Approved 2-12-85
Date

MINUTES OF THE Senate COMMITTEE ON Energy and Natural Resources.

The meeting was called to order by Senator Merrill Werts at
Chairperson

8:00 a.m./~~p.m.~~ XXX on February 7, 1985 in room 123-S of the Capitol.

All members were present except:

Senator Ben Vidricksen - Excused
Senator Phil Martin - Excused

Committee staff present:
Ramon Powers - Research Department
Don Hayward - Revisor's Office
Nancy Jones - Committee Secretary

Conferees appearing before the committee:
James Young - Deputy General Counsel, Chemical Waste Management, Inc.

A hearing was held on S.B. 1 with James Young presenting testimony as an opponent of the bill. Mr. Young summarized the history of Waste Management, Inc. and reviewed Kansas laws and regulations controlling land disposal of hazardous waste. Mr. Young's remarks are outlined in the testimony attached (Attachment A).

Attention was given to amendments which Mr. Young feels will privide adequate policy guidance to the executive branch and continue a reasonable program for the disposal of hazardous waste in Kansas. (Attachment B). Mr. Young summarized the contents of two additional handouts which were given to the committee members. (Attachments C & D).

Mr. Young further stated that he feels land disposal is a cost effective and safe method of getting rid of certain wastes that cannot be disposed of with present regulations and alternate technology. He observed that a major point of this bill is that it prohibits land burial waste unless an exception is made. Under current law small quantity generators of hazardous wastes are exempt from the provisions of RCRA provided that they dispose of the material either in a hazardous waste facility or a sanitary landfill and most of the wastes have been going into sanitary landfills. He noted that with this bill, it would mean none of the small generators' wastes could go to a sanitary landfill. Mr. Young also recommends adoption of amendments previously proposed by Secretary Sabol.

Chairman Werts inquired if the committee does not act on the bill plus certain suggested amendments, would this mean the EPA would directly undertake enforcement of RCRA in Kansas? Mr. Young indicated the amendments made by Secretary Sabol are necessary but not those he proposed as far as enforcement is concerned.

Senator Feleciano inquired if a court ordered procedure might be less stringent than that which the secretary had ordered, which order would prevail? Mr. Youn explained that the department likely would have written the technical aspects of an order for the judge and the department would have advised the court the type of order needed.

Senator Kerr believes there is a consensus that a review board is unnecessary and offered a motion to strike subsection (b)(1), and in (b)(2) line 64 insert in lieu thereof "the Secretary of Health & Environment"; in line 0070 insert conceptional language including that proposed by Mr. Young to provide that 90 days be the time allowed. Motion seconded by Senator Hayden. All references in the bill to the board would be stricken.

Senator Daniels asked for clarification as to the county of residence for filing legal action. Mr. Hayward advised it would be the county in which the facility is located. It was also noted that with this amendment, responsibility is not being shifted from the Secretary.

The motion to amend S.B. 1 carried. Meeting adjourned at 9:00 a.m. Next meeting will be February 12, 1985

2-7-85

guest list

Chip Wheeler	Topeka	Waste Management, Inc.
James Young	Oak Brook, Ill.	" " "
Valerie Hejtmanek	Hutchinson	Close Up Kansas
Randall L Hodgkinson	"	"
Deb Lewis	Lawrence	Close Up Kansas
Richard Harmon	Salina	Close Up Kansas
Patrick Stewart	Salina	Close Up Kansas
Walter Dyer	Topeka	EKOGA
Pete Meier	"	Waste Management Inc.
Dennis Murphey	"	KDHE
Gary Harmon	Salina	Close Up KANSAS
Julie Fredrickson	Lindsborg	" "
Ann Streufert	Lindsborg	Close-Up Kansas
MaryAnn Bumgarner	Topeka	Gen. Burke - intern
Mary Rice	Lawrence	A.G. - intern
Rob Hodges	Topeka	KCCI
Ruth Wilbert	"	Gilbert
Nancy Hogue	"	Budget
Karen McClain	"	KS. ASSOC OF REALTORS
Malcolm Moore	Auburn	Sierra Club
Marsha Marshall	Topeka	Kansas Natural Resource Council
Bill Dawes	Bartlesville OK	Phillips Petroleum Co

BEFORE THE KANSAS SENATE
ENERGY AND NATURAL RESOURCES COMMITTEE

FEBRUARY 7, 1985

TESTIMONY OF: JAMES L. YOUNG
DEPUTY GENERAL COUNSEL
CHEMICAL WASTE MANAGEMENT, INC.

About 10 months ago, March 29, 1984 to be precise, I appeared before this Committee and presented testimony on House Bills 2725 and 2740. The bills were subsequently amended in this Committee and now are a part of the existing Kansas statutory provisions relative to the land disposal of hazardous wastes. Then, as now, Kansas law strictly and rigidly controls the land disposal of hazardous wastes through the following provisions:

1. Existing Kansas law today prohibits the land disposal of hazardous wastes without a permit issued by the Secretary of KDHE.

2. Existing Kansas law today requires that the Secretary must include as a condition of a permit, specific authorization of both the types and the quantities of hazardous wastes allowable for disposal at a permitted facility.

3. Existing Kansas law today requires the Secretary to prohibit by order the land burial of hazardous waste on a determination by the Secretary that there is an environmentally more desirable procedure for disposal available.

4. Existing Kansas law today gives full authority to the Secretary of KDHE to prohibit the land disposal of any hazardous waste if the disposal threatens to cause pollution to the land, air or waters of the state.

5. Existing Kansas administrative regulations today provide authority to KDHE to require proof from a hazardous waste generator that a waste cannot be recycled or disposed of by a method other than land burial prior to issuance of a disposal authorization.

6. Existing Kansas administrative regulations today require that no hazardous waste may be delivered for land disposal unless KDHE has issued a waste disposal authorization for that particular waste stream and method of disposal.

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Attachment A

7. Existing Kansas law today requires that no permit can be issued unless and until the Hazardous Waste Disposal Facility Approval Board has determined that the land disposal facility will comply with Kansas hazardous waste law and administrative regulations regarding land disposal, after consideration of the risk and impact of contamination of ground and surface waters and health and safety.

