY S. REUSS,  
 Chairman, Conservation and Natural Resources Subcommittee,  
 Rayburn House Office Building,  
 Washington, D.C.

DEAR SIR: We are in receipt of your letter dated May 15, 1970 requesting descriptive literature and prices on human waste disposal systems our company manufactures for the railroad industry.

The development of chemical-type toilet systems for the railroad industry has basically been in camp car, foreman cars, cook diner cars, and other cars used by work groups by the railroads, as well as locomotives and cabooses.

The primary feature of our systems is to transfer the waste from the receiving tank to a holding tank and storing it for long periods of time until servicing can be accomplished and the waste disposed of as required by State and local health requirements. In most cases, the large holding tank can be located to accommodate a gravity flow from the receiving tank; and in other cases, where gravity is not possible, we use vacuum to transfer the waste to the larger holding tank.

In our prototype RR-I chemical toilet installed on a major railroad's camp car, we used a double chemical toilet with gravity flow to a holding tank mounted directly below the receiving tank of the toilets. With eight men living in the car, the holding tank lasted 3 months before servicing was necessary.

The RR-I chemical toilet is shipped in kit form which includes everything necessary including two complete private toilet rooms with lighting and a ventilating system which recirculates fresh air while the toilet is in use. This unit is priced \$1,450.00 f.o.b. our plant in Jacksonville, Fla., and the railroad installs the units. We also have a single unit shipped under the same conditions that is priced at \$1,050.00.

We have the RR-II chemical toilet which was developed primarily for use in locomotives and cabooses. This unit features the vacuum holding tank that can be

<sup>1</sup> Include cost of removing existing toilets which now permit discharge of raw wastes directly to the roadbed.

installed in a convenient location without regard to distance or elevation of the toilet compartment. The waste is transferred weekly by activating a vacuum pump for approximately 5 minutes and pulling a valve. This unit is furnished in kit form with vacuum tank, toilet tank complete with seat baffles, automatic closing doors and seat cover, all necessary valves, vacuum pumps and motor (a.c. or d.c.). These chemical toilets were designed whereby they could be installed in the same compartment now in use for that purpose. The price of these units f.o.b. Jacksonville, Fla. is \$950.

While the initial cost of the RR-I and RR-II chemical toilets may seem high, our primary concern in the development of these units was durability under the conditions, and low cost of maintenance and servicing.

Our development of a chemical toilet system for commuter cars and non-commuter intercity passenger cars has not, at this time, matured, however our general thinking is a design around a durable, lightweight recirculating chemical toilet that can be sealed at the end of the run, removed and replaced with a freshly serviced unit in a short period of time. The sealed unit may then be serviced in a sanitary manner and made ready for the next train.

Enclosed you will please find descriptive literature, and so forth, you requested, and if you require further information, we will be pleased to assist.

Very Truly Yours,

JOHN H. THORNTON, *General Manager.*

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CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C. August 7, 1970.*

MR. JOHN THORNTON,  
*General Manager, Duval Chemical Toilets, Inc.,  
Jacksonville, Fla.*

DEAR MR. THORNTON: Thank you for the information supplied in your letter of May 20, 1970. The subcommittee would appreciate receiving the following additional information:

1. The estimated cost of installing the RR-II chemical toilet in—

(a) new:

- (i) Locomotives.
- (ii) Caboose, and

(b) Now-in-service:

- (i) Locomotives.
- (ii) Caboose.

2. The estimated cost in dollars per month of removing wastes from the RR-11 chemical toilet installed in (a) locomotives and (b) cabooses.

Sincerely,

HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee.*

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DUVAL CHEMICAL TOILETS, INC.,  
*Jacksonville, Fla., August 25, 1970.*

HON. HENRY REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee,  
Rayburn House Office Building,  
Washington, D.C.*

DEAR CONGRESSMAN: With reference to your letter dated August 18, 1970, regarding the estimated cost of installing the RR-11 Duval chemical toilet in new and now-in-service locomotives and cabooses along with the estimated cost in dollars of removing the waste from these units, we are pleased to submit the following:

1. The estimated cost of installing the RR-11 chemical toilets in:

(A) New:

- (1) Locomotives, \$40.
- (2) Caboose, \$40.

(B) Now in service:

- (1) Locomotives, \$60.
- (2) Caboose, \$60.

2. The estimated cost in dollars per month of removing waste from the RR-11 chemical toilet installed in (a) locomotives and (b) cabooses based on a holding tank of 40 gallons per unit. The holding tank would need servicing approximately each 10 weeks. Based on a certain volume and using the services of companies in this type of business the cost per month per unit would not exceed \$3, which would also include disposing of the waste in accordance with Public Health Service regulations.

Very truly yours,

JOHN H. THORNTON, *General Manager.*

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HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C., May 15, 1970.*

Mr. RICHARD M. JOHNSON,  
*President, Koehler-Dayton, Inc.,  
Dayton, Ohio.*

DEAR MR. JOHNSON: The Conservation and Natural Resources Subcommittee is investigating the human waste disposal practices of the railroad industry and the means of remedying the results of such practices.

We request, and would appreciate, your furnishing to us the following information:

1. Please send literature describing in detail the operation of the human waste disposal system which your company manufactures for the railroad industry.

2. Please advise us as to:

(a) The cost of this system.

(b) The cost<sup>1</sup> of installing it in the following types of railway cars:

(i) New:

(a) Locomotives.

(b) Cabooses.

(c) Commuter cars.

(d) Noncommuter intercity passenger cars.

(ii) Now-in-service:

(a) Locomotives.

(b) Cabooses.

(c) Commuter cars.

(d) Noncommuter intercity passenger cars.

3. Please advise as to the name and address of any trade association which represents manufacturers of sanitary equipment for the railroad industry.

Sincerely,

HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee.*

KOEHLER-DAYTON, INC., A DIVISION OF LITTON INDUSTRIES,  
*Dayton, Ohio, May 22, 1970.*

Hon. HENRY S. REUSS,  
*House of Representatives, Chairman, Conservation and Natural Resources Subcommittee, Rayburn House Office Building, Washington D.C.*

DEAR MR. REUSS: I would like to commend you and your committee for your efforts relating to pollution abatement. We are privileged to be solicited for assistance, and assure you our cooperation. Our company has participated in both Senate and House Public Works subcommittee hearings on water pollution, and we feel that we made a constructive contribution to the subsequently enacted Public Law 91-224.

The enclosed brochure contains pictures and manuals describing the operation of the recirculating flush toilet used in commercial jet aircraft and in high speed trains.

The effectivity of this type of system is dependent on regular, thorough servicing. The airlines service their units at least daily and often more frequently, depending on the aircraft's schedule.

Those railroads operating with the recirculating toilets must also provide servicing and maintenance facilities and personnel. The train units pictured in the

<sup>1</sup>Include cost of removing existing toilets which now permit discharge of raw wastes directly to the roadbed.

brochure have a relatively large tank because they are used in passenger cars and must accommodate a group of people.

For locomotive and caboose application, where space limitation and usage requirement dictate a smaller tank (but the same working components—pump, filter, bowl, etc.) we utilize the models 105; 125; or 145 installations, all originally developed for aircraft use.

We are developing several new units specifically for caboose and locomotive use, and when ready we will provide you with full particulars.

The following data is submitted with respect to systems' costs.

For passenger car use the units cost between \$600 to \$800 each depending on the features. This does not include attendant plumbing, fittings, etc.

For caboose and locomotive use the units cost between \$500 to \$600 each.

#### *Cost of Installation*

We do not install units; however, the following cost data was obtained from car builders and users.

New cars:

(a) Locomotives: Between \$200 to \$250.

(b) Caboose: Between \$150 to \$200.

(c) Commuter cars: <sup>1</sup> Between \$600 to \$1,000, depending upon complexity of system.

(d) Intercity cars: Same as (c).

Now-in-service cars:

Estimated costs include removal of existing toilets, and average approximately 2½ to 3 times new car installation.

(a) Locomotives: Between \$500 to \$750.

(b) Caboose: Between \$350 to \$600.

(c) Commuter cars: <sup>1</sup> Between \$1,000 to \$2,000.

(d) Intercity cars: <sup>1</sup> Between \$1,000 to \$2,000.

To the best of our knowledge there is no association which represents manufacturers of sanitary equipment for railroads. However, the Public Health Service has tested numerous units, and, as you know, their approval is required for equipment use in commercial transportation.

We hope that this information will prove valuable in your investigation. We, and a number of other Litton Industries divisions are vitally interested and are participating in the national pollution abatement program. If we can be of further assistance, please call on us.

Respectfully yours,

S. BARRIE CLIFF,  
*Vice President and General Manager.*

CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C., July 6, 1970.*

Mr. S. BARRIE CLIFF,  
*Vice President and General Manager,*  
*Koehler-Dayton, Inc.,*  
*Dayton, Ohio.*

DEAR MR. CLIFF: Thank you for the information supplied in your letter of May 22. Your response to the following additional inquiries will be of further help to the subcommittee.

Please advise as to:

1. The usual length of time (in days) your company's toilet system can be used on (a) locomotives, (b) cabooses, (c) commuter cars, and (d) noncommuter intercity passenger cars, before removal of wastes is required.

2. (If possible) the actual or probable average monthly cost to the railroads of removing wastes from your company's toilet system installed in the four types of cars (locomotives, cabooses, commuter cars, and noncommuter, intercity passenger cars).

Sincerely,

HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee.*

<sup>1</sup> Note: This varies considerably depending on whether servicing from one side only, or either side is required.

KOEHLER-DAYTON, INC.,  
Dayton Ohio, July 22, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee,  
House of Representatives,  
Washington, D.C.

DEAR MR. REUSS: Mr. Cliff has requested that I respond to your letter dated July 6, 1970, concerning toilet systems supplied to the railroads.

Our recommendation is that the toilet system be serviced every 3 days. This can be extended to 5 to 7 days if the units are properly maintained. This would apply to all types of cars using recirculating systems.

We do not have information concerning the actual or probable monthly charge for servicing this type of system, but we are attempting to obtain the information from the railroads.

If we can be of any further assistance in providing information required for our flush toilets, please contact me.

Very truly yours,

ALBERT E. SMITH,  
Manager of National Sales.

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CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., May 15, 1970.

LAMERE INDUSTRIES,  
Walworth, Wis.

GENTLEMEN: The Conservation and Natural Resources Subcommittee is investigating the human waste disposal practices of the railroad industry and the means of remedying the results of such practices.

We request, and would appreciate, your furnishing to us the following information:

1. Please send literature describing in detail the operation of the waste disposal system which your company manufactures for the railroad industry.

2. Please advise us as to:

(a) The cost of this system;

(b) The cost<sup>1</sup> of installing it in the following types of railway cars:

(i) New:

(a) locomotives;

(b) Cabooses;

(c) Commuter cars;

(d) Noncommuter intercity passenger cars.

(ii) Now-in-service:

(a) Locomotives;

(b) Cabooses;

(c) Commuter cars;

(d) Noncommuter intercity passenger cars.

3. Please advise as to the name and address of any trade association which represents manufacturers of sanitary equipment for the railroad industry.

