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UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

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EXPECTED AT 10:00 A.M., EDT  
WEDNESDAY, JUNE 27, 1979

STATEMENT OF  
HENRY ESCHWEGE, DIRECTOR *GAO 00130*  
COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION

BEFORE THE  
SUBCOMMITTEE ON OCEANOGRAPHY  
OF THE  
HOUSE MERCHANT MARINE AND FISHERIES COMMITTEE

*HSEC 2764*

ON

[STATUS OF EFFORTS TO PHASE OUT  
OCEAN DUMPING OF MUNICIPAL SEWAGE SLUDGE]



MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE:

WE ARE HERE TODAY AT YOUR REQUEST TO DISCUSS OUR REVIEW OF THE STATUS OF EFFORTS TO PHASE OUT THE OCEAN DUMPING OF MUNICIPAL SEWAGE SLUDGE BY DECEMBER 31, 1981, AS MANDATED BY THE NOVEMBER 1977 AMENDMENT TO THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, COMMONLY REFERRED TO AS THE "OCEAN DUMPING" ACT.

BEFORE ADDRESSING DIRECTLY THE QUESTIONS POSED IN THE COMMITTEE'S REQUEST, I WOULD LIKE TO PROVIDE SOME OVERALL PERSPECTIVE ON THE SLUDGE DUMPING ISSUE.

BACKGROUND

AS YOU KNOW, THE PURPOSE OF THE ACT IS TO PREVENT OR STRICTLY LIMIT THE OCEAN DUMPING OF ANY MATERIAL WHICH WOULD ADVERSELY AFFECT HUMAN HEALTH, WELFARE, OR AMENITIES, OR THE MARINE ENVIRONMENT, ECOLOGICAL SYSTEMS, OR THE ECONOMIC POTENTIAL OF OUR OCEAN RESOURCES.

EPA ~~AGE~~ AGC00024  
~~156-011~~

*Testimony  
005804*

MUNICIPAL SEWAGE SLUDGE, THE RESIDUE RESULTING FROM WASTEWATER TREATMENT, OFTEN CONTAINS TOXIC MATERIALS, INCLUDING HEAVY METALS, SUCH AS MERCURY AND CADMIUM; CHLORINATED HYDROCARBONS, SUCH AS PCBs AND SOME PESTICIDES; AND PATHOGENIC ORGANISMS.

OCEAN DUMPING OF MUNICIPAL SEWAGE SLUDGE HAS ADVERSELY AFFECTED THE MARINE ENVIRONMENT, CLOSED EXTENSIVE AREAS TO SHELLFISHING, AND CONTRIBUTED TO CONDITIONS SUCH AS THOSE IN 1976 WHICH RESULTED IN THE MASSIVE FISH KILL OFF THE COAST OF NEW JERSEY AND THE CLOSING OF SOME BEACHES ON LONG ISLAND. WE HAVE ALSO REPORTED PREVIOUSLY ON PROBLEMS ENCOUNTERED IN ASSURING THAT DUMPING OPERATIONS TAKE PLACE AT DESIGNATED SITES AND ARE CARRIED OUT IN A MANNER DESIGNED TO MINIMIZE ADVERSE ENVIRONMENTAL IMPACT.

THESE FACTORS ALONE SUPPORT THE DISCONTINUANCE OF SLUDGE DUMPING. IN ADDITION, OTHER FEDERAL STATUTES, SUCH AS THE RESOURCE CONSERVATION AND RECOVERY ACT AND THE CLEAN WATER ACT, RECOGNIZE THAT SLUDGE CONTAINS RECOVERABLE RESOURCES AND ENCOURAGE THE BENEFICIAL USE OF SLUDGE. OCEAN DUMPING DISREGARDS THIS POTENTIAL.

OF COURSE, SLUDGE DUMPING IS NOT THE ONLY SOURCE, OR EVEN THE MOST SIGNIFICANT SOURCE, OF MARINE POLLUTION. IN THE NEW YORK BIGHT, FOR EXAMPLE, MORE THAN 7 MILLION WET TONS OF DREDGED MATERIAL WERE DUMPED IN 1978 AT A SITE ONLY 7 MILES FROM SHORE. IN TERMS OF VOLUME, THIS EXCEEDED THE AMOUNT OF SLUDGE DUMPED IN THE BIGHT. FURTHER, 500 MILLION GALLONS OF RAW SEWAGE ARE DISCHARGED TO THE AREA EACH DAY BY NEW YORK CITY AND COMBINED SEWER OVERFLOWS ALSO RELEASE SIGNIFICANT ADDITIONAL AMOUNTS OF SEWAGE SOLIDS TO THE MARINE ENVIRONMENT.

TO CONTROL OCEAN DUMPING, INCLUDING SLUDGE DUMPING, THE ACT ESTABLISHED A PERMIT SYSTEM AND ASSIGNED PRIMARY RESPONSIBILITY FOR ADMINISTRATION OF THE PERMIT SYSTEM TO THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THE 1977 AMENDMENT WAS STIMULATED BY CONGRESSIONAL CONCERN THAT MUNICIPALITIES WERE NOT MOVING RAPIDLY ENOUGH TOWARD IMPLEMENTING ALTERNATIVES WHICH WOULD ALLOW THEM TO STOP OCEAN DUMPING AS SOON AS POSSIBLE; A STATUTORY REQUIREMENT TO END OCEAN DUMPING WAS CONSIDERED TO PROVIDE AN ADDITIONAL INCENTIVE.

AT THE PRESENT TIME, SLUDGE DUMPING IS CONFINED TO TWO SITES IN THE ATLANTIC OCEAN; SLUDGE IS NOT DUMPED IN THE PACIFIC OCEAN ALTHOUGH IT IS DISCHARGED TO THE OCEAN THROUGH OUTFALLS IN SOUTHERN CALIFORNIA. ONE ATLANTIC SITE, 12 MILES OFF THE COAST OF NEW JERSEY AND LONG ISLAND (IN THE NEW YORK BIGHT), IS USED BY 25 MUNICIPALITIES AND SEWERAGE AUTHORITIES IN THE NEW YORK CITY/NORTHERN NEW JERSEY AREA. THIS SITE HAS BEEN IN USE SINCE 1924. THE OTHER DUMP SITE, 35 MILES OFF THE DELAWARE/MARYLAND COAST, IS USED ONLY BY THE CITY OF PHILADELPHIA. THIS SITE HAS BEEN IN USE SINCE 1973; BETWEEN 1961 AND 1973, PHILADELPHIA DUMPED ITS SEWAGE SLUDGE AT A SITE CLOSER TO SHORE.