8. Existing federal law and regulations today contain extensive, new permitting, technical and design requirements for the construction, operation and monitoring of hazardous waste facilities and prohibitions of certain hazardous wastes from landfill disposal. No land disposal facility can be operated unless and until they have a permit issued in accordance with these new requirements. No land disposal facility designed or permitted under the federal requirements is currently operating in Kansas and none can be until such a permit is issued.

It has been represented that the land disposal ban as proposed by Senate Bill 1 is a necessity "to protect the quality of our precious groundwater from which 80% of Kansas water use originates." Recognizing the precious nature of groundwater and the increasing importance of surface water to the health and economic well-being of Kansas, it would appear to be germane to consider any proposed bans in the light of all of the existing and different sources of contamination and their relative contribution and the degree of risk which each poses to the waters of the state. No one would dispute that 80% of Kansas water use originates from groundwater; however one might well question whether the risk of future contamination posed by the land disposal of carefully selected wastes under the present permitting requirements constitutes such a necessity.

Senate Bill 1 intimates, at least, that the Kansas legislature has been remiss in protecting the groundwater because they have failed to enact a landfill disposal ban. That characterization is patently false, given the stringent and detailed Kansas laws which clearly provide the Secretary and KDHE full and sufficient authority to prohibit the land disposal of any hazardous waste unless both the generator and disposer of the waste can conclusively demonstrate that such disposal will pose no threat to public health, safety or the environment and that there is no environmentally more acceptable disposal alternative available. Any necessity for a land disposal ban in Kansas is strictly cosmetic; in point of fact there has been no below-ground burial of any hazardous waste for over three years.

Meaningful prevention of contamination of the ground and surface waters of the State of Kansas can only be accomplished through the application of the best available technology to all sources of contamination and rigorous, across-the-board enforcement. Water pollution in this country was not caused because no laws existed; rather it was the direct result of lack of enforcement or selective enforcement of the laws that did exist that have caused the problem. The prevention of water pollution cannot be accomplished by adopting legislation which does no more than rearrange existing statutory provisions or which relieves state agencies of their responsibility to develop and maintain the necessary technical capability and excellence to rationally and reasonably administer and enforce the environmental control laws which the legislature has entrusted to them.

We are also told that a legislative ban such as that proposed in Senate Bill 1 will simplify the administration of the hazardous waste program by relieving the Secretary and the Department of the necessity to make technical determinations on the suitability of land disposal for specific hazardous wastes and eliminate the necessity and expense for employment of technically qualified personnel to render such decisions. The 1984 amendments to K.S.A. 65-3443(b) considerably reduced the span of the Department's analysis by removing a then existing requirement for an evaluation of the economic impact on the generator as a consideration to an administrative ban on the disposal of a waste for which an environmentally more acceptable alternative is available. Despite the fact that statutory authority has been on the books since 1981 for the Secretary to adopt regulations to totally or selectively ban the below-ground disposal of hazardous wastes, the Department has quite obviously concluded that the risk of contamination from that potential source is adequately controlled by existing statutes. The amendments to the Federal Resource Conservation and Recovery Act adopted November 9, 1984 have established a number of selective land disposal prohibitions and mandated USEPA review of the efficacy of land disposal of all hazardous wastes. Any land disposal in Kansas or any of the states can only be done in compliance with the new RCRA requirements which recognize that there are classes of materials which are quite suitable and safe for such disposal.

As I stressed in my testimony to this Committee last year, with the possible exception of some types of incinerables or the shifting of certain biologically-treatable liquid waste streams from land to water disposal after treatment in publicly-owned sewage treatment plants, virtually every hazardous waste treatment technology will generate residues which will not be amenable to further treatment and will necessarily be disposed of to the land.

Treatment plants will typically produce between 5 to 15 percent of their influent as sludge after treatment and, which after dewatering or solidification, is only suitable for land disposal.

Incinerators can produce as much as 10% ash residual from their influent and, if scrubbers, precipitators or filters for air pollution control are required, can produce scrubber sludges, filter cake and other solids in quantities equal to the total weight of the material incinerated.

Recycling of hazardous wastes also produces waste residuals which must be disposed of to the land after appropriate treatment.

Land disposal will continue to play a necessary and vital role in hazardous waste management. For those classes of wastes which can safely be disposed of in the land, land burial provides a secure and cost effective best management option. I believe that the record made before the Special Legislative Committee on the regulation of hazardous and solid waste generation and disposal during the interim study clearly supports such a conclusion.

Turning to Senate Bill 1, I have prepared amendments which in my opinion will provide adequate policy guidance to the executive branch and continue a reasoned and reasonable statutory program for the disposal of hazardous waste in Kansas.

Session of 1985

SENATE BILL No. 1

By Special Committee on Energy and Natural Resources

Re Proposal No. 20

12-18

AN ACT concerning hazardous waste; prohibiting the underground burial of hazardous waste; providing for exceptions to such prohibition; amending K.S.A. 1984 Supp. 65-3443 and repealing the existing section.

Be it enacted by the Legislature of the State of Kansas:

New Section 1. (a) The underground burial of hazardous waste produced by persons generating quantities of such waste greater than those specified in K.S.A. 1984 Supp. 65-3451 is prohibited except as provided by order of the secretary of health and environment issued pursuant to this act. Such prohibition shall not be construed as prohibiting mound landfill, aboveground storage, land treatment or underground injection of hazardous waste. Any existing hazardous waste disposal facility which utilizes underground burial shall cease such practice and, with the approval of the secretary, shall implement closure and post-closure plans for all hazardous wastes which have been disposed of underground.

(b)(1) ~~There is established the underground hazardous waste disposal review board which shall be composed of seven members as follows: The secretary of health and environment, the state geologist, a member appointed by the president of the senate, a member appointed by the minority leader of the senate, a member appointed by the speaker of the house of representatives, a member appointed by the minority leader of the house of representatives and a member appointed by the governor. The term of office of the appointed members shall be three years. Upon the expiration of the term of office of the appointed members, the appointing authorities shall each appoint a suc-~~

On Page 1, Line 0033 after the word "all" insert the words "units of the facility in which".