Sincerely,

HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee.

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LAMERE INDUSTRIES, INC.,  
Walworth, Wis., May 28, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, Washington, D.C.

DEAR MR. REUSS: We are pleased to submit information on our railhead incinerating sewage disposal system in response to your letter of May 15.

In making any price comparisons, it should be kept in mind that, the railhead is a fully automatic self contained sewage disposal plant, and cannot be directly compared to the conventional toilet which receives and holds raw wastes, postponing the time when these wastes must be dumped and treated by other equip-

<sup>1</sup> Include cost of removing existing toilets which now permit discharge of raw wastes directly to the roadbed.

ment. The minute fully oxidized inert residual from the railhead may be returned to the earth's surface as ordinary dirt and without change in the local ecology.

The following is the information you have requested as best as we can furnish it. Paragraph numbering coincides with yours to facilitate any tabulation you may be making.

1. Two copies of descriptive literature and specifications titled railhead are enclosed.

2. (a) Unit for crew cars, caboose, signal towers, guard shanties, etc., \$360; estimated cost to remove previous flush toilet, \$25 to \$150

(b) (i) (a) New locomotive unit, \$890 to \$1,600 (depending upon routing of fuel and vent systems);

(b) New caboose unit, \$405 to \$700 (EST);

(c) New commuter cars (railhead only used for railroad crew application);

(d) See (c) above.

(ii) (a) Retrofit locomotives, \$690 to \$1,050 (EST);

(b) Retrofit cabooses, \$405 to \$700 (EST);

(c) and (d) Same as (i), (c) above.

3. We are not aware of any trade association representing manufacturers such as ourselves.

Let us know if we can answer further questions.

Very truly yours,

\_\_\_\_\_  
DONALD P. FRANKEL, *President.*

CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C., June 6, 1970.*

MR. DONALD P. FRANKEL,  
*President,*  
*LaMere Industries, Inc.,*  
*Walworth, Wis.*

DEAR MR. FRANKEL: Thank you for the information supplied in your letter of May 28. Your response to the following additional inquiries will be of further help to the subcommittee.

1. Do the installation cost figures you gave include the capital cost of the unit (i.e., the \$360)?

2. Please advise as to the usual length of time (in days) your company's toilet system can be used on (a) locomotives and (b) cabooses before removal of wastes is required.

3. Please advise, if possible, as to the actual or probable monthly cost to the railroads of removing wastes from locomotives and cabooses.

Sincerely,

\_\_\_\_\_  
HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee.*

LAMERE INDUSTRIES, INC.,  
*Walworth, Wis., July 14, 1970.*

HON. HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, Washington, D.C.*

DEAR MR. REUSS: In answer to your letter of June 6 I will answer using the same paragraph numbers as you have.

1. Yes, the \$360 did include the capital cost of the unit. In order that there not be any misunderstanding, I am enclosing one of our wholesale price schedules. As you can see, the \$360 represents the rounded off price for quantity 25 and up units. In way of explanation, the low installation figure of \$405 is based upon tying into an existing flue and fuel system necessary to operate the caboose heating plant.

2. (a) and (b) Forty five days is a reasonable period to expect from normal crew usage and based upon the model quoted above. Present model railheads in most abundant use at the moment are generally serviced approximately every 21 to 28 days.

3. The monthly cost of removal of wastes from the railhead is nil, based upon the following: Human waste is reduced from organic to inorganic compounds

and a completely sterile ash of fully oxidized material is the only residual. This material can then be collected with the general dirt of the car and at the time that the car is cleaned, and simultaneously discarded. This dirt may be returned to the earth's surface without appreciable change in the earth's ecology. Therefore, change in maintenance of the car is not considered appreciable.

I mentioned your name to my younger brother, Dr. John Frankel, in a long distance phone conversation to San Francisco last week, and he said to be sure to say "Hello Henry".

Let me know if I can be of further service.

Very truly yours,

DONALD P. FRANKEL,  
President.

RAIL-HEAD INCINERATING WASTE DISPOSAL PLANT, THE DRY SANITARY TOILET—WHOLESALE PRICE SCHEDULE

Order no.	APPL.	Gas/oil	Volt	List	Quantity prices				
					1-2	3-5	6-11	12-24	25-up
55P5B	Building or	Propane	115 vac	\$549	389	379.25	371.50	365.65	359.80
55N5B	Work car	Natural	115 vac	549	389	379.25	371.50	365.65	359.80
55P12B	Caboose	Propane	12 vdc	549	389	379.25	371.50	365.65	359.80
55F7B	Locomotive	Diesel	74 vdc	( )	( )	( )	( )	( )	( )
55P7B	do	Propane	74 vdc	( )	( )	( )	( )	( )	( )

† Write LaMere Industries Inc.

FLUE MATERIAL

*Flue Kit.*—Will accommodate floor to roof top dimension up to 93 inches. Consists of following type L stainless double wall material:

- 1—4 inch by 60 inch pipe.
- 1—4 inch by 36 inch pipe.
- 1—4 inch by 90 degree elbow.
- 1—roof flashing.
- 1—storm collar.
- 1—top assembly.
- 1—roll high temperature joint tape, 10 feet.

Order kit RR4, \$36.65.

44" TYPE L STAINLESS DOUBLE WALL CARRIED IN STOCK

Part No.	Description	Price	Part No.	Description	Price
4510	4" Rd 12 Lg	\$3.96	4617	4" Tee Cap	\$1.26
4193	4" Rd 12 Adj	4.22	4617	4" Rd Tee/W Cap	12.06
4178	4" Rd 18 In	4.50	1416	4" Flue Extension	3.80
4252	4" Rd 36 In	7.92	4194	4" Wall Thimble	1.96
4241	4" Rd 60 In	13.05	4180	4" Rd 90° Elbow	8.18
4512	4" Storm Collar	.40	4181	4" Rd Draft Hood	2.34
4511	4" Roof Flashing	2.60	4937	4" Flue Top Assy	3.00
	4" Tee	10.80	4316	High Temp. Flue Joint Tape—10'	1.50

Note.—When measuring for flue material, decrease each pipe 11/2" to allow for joint.

*Replacement parts.*—Write for separate sheet, specify model and serial number.

All prices F.O.B. Walworth, Wis., subject to change without notice. Terms: Net 30 days from invoice date.

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., July 2, 1970.

MR. DONALD P. FRANKEL,  
President, La Mere Industries, Inc.,  
Walworth, Wis.

DEAR MR. FRANKEL: The Conservation and Natural Resources Subcommittee has been investigating the widespread practice of discharge of raw human wastes from railroad cars, its health and environmental effects, and the means of remedying such practice.

The subcommittee has therefore scheduled a hearing on this subject on Tuesday, July 28, 1970, 10:00 A.M. in Room 2247 of the Rayburn House Office Building, Washington, D.C.

We are interested in the following topics:

1. How does the discharge of raw human wastes from railroad cars (a) affect public health; or (b) contribute to the pollution of surface or ground waters; (c) what other environmental effects such as offense to sight and smell, particularly in or near railway stations, result from such discharge?
2. What kinds of toilet systems are now available which retain, or retrain and treat, human waste rather than discharge it directly from railway cars?
3. Information concerning the following facts:

TOTAL NUMBER OF CARS

Type of car (1)	Has retention type system (2)	Has retention and treatment system (3)	Has neither type system (4)
1. Locomotive.....			
2. Caboose.....			
3. Commuter.....			
4. Intercity passenger:			
(a) Coach.....			
(b) Sleeper.....			

4. What would be the capital, installation, and operating costs of these different toilet systems for the entire railroad industry (per car)?

5. Should the Commissioner of Food and Drugs revise the Interstate Quarantine Regulation (42 C.F.R. 72.154) to prohibit the discharge of untreated wastes from railroad trains?

We would very much appreciate receiving at the hearing your views and responses on the subject of human waste disposal from trains.

We hope that you will be able to present your views to the subcommittee in person. If your other commitments preclude you from being present, we would appreciate receiving your views through such representative as you may wish to designate.

In view of the number of witnesses the subcommittee wishes to hear, I would like to suggest that if your prepared statement exceeds six typed pages, double space, we will have it included in full in the record, while you present a summary statement of six pages or less, double space, with copies for the members of the subcommittee, for your oral presentation.

To facilitate the preparation of your statement, we enclose a copy of the Rules of the House of Government Operations Committee. To assist the subcommittee members in their advance preparation for the hearing, we would appreciate receiving 15 copies of your statement not later than Thursday, July 23, 1970 (see Rule XI 26 (f)). In addition, we suggest that at least 40 copies of your statement should be brought to the Hearing Room for use at the hearing (by the reporter, subcommittee, press, etc.).

We would appreciate your early confirmation that you or your representative will testify at the hearing.

We shall welcome your views.

Sincerely,

HENRY S. REUSS,  
Chairman.

LAMERE INDUSTRIES, INC.,  
Walworth, Wis., July 20, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, Washington, D.C.

DEAR MR. REUSS: We appreciate your invitation dated July 2d to participate in the hearing on discharge of waste on railroad right of ways; however it is not the intention of LaMere Industries to attend. This decision is based entirely on the premise that LaMere Industries does not consider itself expert in the area of

the effect of railroad car discharge of raw human waste as it affects public health, pollution of surface or ground water and other environmental effects. This does not mean that LaMere Industries does not extend its full and complete cooperation. As a matter of fact if we can be of service to the subcommittee I will be present at the hearing.

The following are answers to your questions and numbered and lettered in the same order:

1. As stated above, LaMere Industries is not informed on the subject of discharge of raw human waste from railroad cars as it affects public health, pollution and possible other effects.

2. The kinds of toilet systems that are available on the market today are the fully automatic self-contained incinerating waste disposal plant; the recirculating chemical toilet and the microphor self-contained aerobic treatment system.

3. LaMere Industries does not have access to a breakdown of type of toilet system versus category of railroad car. However, the following information specific to LaMere applications is submitted:

This organization builds toilets only for crew use as applied to locomotives, cabooses and bunk or crew cars. We have no statistics on number of installations of manufacturers of toilet systems other than our own. To date we have incinerating systems in operation and on order on new locomotives and on retrofit programs on two major railroads and five smaller railroads. In addition, we have trial locomotive units on another five major railroads. We have two caboose programs in operation and a third program is imminent.

Because of the necessity to sometimes remain stationary in remote locations for extended periods our incinerating system is standard equipment on maintenance-of-way crew or bunk cars on three railroads and we are used on approximately twenty-five other railroads.

It appears to the writer that there certainly should be a further break down of type of car to show the maintenance-of-way crew or bunk car installation, and also to show miscellaneous installations. There is the privately owned car, and I understand there are several hundred of these in use in the United States and Canada. In addition, there is the executive or office car of which all major railroads have several. Other types of cars that have been overlooked are test and maintenance-of-way work cars. These are generally dynamometer cars, Sperry Rail Cars, ballast working cars, other maintenance-of-way equipment and railroad wreckers. Many railroad division points have a wreck train on 24 hour alert, complete with bunk cars, diner, etc., ready to clear up the right-of-way after an accident. These wreck trains have been a major customer for incinerating equipment because the incinerating equipment adapts itself beautifully for standby work.