OVERALL, EXISTING SLUDGE DUMPERS SERVE A POPULATION OF ABOUT 15 MILLION, PLUS THOUSANDS OF INDUSTRIAL CUSTOMERS. IN 1978, ABOUT 5.4 MILLION WET TONS OF MUNICIPAL SEWAGE SLUDGE WERE OCEAN DUMPED. TEN MAJOR DUMPERS ACCOUNTED FOR 97 PERCENT OF THIS VOLUME. ATTACHMENT I CONTAINS A BREAKDOWN OF THE OCEAN DUMPERS.

TO ASSIST IN PHASING OUT SLUDGE DUMPING, EPA HAS CONDUCTED  
RESEARCH AND DEMONSTRATIONS OF LAND-BASED MUNICIPAL SLUDGE TREATMENT,  
DISPOSAL, AND UTILIZATION ALTERNATIVES. FURTHER, EPA HAS PROVIDED OVER  
\$8 MILLION TO MUNICIPALITIES AND SEWERAGE AUTHORITIES IN NEW YORK AND  
NEW JERSEY TO ASSIST IN DEVELOPING SPECIFIC SLUDGE MANAGEMENT PLANS.  
FEDERAL FUNDS ARE ALSO AVAILABLE TO DESIGN AND CONSTRUCT FACILITIES  
NEEDED TO IMPLEMENT THESE PLANS. THESE PLANS ARE BEING DEVELOPED,  
HOWEVER, BEFORE

- EPA'S LAND APPLICATION AND LANDFILLING REGULATIONS  
APPLICABLE TO SLUDGE HAVE BEEN FINALIZED,
- THE EFFECTS OF INDUSTRIAL WASTE PRETREATMENT ON THE  
QUALITY OF MUNICIPAL SEWAGE SLUDGE ARE KNOWN, AND
- QUESTIONS RELATED TO EMERGING COMBUSTION PROCESSES  
HAVE BEEN ANSWERED.

ALSO, SOME CURRENT DUMPERS CONTINUE TO HAVE DOUBTS WHETHER THE  
LAND-BASED ALTERNATIVES THEY PROPOSE TO ADOPT ARE AS ENVIRONMENTALLY  
SOUND AS CONTINUED OCEAN DISPOSAL.

EPA HAS TAKEN ACTION TO PHASE OUT SLUDGE  
DUMPING BUT HAS NOT REDUCED THE VOLUME DUMPED

SINCE 1973, EPA HAS TAKEN VARIOUS ACTIONS TO REDUCE THE LEVEL OF  
SLUDGE DUMPING. THESE ACTIONS INCLUDED:

- DENYING PERMITS TO ANYONE NOT DUMPING PRIOR TO 1973.
- PHASING OUT OR DENYING PERMITS TO MORE THAN 100 SLUDGE DUMPERS.
- REQUIRING DUMPERS TO EXAMINE ALTERNATIVE DISPOSAL METHODS.

--CONDITIONING ALL OCEAN DUMPING PERMITS WITH THE REQUIREMENT TO DISCONTINUE SLUDGE DUMPING BY NO LATER THAN DECEMBER 31, 1981.

--TAKING ENFORCEMENT ACTION AGAINST DUMPERS WHO DO NOT COMPLY WITH PHASEOUT SCHEDULES.

DESPITE THESE ACTIONS, NO NET REDUCTION IN THE TOTAL VOLUME OF SLUDGE DUMPED HAS OCCURRED. IN 1973, ABOUT 4.9 MILLION WET TONS OF MUNICIPAL SEWAGE SLUDGE WERE OCEAN DUMPED, COMPARED TO 5.4 MILLION WET TONS IN 1978. THE VOLUME OF SLUDGE TO BE OCEAN DUMPED BY 1981 IS EXPECTED TO EXCEED 11 MILLION TONS, PRIMARILY BECAUSE OF THE UPGRADING OF SEWAGE TREATMENT PLANTS TO SECONDARY TREATMENT LEVELS. FURTHER, NO MAJOR SLUDGE DUMPER EXCEPT THE CITY OF PHILADELPHIA IS REQUIRED BY EPA TO GRADUALLY REDUCE ITS LEVEL OF DUMPING BETWEEN NOW AND THE DEADLINE FOR TOTAL CESSATION OF SLUDGE DUMPING.

ALTHOUGH NUMEROUS DUMPERS HAVE BEEN PHASED OUT, THE ANNUAL VOLUME OF SLUDGE THEY DUMPED WAS NOT SIGNIFICANT. ACCORDING TO ONE EPA OFFICIAL, ALL OF THE PHASEOUTS TO DATE ACCOUNT FOR A TOTAL ANNUAL VOLUME OF ONLY 150,000 WET TONS, OR ABOUT 3 PERCENT OF THE TOTAL SLUDGE DUMPED IN 1978. FURTHER, ONE FORMER DUMPER, CAMDEN, NEW JERSEY, ACCOUNTED FOR MORE THAN 40 PERCENT OF THIS TOTAL. NO MAJOR DUMPER HAS BEEN PHASED OUT TO DATE, ALTHOUGH THE CITY OF PHILADELPHIA HAS MADE SOME PROGRESS IN REDUCING THE AMOUNT OF SLUDGE IT DUMPS EACH YEAR.

SOME MAJOR DUMPERS WILL NOT MEET THE  
DECEMBER 31, 1981, PHASEOUT DEADLINE



IN JANUARY 1977 WE REPORTED THAT BECAUSE OF TECHNICAL, LEGAL, PUBLIC ACCEPTANCE, AND FUNDING PROBLEMS, IT APPEARED UNLIKELY THAT ALL MUNICIPAL AREAS WOULD BE ABLE TO CEASE OCEAN DUMPING BY 1981. BASED ON OUR CURRENT REVIEW, IT APPEARS LIKELY THAT 3 OF THE 10 MAJOR SLUDGE DUMPERS, NEW YORK CITY, WESTCHESTER COUNTY, AND MIDDLESEX COUNTY, WILL BE UNABLE TO MEET THE DEADLINE. THESE THREE DUMPERS ACCOUNTED FOR MORE THAN HALF OF THE SEWAGE SLUDGE DUMPED IN 1978. EPA HAS ALREADY REFERRED NEW YORK CITY AND WESTCHESTER COUNTY TO THE DEPARTMENT OF JUSTICE FOR NOT MAKING SUITABLE PROGRESS TOWARD IMPLEMENTING ALTERNATIVES TO OCEAN DUMPING.