On page 1, beginning at line 0035, strike the entire section through line 0080 and insert the following:

"(b)(1) The secretary of health and environment shall decide whether or not an exception to the prohibition against underground burial of hazardous waste shall be granted for a particular hazardous waste. No decision to grant an exception shall be rendered unless it is demonstrated to the secretary that, except for underground burial, no economically reasonable or technologically feasible methodology exists in Kansas for the disposal of a particular hazardous waste. The procedures for obtaining an exception to the prohibition against the

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Atch. B

ATTACHMENT B

~~cessor. If a vacancy occurs among the appointed members for any reason other than the expiration of a member's term of office, the appointing authority making the original appointment shall appoint a successor to fill the unexpired term of office. The secretary of health and environment shall serve as chairperson of the board. All budgeting, purchasing and related management functions of the board shall be administered under the direction of the secretary of administration. All vouchers shall be approved by the chairperson of the board and the secretary of administration. Three members of the board shall constitute a quorum for the transaction of business by the board. The state agencies which have officers serving on the board shall provide such staff assistance to the board as may be requested by the board. Appointed members of the board attending regular or special meetings of the board shall be paid compensation, subsistence allowance, mileage and other expenses as provided in K.S.A. 75-3223, and amendments thereto.~~

~~(2) The duty of the underground hazardous waste disposal review board shall be to decide whether or not an exception to the prohibition against underground burial of hazardous waste shall be granted for a particular hazardous waste. No decision to grant an exception shall be rendered unless it is demonstrated to the board that, except for underground burial, no economically reasonable or technologically feasible methodology exists for the disposal of a particular hazardous waste. The procedures for obtaining an exception to the prohibition against underground burial of hazardous waste shall be as established and prescribed by the board.~~

~~(3) Whenever the underground hazardous waste disposal review board decides to grant an exception to the prohibition against underground burial of hazardous waste, the secretary of health and environment shall issue an order so providing. Any party aggrieved by the failure to issue an order under this section shall have the right to appeal in the manner provided by K.S.A. 1985 Supp. 65-3440, and amendments thereto.~~

Sec. 2. K.S.A. 1984 Supp. 65-3443 is hereby amended to read as follows: 65-3443. (a) If the secretary finds that the generation, underground burial of hazardous waste shall be established by rules and regulations adopted by the secretary in accordance with K.S.A. 77-415 et seq. and amendments thereto. Any person who has been ordered to dig up and re-bury hazardous waste pursuant to a remedial action, clean-up, spill response, closure or post-closure plan by the secretary or a court shall comply with the terms of the order in lieu of this section.

(2) In adopting rules and regulations the secretary shall require that any person seeking an exception must file a written petition with the secretary in a form and with such content as the rules and regulations shall prescribe. The secretary shall issue an order approving or disapproving the exemption request within 60 days of the filing of the petition and shall include in the order the specific reason or reasons for the approval or disapproval. Any party aggrieved by an order issued under this section shall have the right to appeal to the district court of the county of residence of the appellant in the manner provided by K.S.A. 1985 Supp. 65-3440, and amendments thereto."

accumulation, management or disposal of a hazardous waste by any person is or threatens to cause pollution of the land, air, or waters of the state or is or threatens to become a hazard to persons, property or public health or safety or that the provisions of this act or any rule or regulation adopted pursuant thereto have been otherwise violated, the secretary may order the person to modify the generation, accumulation or management of the hazardous waste or to provide and implement such hazardous waste management procedures as will prevent or remove the pollution or hazard or take any other action deemed necessary. The secretary may order any person having a permit issued under this act, and who operates a public or commercial hazardous waste management facility, which the secretary finds suitable to manage the hazardous waste, to provide and implement hazardous waste management procedures to prevent or remove such pollution or hazard. Such order shall specify a fair compensation to the owner or permittee for property taken or used and shall specify the terms and conditions under which the permittee shall provide the hazardous waste management services. Any order issued shall specify the length of time after receipt of the order during which the person or permittee shall provide or implement hazardous waste management procedures or modify the generation, accumulation or management of the hazardous waste.

~~(b) If the secretary finds that there is an environmentally more desirable procedure available other than ground burial for the disposal of a particular type of hazardous waste, the secretary shall order that the use of ground burial for the disposal of that type of hazardous waste be discontinued. The secretary in developing such finding may require the generator to provide information and plans for potential environmentally more desirable procedures.~~

~~(c)~~ *(b)* The secretary shall adopt rules and regulations providing for approval of closure and post-closure plans, establishing standards for underground injection, land treatment, and above ground storage of hazardous waste.

On page 3, line 1117, insert a comma after the word "treatment" and add the words "mound landfill".

~~(d)~~ *(c)* Any party aggrieved by an order under this section

shall have the right of appeal in accordance with the provisions of K.S.A. 1985 Supp. 65-3440, and amendments thereto.

Sec. 3. K.S.A. 1984 Supp. 65-3443 is hereby repealed.

Sec. 4. This act shall take effect and be in force from and after its publication in the statute book.

SUBJECT: RESTRICTION OF HAZARDOUS WASTES
AT LAND DISPOSAL FACILITIES

Chemical Waste Management, Inc. (CWM) submits the following comments on the prohibition of hazardous wastes from land disposal.

CWM supports the efforts to consider appropriate restrictions of certain untreated hazardous wastes from land disposal. We currently prohibit the disposal of free liquids in landfills, in addition, we support development of appropriate regulations and standards for all treatment and disposal options. Equal enforcement of such regulations and standards will ensure protection of public health and the environment.

Although we support the intent to consider restricting certain forms of hazardous waste from land disposal, the degree to which a particular waste stream will or can pose a threat to public health and the environment when land disposed depends on many factors. These include chemical and physical properties of the waste stream, the extent of risk management (e.g., treatment practices) applied to the waste prior to land disposal, the potential for dispersion beyond a disposal site and subsequently throughout the environment, and the fate of waste constituents within particular environmental media. Keeping these factors in mind, our comments will focus on several specific topics:

- Characteristics of waste that determine levels of toxicity, mobility, persistence, and bioaccumulation;

- Fate of waste at a waste management facility;

- Factors of importance for risk assessment models;

- Evaluation of alternative technologies;

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Attachment C

- Implementation factors;

- Potential for new technological developments and siting of new facilities.

WASTE CHARACTERISTICS

What wastes should be prohibited from land disposal?

Because of the diversity of the waste universe that must be evaluated, CWM recommends that solvents receive highest priority. These wastes pose difficult problems in characterizing a category as well as for identifying alternative disposal options.

