

REPORT ON THE PROCEEDINGS
OF THE
EPA INFECTIOUS WASTE MANAGEMENT MEETING
NOVEMBER 12, 1987
EPA HEADQUARTERS
WASHINGTON, DC

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SUMMARY

On November 12, 1987, the U.S. EPA convened a panel of experts representing healthcare professionals and practitioners from government, academia, industry and professional and trade associations to discuss and evaluate the nature and extent of the risks posed by wastes that contain infectious materials on human health and the environment. The meeting was held in response to growing concerns about the management of infectious waste to help evaluate whether EPA should undertake any additional action under the Resource Conservation and Recovery Act.

This document is intended to present those issues of concern as defined by the working group and to provide the EPA with recommendations for a course of action. The issues discussed were controversial and concurrence on recommendations for EPA consideration was not realized for each issue debated. The majority of material presented in this document was discussed during the meeting, however some statements have been provided to add background for assistance in issue clarification and definition. The issues and recommendations are summarized below.

Determining the degree of risk posed by the improper management of infectious waste on human health and the environment is one of the critical issues requiring resolution and the one that influences all other issues pertaining to infectious wastes. Due in part to the subjectivity of assigning infectious potential to a waste, the lack of epidemiological data, and to the fear of the unknown or the not understood, there exists a perception that there is a threat to public health from infectious wastes or from all medical wastes in general.

In assessing the degree of risk posed by infectious wastes, exposure potential is a primary factor which dictates the extent to which human health or the environment may be threatened. Exposures may be occupationally derived or they may be viewed as environmental, threatening the health or the environment of the general public. Many of the concerns with infectious wastes raised by the public have resulted from incidences of indiscriminate infectious waste disposal. These incidences have been limited, with actual exposures to the general public from known infectious wastes occurring only in a few instances. Exposures to infectious wastes that could result in disease transmission are more likely to occur in those occupational settings that generate, transport, store, treat or dispose of these wastes. Education of those who generate, transport, and dispose of infectious wastes was viewed as the key to reducing any potential risks from these wastes.

Attempts have been made by the Centers for Disease Control and the U.S. Environmental Protection Agency to standardize the definition of what constitutes an infectious waste. However, problems develop when attempting to apply any definition to medical wastes since it is not realistic or feasible to assay a waste to determine that pathogens exist in numbers capable of disease transmission. Identification therefore remains qualitative at best, and is determinant on the subjectivity of the

individual or group involved in that decision making process. Notwithstanding the risk perceptions and anxieties associated with the fear of contracting AIDS, those categories of infectious wastes that are recognized by both the CDC and the EPA as possessing a real potential to transmit disease are contaminated sharps, human blood and blood products, pathological wastes (body parts and tissues), and laboratory wastes. Because of the known disease association with the waste (laboratory cultures, diagnostic specimens, blood, or body fluids) or the potential for accidental injection (needles), these waste streams were recognized as having the highest potential for causing disease transmission, dictating that they be handled and disposed of properly.

Hospitals have been perceived to be the major, if not the only source of infectious waste warranting proper management procedures. Typical generators of infectious waste could also include private and public health clinics, nursing homes and other chronic care facilities, dental clinics, diagnostic laboratories, and blood banks. Although the volumes of infectious wastes generated would normally be less than those generated by a hospital, wastes containing blood, blood products, needles and syringes are commonly generated by these facilities and could pose an equivalent risk (as that generated by hospitals) if not properly disposed of. It was recommended that the small quantity infectious waste generator issue be further studied.

To minimize exposure to infectious wastes requires the proper packaging of these materials. Off-site disposal of infectious wastes, treated or untreated, has posed problems to haulers, operators of transfer stations, municipal incinerator operators, and landfill personnel due to improper packaging by the generator or through the violation of the container during the transfer, storage or disposal process. Because of the physical nature of these wastes, needles and syringes and liquid infectious wastes (notably blood) have been cited most frequently as being the greatest potential threat to the sanitation worker. Although the packaging issue was not resolved, an awareness of and proper response to the hazards posed during infectious waste processing through education and training were viewed as a way to minimize this workplace exposure.