AT THE SAME TIME, THE SEVEN OTHER MAJOR DUMPERS FACE TIGHT SCHEDULES AND THEIR ABILITY TO MEET THE DECEMBER 31, 1981, DEADLINE TO END OCEAN DUMPING IS BY NO MEANS ASSURED. SEVERAL CONSIDERATIONS HAVE LED US TO THESE CONCLUSIONS.

NEW YORK CITY/NORTHERN NEW JERSEY

PERMITS ISSUED TO THE NINE MAJOR DUMPERS IN THE NEW YORK CITY/NORTHERN NEW JERSEY AREA IN AUGUST 1976 SPECIFIED THAT THEY WOULD HAVE TO IMPLEMENT OCEAN DUMPING ALTERNATIVES BY DECEMBER 31, 1981. EACH RECEIVED FEDERAL FUNDS TO EXAMINE ALTERNATIVES AND TO DEVELOP THE SLUDGE MANAGEMENT PLANS NEEDED TO PHASE OUT THEIR DUMPING OPERATIONS. THE SLUDGE MANAGEMENT PLANS WERE DUE TO EPA BY DECEMBER 31, 1977, BUT NONE OF THE NINE DUMPERS SUBMITTED AN APPROVABLE PLAN BY THAT DATE. FIVE OF THE DUMPERS, NEW YORK CITY, NASSAU COUNTY, WESTCHESTER COUNTY, MIDDLESEX COUNTY AND PASSAIC VALLEY

REQUESTED EXTENSIONS OF THE DEADLINE FOR SUBMITTING SLUDGE MANAGEMENT PLANS. EPA GRANTED THESE EXTENSIONS IN FEBRUARY 1978. SOME OF THESE DUMPERS, HOWEVER, STILL DO NOT HAVE APPROVED SLUDGE MANAGEMENT PLANS.

ANOTHER FACTOR COMPLICATING THE PHASEOUT INVOLVES THE NEED FOR SLUDGE DEWATERING EQUIPMENT. ALL NINE DUMPERS NEED DEWATERING EQUIPMENT BEFORE ANY ALTERNATIVE TO OCEAN DISPOSAL CAN BE ADOPTED. DESIGN OF THIS EQUIPMENT CAN TAKE UP TO 12 MONTHS, AND ONCE DESIGN IS COMPLETED AND A MANUFACTURER SELECTED, 19 ADDITIONAL MONTHS MAY PASS BEFORE THE EQUIPMENT IS DELIVERED. AN EPA OFFICIAL HAS STATED THAT UNLESS CONTRACTS ARE AWARDED FOR DEWATERING EQUIPMENT IN 1979, PERMITTEES WILL BE UNABLE TO MEET THE 1981 DEADLINE.

AS OF JUNE 8, 1979, SIX OF THE NINE DUMPERS, INCLUDING NEW YORK CITY, WESTCHESTER COUNTY, AND MIDDLESEX COUNTY, HAD NOT YET RECEIVED EPA AUTHORIZATION TO BEGIN DESIGNING THEIR DEWATERING EQUIPMENT. TWO OTHER DUMPERS ARE IN THE DESIGN PHASE. ONLY ONE DUMPER, THE PASSAIC VALLEY SEWERAGE COMMISSIONERS HAS COMPLETED THE DESIGN AND AWARDED THE CONTRACT FOR THE EQUIPMENT. PASSAIC VALLEY'S CHIEF ENGINEER, HOWEVER, STATED THAT HIS SEWERAGE AUTHORITY COULD MISS THE PHASEOUT DEADLINE, GIVEN THE LONG LEADTIME TO PROCURE THE DEWATERING EQUIPMENT AND THE EXTENDED PERIOD NEEDED TO DEBUG THE EQUIPMENT ONCE IT IS INSTALLED.

OTHER PROBLEMS ARE ALSO DELAYING THE PHASEOUT PROCESS. FOR EXAMPLE:

--NEW YORK CITY NEEDS TO OBTAIN THE APPROVAL OF ITS BOARD OF ESTIMATE FOR THE TWO SITES PROPOSED FOR SLUDGE DEWATERING, THE THREE SITES PROPOSED FOR COMPOSTING, AND THE FIFTEEN

SITES PROPOSED FOR COMPOST APPLICATION. STRONG PUBLIC OPPOSITION TO DESIGNATING THESE SITES IS ANTICIPATED.

--WESTCHESTER COUNTY'S PROPOSED COMPOSTING SITE WAS TURNED DOWN BY AREA RESIDENTS. THIS WAS FOLLOWED BY PUBLIC OPPOSITION TO ITS PROPOSED SLUDGE DEWATERING SITE, WHICH IS LOCATED LESS THAN 100 FEET FROM AN APARTMENT COMPLEX. IN MAY 1979, EPA ASKED THE COUNTY TO RESTUDY AVAILABLE SITES AND INTERIM ALTERNATIVES TO OCEAN DUMPING AND TO SUBMIT A REVISED FACILITIES PLAN TO THE AGENCY BY EARLY 1980.

--THE SLUDGE MANAGEMENT PLAN PREPARED FOR JOINT MEETING OF ESSEX AND UNION COUNTIES RECOMMENDED INCINERATION AS THE PREFERRED ALTERNATIVE TO OCEAN DUMPING. THE STATE OF NEW JERSEY, HOWEVER, ASKED THE SEWERAGE AUTHORITY TO RESTUDY COMPOSTING. COMPOSTING WAS SUBSEQUENTLY TURNED DOWN DUE TO THE METAL CONTENT OF THE SLUDGE AND THE LACK OF FIRM MARKETS.

--MIDDLESEX COUNTY'S PLAN, ISSUED IN JULY 1978, ALSO RECOMMENDED INCINERATION, BUT BECAUSE OF THE HIGH ESTIMATED COSTS OF THE PROCESS, A LATER REPORT RECOMMENDED COMPOSTING AND CODISPOSAL OF SLUDGE AND SOLID WASTE.

--THE BERGEN COUNTY UTILITIES AUTHORITY SELECTED A SITE ADJACENT TO THE TREATMENT PLANT FOR A COMPOSTING FACILITY. THE STATE, HOWEVER, WANTS TO USE THE SITE FOR A PARK. AN ALTERNATIVE SITE ACROSS THE RIVER FROM THE TREATMENT PLANT IS NOT NOW OWNED BY THE AUTHORITY AND POSES ACCESS PROBLEMS.