For example, the types of waste designated as halogenated solvents encompasses a broad range of material with differing concentrations. This category can include liquids with 90% solvents, less than 10% solvents, and even down to trace amounts. The type of solvent present in the waste will also vary. This broad category also can include contaminated soil or residues from treatment processes. The hazard posed by each will be very different and the available disposal alternatives also will be limited depending on concentration levels as well as form of the material.

How should restricted waste be identified, using criteria of toxicity, mobility, persistence and bioaccumulative potential?

There are several different properties of a waste, or a particular constituent of a waste stream, that will determine whether it is toxic, mobile, persistent, and bioaccumulative. For example, the inherent toxicity of a waste stream is a function of the capacity of the constituents to produce adverse effects. The magnitude of these effects will depend on the chemical, physical, and toxicological properties of the constituents, the concentration levels within the waste stream, and the sensitivity of the organisms being exposed to the waste. It is important to remember:

> For any chemical, there is a concentration level that will produce adverse effects in any organism; conversely for any compound, there are concentrations sufficiently low that no adverse effect can be detected.

In order for an adverse effect to occur, the hazardous constituents must be able to reach an organism. Thus of the four criteria being considered, mobility and persistence are of major importance. Mobility potential may be the most important factor for land disposal and should receive the greatest weight in any evaluation process.

CWM suggests that waste be evaluated using a process that considers these criteria in a sequential process as illustrated in Figure 1. In such a process, wastes are reviewed first for the capability to be mobilized easily and to exhibit persistent characteristics, if released to environmental media. Next the toxic and bioaccumulative potential are evaluated for those wastes considered to be "highly" mobile and "strongly" persistent. Such an approach is similar to classification schemes that were developed by several states as a means to discriminate among degrees of hazard.[1]

CWM considers it important that when using these four criteria to determine restrictions on land disposal, the terms "highly" and "strongly" must be clearly defined by setting specific limits, preferably numerical in nature. It is not possible technically to identify "natural" breakpoints to distinguish between high and low levels of mobility, persistence or toxicity, however limits must be established, albeit arbitrarily. CWM must emphasize that some numerical value is required that can be uniformly applied to all wastes being considered for restrictions.

[1] The State of Washington, Department of Ecology, Solid Waste Management Division and State of Michigan, Department of Natural Resources, Michigan Critical Materials Register, Environmental Protection Bureau.

There is precedent for establishing numerical criteria as a means to distinguish among degrees of hazard. For example, there are generally accepted ranges for different degrees of toxicity.[2] Mobility potential can be determined by testing for aqueous and nonaqueous solubilities with acceptable concentration ranges being designated. For example, the State of Illinois is considering banning certain wastes from land disposal. The proposed legislation establishes a threshold level for halogenated solvents at 1%, as detected in the nonaqueous phase. In another instance, the waste classification system developed by the State of Washington integrates toxicity and persistence measurement using specific numerical "cut-off" limits.

CWM would discourage developing restrictions based only on the inherent toxicity of a waste stream. The mandate to use other waste management practices could increase potential harm to public health and the environment. It may be possible, for example, to contain and immobilize effectively an inherently toxic waste stream in a landfill; however, if the Agency restricted such a waste, it is possible that alternative disposal methods actually could increase either the formation of hazardous by-products or the mobility of hazardous constituents. For example, incineration of a particular waste may lead to chemical interactions that would result in destruction of the constituent of concern, but produce other hazardous compounds that may be released to air.

Should land disposal restrictions consider the various forms of a waste?

CWM recommends that land disposal restrictions distinguish between forms of a particular waste. Consider a hypothetical Waste A, containing hazardous constituents. In a liquid form, these constituents undoubtedly would be quite mobile. There would a a high probability of movement within the landfill, potential deterioration of the liner and

[2] Casarett and Doull's Toxicology, 2nd edition 1980, pg 12. In addition, the Michigan Critical Materials Register establishes numerical ranges for toxicity, persistence, and bioaccumulative potentials.

subsequent migration beyond the facility. However, if disposed in a solid form, the potential for mobilization of the hazardous constituents may be very low; the extent of any mobilization would actually depend on whether the constituents were water soluble and conditions at the disposal site (e.g., the amount of rainfall, the impermeability of temporary or permanent covers). Also, it will be necessary to recognize that certain treatment processes change the state of the waste, without altering hazardous properties of the constituents. Thus, although the inherent toxicity may not have been eliminated, the form of the residue may be such that migration from a land disposal site is prevented or significantly reduced (e.g. residues are solidified or encapsulated).

Should the quantity of a hazardous waste or concentration levels of constituents have a bearing on decisions for restrictions?

Quantity and concentrations levels should be considered in decisions about restrictions. This is important when considering residues from treatment processes. Using solvents as an example, it can be very difficult to remove low concentration (e.g. 1 or 2 ppm) from the residue. Also the cost of treating levels of 1000 ppm vs 1 ppm should be considered.

Small quantities of hazardous wastes can pose special problems for disposal. There are safe methods of disposing of "lab packs" in containers within landfills. If such practices were prohibited, increased potential hazards could develop. Because of the small quantities, these materials would have to be stored until sufficient amounts were collected to make treatment or incineration economically viable.

Limits for allowable concentrations can be set through the use of risk assessments. Possible models are discussed in sections that follow. Small quantity exemptions have been established in other areas of the RCRA program already; new quantity limitations may not be necessary.

FATE OF WASTE STREAMS AT A WASTE MANAGEMENT FACILITY

Should disposal restrictions differentiate between types of land disposal facilities?

Because the definition of land disposal is expansive, management practices at land disposal facilities vary significantly. EPA defines land disposal as including deep well injection, surface impoundments, land farming, waste piles, and landfills. The potential threat posed to public health and the environment is not the same at each type of facility. Because of the contained structure and current design specified by RCRA regulations for deep wells and landfills, the fate of waste disposed at these sites will be quite different from those wastes applied at land farms, held in waste piles, and treated in surface impoundments.