4. LaMere Industries believes that the best source for capital and operating costs of toilet system information is the railroads as such information must have been developed by the railroads. Estimates of this nature were submitted to the Subcommittee in our letter dated May 28, 1970 and no further information is available.

5. LaMere Industries is not equipped to discuss such regulations as the Interstate Quarantine Regulation and prohibition of discharge of untreated wastes from railroad trains.

The following are general comments appropos to the tenor of the hearing. Recent statistical information circulated within the railroad industry and purported to have a toilet manufacturer source indicates considerably more individual average daily weight feces than clinical information at LaMere Industries would indicate. Sunderman "Normal Values in Clinical Medicine," chapter 29, page 254, states that the normal human averages 115 grams per day (.25 lbs.) excretion. Other information generally indicates ranges, depending on race and diets of .22 to .44 lbs. daily defecation. The ¼ lb. figure has been accepted by the Depts. of the Army, Air Force (Project Barebase) and American Gas Association in testing our devices for incineration effectiveness.

We are of the opinion that the short duration of freight crews aboard modern high speed freights minimizes the number of defecations which crew use toilets receive. We have found evidence that the loads are mostly urine indicating a preference to "go" before or wait until after the run. Therefore, the use is more for the emergency where the individual is not feeling normal or the freight is delayed. We also have learned to distinguish between our products used on a work shift basis as contrasted with those being used on a living quarter basis. The subcommittee interest appears to lie in the former only, which we consider a much lighter type of use.

The latter or bunk car type of use (as an example) obviously receives much heavier use and surprisingly has not been considered by the subcommittee. These cars may be parked on the right-of-way for a few hours or on a siding for several months. It is our opinion that the railroads have always provided means for handling the waste effluent from these cars. Our work with the railroads in this department (maintenance-of-way) has been in the realm of modernizing and updating. (I have never witnessed flush toilet systems on such cars without provision for effluent disposal as the potential of longtime parking in one area obviously has negated any track dumping.) Many of the bunk cars have used outside rental toilets prior to updating programs.

It is not considered realistic to convert the entire inhabited rolling stock of the railroad industry. As an example, it is unrealistic to ask railroads to install a toilet in a locomotive switcher that spends its workday hauling into and out of industrial facilities any more than providing a toilet for the municipal bus driver. The same statement holds true for cabooses that are assigned to local freight type of work. The railroad pocket list shows the approximate total number of U.S. locomotives as 26,700; of these it shows that approximately 7,900 are switchers. There must be some similar number of cabooses that are also used in local operation, and therefore should not be considered.

It is recommended that a standard be devised in conjunction with the railroads on what cars should be equipped with retention systems. In addition to the more common baselines, the standard should cover such factors as: Percent utilization (an office car is low and should possibly be exempt.) Parked car but occupied (a wreck train is parked and possibly should have a retention system).

These are but two of many factors not usually thought of. Before committing all inhabited cars to retention systems, it should be remembered that ultimately the public pays for the program because the railroads must pass on the increased costs.

Sincerely,

DONALD P. FRANKEL,  
*President.*

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C., July 2, 1970.*

ELECTROLUX,  
*Luxbacken 1, L. Essingen,  
Stockholm, Sweden.*

Dear Sirs: The Conservation and Natural Resources Subcommittee is investigating the human waste disposal practices of the railroad industry in this country, and the means of remedying the results of such practice.

We have received information from the Royal Swedish Embassy indicating that the Swedish State Railways is currently testing for possible installation on its passenger cars a vacuum toilet waste disposal and retention system marketed by your company. Along with this information we received literature outlining the principal features and advantages of the vacuum toilet system.

We would appreciate your furnishing to us the following information:

1. Please send literature describing in detail the operation of the vacuum toilet system your company manufactures for the railroad industry.

2. Please advise as to:

(a) the capital cost of this system;<sup>1</sup>

(b) the cost<sup>1 2</sup> of installing it in the following types of railway cars:

(i) New—

(a) Locomotives.

(b) Cabooses.

(c) Commuter cars.

(d) Noncommuter intercity passenger cars.

(ii) Now-in-service—

(a) Locomotives.

(b) Cabooses.

(c) Commuter cars.

(d) Noncommuter intercity passenger cars.

<sup>1</sup> Give cost in U.S. dollars.

<sup>2</sup> Include cost of removing existing toilets which now permit discharge of raw wastes directly to the roadbed.

(c) The monthly cost<sup>1</sup> to the railroads of operating that system on each of the four types of cars (locomotives, cabooses, commuter cars, and noncommuter intercity passenger cars), if known.

3. Please supply data which support your company's statement that the chemical additives used in the flushing liquid of competitors' toilet systems "harm the bacterial action in treatment plants." (See attached material of your company.)

Sincerely,

HENRY S. REUSS,  
Chairman.

Enclosure.

ELECTROLUX,  
Stockholm, August 3, 1970.

Re the train application of the Electrolux vacuum sewerage system.

CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
Rayburn House Office Building, Washington D.C.

DEAR SIR: Thank you for your letter of July 2.

The test installation on which you have received information from the Swedish Embassy consists of one railroad car which has been in successful operation for about 4 months. Shortly a second test installation will be put into operation.

Thus the train application of our vacuum system being in a preliminary stage, we have little of the information ready which you ask for in your letter.

The preliminary price in Sweden for the components of a vacuum toilet system for a railroad car (two vacuum toilets complete with mechanism, collecting tank—180 U.S. gallons, vacuum pump, complete control equipment, transport piping, heating cables for tank and pipes, insulation) is \$1,550.

This price has been based on a series of 600 railroad cars.

The price does not include any cost for installation of the system or removal of existing toilets. We are sorry to inform you that we cannot give you any valid figures on the costs of these works due to the very reduced experience that we have had so far.

We have also been asked by the Swedish State Railways to study the possible design of a one vacuum toilet system for locomotives. The design is, however, not ready yet and consequently no cost figures are available.

Our statement that the sanitary liquids of chemical toilets harm the bacterial action in treatment plants is based on the fact that these liquids contain bactericide substances, i.e. substances intended to kill the bacteria of the fecal matters. These bactericide substances are as a consequent harmful to the micro-organisms on which all biological treatment plants (activated sludge, trickling filter and other processes) base their operation.

Limited volumes of the contents from chemical toilets do not influence the normal action of large size treatment plants. Large volumes can however be very harmful to the micro-organisms of small plants.

We may mention that the treatment plant of the town of Solna, north of Stockholm, where the main service station of the Swedish State Railways is situated, have refused to receive more than the contents from a limited number of chemical toilets.

Of all bactericide substances of the chemical toilet liquids, formaldehyde is considered to be the one causing the least harm due to the fact that it can be biologically decomposed. Its limit concentration for sewage and industrial effluents is 1.0 mg./liter.

The above questions have been discussed in a memorandum from the Swedish Government's National Environment Protection Board. The memorandum is in Swedish but if you so wish, we shall ask for permission to have it translated to English for you. Kindly advise us.

Please also advise us if you want us to keep you informed on the future development of our vacuum sewerage system for trains.

Yours sincerely,

JAN SKÖLD,  
Environmental Systems Division, Marketing Department.

APPENDIX VII.—CORRESPONDENCE WITH PUBLIC HEALTH  
AUTHORITIES

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., June 2, 1970.

MR. ROBERT D. TIMM,  
*Chairman, Washington Utilities and Transportation Commission,  
Olympia, Wash.*

DEAR MR. TIMM: The Conservation and Natural Resources Subcommittee is investigating the human waste disposal practices of the railroad industry and the means of remedying the results of such practices.

We understand that your Commission has ruled that railroads in the State of Washington must utilize human waste disposal systems which prevent direct discharge of wastes onto the rights-of-way.

We would very much appreciate your sending us the following materials or information:

1. A copy of the ruling(s) or regulation(s) which require(s) railroads operating in the State of Washington to use retention-type waste disposal systems, indicating the date of such ruling(s) or regulation(s);

2. A copy of any studies and statements to your Commission by experts in sanitary engineering or environmental health, describing the health risks and pollution effects of discharging human wastes onto railroad rights-of-way;

3. Any other information which you believe would assist the subcommittee in defining the health and environmental problems presented by the railroads' discharge of wastes onto their rights-of-way, the technology available to control or eliminate these problems, and the costs to the railroads of utilizing this technology.

Sincerely,

HENRY S. REUSS,  
*Chairman.*

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WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,  
*Olympia, Wash., June 11, 1970.*

HON. HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee,  
Washington, D.C.*

DEAR CONGRESSMAN REUSS: This will acknowledge your letter of June 2 requesting information on human waste disposal practices of the railroad industry in the State of Washington.

The Washington Utilities and Transportation Commission adopted rules covering sanitation and shelter applying to employees of common carrier railroads in 1958, although there is nothing in the rules which will prevent the discharge of raw human waste along railroad rights-of-way except within yard servicing areas (WAC 480-66-060 (7)). However, the Commission has continually encouraged the use of incinerator type disposal units on railroad engines and cabooses. We are acquainted with three types commercially available, including electric fired, gas fired and fuel oil fired models. Some of the electric units have been used on engines in the State of Washington for a number of years, with more or less success. It is our experience that all incinerator type disposal units require a very high degree of maintenance to keep them in operation. There is no reference to passenger equipment in our rules, because they only apply to facilities furnished for employees' use.

To specifically answer your three questions:

1. This agency has no rule that requires retention type waste disposal systems on railroads operating in Washington.

2. The only study applying to the railroad pollution problem with which we are familiar was prepared and published by Monogram Industries of Venice, Calif., dated November 1, 1969.

3. Under the Washington sanitation rules, there is a choice in the type of disposal unit that can be furnished on railroad rolling stock. These include flush type, chemical type, and the incinerator type previously mentioned. Although our staff has not made an extensive study of any but the incinerator type disposal unit, they have expressed the opinion that it might be difficult to find room on a locomotive to install a retaining tank for flush type unit. They also observe that the chemical type units with which they are familiar are charged with a liquid disinfectant which would probably be difficult to retain under rough handling of the engine or caboose.

Under these conditions, it is the opinion of our railroad staff that the development of an incinerator type which actually consumes the waste, leaving a minimum of nontoxic residue, might be the best solution. The greatest problem with this type of unit seems to be its inability to entirely eliminate unpleasant odor during a disposal cycle.

It is our understanding that the cost of an "Incinolet" unit runs in the neighborhood of \$450, and we have no idea of what the cost of a flush or chemical type installation might be.

Enclosed is a copy of the Washington rules relative to railroad sanitation for your further information.

Sincerely,

ROBERT D. TIMM,  
Chairman.

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HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., June 3, 1970.

DR. CHARLES A. FARISH,  
Director, National Sanitation Foundation, School of Public Health, University  
of Michigan, Ann Arbor, Mich.

DEAR DR. FARISH: The Conservation and Natural Resources Subcommittee is investigating the human waste disposal practices of the railroad industry and the means of remedying the results of such practices.