THE USE OF EITHER SITE REQUIRES A PERMIT FROM THE ARMY  
CORPS OF ENGINEERS BECAUSE BOTH SITES INVOLVE CONSTRUCTION  
IN WETLANDS AREAS. TO DATE, THE SITE SELECTION PROBLEM  
HAS NOT BEEN RESOLVED.

#### PHILADELPHIA

IN MAY 1979, EPA AND THE CITY OF PHILADELPHIA SIGNED A CONSENT DECREE  
CALLING FOR THE CITY TO STOP OCEAN DUMPING ENTIRELY BY DECEMBER 31, 1980.  
TO PHASE OUT OCEAN DUMPING, PHILADELPHIA IS CURRENTLY PURSUING A SLUDGE  
GIVEAWAY PROGRAM, LAND APPLICATION, STRIP MINE RECLAMATION, AND LANDFILLING.

THE CITY OF PHILADELPHIA BELIEVES ITS SLUDGE GIVEAWAY PROGRAM HAS  
BEEN SUCCESSFUL; AIR-DRIED SLUDGE FROM STORAGE LAGOONS AT THE TREATMENT  
PLANTS HAS BEEN MADE AVAILABLE FOR BOTH PUBLIC AND PRIVATE USE AS A SOIL  
CONDITIONER. EFFORTS ARE NOW UNDERWAY TO MARKET THE PRODUCT NAMED  
"PHILORGANIC" COMMERCIALY.

FIFTEEN MILLION GALLONS OF LIQUID SLUDGE WERE APPLIED TO AGRICULTURAL  
LAND FROM 1978-79. HOWEVER, THE CITY HAS BEEN UNSUCCESSFUL IN EXTENDING  
THE PROCESS OUTSIDE THE CITY LIMITS BECAUSE OF OPPOSITION FROM LOCAL RES-  
IDENTS. IF SUCCESSFUL, THOUSANDS OF ACRES OF FARMLAND SURROUNDING THE  
CITY COULD BECOME AVAILABLE FOR FURTHER APPLICATION.

PHILADELPHIA RECENTLY COMPLETED A SMALL STRIP MINE RECLAMATION  
PROJECT IN WESTERN PENNSYLVANIA AND HAS RECEIVED A STATE PERMIT FOR ONE  
OF TWO LARGE PROJECT SITES. THESE SITES ARE EXPECTED TO UTILIZE A MAJOR  
PORTION OF THE CITY'S SLUDGE OVER THE NEXT FEW YEARS. COMPOST HAS BEEN  
USED AS A LANDFILL COVER IN A SMALL PROJECT, BUT THE HIGH COST OF  
LANDFILLING HAS LIMITED CONSIDERATION OF THIS OPTION.

PHILADELPHIA HAS REDUCED THE AMOUNT OF SLUDGE IT DUMPS, AND ACCORDING TO AN EPA OFFICIAL, SHOULD ATTAIN ITS JULY 1979 GOAL OF REDUCING THE ANNUAL VOLUME BY 50 PERCENT (350,000 WET TONS). THE CITY PLANS TO CONTINUE THE PROJECTS MENTIONED WHILE ALSO SEEKING OTHER LONG-TERM SOLUTIONS TO OCEAN DUMPING, INCLUDING THE EVALUATION OF A PROCESS WHICH WOULD CONVERT SEWAGE SLUDGE TO A SAFE AND USEFUL HIGHWAY CONSTRUCTION MATERIAL.

DESPITE THE PROGRESS MADE TO DATE, A NUMBER OF FACTORS MAKE PHILADELPHIA'S FINAL COMPLIANCE WITH THE DEADLINE UNCERTAIN. FOR EXAMPLE:

- THE VOLUME OF SLUDGE PRODUCED IS EXPECTED TO INCREASE IN THE FUTURE. THE CONSENT DECREE SIGNED BY PHILADELPHIA REQUIRES IT TO UPGRADE ITS TREATMENT PLANTS TO REMOVE 86 - 89 PERCENT OF OXYGEN DEPLETING POLLUTANTS FROM ITS SEWAGE--WHILE, ACCORDING TO EPA, THE CITY'S EXISTING TREATMENT SYSTEMS REMOVE AS LITTLE AS 30 PERCENT OF SUCH POLLUTION.
- PUBLIC OPPOSITION TO CITY DISPOSAL SITES MAY DELAY OR DEFEAT PLANS FOR LARGE-SCALE STRIP MINE RECLAMATION.
- THE MARKET FOR SLUDGE OR SLUDGE PRODUCTS MAY BE RESTRICTED BY EPA REGULATION OR BY LIMITED PUBLIC DEMAND.

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FINALLY, ONE FACTOR MAY IMPACT ON THE ABILITY OF ALL TEN MAJOR DUMPERS TO MEET THE PHASEOUT DEADLINE. AFTER JUNE 30, 1979, EPA REGULATIONS STIPULATE THAT GRANTS FOR FACILITIES CONSTRUCTION CANNOT

BE APPROVED UNLESS THE GRANTEE HAS AN APPROVED INDUSTRIAL COST RECOVERY SYSTEM. CURRENTLY, NONE OF THE MAJOR OCEAN DUMPERS HAS AN APPROVED INDUSTRIAL COST RECOVERY SYSTEM.

THE VIABILITY OF INTERIM ALTERNATIVES  
TO OCEAN DUMPING IS QUESTIONABLE

TO COMPLY WITH THE DECEMBER 31, 1981, DEADLINE AND TO ALLOW SUFFICIENT TIME TO DEVELOP AND IMPLEMENT LONG-TERM SOLUTIONS TO SLUDGE MANAGEMENT PROBLEMS, DUMPERS IN THE NEW YORK CITY/NORTHERN NEW JERSEY AREA ARE CONSIDERING THE ADOPTION OF INTERIM DISPOSAL MEASURES INCLUDING

- LANDFILLING OF DEWATERED SLUDGE,
- COMPOSTING OF DEWATERED SLUDGE, FOLLOWED BY LAND APPLICATION OF THE COMPOST AS A SOIL CONDITIONER OR SOLID WASTE LANDFILL COVER; OR
- STORAGE OF DEWATERED, DRIED SLUDGE.