In fact, the characteristics of mobility and persistence of any particular waste stream proscribe the suitability of any particular land disposal practice. For example, land farming practices already are restricted to those types of waste that are readily biodegradable. At these facilities care is taken to monitor concentration levels of constituents and required nutrients to maintain optimal conditions for degradation. The presence of potentially toxic elements is also monitored, as these will reduce the efficiency of this particular waste management operation. Those management practices that depend on evaporative processes or water-permeable liners do not dispose of wastes containing highly water-soluble hazardous constituents. Deep wells are used generally for very dilute waste streams; because of industry's criteria for configuration and location of these wells, the factors of mobility, persistence, and potential toxicity for waste streams may not be of major importance for this waste management practice.

Although CWM recognizes that it will be a difficult task, restrictions should be established by differentiating among different types of land disposal. We find it preferable to do this in the rulemaking process, rather than developing facility exemptions through petitioning.

Should hydrogeological settings be considered when establishing land disposal restrictions?

The concept of different land disposal practices (containment or degradation) can reduce the importance of one or the other criteria (mobility, persistence, toxicity, bioaccumulative) used to evaluate restrictions. As stated above, some land disposal operations promote destruction of hazardous characteristics of waste being disposed. Land farming is one; some storage surface impoundments, where either aerobic or anaerobic degradation is promoted, may be another. For these two types of facilities, mobility of the waste may not be a critical factor. If the constituents are readily degraded, the threat to public health or the environment of any potentially mobile waste has been eliminated.

Site conditions can have a major influence on the potential for threats to public health and the environment. For example, hydrogeological conditions at a landfill site can provide additional barriers to off-site migration of potentially hazardous constituents. Climatic conditions also can reduce concern about restrictions at a management facility. If precipitation at a site is very limited, mobility of waste constituents within a landfill will be inhibited.

The structural design of a facility can reduce the potential for migration of wastes, reducing the concern about persistence and toxicity of hazardous constituents. In addition to the structural design of a facility, there are often additional precautions taken at to reduce liquid accumulation and leachate buildup. For example, at any landfill, control of rainwater runoff is part of good management practice. In addition, an air inflatable structure system is being evaluated and incorporated to cover disposal trenches at landfill sites. With this system, the operating disposal trench of the facility is enclosed within the air inflatable structure; thus open areas of the landfill are not exposed to climatic conditions, and accumulation of precipitation within an open cell is prevented.

EPA has promulgated land disposal regulations based on reducing or preventing the migration of hazardous constituents. EPA is now working on locational standards for land disposal facilities; thus site specific factors will already have been included in location standards and may not be important in the development of waste restrictions.

What other factors are important in setting restrictions on waste for land disposal? What standards should be considered?

There are factors that will require stringent evaluation when considering prohibitions to land disposal of certain hazardous waste. For facilities that depend on degradation of waste constituents, a careful evaluation must be made to determine whether all constituents within any particular waste stream can or cannot be readily biodegraded; also concentration levels of particular constituents and interactions among different constituents can influence (either enhancing or inhibiting) the degradative potential. Site conditions can be a favorable aspect as well as an unfavorable concern. While thick and highly impermeable clays can act as appropriate barriers for migration from a landfill, some types of compounds can penetrate certain natural barriers.[3] For example, strong organic and inorganic acids and bases can solubilize portions of clay and soil-bentonite barriers. Acids can penetrate limestone formation that might underly some land disposal facilities. Certain chemicals would be inappropriate because of the adverse effects they might have on artificial liners. For example, chlorinated polyethylene liners can swell in the presence of aromatic hydrocarbons and oils; ethylenepropylene rubber can be adversely affected by petroleum solvents or halogenated solvents. In addition, potential interaction among different waste streams could lead to conditions that would influence the effectiveness of a particular type of liner.

[3] Engineering Science, Comparative Evaluation of Incinerators and Landfills, prepared for CMA, May 1982.

When evaluating the effect of certain waste on landfill liners, current studies must be reviewed with care. Those studies that indicate liner vulnerability were conducted using pure chemicals only. More recent study results suggest that such chemicals when tested in a waste stream do not adversely impact landfill liners.

When evaluating restrictions EPA should apply all existing air and water standards. CWM emphasizes that these should not be applied at the land disposal site but rather at the discharge point. Models are available to identify appropriate concentrations on site based on allowable levels in water and air sources. See the discussion on models that follows.

RISK ASSESSMENT MODELS

How can risk assessment be used in formulating a set of land disposal prohibitions?

CWM must emphasize that any model should be considered only as a tool in the decision making process and cannot be used to provide the final decision. However, when attempting to use any model as a tool for decision making, there are certain limitations that must be recognized.

1. The indicators used to identify risks should be relevant to actual exposure situations at the different types of land disposal facilities. These indicators should reflect the range of hazards that might be expected, the environmental state of the constituents of concern once migration from the site has occurred, and realistic exposure factors.
2. The data base used in these models should include accurate, verifiable information to the extent possible. Uncertainties in the scope of the data base (e.g., wide-ranging variability in a waste category) and precision of the data base must be identified and presented along with the results of the model.
3. Any biases incorporated in a model must be presented with the results and carefully evaluated. These biases can be associated with the choice of assumptions made in a model or

with the quantitative values assigned to critical elements of a model. These types of biases will influence the outcome of the model and decision makers should have an indication of the effects of the biases.

4. For those models that attempt to compare risks associated with different waste streams (e.g. alternative methods for a particular type of management option, or outcomes of alternative management practices), it is necessary to provide sensitivity analyses that will indicate the changes that may occur in results when different assumptions are used or different quantitative values apply to the various options.

A major difficulty in using risk assessment models is the need to make tradeoffs between a usable model and a realistic model. In order to model any waste management situation accurately, the design can become so complicated that it is no longer useful because of cost, time to run it, and limited data available for all components. On the other hand, if a model is too simple, then results may have little relevance to the issue in question, and therefore have limited application in reaching a decision.

Another problem is in choosing those indicators that are most appropriate to decisions about restricting management practices for particular waste streams. Most models being developed within EPA, are inadequate for this purpose, particularly the W-E-T model. These models generally assume that waste constituents will be released in a pure form; data on health effects are collected for a few specific chemicals without regard for interactions amount constituents that would change the hazard potential. Such models may provide absolute worse-case results, but hardly can be considered to provide a realistic prediction of the actual operation of a management facility. If decisions about restrictions in land disposal facilities are to be made with the assistance of modeling results, an attempt must be made to develop models that will include factors reflecting the fate of waste within a

particular type of land disposal facility; for example, in situ changes that might be expected because of the presence of anaerobic or aerobic degradation, interactions among constituents in mixed waste streams and the influence of physical forms of waste.