We are aware of the reports published in 1950 by The Association of American Railroads, of a study under the directorship of Dr. Abel Wolman of Johns Hopkins University, concerning the public health risks associated with the discharge of untreated human wastes directly onto railroad rights-of-way.

The subcommittee would very much appreciate learning from you the following information:

1. What studies, if any, have been conducted since 1950 relating to the public health risks of depositing human excrement on railroad rights-of-way?
2. What studies, if any, have been conducted concerning water pollution caused by the discharge of human wastes and garbage from railway cars onto trestles and bridges crossing waterways or onto land areas near such waterways?

We would also appreciate your informing us about sources of information which you believe would assist the subcommittee concerning these questions.

Sincerely,

HENRY S. REUSS,  
Chairman.

(NOTE.—An identical letter was addressed to Dr. John C. Hume, director of School of Public Health, Johns Hopkins University, whose response follows that of the National Sanitation Foundation.)

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NATIONAL SANITATION FOUNDATION,  
Ann Arbor, Mich., June 12, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, Washington, D.C.

MY DEAR MR. REUSS: This responds to your letter of June 3, 1970, addressed to Charles A. Farish, executive director of our organization. I am replying for Mr. Farish who is away from the office for a period of annual leave.

With regard to your query concerning information about human waste disposal

from railroad trains, you make mention of having the most comprehensive study report which to my knowledge has been made.

I am not firm in my recollection, but I believe that subsequent to Dr. Wolman's work there was some followup study and reporting undertaken on behalf of the Association of American Railroads. I am sorry I cannot provide tangible documentation.

The National Sanitation Foundation has not been involved in any study of this kind. Our involvement has been confined to performance evaluation of package sewage treatment plants and of waste-water sewage disposal devices for smaller watercraft.

If we can be of further help to you in any way, please do not hesitate to call upon us.

Sincerely yours,

ROBERT M. BROWN,  
*President.*

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THE JOHNS HOPKINS UNIVERSITY,  
SCHOOL OF HYGIENE AND PUBLIC HEALTH,  
*Baltimore, Md., June 30, 1970.*

HON. HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee of the Committee on Government Operations, House of Representatives, Washington, D.C.*

DEAR CONGRESSMAN REUSS: Thank you for your letter of June 4 regarding the investigation which your subcommittee is making of the human waste disposal practices of the railroad industry and the means of remedying the results of such practices.

An inquiry into the health hazards of railroad waste disposal practices reveals no additional studies since those sponsored by the Association of American Railroads. The late Dr. Kenneth F. Maxcy, renowned epidemiologist, and Dr. Abel Wolman, a leading authority on water supply, both on our faculty at the time, were key participants in the study.

Repetition of these studies seems wholly unwarranted in view of the absence of evidence that the discharge of human wastes on the roadbed from moving trains does endanger the health of the public or of railroad track workers or contaminates public water supplies. It would seem that the sevenfold decrease in railroad passenger volume since the study would result in less concern for a review.

The problem with the ground discharge of wastes, then and to some extent now, is the nuisance when the train is standing in a station, switchyard, or service area. Newer coaches utilize a containment tank similar to the airlines; however, when not so equipped the doors to toilets are to be locked to prevent the hopper from being discharged in restricted areas. The latter is sometimes not faithfully done.

It is suspected that the current revival of the 1903 Barrington hypothesis of railroad bed infection is due to the rediscovery of the railroads' practices, or lack of them, with regard to waste disposal.

A public health-conservation-railroad problem of a much higher rank than toilet discharge involves the numerous wrecks which release explosive materials and toxic chemicals into the environment.

I am sorry that we are unable to provide any additional data but hope that the above information will be helpful.

Sincerely yours,

JOHN C. HUME, M.D., DR. P.H., *Dean.*

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HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
*Washington, D.C. June 25, 1970.*

DR. ANTONIO CIDECKO,  
*Acting Dean,  
University of Pittsburgh School of Public Health,  
Pittsburgh, Pa.*

DEAR DR. CIDECKO: The Conservation and Natural Resources Subcommittee is investigating the human waste disposal practices of the railroad industry and the means of remedying the results of such practices.

We are aware of the reports published in 1950 by the Association of American

Railroads, of a study under the directorship of Dr. Abel Wolman of Johns Hopkins University, concerning the public health risks associated with the discharge of untreated human wastes directly onto railroad rights-of-way.

The subcommittee would very much appreciate learning from you the following information:

1. What studies, if any, have been conducted since 1950 relating to the public health risks of depositing human excrement on railroad rights-of-way?
2. What studies, if any, have been conducted concerning water pollution caused by the discharge of human wastes and garbage from railway cars onto trestles and bridges crossing waterways or onto land areas near such waterways?
3. What studies, if any, have been conducted pertaining to any other environmental effects of the disposal of human wastes from trains onto railroad rights-of-way?

We would also appreciate your informing us about sources of information which you believe would assist the subcommittee concerning these questions.

Sincerely,

HENRY S. REUSS, *Chairman.*

(NOTE.—An identical letter was addressed to Dr. William C. Reeves, acting dean, University of California School of Public Health, Berkeley, Calif., the response to which follows that of the University of Pittsburgh School of Public Health.)

UNIVERSITY OF PITTSBURGH  
GRADUATE SCHOOL OF PUBLIC HEALTH,  
Pittsburgh, Pa., August 17, 1970.

HON. HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee,*  
*Washington, D.C.*

DEAR CONGRESSMAN REUSS: In response to your letter of June 25 asking of our knowledge of any studies having been done in relation to the matter of human wastes on railroad rights-of-way, we hope the following will be of value:

1. The "Handbook of Sanitation of Railroad Passenger Cars," 1964 revision, published by the Department of HEW, says nothing about when, where, or in what manner human wastes are to be flushed from the passenger cars. There is nothing of a pollution nature in this handbook.

2. Soviet Union literature exhibits one source, "Hygiene and Epidemiology in Railroad Transportation," A. A. Prokhorov, *Gig Sanit.* 32: 289 Nov. 1967. This source is very general and without references, and so is of very little value. The article did mention, however, that further work had been done, but we can find no additional references.

3. We have checked the "Index Medicus" under several headings back through 1960 and can find no evidence of any published reports of articles that deal with the question of human wastes on railroads.

4. We also checked our main library listings of doctoral dissertations and can find none that would be of help.

In conclusion, it would appear, at least from our search, that there are no recent reports or studies having to do with the subject of your interest. The matter may be self-eliminating however, since the peak of passenger travel on railroads occurred a couple of decades ago and had been rapidly declining ever since. In fact, if the trend continues, there may be virtually no passenger service in this country within a few years. If the Government anticipates an upgrading of the American railroad passenger service to create a balanced transportation system in the United States—a program which I would wholeheartedly endorse—then we would strongly recommend that "waste holdup tanks" for passenger cars be incorporated into future designs. This obviously is a desirable and we feel a workable scheme, as it is presently being used by the airlines and intercity bus companies.

It is our hope that you have further success in your studies of railroad sanitation, and we regret that we were not able to provide more fruitful information. However, I am slated for a World Health Organization short-term consultantship in September 1970. During this period, I could, if you feel it would be of value to the Conservation and Natural Resources Subcommittee, undertake to find out what, if anything, is being done to remedy the situation in such countries as Switzerland, Yugoslavia, Israel, and Great Britain.

Sincerely yours,

MAURICE A. SHAPIRO,  
*Professor of Environmental Health Engineering.*

UNIVERSITY OF CALIFORNIA, BERKELEY,  
SCHOOL OF PUBLIC HEALTH,  
Berkeley, Calif., July 1, 1970.

HENRY S. REUSS,  
*Chairman, Conservation and Natural Resources Subcommittee of the Committee on  
Government Operations, House of Representatives, Washington, D.C.*

DEAR MR. REUSS: Dean Reeves, who is temporarily away from his office, has asked me to answer your inquiry of June 25 concerning discharge of wastes from trains. While no one on our faculty or among our students has had any specific interests in the subjects you raise, they have made a limited survey of the literature. As far as we can find, there have been no significant studies since those of Professor Wolman's of about 20 years ago. These studies were essentially definitive concerning the subject and have apparently not led to further investigation.

Of course, there is a good deal of effort being directed to the subject of waste disposal in closed systems. This is not really relevant but may ultimately lead to much better understanding of waste disposal procedures. One of our faculty is about to embark on research with human subjects participating in an enclosed conservative waste recycling system. If you are interested, we will be glad to call your attention to Prof. William J. Oswald's work.

Very sincerely yours,

BERNARD D. TEBBENS, Sc. D.,  
*Chairman, Environmental Health Sciences.*

COMMONWEALTH OF PENNSYLVANIA,  
DEPARTMENT OF HEALTH,  
Harrisburg, Pa., July 29, 1970.

Hon. HENRY S. REUSS,  
*Conservation and Natural Resources Committee,  
U.S. House of Representatives, Washington, D.C.*

DEAR MR. REUSS: In connection with your hearings on sewage discharges from trains, I am attaching a copy of a letter I wrote to HEW on December 15, 1969.

I hope that corrective action will be taken.

Sincerely yours,

WESLEY E. GILBERTSON, P.E.,  
*Deputy Secretary for Environmental Protection.*

COMMONWEALTH OF PENNSYLVANIA,  
DEPARTMENT OF HEALTH,  
Harrisburg, Pa., December 15, 1969.

Mr. CHARLES C. JOHNSON, JR.,  
*Administrator, Consumer Protection and Environmental Health Service,  
Public Health Service,  
Washington, D.C.*

DEAR C.C.: I have just received a referral from the Office of the Governor or the Commonwealth of Pennsylvania of a report prepared by Monogram Industries, Inc., 3226 Thatcher Avenue, Venice, Calif., concerning the practice of discharging human wastes by direct dumping from railroad cars. Undoubtedly Monogram Industries, Inc., has furnished a copy of their report to your office also.

A brief review of this report indicates that it is a matter of fact description of the primeval practice of indiscriminate dumping of human wastes along railroad rights-of-way. The report cites the present regulations of the U.S. Public Health Service in this connection. I think that you would agree with me that it is high time that PHS took another look at this question. I am well aware that there may be little epidemiological evidence of disease transmission directly associated with this practice. However, it seems to me that in the name of common decency it should now be prohibited. I hope that you and your staff will agree on this point.

With personal regards,

Sincerely yours,

WESLEY E. GILBERTSON, P.E.,  
*Deputy Secretary for Environmental Protection.*

STATE OF WASHINGTON,  
DEPARTMENT OF HEALTH,  
SEATTLE REGIONAL OFFICE,  
*Olympia, Wash., August 3, 1970.*

HON. HENRY S. REUSS,  
*Chairman, House Conservation and Natural Resources Committee,  
House of Representatives,  
Washington, D.C.*

DEAR CONGRESSMAN REUSS: The sanitary engineering section of the Division of Health of the State of Washington is very much concerned with discharge of sewage from trains, particularly so in the Seattle and Tacoma domestic drinking watersheds. Toilets are supposed to be locked during this part of the trip, but this is not always effective. In addition, the problem of frozen sewage wastes on the undercarriage, thawing as the trains come over mountains, creates an additional problem.