THE INTERIM MEASURES BEING CONSIDERED ARE MORE EXPENSIVE THAN OCEAN DUMPING. IN ADDITION, THESE INTERIM MEASURES POSE CERTAIN ENVIRONMENTAL AND PRACTICAL PROBLEMS WHICH MAY ONLY TRANSFER PROBLEMS FROM THE OCEAN TO OTHER DISPOSAL MEDIA, SUCH AS LAND AND AIR.

LANDFILLING

THREE MAJOR DUMPERS IN NEW JERSEY, MIDDLESEX COUNTY, LINDEN-ROSELLE, AND RAHWAY VALLEY, PLAN TO LANDFILL SLUDGE. A FOURTH, JOINT MEETING OF ESSEX AND UNION COUNTIES, MAY HAVE TO LANDFILL IF THEIR INCINERATOR IS NOT OPERATIONAL BY 1981. AT THE PRESENT TIME, ONLY 11 LANDFILLS IN NEW JERSEY MAY ACCEPT THEIR SLUDGE. GROUND WATER IN THE VICINITY OF ALMOST ALL OF THESE FACILITIES HAS SHOWN SUBSTANTIAL CONTAMINATION, AND THE FACILITIES HAVE BEEN PLAGUED BY OPERATIONAL PROBLEMS AND

NUMEROUS VIOLATIONS OF STATE ENVIRONMENTAL REGULATIONS. AT PRIOR OCEAN DUMPING PERMIT HEARINGS, THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION TESTIFIED THAT DENIAL OF OCEAN DUMPING PERMITS TO NEW JERSEY FACILITIES WOULD RESULT IN INCREASED VOLUMES OF SEWAGE SLUDGE ENTERING LANDFILLS IN THE STATE. A DEPARTMENT OFFICIAL STATED THAT THE SITUATION WAS ALREADY INTOLERABLE AND THEY COULD NOT ENDORSE ANY ACTION WHICH WOULD FURTHER AGGRAVATE GROUND AND SURFACE WATER CONTAMINATION PROBLEMS.

THE DIRECTOR OF THE INTERSTATE SANITATION COMMISSION OF NEW YORK, NEW JERSEY, AND CONNECTICUT IS ALSO OPPOSED TO SHORT TERM LANDFILLING BECAUSE LANDFILL CAPACITY IS LIMITED AND POTENTIAL GROUND WATER POLLUTION IS SERIOUS. A NEW JERSEY OFFICIAL TOLD US THAT, FROM A PRACTICAL STANDPOINT, LANDFILLS IN THE STATE ARE ALREADY OVERBURDENED AND LANDFILL CAPACITY FOR SLUDGE DUMPERS MAY BE UNAVAILABLE WHEN NEEDED IN 1981. EVEN IF LANDFILL CAPACITY IS AVAILABLE, INCREASED TRANSPORTATION COSTS WILL BE INVOLVED. MOST OCEAN DUMPERS ARE LOCATED IN THE NORTHERN PART OF THE STATE, WHEREAS THE LANDFILLS ARE IN THE SOUTHERN PART. CONSEQUENTLY, NEW JERSEY OFFICIALS TOLD US THAT DUMPERS MAY HAVE TO CONSTRUCT THEIR OWN LANDFILLS IN HIGHLY POPULATED AREAS WHERE GROUND AND SURFACE WATER CONTAMINATION PROBLEMS ALREADY EXIST.

REGARDLESS OF WHERE SLUDGE IS LANDFILLED, LANDFILLING TREATS SLUDGE AS A WASTE AND LITTLE BENEFICIAL USE IS DERIVED FROM IT.

#### COMPOSTING

NEW YORK CITY, NASSAU COUNTY, AND THE BERGEN COUNTY UTILITIES AUTHORITY HAVE CHOSEN COMPOSTING AS AN INTERIM ALTERNATIVE TO OCEAN DUMPING. NASSAU AND BERGEN COUNTIES PLAN TO USE THEIR COMPOST AS

A SOIL CONDITIONER OR AS A SOLID WASTE LANDFILL COVER, WHEREAS  
NEW YORK CITY PLANS TO APPLY ITS COMPOST ON CITY-OWNED LAND.

UNDER NEW YORK CITY'S PLAN, SLUDGE WOULD BE DEWATERED AT TWO  
LOCATIONS AND BARGED OR TRUCKED TO THREE OTHER LOCATIONS FOR COMPOSTING.  
THE COMPOST, ABOUT 225,000 DRY TONS PER YEAR, WOULD BE APPLIED TO  
UNDEVELOPED PARK LAND AT 15 SITES IN THE CITY. AT THESE SITES, 8  
INCHES OF COMPOST (OR 500 TONS PER ACRE) WOULD BE APPLIED. THE CITY'S  
COMMISSIONER OF ENVIRONMENTAL PROTECTION BELIEVES THAT ENOUGH LAND  
IS AVAILABLE TO ACCOMMODATE THIS INTERIM SOLUTION FOR 6 TO 7 YEARS  
AT AN ESTIMATED CAPITAL INVESTMENT COST OF \$250 MILLION.

EPA OFFICIALS BELIEVE THAT THE PROPOSED PROGRAM WOULD BE  
ENVIRONMENTALLY SOUND IF IT IS MANAGED AND MONITORED PROPERLY. THE  
CITY ITSELF, HOWEVER, HAS RESERVATIONS ABOUT THE PROPOSAL. BECAUSE  
OF THE HEAVY METAL CONTENT OF THE SLUDGE, THE CITY MAY HAVE TO RESTRICT  
FUTURE USES OF THESE LANDS. IN ADDITION, STRONG PUBLIC OPPOSITION TO  
THE SELECTION OF THESE SITES IS EXPECTED.

THE MAJOR OUTLET PLANNED FOR BERGEN COUNTY'S COMPOST IS FOR USE  
AS A FINAL COVER FOR SOLID WASTE LANDFILLS IN THE AREA. FOR EXAMPLE,  
THE SEWERAGE AUTHORITY'S CONSULTING ENGINEERS ESTIMATED THAT ONE 93-ACRE  
LANDFILL IN THE AREA COULD ACCOMMODATE THE COUNTY'S COMPOST PRODUCTION  
FOR ABOUT 2 YEARS, IF A 2-FOOT COVER (HALF TOPSOIL) WERE APPLIED.