Rather than use models to make comparative assessments between land disposal and alternative management practices, a possible application of risk assessment models would be to identify acceptable risk levels in drinking water and ambient air for those constituents for which currently there are no standards. Models could be developed that would indicate appropriate quantities or concentration levels for waste constituents in any particular land disposal facility, whether these are landfills, land farms, deep wells, or surface impoundments. Such an approach is not unprecedented. Acceptable risk levels have been set for health and environmental standards in other sections of the Agency. For example, these have ranged from 10^{-5} to 10^{-7} for evaluating carcinogens. This approach is being considered for use in the Superfund program as a means of identifying acceptable cleanup levels. Using toxicological data, environmental and health standards, and data on environmental fate of constituents, an acceptable risk level for exposure beyond the site can be identified. Models are used to evaluate concentration levels within the site that would not exceed the exposure risk level if constituents were released from the site.

EVALUATION OF ALTERNATIVE PROCESSES

How should alternative technologies be considered in setting restrictions for land disposal?

In identifying alternative options for those wastes that may be restricted from land disposal facilities, there are major issues that must be considered. First, the selection of criteria with which alternatives will be evaluated must reflect the difference in intent of alternative technologies. The same criteria cannot be used then

evaluating the effectiveness of incineration as compared to the effectiveness of stabilization. The operation processes are completely different; one is aimed at detoxification or destruction of hazardous constituents, the other at immobilization. The type of waste that can be addressed most efficiently in each also are different, as is the intentional release of constituents (e.g. air emissions). Containment technologies are designed to reduce or eliminate environmental releases, whereas incineration processes do have intentional release of certain compounds to air.

Second, when alternative options for a particular waste stream are identified, evaluation of similar processes must acknowledge the differences among them. For example, even when similar treatment processes are considered, the actual operation of each may result in different end products. Stabilization processes are a good illustration. Among the most commonly used stabilization treatments, the structural strength and permeability levels of final products are very different, but that does not mean that one or the other process is superior for immobilizing hazardous components of a waste. Therefore the need must be recognized to develop evaluation criteria that reflects the end result of alternative processes, rather than attempt to identify the "best" alternative. The end result for all management practices is effective protection of public health and the environment.

Third, the fact must be recognized and accepted that all alternatives to land disposal will produce residues that can only be placed in the land. These residues may or may not be less hazardous than the original waste stream. In some instances, an alternative process reduces the volume of material that will be placed in the land; however, in other instances the volume can be increased.

Certain factors must be considered in the evaluation of alternatives:

a) The mobility, persistence, toxicity, and bioaccumulative potential for major constituents within the process residue.

b) The potential for public or environmental exposures during operation of the alternative technologies.

c) The quality of intentional releases (e.g. air emissions) from alternative technologies.

Finally, we must consider whether increases in cost are justified by an assessment of the comparative risks and benefits associated with the various alternatives. While CWM would agree that costs should not be the overriding factor for determining restrictions in land disposal, costs are a legitimate concern. In the real world, general economic conditions and the cost to generators for particular disposal practices have an impact on the way wastes are managed. Thus for "borderline" cases (e.g. when the constituent of concern is very dilute or when removal of final traces from the waste are extremely difficult), it will be necessary to consider cost factors.

CWM must caution that the decision about restrictions must be viewed in the broadest context of waste management. If the "bigger" picture is not considered, land disposal restrictions can have undesirable effects. If the restrictions are unreasonable (i.e. alternatives cannot be realistically applied), then generators may be forced to engage in undesirable practices such as long-term storage that is less regulated than land disposal, or even in illegal disposal.

With careful planning regulations can be a driving force for development of new technology. The threat of restrictions is already making changes in waste management as evidenced by the increased interest in treatment. However, the effective dates of restrictions must be timed to allow for scale-up of new technology and for lead times in matching waste stream generators with waste treators.

IMPLEMENTATION FACTORS

How can the land disposal restrictions be implemented?

Having identified those waste streams that will be restricted from land disposal facilities, it is necessary to develop an effective strategy for implementing these restrictions. This will not be an easy task. Certain questions must be addressed.

Under RCRA regulations all forms of a listed hazardous waste are considered hazardous, unless delisting has occurred. Would the restrictions of certain hazardous wastes be applied to all forms of the waste, e.g., liquid or solid? If the hazardous level has not changed but the mobility has, will the restrictions still apply?

Legally, where would the restrictions apply? At the point of generation of the waste or at the waste management facility?

Would the restriction be generic to a waste designation, e.g., F001 or F002? What criteria would the Agency use to allow site-by-site exemptions to the restrictions?

The delisting process under RCRA regulations is a cumbersome process for both the waste management industry and the Agency. Is it likely that reviewing site-by-site exemptions to restrictions also would be extremely cumbersome and time consuming? Will there be opportunities to reduce the time factor? This could be particularly important for those generic restrictions whereby alternative options are limited.

While some may consider that restrictions for land disposal should be the driving force for development of more acceptable management options, it may not work in actual practice. There are many factors that influence development of new technologies, including:

- Availability of new alternative processes for particular waste streams;
- The stage of development of any new process, e.g., at only an experimental stage, or pilot scale;
- Economic conditions that will affect both expansion of existing facilities and development of new alternatives;
- Delays in obtaining necessary federal and state permits;
- Problems associated in siting new facilities.

Of these factors, siting of new facilities or expansion of existing sites likely will be the most limiting factor for management options. Public groups have not yet recognized any differences between land disposal facilities and those facilities that treat or destroy the waste

streams. Once sited, permitting delays will be another major factor in implementing the restrictions. Thus even though the technology may be available, it may be very difficult to put the new technology on line in a timely fashion.

At this point in the dialogue on restrictions, it is doubtful that either EPA or any interested group has the answers, certainly not CWM. But CWM is committed to assisting in this difficult effort. Once the above issues and questions have been addressed decisions have been made about restricting certain wastes, it will be necessary to find an appropriate mechanism. CWM makes the following recommendations.