We did not agree with the old research on this problem as it was done under much different conditions than those existing in this State.

It is, in our judgment, a potential health problem as well as an affront to common decency. We recommend it be stopped at the earliest practicable time.

Very truly yours,

WALLACE LANE, M.D.,  
*Assistant Secretary, Division of Health.*  
By ROBERT E. LEAVER,  
*Planning Engineer, Sanitary Engineering Section*

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CITY OF TACOMA,  
DEPARTMENT OF PUBLIC UTILITIES,  
*Tacoma, Wash., August 6, 1970.*

Congressman HENRY S. REUSS,  
*Chairman, House Conservation and Natural Resources Committee, House of Representatives, Washington, D.C.*

DEAR CONGRESSMAN REUSS: We have been advised by the Washington State Department of Social and Health Services that the House Conservation and Natural Resources Committee, of which you are chairman, is currently accepting testimony in connection with the proposed legislation to limit the discharge of sewage wastes from railroad trains. As a water purveyor, we are deeply concerned with the procedures followed in this regard, especially in our watershed area, because of potential risk to public health.

The city of Tacoma obtains its principal water supply for industrial and domestic use from the Green River watershed which is located approximately 50 miles east of the city. The city controls access into the area and restricts the activities for public health reasons by ownership and agreements with the major land owners. Water is diverted directly from the river and no treatment is presently required except simple chlorination.

The Green River watershed, which is a rugged mountainous area, is traversed by the Burlington-Northern Railroad. Over the past 60 years the city has obtained its water supply from this area, and a continuous effort has been made to prevent discharge of wastes from railroad equipment. The railroad has been most cooperative from the standpoint of locking the restrooms and placing metal flashing on bridges crossing either the streams or the Green River within the watershed area. However, even with these extensive precautions, there is still an element of risk to the public health.

We appreciate the efforts of your committee in this regard and urge the enactment of legislation requiring the use of self-contained waste control facilities on railroad equipment.

If we can provide you with additional information on this matter, please advise.

Very truly yours,

A. J. BENEDETTI,  
*Superintendent, Water Division.*

APPENDIX VIII.—CORRESPONDENCE WITH RAILWAY CAR  
MANUFACTURERS

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington D.C., January 15, 1970.

Mr. PHILIP W. SCOTT,  
President, Budd Co., Philadelphia, Pa.

DEAR MR. SCOTT: In November 1969 this subcommittee began examination of the problem of human waste disposal from interstate trains. According to a report entitled "A Report on Railroad Waste Pollution, November 1, 1969," by Monogram Industries, Inc., of Venice, Calif. (copy enclosed), our Nation's railroads are operating with only the most primitive of human waste disposal systems. That report indicates that over 50 million pounds of untreated human waste are discharged annually from locomotives and cabooses. Although that report does not include any estimate of human wastes discharged from commuter and intercity passenger trains, even greater amounts presumably emanate therefrom. These wastes constitute a significant and avoidable source of pollution of our Nation's watersheds.

We would appreciate your providing to us the following information:

1. Number of intercity and commuter passenger railroad cars manufactured by your company in calendar year 1969.
2. Your company's production of railroad cars for intercity and commuter passengers during calendar year 1969 constituted what percentage of the total U.S. production of such cars?
3. Describe the type of human waste disposal system installed in the railroad passenger cars manufactured by your company in calendar year 1969.
4. If any system mentioned in your answer to question 3 above involves some treatment or holding of the wastes, please state—
  - (a) When your company began installing such a system;
  - (b) The nature of the treatment or holding system.
5. Please describe the research and development which your company is now conducting, or has done during calendar year 1969, to improve the facilities for handling human wastes on railroad cars manufactured by your company.
6. (a) Please state the estimated cost to install a holding tank type disposal system in a passenger car which lacks such a system.  
(b) To the best of your information, what would be the estimated cost of installing a holding tank disposal system in all railroad passenger cars which lack such a system?  
(c) Please explain the basis for your estimates.
7. We would appreciate your views and recommendations for reducing or eliminating the discharge of untreated human wastes from railroad cars.

Sincerely,

HENRY S. REUSS,  
Chairman,

(NOTE.—An identical letter was addressed to Pullman Standard on January 15, 1970. The Pullman response follows that of the Budd Co.)

THE BUDD CO.,  
RAILWAY DIVISION,  
Philadelphia, Pa., February 2, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee, House of Representatives,  
Washington, D.C.

DEAR SIR: This will acknowledge your letter to Mr. P. W. Scott dated January 15, 1970.

Relative to the information requested, we advise as follows, using item numbers as in your letter:

1. We shipped 256 commuter cars in calendar year 1969. These were for operation on the Long Island Railroad and purchased by the Metropolitan Transit Authority in New York.
2. Our 1969 shipments were 74.6 percent of total shipped by the industry.
3. These cars operate in married pairs only, one of which incorporates toilet facilities. The toilet is a self-contained unit with retention tank.
4. (a) The self-contained toilet units were first installed by us on "Metroliner" cars built in 1967 and 1968.
- (b) The toilet units are manufactured by Koehler-Dayton, Inc., 401 Leo St., Dayton, Ohio, and are designated "Train-Lav." We are enclosing the following literature which will provide full details relative to operation, maintenance and retention system:

Koehler-Dayton, drawing 1-114995 (2 sheets);

Koehler-Dayton, overhaul manual;

Koehler-Dayton, maintenance manual.

We are also including data relating to the servicing carts used by the operating railroads to drain the toilet waste reservoir. These units are purchased from DeBoliac Engineering & Manufacturing Corp., Miami, Fla.

5. Since incorporating the above type self-contained toilet unit, starting in 1967, our R. & D. efforts have been directed only toward optimum reliability of that unit.

In reference to your questions under item 6, we cannot offer information on passenger cars now in railroad service. Previous passenger cars which we built, using old style toilet units, have been in railroad ownership for a number of years and we do not know the present condition of these cars. Therefore, we are not able to estimate costs for individual cars nor for all cars. We suggest you contact the railroad owners direct on these questions.

We hope the above information will assist in your subcommittee work and if we can be of further help please do not hesitate to contact us.

Very truly yours,

NORMAN W. FESMIRE,  
Vice President, Marketing.

PULLMAN-STANDARD  
A DIVISION OF PULLMAN INC.,  
Chicago, Ill., January 21, 1970.

Mr. H. S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee, Washington, D.C.

DEAR MR. REUSS: In reference to your inquiry of January 15, 1970, Pullman Inc., is genuinely interested in any program that will help eliminate the problem of pollution and aid in conservation of natural resources. Conservation and pollution is everyone's concern, and we shall be happy to render any assistance possible to your office in this very needed project.

In answer to your questions, we produced a total of 87 passenger railroad cars last year, which represented approximately 10 percent of the total U.S. production of such cars. All, except eight, of these cars contained no human waste disposal systems whatsoever because of the nature of their shortrun use. The eight cars built with human waste disposal systems were not of the retention or chemical treatment type systems. This is due to the fact that Pullman-Standard is a custom builder of railroad passenger cars and, as such, builds only what our customers specify. The Erie-Lackawanna Railroad, for example, has specified the use of Monogram Industries chemical treated holding tank type disposal system in their order to us for 105 commuter cars which will be delivered during a 10-month period starting in June of this year. A brochure of this system is enclosed for your inspection.

At the present moment, Pullman-Standard conducts no research or development in this area due to the fact that this is a purchased item for us and acceptable systems are already available on the market. The cost of installing such equipment on existing passenger cars is estimated to be between \$1,200 and \$1,400 per car, based on current material and labor costs. Without a great deal of investigation, we would hate to hazard a guess as to an estimate of the total cost of installing holding tank disposal systems in all railroad passenger cars without such a system.

It is our feeling that no pollution problem is too small to be ignored, and, as such, we shall be glad to assist your office with this cause in our dealings with the railroads.

Yours very truly,

ELWYN T. AHNQUIST,  
Vice President and General Manager.

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HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., January 16, 1970.

Mr. K. O. ANDERSON,  
Manager, Locomotive and Car Equipment Department,  
General Electric Co. Erie, Pa.

DEAR MR. ANDERSON: In November 1969 this subcommittee began examination of the problem of human waste disposal from interstate trains. According to a report entitled "A Report on Railroad Waste Pollution, November 1, 1969," by Monogram Industries, Inc. of Venice, Calif. (copy enclosed), our Nation's railroads are operating with only the most primitive of human waste disposal systems. That report indicates that over 50 million pounds of untreated human waste are discharged annually from locomotives and cabooses. Although that report does not include any estimate of human wastes discharged from commuter and inter-city passenger trains, even greater amounts presumably emanate therefrom. These wastes constitute a significant and avoidable source of pollution of our Nation's watersheds.

We would appreciate your providing to us the following information:

1. Number of locomotives manufactured by your company in calendar year 1969.
2. Your company's production of locomotives during calendar year 1969 represented what percentage of the total U.S. production of locomotives?
3. Describe the type of human waste disposal system installed in locomotives manufactured by your company in calendar year 1969.
4. If the system mentioned in your answer to question 3 above involves some treatment or holding of the waste, please state:
  - (a) When your company began installing such a system;
  - (b) The nature of the treatment or holding system.
5. Please describe the research and development which your company is now conducting, or has done during calendar year 1969, to improve the facilities for handling human wastes on locomotives manufactured by your company.
6. (a) Please state the estimated cost to install a holding tank type disposal system in a locomotive which lacks such a system.
- (b) Please explain the basis for your estimate.
- (c) To the best of your information, what would be the cost of installing a holding tank disposal system in all locomotives which lack such a system?
- (d) Please explain the basis for your estimate.
7. We would appreciate your views and recommendations for reducing or eliminating the discharge of untreated human wastes from railroad cars.

Sincerely,

HENRY S. REUSS,  
Chairman.

(NOTE.—Identical letters were addressed to the International Car Corp., on January 16, 1970, and to Electro-Motive Division of General Motors Corp., on January 19, 1970. Their responses follow that of the General Electric Co.)

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GENERAL ELECTRIC Co.,  
TRANSPORTATION SYSTEMS DIVISION,  
Erie, Pa., February 26, 1970.

Congressman HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee of the Committee on Government Operations, Washington, D.C.

DEAR CONGRESSMAN REUSS: The following information is furnished in reply to your letter of January 16, 1970, regarding the types of toilet systems used on loco-

motives built by the General Electric Co. The numbered paragraphs correspond to to the questions in your letter.

1. General Electric manufactured 234 locomotives for service on U.S. railroads in 1969.

2. This output represented approximately 21 percent of total U.S. production.

3. The type of waste disposal system used on locomotives is specified by individual customers, and is furnished as an optional item. The locomotives shipped last year were equipped with toilet arrangements as follows:

168—flush type;

24—dry type;

10—provision for Incinolet (electric type) to be installed by the railroad;

34—none. Presumably railroads made their own arrangements for toilet installations.