THE EXECUTIVE DIRECTOR OF THE AUTHORITY, HOWEVER, HAS EXPRESSED  
CONCERN ABOUT THE VIABILITY OF THE INTERIM SOLUTION. BOTH POTENTIAL  
SITES IDENTIFIED FOR THE COMPOSTING OPERATION ARE IN THE WETLANDS AREA  
OF THE HACKENSACK MEADOWLANDS, NECESSITATING CONSIDERABLE LEGAL AND  
ENGINEERING INVESTIGATION. ALSO, THE EXECUTIVE DIRECTOR IS CONCERNED

ABOUT POTENTIAL HEALTH PROBLEMS WITH COMPOSTING IN A DENSELY POPULATED AREA. HE POINTED OUT THAT EVIDENCE EXISTS THAT CERTAIN PATHOGENS AND SECONDARY ALLERGENS ARE GENERATED BY COMPOSTING AND THAT THESE VIRUSES MAY MIGRATE FROM THE SITE AND BE POTENTIALLY HARMFUL TO PERSONS WITH PULMONARY AND CARDIAC DISEASES.

THE UTILITY AUTHORITY OFFICIAL ALSO BELIEVES THE PROPOSED INTERIM MEASURE POSES LEGAL QUESTIONS IN TERMS OF LIABILITY TO PERSONS CLAIMING INJURY FROM VIRUSES EMANATING FROM THE COMPOSTING FACILITY AND MORE TIME IS NEEDED TO RESEARCH THE HEALTH RISKS ASSOCIATED WITH DEVELOPING SLUDGE MANAGEMENT TECHNOLOGY.

HEALTH RISKS CAN BE REDUCED THROUGH SOUND MANAGEMENT OF THE COMPOSTING PROCESS AND SUBSEQUENT LAND APPLICATION. NEW JERSEY HAS PROPOSED SOIL AND GROUND WATER MONITORING REQUIREMENTS FOR COMPOST RECIPIENTS USING HEAVY APPLICATIONS. UNFORTUNATELY, SOUND MANAGEMENT HAS NOT ALWAYS BEEN PRACTICED IN THE PAST, AS EVIDENCED BY OUR PREVIOUS COMMENTS WITH RESPECT TO LANDFILLING SOLID WASTE.

QUESTIONS ABOUT THE POTENTIAL HEALTH AFFECTS OF COMPOSTING SEWAGE SLUDGE HAVE ALSO BEEN RAISED BY OTHERS. FOR EXAMPLE, WHEN NASSAU COUNTY PROPOSED COMPOSTING AS AN INTERIM ALTERNATIVE TO OCEAN DUMPING, THE COUNTY HEALTH DEPARTMENT REGISTERED SERIOUS RESERVATIONS, BECAUSE OF THE POTENTIAL FOR GROUND WATER POLLUTION. NASSAU COUNTY'S POPULATION DEPENDS ON GROUND WATER AS A POTABLE WATER SOURCE AND NASSAU COUNTY HAS BEEN DESIGNATED A SOLE SOURCE AQUIFER ZONE. THE HEALTH DEPARTMENT DID, HOWEVER, AGREE TO A PILOT COMPOSTING PROJECT.

THE PILOT PROJECT INCLUDES TESTS OF THE DEWATERING EQUIPMENT AND AN EVALUATION OF THE EFFECTS OF COMPOSTING ON GROUND WATER IN THE AREA.

ALTHOUGH THE PROJECT IS NOT SCHEDULED FOR COMPLETION UNTIL AUGUST 1979, SOME PROBLEMS HAVE ALREADY BEEN IDENTIFIED. THE DEWATERING PROCESS IS USING THREE TIMES THE AMOUNT OF CHEMICALS ORIGINALLY PLANNED AND IS PRODUCING A SLUDGE CAKE WITH A HIGH CHEMICAL CONTENT, WHICH COULD DAMAGE THE MARKETABILITY OF THE COMPOST AS A SOIL CONDITIONER. THE HIGH CHEMICAL CONTENT COULD ALSO CAUSE INCREASED INCINERATOR CORROSION WHICH WILL SHORTEN EQUIPMENT LIFE. A FINAL DECISION ON COMPOSTING MUST AWAIT COMPLETION OF THE PILOT PROJECT.

A NEW DEWATERING PROCESS MAY HAVE TO BE DESIGNED. COUNTY OFFICIALS SAID THAT IF COMPOSTING IS NOT FEASIBLE THEY WILL MERELY STOCKPILE THE DEWATERED SLUDGE UNTIL IT CAN BE INCINERATED. IN MAY 1979, EPA NOTIFIED NASSAU COUNTY THAT QUESTIONS STILL REMAIN CONCERNING ITS INTERIM SOLUTION REGARDING

- PATHOGEN KILL,
- CHEMICAL INTERFERENCE WITH THE COMPOSTING PROCESS,
- MARKETABILITY, AND
- EFFECT ON GROUND WATER.

STORAGE

TO COMPLY WITH THE DECEMBER 31, 1981, DEADLINE, PASSAIC VALLEY HAS PROPOSED AN UNUSUAL ALTERNATIVE. THE AUTHORITY PLANS TO DEWATER AND DRY SLUDGE AND STORE IT IN A FACILITY TO BE BUILT ON A 90-ACRE SITE ADJACENT TO THE SEWAGE TREATMENT PLANT. IN 1977, PASSAIC VALLEY OCEAN DUMPED ABOUT 53,000 DRY TONS OF SLUDGE. BUT WHEN SECONDARY TREATMENT BEGINS IN 1981, THE VOLUME OF SLUDGE WILL INCREASE SIGNIFICANTLY. THE STORED SLUDGE WILL EVENTUALLY BE INCINERATED, WHEN PASSAIC VALLEY'S PROPOSED INCINERATOR COMES ON LINE IN THE MID-1980s. A PASSAIC VALLEY OFFICIAL

ESTIMATES IT WILL COST ABOUT \$4 MILLION TO CONSTRUCT THE TEMPORARY STORAGE FACILITY. THE ENTIRE COST OF THE FACILITY MAY BE BORNE BY THE AUTHORITY BECAUSE EPA HAS DECIDED THAT SUCH A TEMPORARY FACILITY IS NOT ELIGIBLE FOR FEDERAL FUNDING. PASSAIC VALLEY HAS APPEALED THAT DECISION.