Exposures may be occupationally derived or they may be viewed as environmental, resulting from inappropriate infectious waste management or disposal practices. Environmentally, public exposure to infectious wastes should only occur through improper disposal practices that allow direct contact with infectious waste materials. Such practices have included the disposal of infectious waste into dumpsters that are easily accessed by the public and the disposal of wastes in locations unsuitable for waste disposal (along the side of the road, on farms, in abandoned warehouses, and in public waters). Exposure to infectious waste is more likely to originate in those occupational settings that generate, transport, store, treat or dispose of these wastes. Effective management plans in each of these settings should minimize public and worker exposure resulting from inappropriate disposal practices. It was again viewed that education and training of those who generate, transfer, and dispose of infectious wastes would serve to minimize public and workplace exposures.

The implementation of a tracking or manifesting system has been suggested as a solution to minimize or eliminate the risk to the public from inappropriate infectious waste disposal practices. Before the initiation of regulations or standards, the necessity of a tracking system should first be assessed based upon the risk potential to the public from mismanagement of these wastes. If it is determined that Federal standards are required, the usefulness of a tracking or manifest system in achieving the objectives of these standards should be evaluated. The resulting structure of any such tracking system should be commensurate with the risks incurred during the transportation and disposal of these wastes. No consensus was received on whether a tracking or manifest system was justified by risk potential or by the benefits that could be achieved upon the institution of such a system.

From the discussions that took place during the meeting, education was viewed as a common denominator to resolving many of the issues debated. Chaos is perceived by the public and by the States on infectious waste management issues primarily due to the lack of Federal agency consistency and direction in these matters. EPA's role to resolve these issues could be via the issuance of guidance documents or through the promulgation of regulations. Since these problems exist now and since they appear to require education in their resolution, EPA should direct its initial efforts in providing the direction and information needed through the development of guidance documents.

These small generators also typically will rely on the building's management to provide waste disposal services. As such, what thought the small generator may have had with regard to the infectious potential of his waste will be forgotten once the waste leaves the office. The management service, generally not knowledgeable of infectious waste, will dispose of these materials into the general waste stream.

Those small quantity generators concerned about the management of their infectious wastes often are faced with the problem of not having a mechanism for disposal. As with many small or independent generators, the equipment to treat this waste is not available and is economically prohibitive to purchase. Many areas of the country do not have commercial off-site disposal services available which want to or can properly treat or dispose of these wastes. Hospitals having the capability to treat these wastes are also reluctant to accept these wastes for disposal because of the waste's potential liability or because of state requirements prohibiting or interfering with the disposal process.

Packaging and Containment of Infectious Wastes

To minimize exposure to infectious wastes requires the proper packaging of these materials. The integrity of the packaging is important during the collection, transport, and storage processes to prevent release of the infectious waste materials contained within the bag or container.

The selection of proper packaging materials that are appropriate for the types of wastes being contained is critical to ensure containment integrity. For bulk wastes containing contaminated disposables and residual liquids, polyethylene or polypropylene bags are most appropriate for intra-facility use. Polyethylene bags are generally used for primary waste collection. However, they are not heat resistant and must be overbagged with heat-resistant, polypropylene bags for treatment by steam sterilization. Resistance to tearing is dependent on thickness (mil gauge) or tensile strength as determined by the ASTM dart drop test (ASTM Standard D 1709-75).

Puncture-resistant containers should always be used for all sharps or any material that has the capability of puncturing a plastic bag. Selection of appropriate sharps containers is dependent on treatment method and residual liquid associated with the sharps. Typically, many healthcare facilities are using polypropylene containers specifically designed for sharps waste.

Any container or bag used should have the capability of being closed-off or tied to prevent spills during in-house transfer, storage, or collection. Any container holding infectious liquid wastes should be capped with leak-proof lids, double-bagged, placed in a corrugated container to minimize the release of potentially infectious liquids. No compaction or grinding of infectious wastes should occur before treatment since violation of the packaging could cause release of pathogenic microorganisms.

Off-site disposal of infectious wastes, treated or untreated, has posed problems to haulers, operators of transfer stations, municipal incinerator operators, and landfill personnel due to improper packaging by the generator

or through the violation of the container during the transfer, storage or disposal process. Because of the physical nature of these wastes, needles and syringes and liquid infectious wastes (notably blood) have been cited most frequently as being the greatest potential threat to the sanitation worker. Although bags and boxes used for the containment of infectious wastes work well in the healthcare environment in containing their contents, once these materials begin their journey toward ultimate disposal they are subjected to external pressures that easily rupture the container. This process begins in the healthcare facility's compactor-receiver where the bags and boxes may be initially broken or torn during compaction. In those instances where waste is taken to a transfer station, these containers may also may be ruptured during those dumping and compaction processes thus subjecting the operators to potential exposure. At the landfill or municipal incinerator, containers are also roughly treated before disposal, further adding possible direct exposure to these wastes.