4. None of the systems applied involved holding tanks. The electric type reduces the waste to ash.

5. We depend upon the manufacturers of specialty items which are specified by the railroads, such as toilets, to do research on their equipment. We follow these developments, including presentations of information on new items, and demonstrations of new equipment, such as the Monogram holding tank type toilet.

6. (a) We estimate that the installation of a holding tank system would increase the locomotive price by approximately \$1,000.

(b) The basis for this estimate is the vendor price of the equipment, plus installation costs.

(c) (d) Assuming approximately \$1,000 per locomotive as the cost of installation, the total cost of adding this system to all locomotives would be on the order of \$25 to \$30 million for the U.S. fleet. However, one would question whether a toilet is required on every locomotive unit. Most road locomotives are operated in multiple units, so there is a crew in only the lead unit of say three locomotives on an average train.

Also, most switcher locomotives are considered not to require a toilet, since they are used in the yards where other facilities are available.

7. Toilet arrangements which will burn the waste, or hold it in a tank, are the only types which have come to our attention, which would reduce or eliminate the discharge from rail vehicles.

If we can be of any further help, please let us know.

Very truly yours,

D. R. MEIER,

Manager, Locomotive Business and Product Plan.

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INTERNATIONAL CAR CO.,  
DIVISION OF INTERNATIONAL RAMCO, INC.,  
A PART OF NATIONWIDE INDUSTRIES, INC.,  
Buffalo, N.Y., January 23, 1970.

HON. HENRY S. REUSS,  
House of Representatives,  
Washington, D.C.

DEAR SIR: In reply to your letter of January 16, 1970, regarding the problem of railroad human waste disposal on railway equipment, we offer the following information:

1. Our company built 310 new caboose cars in 1969.

2. Although definite data is not available on the total number of cabooses built in United States during 1969 in railroad and car building shops, we estimate our production for 1969 to represent approximately 75 percent of the total new cabooses produced.

3. The following types of toilets were installed in the 310 cabooses built in 1969: Dry Hoppers; Flushing Hoppers; Chemical recirculating type toilets with holding tanks.

4. (a) The chemical type with holding tank which we installed in 10 cabooses in 1969 was the first of this type used for such purpose.

(b) The treatment of the effluent is accomplished by mixing 3 gallons of water with 4 ounces of deodorizing chemical. A circulating pump provides agitation and flushing and when the holding tank reaches capacity of 14 gallons (approximately 176 uses), the holding tank is drained into a portable tank and transported to a

sewer, after which the unit is recharged. I understand from discussing this with the operating department of one particular railroad that servicing is required on a 30-day basis.

5. We do not attempt to construct toilets or hoppers for caboose cars of our manufacture. We endeavor to keep aware of any new developments in this field so that we can offer them to our railroad customers. The recirculating chemical toilets, first used in airplanes, are now entering the pleasureboat field, as well as, buses and railroad equipment. We are watching this development with interest.

In the past we have installed at least two types of incinerating toilets but after a few years of service, the railroads using same objected to the high maintenance cost and obnoxious odors emanating from the vent. Many years ago we made an application, in a series of cabooses, which consisted of a flushing hopper with a large holding tank mounted under the car. This too was a high maintenance item and required frequent servicing.

6. (a) The estimated cost of installing a holding tank type disposal system in a new caboose varies from \$700 to \$800 per car, depending on type installed. One particular brand is air operated and another electrically operated.

(b) The estimate stated in 6(a) is based on installations made at our shop in 1969.

(c) In order to give an approximate cost of installing holding tank disposal systems in all cabooses, it would be necessary to know how many cabooses not so equipped are operating in the United States.

Monogram Industries in their report "Railroad Waste Pollution" mentions 15,000 such units and, using this figure, the total cost would be approximately \$12 million. In addition to cost of installation, the railroads would be subjected to cost of servicing the holding tanks on a periodic schedule of 30 days or less.

(d) See 6(c).

7. In my opinion the waste disposal problem is only critical in stations, yards, and when passing through cities or other densely populated areas. Possibly through a public health service regulation it could be made mandatory that the doors to toilet compartments be locked or, at least that the toilets not be used at these times. Railroad personnel are accustomed to complying with various operating rules, safety rules, and so forth and would abide by such regulation after some education on the subject from their supervisors.

The problem of dumping raw waste in rural or other remote areas is of considerably less importance when you consider wild life and domestic animals contributing substantially more excrement in these areas. In fact, I have ridden caboose cars and noted the number of dead and decaying carcasses of raccoons, skunks, rabbits, and so forth along the right of way. This, of course, is uncontrollable.

From my past experience in riding cabooses, I have noted that generally the train crew in the caboose is composed of two men, occasionally three, and their entire run on thru train consists of 2½ to 4 hours. Normally the toilet is not used during such runs.

Monogram has prepared a good presentation, however, I take some exceptions, as follows:

Page 6.—"If railroads can directly dump raw human excrement on the land, why is it required that buses and aircraft retain all wastes?"

This is not a fair comparison, particularly in view of the railroads owning and paying taxes on their right-of-way, whereas, buses are using public highways and airplanes, as well, are well subsidized. This does not relieve the railroads of the problem in populated areas but at least "apples should be compared with apples."

Page 9.—The facts as well as the arithmetic is faulty. We did not produce 350 cabooses in 1969 and 350 were not built elsewhere. Even if 700 had been built 95 would not equal 750 new cabooses with toilets dumping directly onto the tracks.

Page 10.—The housekeeping in the toilet room does not pertain to the subject. Pages 13 and 14.—The number of uses is grossly overstated based on my experience and other information.

To the best of my knowledge flushing hoppers on cabooses, locomotives, and passenger cars use 2 to 3 quarts of water per flush not 3 gallons as reported.

The above information and opinions are my own and if any additional facts are required, please feel free to communicate with me.

Very truly yours,

KARL F. LONG,  
President.

GENERAL MOTORS CORP.,  
ELECTRO-MOTIVE DIVISION,  
La Grange, Ill., March 2, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee,  
Washington, D.C.

DEAR MR. REUSS: In answer to your letter of January 19, 1970, requesting information concerning the type of human waste disposal systems applied by Electro-Motive Division, following are comments on the seven items listed in your letter.

1. During the calendar year of 1969, Electro-Motive manufactured a total of 971 locomotives.

2. The 971 locomotives manufactured during the calendar year of 1969 represented 83 percent of the total locomotives produced in the United States.

3. In the calendar year of 1969, Electro-Motive installed the following types of human waste disposal systems:

- (a) Flush type.
- (b) Electric incinerating type.
- (c) Dry type.
- (d) Chemical type.

4. Of the four waste disposal systems installed on Electro-Motive's locomotives during the calendar year of 1969, only the electric incinerating and chemical types involve treatment and holding of the waste. The nature of treatment and holding systems for the electric incinerating and chemical types are described below:

#### ELECTRIC INCINERATING TYPE

The electric incinerating system incorporates an electric heating coil which is thermostatically controlled. The waste created as a result of the incinerating process is deposited in an ash pan, which requires emptying approximately once every 60 days, according to the manufacturer.

#### CHEMICAL TYPE

The recirculating chemical type, which is the only type Electro-Motive has applied to date, contains an initial fluid charge of 2 gallons of water-chemical mixture. This unit is allowed to build up its initial 2-gallon charge to 5 gallons before dumping is required.

The first application of an incinerator system was made by Electro-Motive in February 1964. The first and only application of a chemical system was made in December 1969.

5. Since the human waste disposal system has no function in the basic job performed by a locomotive—that of providing a power source to move trains—it has been Electro-Motive's policy to consider the waste system as a modification to be provided at the request of our railroad customers. Likewise, due to several different models and types available, the system selection is also left up to the customer.

Inasmuch as the human waste disposal system is not considered a basic part of our locomotive, we do not have a design development program. Waste disposal systems are specified by the locomotive user. Therefore, the design, development, and marketing of locomotive human waste systems are left up to the individual equipment manufacturer. Our only engineering function has been to design the application of these units to our locomotive.

We do, however, make ourselves available to consult with the vendors in order to make their product designs applicable to locomotive configuration and service conditions to the best obtainable degree.

6. We are unable to provide an estimated cost to install a holding tank disposal system on our locomotives. We have never made such an installation and substantial redesign of the underframe structure would be required to accomplish it. We are, therefore, unable to make an intelligent estimate at this time.

7. We believe in order to retain the waste or to reduce the effective pollution by this waste, the most practical method would be to use either the chemical or an incinerating waste disposal system. To date the incinerating type has not been 100-percent satisfactory, according to our customer reports and our experience. This, however, does not mean that improvements in the future will not make them more acceptable. The recirculating chemical types are relatively new

in the locomotive field and sufficient field experience is not available to evaluate them properly. They do appear to be progressing rapidly and could be of great use in the future.

Enclosed you will find material describing these various systems.

I trust this information will be helpful to the Subcommittee on Conservation and Natural Resources.

Yours very truly,

B. B. BROWNELL.  
*Vice President.*

(NOTE.—The enclosures referred to are in the subcommittee files.)

## APPENDIX IX.—ADDITIONAL COMMUNICATIONS

AIR TRANSPORT ASSOCIATION OF AMERICA,  
Washington, D.C., July 15, 1970.

Mr. F. C. DINSMORE,  
Legal Assistant, Conservation and Natural Resources Subcommittee,  
Washington, D.C.

DEAR MR. DINSMORE: In reply to your inquiry concerning information on the disposal of human wastes and the disposal systems utilized by airline aircraft, attached is a "Handbook on Sanitation of Airlines," prepared and published by the Public Health Service. In particular, pages 23-28 are concerned with the above subject. This publication was produced in 1964 and is now in the process of being revised.

Wastes on airline aircraft are deposited into a tank-type container under the aircraft lavatory and mixed with antibacterial and deodorizing chemicals where they are changed into liquid or slush by a garbage disposal-type grinder in the aircraft. On the ground, this waste is transferred to a sewage tank truck, as shown on page 25 of the attached publication. The typical tank truck has a capacity of 150 to 350 gallons. Most trucks are equipped with a complete antibacterial, deodorizing, flushing and rinsing system. The waste is then transferred to the triturator (waste disposal area) or incinerator, and from there is disposed of by the local city sewage system. The aircraft lavatory is cleaned by flushing and refilling both tank and lavatory units.

The periods of use of the waste holding system, or lavatory tank, before servicing is required, depends primarily on the duration of flight and the number of people aboard. For example, on a transcontinental or international flight, the system is serviced at the turnaround point. If the schedule involves flights of short duration and little usage of the lavatory, the system will not be serviced at every stop. Normal operating procedures is to service the system three or four times a day.

The cost figures for airline disposal systems also vary. The airlines, at some locations, pay a usage fee for the triturator and at other locations it is owned by the airlines. Prices for the sewage tank truck range from \$7,000 to \$15,000. The number of such tank trucks depend on the location; for example, Pan American has eight trucks at Kennedy Airport, four in London, one in Paris, and one in Frankfurt. For detailed information on costs, exact prices may be obtained from the manufacturer.