ENVIRONMENTALLY, THE SEWERAGE AUTHORITY'S CONSULTING ENGINEERS BELIEVE THE INTERIM PLAN IS SAFE, IF MANAGED PROPERLY. EPA, HOWEVER, HAS SOME RESERVATIONS ABOUT THE PROJECT, BECAUSE OF THE POTENTIAL FOR SPONTANEOUS COMBUSTION, ODORS, AND GROUND WATER POLLUTION. AN EPA OFFICIAL INDICATED THAT STOCKPILING OF SLUDGE WAS ACCEPTABLE ONLY AS A STOPGAP MEASURE AND THE SITE WILL NEED TO BE CLOSELY MONITORED.

LONG-TERM SOLUTIONS ALSO  
POSE SOME UNCERTAINTIES

LONG-TERM ALTERNATIVES TO OCEAN DUMPING UNDER CONSIDERATION ALSO POSE UNCERTAINTIES WITH RESPECT TO POTENTIAL AIR POLLUTION AND ASH DISPOSAL PROBLEMS, WHICH WILL NEED TO BE RESOLVED BEFORE THE PROPOSALS CAN BE IMPLEMENTED. RESOLUTION OF THESE QUESTIONS IS ESPECIALLY IMPORTANT TO DUMPERS WHOSE INTERIM SOLUTIONS HAVE LIMITED USEFUL LIVES.

ALL NINE MAJOR SLUDGE DUMPERS IN THE DENSELY POPULATED NEW YORK CITY/NORTHERN NEW JERSEY AREA ARE CONSIDERING VARIOUS COMBUSTION PROCESSES AS LONG-TERM SOLUTIONS. THESE PROCESSES INVOLVE BURNING SLUDGE ALONE OR CODISPOSAL OF SLUDGE AND SOLID WASTE. THESE PROPOSALS RAISE QUESTIONS WITH RESPECT TO POTENTIAL AIR POLLUTION AND ASH DISPOSAL PROBLEMS.

EPA ACKNOWLEDGES THAT LIMITED DATA ARE AVAILABLE TO ASSESS THE EXTENT OF AIR POLLUTION FROM SLUDGE INCINERATORS AND THAT NO CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT HAS BEEN PERFORMED WITH RESPECT TO ADOPTING INCINERATION IN THE METROPOLITAN AREA ON A BROAD SCALE.



IN ADDITION, AN EPA OFFICIAL STATED THAT UNCONTROLLABLE AMOUNTS OF TOXICS MAY BE EMITTED WHEN SLUDGE IS BURNED, WHICH COULD HAVE A SIGNIFICANT EFFECT ON AIR QUALITY.

THE STATE OF NEW JERSEY NOTIFIED JOINT MEETING OF ESSEX AND UNION COUNTIES THAT ITS PROPOSED MULTIPLE-HEARTH INCINERATOR WOULD MEET THE NATIONAL LEAD AMBIENT STANDARDS, BUT THE LEAD EMITTED BY THE FACILITY WOULD EFFECTIVELY EXHAUST THE TOTAL LEAD ALLOCATION FOR THE AREA. THEREFORE, FUTURE INDUSTRIAL GROWTH IN THE AREA WOULD BE LIMITED. ALSO, IF ALL AIR ALLOCATIONS ARE USED UP BEFORE A PERMIT IS ISSUED FOR A PROPOSED SLUDGE DISPOSAL FACILITY, IT MAY BE NECESSARY TO FIND AND SHUT DOWN OR CLEAN UP OTHER POLLUTING FACILITIES TO OFFSET THE ADDED AIR POLLUTION.

IN ADDITION TO POLLUTANTS FOR WHICH STANDARDS HAVE BEEN ESTABLISHED, THE EMISSION OF POLLUTANTS FOR WHICH NO AMBIENT AIR QUALITY STANDARDS CURRENTLY EXIST MAY POSE A PROBLEM. FOR EXAMPLE, CADMIUM, WHICH IS FOUND IN HIGH LEVELS IN SLUDGE PRESENTLY OCEAN DUMPED, MAY POSE A SERIOUS PROBLEM. AN EPA ANALYSIS OF AN INCINERATION PROCESS PROPOSED BY ONE DUMPER CONCLUDED THAT THE PROJECTED AFFECT OF AMBIENT CADMIUM CONCENTRATIONS WAS SIGNIFICANT AND ENVIRONMENTALLY UNACCEPTABLE. THE AFFECT ON INDIVIDUALS LIVING IN THE AREA WOULD BE EQUIVALENT TO THE CADMIUM RETAINED FROM SMOKING A PACK OF CIGARETTES A DAY. THE ANALYSIS ALSO INDICATED THAT THE EMISSIONS COULD LEAD TO INCREASED DIETARY LEVELS OF CADMIUM IF HOME GROWN VEGETABLES WERE CONSUMED.

THE DISPOSAL OF ASH PRODUCED BY INCINERATION AND RELATED METHODS OF VOLUME REDUCTION IN AN ENVIRONMENTALLY ACCEPTABLE MANNER ALSO POSES PROBLEMS. THE ASH IS PRODUCED IN SUBSTANTIAL QUANTITIES AND A LARGE

PORTION OF THE HEAVY METALS CONTAINED IN THE SEWAGE SLUDGE END UP IN THE ASH. THEREFORE, THE ASH MAY BE DESIGNATED AS A HAZARDOUS WASTE AND REQUIRE SPECIAL HANDLING. THE ASH DISPOSAL PROBLEMS OF THE PASSAIC VALLEY SEWERAGE AUTHORITY PROVIDE A GOOD EXAMPLE. WHEN THE AUTHORITY'S INCINERATOR BEGINS OPERATION IN THE MID-1980'S, IT WILL PRODUCE 90 TONS OF ASH PER DAY. THE SEWERAGE AUTHORITY DOES NOT OWN SUFFICIENT LAND ON WHICH TO BUILD ITS OWN ASH DISPOSAL FACILITIES AND BELIEVES THAT THE SOLUTION TO THE PROBLEM MUST BE DEALT WITH AT THE STATE LEVEL.

#### CONCLUSIONS

ALTHOUGH SUBSTANTIAL FUNDING HAS BEEN INVESTED IN THE PLANNING AND IMPLEMENTATION OF ALTERNATIVES TO OCEAN DUMPING OF MUNICIPAL SEWAGE SLUDGE SINCE 1973, NO NET REDUCTION IN VOLUME HAS BEEN ACHIEVED TO DATE. FURTHER, THE VOLUME OF SLUDGE TO BE OCEAN DUMPED IS PROJECTED TO DOUBLE BY 1981.