Occupational Versus Environmental Exposures From Infectious Wastes

In assessing the degree of risk posed by infectious waste, exposure potential is a primary factor which dictates the extent to which human health or the environment may be threatened. Exposures may be occupationally derived or they may be viewed as environmental, resulting from inappropriate infectious waste management or disposal practices. Many of the concerns with infectious wastes raised by the public have resulted from incidences of indiscriminate infectious waste disposal. However from a public health viewpoint, actual exposures to the general public from known infectious wastes have been very limited. Exposures to infectious waste are more likely from those occupational settings that generate, transport, store, treat or dispose of these wastes. Effective management plans in each of these settings should minimize public exposure resulting from inappropriate disposal practices.

Environmentally, public exposure to infectious wastes should only occur through improper disposal practices that allow direct contact with infectious waste materials. Such practices have included the disposal of infectious waste into dumpsters that are easily accessed by the public and the disposal of wastes in locations unsuitable for waste disposal (along the side of the road, on farms, in abandoned warehouses, and in public waters).

Landfilling of these wastes in sanitary landfills should not be viewed with the same perceived threat as hazardous chemical waste. It has not been documented or shown epidemiologically that an environmental threat exists when these wastes are disposed in a properly constructed sanitary landfill. In fact, due to the biological instability of microorganisms recognized as human pathogens, the potential of any negative environmental consequence should diminish over time.

From the perspective that risk from infectious wastes is greater in the occupational setting, it now becomes the employer's responsibility to insure that these wastes are managed properly on-site and to ensure that any off-site transport and disposal is properly conducted. For the generator of infectious wastes, these responsibilities would include the development and implementation of a management program that addresses waste identification,

segregation, packaging, transport, treatment, disposal and employee training. Selection of a responsible contractor for those wastes being transported off-site for disposal should also be the responsibility of the generator of that waste.

For haulers and disposers of infectious wastes, it is the employer's responsibility to properly train all employees engaged in any activity that could result in an exposure to an infectious waste. Such training and education would include hazard recognition, personal protection practices, decontamination procedures, treatment and disposal procedures.

Tracking (Manifesting) Infectious Wastes

The implementation of a tracking or manifesting system has been suggested as a solution to minimize or eliminate the risk to the public from inappropriate infectious waste disposal practices. Before the initiation of regulations or standards, the necessity of a tracking system should first be assessed based upon the risk potential to the public from mismanagement of these wastes. If it is determined that Federal standards are required, the usefulness of a tracking or manifest system in achieving the objectives of those standards should be evaluated. The resulting structure of any such tracking system should be commensurate with the risks incurred during the transportation and disposal of these wastes.

Although inappropriate infectious waste disposal practices have gained extensive media coverage, they remain for the most part, isolated incidences. From the previous discussion, the majority of problems attributed to infectious wastes have been occupationally derived. As such, the responsibility of proper waste disposal should remain with the generator of that waste. However, infectious wastes in many regions of the country are not treated or disposed of locally, making monitoring of the disposal process by the generator difficult. As a result, a few unscrupulous haulers have taken advantage of the situation and indiscriminately disposed of the waste. To allay generator fears, several infectious waste haulers and disposers have initiated tracking systems that log the flow of the waste to its intended destination. Although these tracking mechanisms, in general, do not inform the generator that the waste has made it to the disposal site, these mechanisms are useful in retracing the path of the waste if something goes wrong and identifying the actual generator of that package or container. As such, this form of tracking could be viewed as a means to reduce the generator's liability.

The format of infectious waste transport and disposal monitoring could be viewed as a tracking process as described above or as a manifesting process similar to that used for hazardous chemical wastes under RCRA. The questions needed to be resolved before any system is developed include:

- * Will tracking lessen the risk of disease transmission?
- * Will tracking eliminate illegal disposal practices?
- * If a manifest form of tracking is considered, is its complexity and economic cost commensurate with the minimal risks associated with infectious wastes?

- * If manifesting is considered, what definitions will be used to determine those wastes being transported and disposed? Will treated wastes also require manifesting?
- * If manifesting is considered, Should the manifesting of infectious wastes be tied in with the registration of haulers? Will a separate generator identification number be required for infectious waste generators versus those for chemical wastes
- * Will the manifest system proceed only to the point of treatment or will it go further, monitoring the ultimate disposal of incinerator ash or steam sterilized infectious wastes?
- * Should Federal direction be in the form of guidelines or regulations?