Generic restrictions should be identified with alternative implementation options, as illustrated in Figure 2. One option would be for immediate implementation. This would apply to those wastes for which alternative treatments are now readily available. A second option would focus on those wastes that cannot be effectively treated with current technology; new technologies are in development stage and implementation of the restrictions would coincide with scale-up time frames. The third option would address those waste that may not be appropriate for land disposal but for which viable technologies are not yet commercial available. Special actions, perhaps regarding storage arrangements, would be necessary. For each of these options appropriate site conditions that would permit land disposal of treatment residues must be identified.

SUMMARY

The CWM positions on land disposal can be summarized in the following major points.

1. All treatments result in solid residue that will require some form of land disposal.

2. Immediate attention should be focused on solvents. When the problems inherent to reaching a decision on land disposal restriction are resolved, other groups of listed waste streams should then be considered for land disposal restrictions.

3. There must be differentiation among the different types of land disposal.

4. The form of the waste is important. Liquids should be restricted from landfill disposal.

5. Quantity and concentration are important considerations. Small quantity generation may need special exemptions or special attention.

6. All existing environmental and health standards should be applied at the point of target exposure; appropriate concentrations at the land disposal site can be identified with risk assessment models.

7. Risk assessment models are a tool for decision making; they are most appropriate for establishing acceptable concentrations not for identifying restricted waste streams.

8. Cost factors are important in identifying appropriate alternative technologies. EPA will have to accept economic limits for forcing particular alternatives.

9. CWM supports the use of regulations to force adoption of appropriate alternatives.

10. Public opposition to hazardous waste management facilities in general will continue to delay siting of treatment facilities and the expansion or continuation of existing treatment and disposal facilities.

Figure 1. Sequential evaluation for restricted wastes.

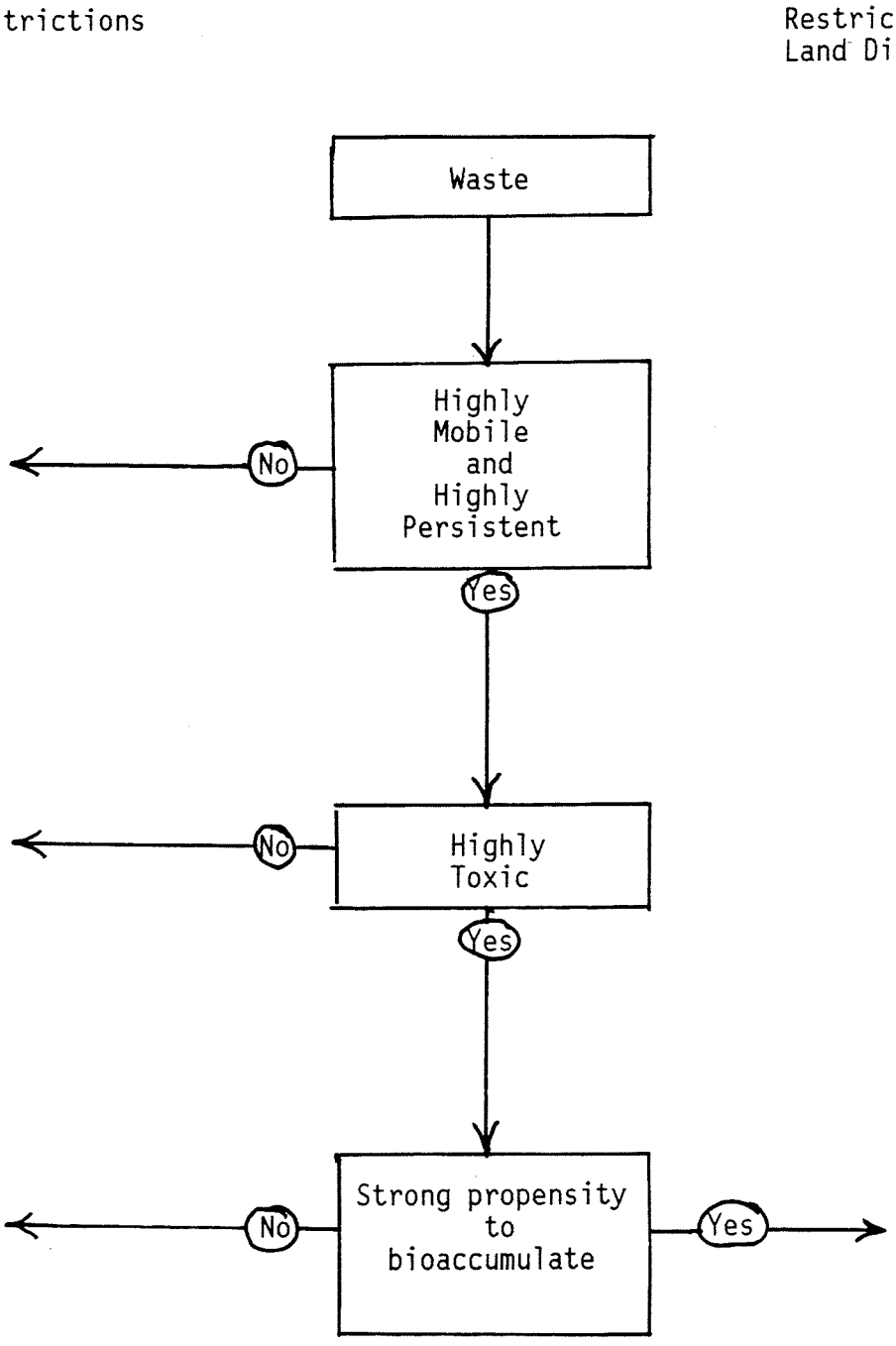
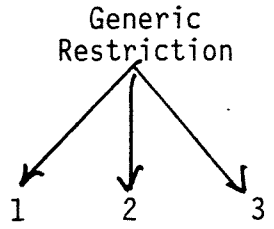


Figure 2. Pathways for Implementation.



Concentration limits
for treatment residues

1 Treatment alternatives currently available; restrictions applies immediately.

2 Treatment alternatives in pilot phase only; time delay for implementation based on scale-up schedules.

3 Treatment alternatives at experimental stage only; restrictions conditional on proven effectiveness of proposed technology.

DRAFT REPORT

on

INCINERATION OF HAZARDOUS LIQUID WASTE

by the

SCIENCE ADVISORY BOARD

ENVIRONMENTAL EFFECTS, TRANSPORT AND FATE COMMITTEE.
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

December, 1984

S. Exec 2/7/85
Attachment D

Disclaimer.