The three companies of which you inquired (Monogram Systems, Inc., Cohler/Dayton, and Electrolux Consolidated Foods Corp.) are suppliers to the airlines. In addition, other suppliers of aircraft disposal systems and ground disposal equipment include Wollard Aircraft Equipment Corp., Miami, Fla.; Accessory Control and Equipment Corp., New Britain, Conn.; DeBolac Co., Miami, Fla.; General American Transportation Corp., Niles, Ill.; and John Bean Division of the FMC Corp., San Jose, Calif. Some limited equipment is also purchased overseas by U.S. international air carriers.

The airlines are investigating, and have flight tested, two new aircraft waste disposal systems which actually burn off waste in flight. These systems need more refinement and testing before they become operationally reliable, but there is a possibility that airlines will use these systems after they are proven safe and reliable.

I hope the above will be of assistance. I might suggest that if you need further detailed information, it may be obtained from the manufacturers listed above.

Sincerely,

H. GRADY GATLIN,  
Director of Operations.

THE AMERICAN SHORT LINE RAILROAD ASSOCIATION,  
Washington, D.C., July 23, 1970.

Mr. F. CLEMENT DINSMORE,  
Professional Staff Member,  
Subcommittee on Conservation and Natural Resources,  
Washington, D.C.

DEAR MR. DINSMORE: I appreciate the opportunity of finally getting around to chat with you if only for a few minutes. Enclosed is a tabulation of the mileage represented by our membership. As you can see, "time on the road" would not necessarily be too long. Most of our members are feeder-type lines dependent on their trunkline connections. Some are primarily switching carriers.

As to our membership, discharge of raw human waste from railroad cars (and in the short-line area we are speaking of freight service) has insignificant impact on ecology or unpleasant public effects. Time on duty usually precludes the usage of other than fixed sanitary facilities.

Any views I bring due to my past experience in trunkline service would simply echo the testimony to be presented by the Association of American Railroads.

Yours truly,

P. H. CROFT, *President.*

HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE,  
COMMITTEE ON GOVERNMENT OPERATIONS,  
Washington, D.C., July 23, 1970.

Mr. TAYLOR SOOP,  
Executive Secretary,  
Railway Labor Executives Association,  
Washington, D.C.

DEAR MR. SOOP: The Conservation and Natural Resources Subcommittee has been investigating the widespread practice of discharge of raw human wastes from railroad cars, its health and environmental effects, and the means of remedying such practice.

The subcommittee has therefore scheduled a hearing on this subject on Tuesday, July 28, 1970, 10 a.m. in room 2247 of the Rayburn House Office Building, Washington, D.C.

We are interested in the following topics:

1. How does the discharge of raw human wastes from railroad cars (a) affect public health; or (b) contribute to the pollution of surface or ground waters; (c) what other environmental effects such as offense to sight and smell, particularly in or near railway stations, result from such discharge?
2. What kinds of toilet systems are now available which retain, or retain and treat, human waste rather than discharge it directly from railway cars?
3. Information concerning the following facts:

TOTAL NUMBER OF CARS

Type of car	Has retention type system	Has retention and treatment system	Has neither type system
1. Locomotive.....			
2. Caboose.....			
3. Commuter.....			
4. Intercity passenger:			
(a) Coach.....			
(b) Sleeper.....			

4. What would be the capital, installation, and operating costs of these different toilet systems for the entire railroad industry? And per car?

5. Should the Commissioner of Food and Drugs revise the Interstate Quarantine Regulation (42 CFR 72.154) to prohibit the discharge of untreated wastes from railroad trains?

The hearing record of the subcommittee will remain open for 10 days after the hearing. If you wish to submit a statement for the record on the subject of human waste disposal from trains, we would appreciate your sending it to us in four copies, typed on one side, double spaced.

Sincerely,

HENRY S. REUSS,  
Chairman.

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RAILWAY LABOR EXECUTIVES' ASSOCIATION,  
Washington, D.C., August 5, 1970.

HON. HENRY S. REUSS,  
Chairman, Conservation and Natural Resources Subcommittee, Committee on Government Operations, Washington, D.C.

DEAR CHAIRMAN REUSS: In accordance with your letter of July 23, 1970, enclosed is original and four copies of a statement by Mr. C. J. Chamberlain, president, Brotherhood of Railroad Signalmen, on the subject of human waste disposal from trains.

Sincerely,

J. TAYLOR SOOP,  
Executive Secretary.

STATEMENT OF CHARLES J. CHAMBERLAIN, PRESIDENT, BROTHERHOOD OF RAILROAD SIGNALMEN, BEFORE THE CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE OF THE COMMITTEE ON GOVERNMENT OPERATIONS, AUGUST 4, 1970

My name is Charles J. Chamberlain, and I am president of the Brotherhood of Railroad Signalmen with offices at 2247 West Lawrence Avenue, Chicago, Ill.

My comments are in response to the inquiry dated July 23, 1970, addressed to Mr. Taylor Soop, executive secretary, Railway Labor Executives' Association by the Honorable Henry S. Reuss, chairman of the Conservation and Natural Resources Subcommittee. Comments were solicited on, among others, the topic of how the discharge of raw human wastes from railroad cars affects public health.

The Brotherhood of Railroad Signalmen represents more than 99 percent of the railroad employees in the United States who are employed today in the craft of railroad signaling. This organization is one of the international standard railroad labor unions affiliated with the AFL-CIO and the Railway Labor Executives' Association.

The Brotherhood of Railroad Signalmen was founded in 1901, and since its inception has represented highly skilled craftsmen who perform work necessary to the safe and efficient operation of the Nation's railroad industry. Today, we represent signalmen on virtually every railroad and switching and terminal company in the United States. Presently there are approximately 12,000 signal employees working on the Nation's carriers.

Many pages could be written describing the various types of signaling systems which are installed and maintained by our craft, all of which contribute immeasurably to the safety, efficiency, and economy of the carrier's operations. However, in order to keep this statement brief, I shall say only that, among others, these systems include automatic block signals, centralized traffic control, automatic train control, traffic control, interlockings, automated classification yards, and detector devices which indicate hazards to train operations where defects or unusual conditions arise with respect to the track, structures, and rolling stock.

For the most part, signalmen work either alone or in small groups over a territory comprised of several miles of line of road. Because the control of the systems is usually from some sort of office, a signalman works in such offices as well as along the right-of-way. He comes in personal contact with control operators, dispatchers, operating personnel, and other craftsmen who work along the right-of-way.

Signal systems with which this statement deals have a direct physical connection to the tracks over which trains operate. This connection is through devices which are installed on the crossties in the track and attached to the track by means of rods.

Inspections and adjustments of the signal devices are made regularly by signalmen in order to assure compliance with specifications designated by the carriers' engineering departments and the Federal Railroad Administration. Covers must

be removed before inspection can be made, and adjustments are accomplished by moving adjusting nuts on the connecting rods. The covers and adjusting nuts are exposed.

The devices used in signal systems, located at trackside, are generally installed between 24 and 30 inches from the rail in order to avoid, as much as possible, damage from equipment which might be loose and dragging from railroad cars. This location, however, has the disadvantage of placing these devices where they catch human wastes as they are discharged from railroad cars. The covers of the devices and connecting rods often are covered with such human wastes when a signalman must make his periodic inspections and adjustments.

In a situation where a signalman must make an inspection and adjustment to a signal device which is contaminated with human waste, he not only exposes himself to such contamination, but it also gets on his tools and clothing. Inasmuch as washrooms are not always nearby when contamination of this sort occurs, considerable time can elapse before a signalman can clean himself and his tools. Furthermore, in his contact with fellow workers the contamination can be passed from the signalman to others either by personal contact or through the use by others of his tools. The person to whom such contamination is passed might be totally unaware of its presence and fail to take the necessary steps for its sanitary removal.

It would be the suggestion of the Brotherhood of Railroad Signalmen that all cars capable of receiving human wastes should be equipped with toilets which are equipped to chemically dispose of these wastes or store them until they can be properly flushed into a sanitary sewer system.

I wish to thank the subcommittee for their courtesy in extending me the opportunity of presenting my views on this important matter.

JULY 28, 1970.

Hon. HENRY S. REUSS

*Chairman, Conservation and Natural Resources Subcommittee, House Committee on Government Operations, Washington, D.C.*

DEAR CONGRESSMAN REUSS: Today's testimony on railroad raw sewage disposal by the Food and Drug Administration's Commissioner, Charles C. Edwards raises serious questions regarding the integrity of the FDA. The testimony was not a presentation of a public health agency but the snivelling, cowering commentary of a politicized bureaucracy taking orders from the Association of American Railroads.

First and foremost, Dr. Edwards reversed his public health specialists and 300 years of public health science by stating that there was no evidence linking the discharge of such human waste with communicable diseases. Consequently, he stated the FDA could not proceed to do what it has done for airplanes and buses—ban the discharge of raw human wastes. This is sheer political chicanery by the Department of Health, Education, and Welfare. Dr. Edwards summarily reversed his own specialists in FDA who have been demanding a prohibition on railroad discharge or raw human excrement. This includes Harry Haverland who is in charge of interstate carrier sanitation of the Public Health Service. These specialists were reversed in the flimsiest, most contradictory testimony that I have ever read by a Federal official. In his brief six page statement, Dr. Edwards flip-flopped several times, alternately stating that such raw sewage was exposing people to health hazards and then saying that there was no public health menace.

Clear evidence that Commissioner Edwards bowed to external pressure is indicated in a letter dated January 20, 1970 to Dr. Wallace Lane, director of the Washington State Department of Health by Frank W. Mackison of the Bureau of Compliance of the FDA. At that relatively early date, the Public Health Service had made up its mind that the railroad's dumping of human waste on trackbeds had to be prohibited. In his letter, Frank W. Mackison stated:

Section 72.154 of the Interstate Quarantine Regulations deals with this subject. The regulations do not prohibit the discharge of waste from railroad equipment except in certain defined areas. However, the Public Health Service has gone on record as opposing the practice of discharging such waste on trackbeds. In this regard we believe that the most desirable waste disposal method would be the retention of the materials on the conveyance with ultimate disposal at approved servicing areas. This would not, however,

preclude the use of other types of equipment which would provide an equally acceptable means of disposing of the waste material.

In regards to the future, the Food and Drug Administration has been working with the legal staff to develop a regulation which will prohibit the discharge of human waste on trackbeds.

The gloating, private assurances by Washington-based railroad lobbyists that they have the FDA well in hand proved correct. Commissioner Edwards declared that 300 years of public health policy stops short to permit the continuance of the railroads' exclusive right to defecate on the open and in crowded railroad station areas. Every other commercial or industrial firm is prohibited from dumping raw human sewage on the open land. Railroads, wallowing in mismanagement and historic arrogance, are rewarded with a resounding surrender by FDA. Although it is relatively easy to make usable estimates of cost, the FDA chose to rely on the Association of American Railroads' figures without beginning to question how they were aggregated and what costs were duplicated. FDA then proceeded to ignore other much lower estimates by suppliers of sanitary equipment as if they were totally irrelevant.