Recommendations For EPA Involvement

With potential Congressional legislative action pending for EPA involvement in infectious waste management, the necessity for EPA's involvement and the role it may play in resolving the issues discussed above should be evaluated from the perspective of both the nature and degree of risk associated with infectious wastes. An assessment of both those real and perceived risks was attempted at the November 12th meeting. The results of this assessment are summarized below.

*** Risks from Infectious Wastes**

The majority of risks from infectious wastes are occupationally derived. Most risks are at the source of generation of infectious wastes. With proper infectious waste management in the workplace and minimal requirements for disposal, risks to the public and the worker should be minimized. Education of those who generate, transport, and dispose of infectious wastes is viewed as the key to risk reduction.

*** Infectious Waste Definition***

Of those categories of infectious waste defined by CDC and EPA, contaminated needles, laboratory wastes, and bulk blood were cited as having the greatest potential for disease transmission. Of these, contaminated needles pose a serious threat because of their capacity to puncture the skin, providing a direct portal of entry for disease causing agents. Laboratory wastes and bulk blood properly decontaminated on-site should pose no threat to the environment, public or sanitation worker.

*** Small Quantity Infectious Waste Generators***

Hospitals are not the only generators of infectious wastes. Clinics and independent physicians' offices generate small quantities of waste that may be capable of disease transmission if not properly managed and disposed. Needles generated by these generators were cited as the infectious waste stream of most concern. It was recommended that the small quantity generator issue be furthered studied.

*** Packaging and Containment of Infectious Waste**

Examples were cited of waste containers rupturing during the

process of off-site disposal of treated and untreated infectious waste. Although these containers are normally sufficient for use at the site of generation, they cannot withstand compaction and the other external physical forces exerted during transport and disposal processes. Rupturing of these containers can result in a workplace exposure. Although this packaging issue was not resolved, an awareness of and proper response to the hazards posed during infectious waste processing through education and training were viewed as a way to minimize this workplace exposure.

* Occupational Versus Environmental Exposures From Infectious Wastes

Although media coverage has dwelled on the potential for public exposure from inappropriate infectious waste disposal practices, these incidences are viewed as isolated and pose minimal risk to the public at large. From an occupational perspective, the potential for risk becomes greater due to the increased likelihood that the generator, the hauler, and disposer may come into contact with the waste. To minimize the risk to these workers, emphasis should be placed on informing the worker of the hazards posed and training them in the necessary personal protection mechanisms. As such, the Occupational Safety and Health Administration (OSHA) has the authority for jurisdictional oversight on these worker health and safety issues. If OSHA does become involved in these issues, efforts should be coordinated between EPA and OSHA to ensure consistency on definition and approach in any rule making.

* Tracking (Manifesting) Infectious Wastes

No consensus was received on the issue of tracking or of manifesting infectious wastes. It was viewed that it made sense to know where your waste was going, but whether the initiation of a Federal tracking or manifesting system was justified by risk potential or by benefits that could be achieved was questionable.

From the discussions that took place during the meeting, education was viewed as a common denominator to resolving many of the issues debated. Chaos is perceived by the public and by the States on infectious waste management issues primarily due to the lack of Federal agency consistency and direction in these matters. Although some infectious waste risk could be visualized as environmental and under the jurisdiction of EPA, many of the problems cited are occupational and may be within OSHA's jurisdiction. As such, cooperation of these two agencies may be ultimately required to provide that information and training necessary to reduce the real risks posed by infectious wastes and to provide a consistent approach to the management of these materials.

EPA's role to resolve these issues could be via the issuance of guidance documents or through the promulgation of regulations. Since these problems exist now and since they appear to require education in their resolution, EPA should direct its initial efforts in providing the direction and information needed through the development of guidance documents. The development and dissemination of educational materials can proceed more quickly than regulation promulgation. If the issues cannot be resolved in this manner the next step that could be taken would be the issuance of

criteria documents. If the first two measures fail, regulations could be promulgated.

To assist EPA in the production of educational materials, many trade and professional organizations could be called upon to help develop and disseminate guidance materials. Providing materials specific to the needs of the various generators of infectious wastes and to those sanitation workers who haul, store, transfer, treat or dispose of infectious wastes should significantly assist in minimizing exposures to infectious wastes.