THREE OF THE 10 MAJOR OCEAN DUMPERS, WHO ACCOUNTED FOR OVER 50 PERCENT OF THE SLUDGE BEING DUMPED, WILL MORE THAN LIKELY NOT MEET THE DECEMBER 31, 1981, DEADLINE, AS MANDATED BY THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, AS AMENDED. OTHER MAJOR DUMPERS MAY ALSO HAVE DIFFICULTY MEETING THE DEADLINE. FOR THOSE DUMPERS WHO PLAN TO IMPLEMENT INTERIM LAND-BASED ALTERNATIVES TO OCEAN DUMPING, PROBLEMS EXIST WITH RESPECT TO POTENTIAL GROUND WATER POLLUTION, PATHOGENIC DISEASE, AND STRONG PUBLIC OPPOSITION TO PROJECT SITES.

LONG-TERM SOLUTIONS TO OCEAN DUMPING, PARTICULARLY THERMAL-BASED PROJECTS, ALSO POSE UNCERTAINTIES IN TERMS OF POTENTIAL AIR POLLUTION

AND ASH DISPOSAL PROBLEMS. THESE POTENTIAL PROBLEMS WILL NEED TO BE RESOLVED BEFORE ANY LONG-TERM SOLUTIONS CAN BE IMPLEMENTED.

DESPITE THE SHORTCOMINGS, SOME MOMENTUM HAS BEEN BUILT UP IN EPA'S PROGRAM TO PHASE OUT OCEAN DUMPING OF MUNICIPAL SEWAGE SLUDGE AND TO REPLACE THIS LONGSTANDING PRACTICE WITH ACCEPTABLE ALTERNATIVES. CONSEQUENTLY, WE DO NOT BELIEVE THAT ANY ACTION SHOULD BE TAKEN THAT WOULD STALL THE FORWARD PROGRESS OF THE PROGRAM.

AN ACROSS-THE-BOARD EXTENSION OF THE 1981 DEADLINE WOULD DO JUST THAT. HOWEVER, SOME FLEXIBILITY WILL BE NEEDED FOR THOSE DUMPERS WHO WILL NOT MEET THE PROGRAM DEADLINE.

TO PROVIDE THIS FLEXIBILITY, IT WOULD SEEM APPROPRIATE FOR THE CONGRESS TO AUTHORIZE THE EPA ADMINISTRATOR TO GRANT WAIVERS OF THE DEADLINE ON A CASE BY CASE BASIS. WAIVERS SHOULD ONLY BE GRANTED TO DUMPERS WHO DEMONSTRATE SINCERE EFFORTS TOWARD PHASING OUT OCEAN DUMPING AS SOON AS PRACTICABLE. THE EPA ADMINISTRATOR MIGHT ALSO WAIVE THE INDUSTRIAL COST RECOVERY REQUIREMENTS ON A CASE-BY-CASE BASIS, SINCE THEIR ENFORCEMENT WOULD FURTHER IMPEDE PROGRESS TOWARD PHASING OUT OCEAN DUMPING.

TO PROVIDE AN ECONOMIC INCENTIVE FOR A CONTINUATION OF PHASE OUT EFFORTS FOR THOSE DUMPERS GRANTED WAIVERS, IN ACCORDANCE WITH AN APPROVED COMPLIANCE SCHEDULE, THE ADMINISTRATOR SHOULD EITHER:

- REQUIRE THAT ALL OR PART OF THE SEWAGE SLUDGE PRODUCED BE DUMPED AT A SITE FURTHER OFF SHORE (EPA IS CURRENTLY PREPARING AN ENVIRONMENTAL IMPACT STATEMENT ON THE EXISTING 106-MILE CHEMICAL WASTE SITE, INCLUDING THE EFFECTS OF DUMPING SLUDGE THERE); OR

--PERMIT DUMPERS TO CONTINUE USING EXISTING SLUDGE SITES  
BUT SEEK CONGRESSIONAL AUTHORITY TO REQUIRE THEM TO  
DEPOSIT IN A FUND TO BE USED FOR LAND-BASED ALTERNATIVES  
THE DIFFERENCE IN THE COST OF DUMPING AT THOSE SITES AND  
A SITE FURTHER OFF SHORE.

ALSO, TO INSURE THAT INTERIM AND LONG-TERM ALTERNATIVES TO OCEAN  
DUMPING ARE ENVIRONMENTALLY ACCEPTABLE, AND DO NOT TRANSFER A POLLUTION  
PROBLEM FROM THE OCEAN TO THE LAND OR AIR, THE ADMINISTRATOR SHOULD  
REQUIRE THAT

--LAND-BASED ALTERNATIVES ARE PROPERLY MANAGED AND MONITORED  
TO MINIMIZE ADVERSE EFFECTS ON SURFACE AND GROUND WATERS,  
LAND, AND HUMAN HEALTH, AND

--AN ANALYSIS BE UNDERTAKEN OF THE POTENTIAL CUMULATIVE  
EFFECT OF COMBUSTION ALTERNATIVES ON THE AMBIENT AIR  
QUALITY IN AREAS WHERE SUCH ALTERNATIVES WILL BE  
CONCENTRATED.

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MR. CHAIRMAN, THIS COMPLETES MY PREPARED STATEMENT. WE SHALL BE  
GLAD TO RESPOND TO ANY QUESTIONS YOU OR OTHER MEMBERS OF THE COMMITTEE  
MAY HAVE.

OCEAN DUMPING OF SEWAGE SLUDGE IN 1978

<u>Major New York Dumpers:</u>	<u>Volume (thousand wet tons)</u>	<u>Percent of total volume</u>
New York City	2,480	46
Nassau County	385	7
Westchester County	<u>108</u>	<u>2</u>
	<u>2,973</u>	<u>55</u>
<u>Major New Jersey Dumpers:</u>		
Passaic Valley Sewerage Commissioners	602	12
Middlesex County Sewerage Authority	544	10
Bergen County Utilities Authority	235	4
Joint Meeting of Essex and Union Counties	226	4
Linden - Roselle Sewerage Authority	232	4
Rahway Valley Sewerage Authority	<u>(1)</u>	<u>(1)</u>
	<u>1,839</u>	<u>34</u>
<u>Major Pennsylvania Dumpers:</u>		
City of Philadelphia	<u>410</u>	<u>8</u>
<u>16 Minor Dumpers in New York and New Jersey</u>	<u>164</u>	<u>3</u>
Total	<u>5,386</u>	<u>100</u>

Note: (1) Included in Linden - Roselle Sewerage Authority Figures.