Mr. Chairman, I believe that both the testimony by Dr. Edwards and the Association of American Railroads should be given critical scrutiny by your staff against the information supplied you for the record over the past few months and the aforementioned letter of Mr. Mackison. Questions should be addressed to Dr. Edwards concerning precisely how his decision was reached, why he adopted the industry's noninvestment policy re sanitation, how many meetings were held with railroad officials in private, their date and location, and why railroads should be outside the law that other common carriers have to observe. Also, Dr. Edwards should be requested to supply you with a compliance report regarding the quarantine regulation that requires toilets to be locked when the conveyances are at a station or servicing area. The evidence is that this regulation is violated routinely and openly. Finally, he should be asked why the FDA has not designated areas where there shall be no discharge of raw sewage (such as near reservoirs) as provided by existing regulations.

The burden of proof is on the railroads to show the neutrality or value, from a public health standpoint, of dumping raw sewage on the open land. They have never upheld this burden nor do they even see it as a responsibility. The FDA has never required this burden to be met and in this knowing default has broken trust with the American people. Furthermore, Dr. Edwards showed no concern over worker exposure to such raw sewage when laboring to maintain the tracks. In short, Dr. Edwards disgraced the public health profession in the Public Health Service for whom he spoke. The subcommittee should require solid answers to these important questions.

Thank you.

Sincerely,

RALPH NADER.

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FOOD AND DRUG ADMINISTRATION,  
BUREAU OF COMPLIANCE,  
January 20, 1970.

WALLACE LANE, M.D.,  
*Director, Department of Health,  
State of Washington,  
Olympia, Wash.*

DEAR DR. LANE: As you know, Mr. Milton E. Held of our San Francisco Regional Office referred your letter of December 3, 1969, regarding waste disposal from trains to me for reply. I regret the delay in responding to your letter and take this opportunity to provide you with our views on the subject as you requested.

Section 72.154 of the Interstate Quarantine Regulations deals with this subject. The regulations do not prohibit the discharge of waste from railroad equipment except in certain defined areas. However, the Public Health Service has gone on record as opposing the practice of discharging such waste on trackbeds. In this regard, we believe that the most desirable waste disposal method would be the retention of the materials on the conveyance with ultimate disposal at approved servicing areas. This would not, however, preclude the use of other types of equipment which would provide an equally acceptable means of disposing of the waste material.

Although the practice of discharging waste from existing railroad equipment onto the trackbeds continues, this is not the case with new prototype trains such as the Metroliner and TurboTrain. During the designing stage of these trains, we worked with the railroads and the Department of Transportation in developing a satisfactory means of handling waste. They are operating today with waste retention facilities. Disposal of the waste and sewage is at designated areas.

In regards to the future, the Food and Drug Administration has been working with the legal staff to develop a regulation which will prohibit the discharge of human waste on trackbeds.

Sincerely,

FRANK W. MACKISON,  
*Acting Deputy Chief, Interstate Travel Sanitation Branch,  
Division of Sanitation Control, Office of Control and Guidance.*

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UNITED TRANSPORTATION UNION,  
WASHINGTON OFFICE, NATIONAL LEGISLATIVE DEPARTMENT,  
*Washington, D.C., August 12, 1970.*

HON. HENRY S. REUSS,  
*Chairman, Subcommittee on Conservation and Natural Resources,  
Washington, D.C.*

DEAR CHAIRMAN REUSS: The United Transportation Union is 100 percent in support of any movement which will bring an end to the pollution of America's railroad rights-of-way by the practice of discharging human waste and litter through the open chute toilet facilities on the vast majority of railroad engines, passenger cars, camp cars, and cabooses.

No case has to be made that human waste contains germs and, when deposited in the open—along railroad tracks, can pollute the watersheds from which comes our drinking water and is a source of disease to be spread by birds and insects.

Any employee whose duties require him to walk the rights-of-way at night has had the unpleasant experience of stepping in this waste deposit along the tracks. In addition to the unsanitary aspects of spreading waste along the railroads' rights-of-way, one must consider the unpleasant sight of such waste to persons in stations and at railroad highway grade crossings.

This form of pollution is a menace to the health of both the employees and the general public. It can be eliminated easily and completely by control at the source—utilizing toilets equipped with waste retention systems like those now in use on airlines and buses, or facilities equipped with gas or electric burners which reduces waste to an odorless, bacteria-free ash. The method employed is not the concern of those who would put an end to this dangerous pollution. The fact is that means do exist to eliminate the problem and it should be done as soon as possible.

We appreciate the opportunity to express our views on this matter and will lend our wholehearted support to any measure requiring the installation of sanitary waste retention or disposal toilet facilities on all railroad engines, passenger cars, camp cars, and cabooses in the United States.

Respectfully yours,

AL H. CHESSEY,  
*National Legislative Director.*

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CONGRESS OF THE UNITED STATES,  
HOUSE OF REPRESENTATIVES.  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
RAYBURN HOUSE OFFICE BUILDING,  
*Washington, D.C., July 30, 1970.*

MR. RALPH NADER,  
*Washington, D.C.*

DEAR MR. NADER: We are returning to you, enclosed, the copy of the letter of May 8, 1970, from Mr. M. J. Ryan, Acting Director, Office of Legislative Services, Department of Health, Education, and Welfare to Senator George Murphy. Thank you for making it available to the subcommittee.

In your testimony before the subcommittee you stated:

"I might add that Japan, Canada, and the nations of Western Europe are far stricter in present and prospective requirements for their railroads. Sweden, for example, bans direct dumping of sewage."

You also stated:

"The cost of installing the minimum requirement retention toilets, materials and labor, is about \$50 per unit."

You further stated:

"Although figures vary on how much it would cost to put the most elementary retention toilets in existing facilities, plus servicing, I do not think that the entire cost would exceed \$15 million per year."

We would appreciate your supplying to us the following:

1. When did Sweden ban direct dumping of sewage from trains? Please send copy of regulation, if possible, or citation to regulation.
2. What do other nations of Western Europe require, or what have they announced they will require, of the railroads as to waste disposal?
3. Please describe a "minimum requirement retention toilet."
4. What is the basis for your installation cost figure of \$50 per toilet?
5. Please explain how you arrived at the figure of \$15 million as your estimate of the capital and servicing cost for "the most elementary retention toilets" in railway cars lacking such toilets.

We would appreciate your early response.

Sincerely,

HENRY S. REUSS, *Chairman,*  
*Conservation and Natural Resources Subcommittee.*

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CONGRESS OF THE UNITED STATES,  
HOUSE OF REPRESENTATIVES,  
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE  
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,  
RAYBURN HOUSE OFFICE BUILDING,  
Washington, D.C., August 11, 1970.

Dr. CHARLES C. EDWARDS,  
*Commissioner of Food and Drugs,*  
*Food and Drug Administration,*  
*Rockville, Md.*

DEAR DR. EDWARDS: The subcommittee appreciated receiving your testimony on July 28, 1970, on the question of prohibiting the discharge of untreated human wastes from trains.

After a review of the hearing record and past correspondence, we find, however, that the position of the FDA on prohibiting such discharges from trains is not clear.

In your letter to us of April 22, 1970, in reply to several questions posed by the subcommittee, you stated:

\* \* \* In addition, we are now working with our legal staff to *revise the Interstate Quarantine Regulations to prohibit the discharge of human wastes from trains* (answer to question 8).

\* \* \* \* \*  
We would *recommend that all wastes, garbage, and other polluting material be retained aboard the car until it can be disposed of in a sanitary manner at an approved location* (answer to question 11) (underlining supplied).

Further, you indicated at the July 28 hearing that the position of the Food and Drug Administration continued to be as described by Mr. M. J. Ryan, Acting Director, Office of Legislative Services, Food and Drug Administration, to Senator George Murphy of California in a letter dated May 8, 1970, as follows:

The regulation (42 CFR 72.154) as now written does not prohibit the discharge of waste from railroad equipment except in certain definite areas. Since assuming responsibility in this area in 1969, the *Food and Drug Administration has proposed a revision of this section.*

*Such action will impose restrictions similar to those now in existence for airplanes and buses. We will move forward with this proposal as quickly as possible (emphasis added).*

However, the above statements are not consistent with the actions which FDA, according to your testimony at the July 28 hearing, will take, as following:

1. (a) FDA will publish in the Federal Register: "a notice of proposed rulemaking requiring that railroad passenger cars, locomotives and cabooses *constructed after December 1971* be fitted with full retention facilities when sanitary facilities are required" (underlining supplied); and

(b) Mr. Nader's petition, "inviting comments and whatever evidence he, the scientific community, or anyone else may have on this matter and on the magnitude and complexity of retrofitting."

2. FDA will continue discussions with other Federal agencies and the railroads "regarding the complexity of installing retention facilities on existing railroad conveyances having sanitary facilities."

In order that the subcommittee will completely understand FDA's position on this problem, we would appreciate your prompt response to each of the following questions and points:

1. Will the FDA publish proposed regulations to prohibit the discharge of wastes from all trains regardless of when they were constructed?

2. If your reply to question (1) is yes, please:

(a) State when you expect to publish such proposed regulations.

(b) How much time will you allow railroad companies to comply with the regulations (i) as to new cars and (ii) as to cars already constructed?

3. If your reply to question (1) is no, please provide to us:

(a) Your explanation as to why FDA has changed its position from that stated last April 22 and May 8;

(b) The technical, scientific, and other data used by FDA in reaching this changed position, including copies of all letters, memoranda, or other comments received from every railroad company or trade organization and every railroad car manufacturer concerning this subject since January 1, 1969;

(c) A statement of the average life expectancy of (i) railroad passenger cars, (ii) locomotives, and (iii) cabooses constructed;

(d) A statement estimating how long it will take to eliminate the problem of waste discharges from trains if full retention or treatment facilities are required only on the above types of cars constructed after December 1971; and

(e) A statement explaining why you would delay requiring refitting until 1972 construction.

4. (a) Why have neither you nor the Surgeon General designated any area in which the present regulation (42 CFR 72.154) would prohibit the "discharge of excrement, garbage, waste water or other pollution material" from trains?

(b) Since the problem cannot be fully eliminated until all cars are fitted with retention or treatment facilities, please state the areas you will designate in which discharges of untreated wastes will be prohibited?

5. Please refer to completed table B, "Actions by Department of Health, Education, and Welfare Against Alleged Violations of 42 CFR 72.141 and 72.154 During Fiscal Years 1965-1970," which you enclosed with your letter to us April 22, 1970. That table shows that, while there were 93 violations during those fiscal years, none of the "enforcement actions" listed resulted in prosecutions under 42 U.S. Code 271(a) which provides a fine, or imprisonment, or both, for such violations. Yet, in many instances, there were repeated violations in the same area by the same carrier.

(a) Why hasn't FDA sought to prosecute these carriers (i) for each of these violations, or (ii) at the very least, for repeated violations by the same carrier at the same location?

(b) Will the FDA now establish a policy of vigorously enforcing its regulations through the use of 42 U.S. Code 271(a)?

Sincerely,

HENRY S. REUSS, *Chairman,*  
*Conservation and Natural Resources Subcommittee.*

(NOTE.—No responses to the above letters to Mr. Nader and Dr. Edwards had been received at the time this hearing record was printed.)