The following document is a draft report of the Sciene Advisory Board's Committee on Environmental Effects, Transport and Fate, augmented by members of the Environmental Engineering Committee, on the scientific adequacy of the methods and data used in making decisions concerning the incineration of liquid hazardous wastes on land and at sea. The report is subject to further revisions by that Committee, as well as by the Executive Committee of the Science Advisory Board, and has not been approved by either of those committees. Thus, this draft of the report has no official standing, and significant changes may be expected prior to approval by the Board.

SYNOPSIS

Introduction.

This synopsis contains major conclusions and recommendations that have been developed by the Committee. In addition, there are many other conclusions and recommendations that appear only in the body of the report, because they deal with more specific rather than general aspects of incineration of hazardous wastes.

The sequence of reporting findings and recommendations follows the path of the waste and its daughter products from generator to final biological receptor. This ordering of recommendations does not imply a prioritization. In the eyes of the Committee, the most important aspect of an analysis of incineration practices is the determination of their ultimate impacts on the environment, including humans.

Major Conclusions and Recommendations

Conclusion 1:

Nearly all types of hazardous waste management practice involve the collection, transport, temporary storage, pumping, and valving of the wastes. All of these processes are subject to partial and complete failures, and spills and fugitive emissions have occurred. Fugitive emissions and spills may release as much or more material to the environment than the direct emissions from waste incineration processes themselves.

RECOMMENDATION 1:

THE AGENCY SHOULD ASSESS THE RELEASES TO THE ENVIRONMENT OF WASTES AND WASTE-DERIVED MATERIALS FROM ALL PHASES OF EACH WASTE

MANAGEMENT PROCESS.

Conclusion 2:

To monitor whether or not liquid hazardous wastes were being destroyed in the incineration process, the concept of destruction efficiencies was adopted by the Agency. This approach emphasizes the elimination of several preselected compounds in the waste and does not fully address either partial oxidation or chemical recombinations, which may create new toxic compounds in the incineration process. Thus, to date, only a very small portion of the compounds found in emissions from incinerators has been identified qualitatively or quantitatively. As a consequence, the concept of destruction efficiency used by the Agency was found to be incomplete and not useful for subsequent exposure assessments.

RECOMMENDATION 2:

THE EMISSIONS AND EFFLUENTS OF HAZARDOUS WASTE INCINERATORS NEED TO BE ANALYZED IN SUCH A WAY THAT THE IDENTITY AND QUANTITY OF THE CHEMICALS RELEASED INTO THE ENVIRONMENT, INCLUDING THEIR PHYSICAL FORM AND CHARACTERISTICS (PARTICLES, DROPLETS, GASES), CAN BE ESTIMATED.

Conclusion 3:

Research on the performance of incinerators has been conducted only under optimal burn conditions, and sampling has usually been discontinued during upset conditions, which occur with unknown frequency. Even relatively short-term operation of incinerators in upset conditions can greatly increase the total

loading to the environment.

RECOMMENDATION 3:

THE DETERMINATION OF THE ACTUAL EMISSIONS AND EFFLUENTS OF AN INCINERATOR TO THE ENVIRONMENT MUST ASSESS THE TOTAL MASS LOADINGS TO THE ENVIRONMENT UNDER ALL CONDITIONS OF INCINERATION.

Conclusion 4:

The existing analytical data for emissions from hazardous waste incinerators have serious limitations. The major problems are that only a limited number of chemicals are selected for analyses and that the analytical methodologies are not validated for the conditions of the test and for the matrix in which these chemicals were to be analyzed. As a result there are no complete and reliable analyses of mass emissions from either land or sea-based incinerators on which subsequent estimates of potential for environmental impact can be based. The analytical problems are particularly difficult for incinerator stacks with very high exit temperatures.

RECOMMENDATION 4:

SAMPLING AND ANALYTICAL METHODOLOGIES MUST BE VALIDATED FOR MEASUREMENTS OF EMISSIONS FROM HAZARDOUS WASTE INCINERATORS.

Conclusion 5:

The identification of optimal locations for alternative incineration sites can be greatly improved through the proper use of modelling and simulations. The siting evaluations should consider temporal meteorological variations as well as micro-meteorological differences associated with the sites. In this

way the Agency could evaluate local, site-specific effects on the dispersion and subsequent exposures to waste incinerator emissions.

RECOMMENDATION 5:

DECISIONS ON THE SITING AND OPERATION OF HAZARDOUS WASTE INCINERATORS MUST CONSIDER LOCAL METEOROLOGICAL CONDITIONS IN DETAIL TO MAXIMIZE ATMOSPHERIC DILUTION AND TO AVOID EXCESSIVE AMBIENT CONCENTRATIONS.

Conclusion 6:

The Committee found that the Agency's evaluations have placed emphasis on dilution, but has not effectively addressed mechanisms in the environment which would result in the concentration of emission products.

The segments of the biosphere which will be impacted by the emissions from chemical waste incineration will be largely influenced by the dynamics of atmospheric and aquatic transport processes. Within these processes, mechanisms such as:

a) phase separation and chemical distribution between phases;

b) interphase transport at air/water, air/solid, water/solid, and water/biota interfaces;

c) photo- and biochemically stimulated reactions involving the incinerator emissions after they leave the stack;

are likely to prominently influence the concentrations which actually impact biota. Surface micro-layers, such as sea slicks, may play significant roles in the concentration of some chemical

species.

These processes are time dependent, and exhibit both short-term and long-term variability and trends. These changes influence the selection of the most appropriate averaging time to be used in the analyses of potential effects of burning duration on time dependent transport and fate.

It is possible to use simulation models effectively for may aspects of the evaluation of the environmental transport and fate of emitted chemicals. However, such simulations often have significant limitations, which were not always recognized by the Agency. Such limitations can become debilitating when several simulation models are linked into large scale simulations. The results from these large scale simulations are unconvincing, especially when they are not supported by field validations.

RECOMMENDATION 6:

a) THE DYNAMICS OF ENVIRONMENTAL TRANSPORT, INCLUDING CHEMICAL DITRIBUTION BETWEEN PHASES, AND INTERPHASE MASS TRANSPORT, SHOULD BE EVALUATED IN A WAY THAT IS USEFUL FOR EXPOSURE ASSESSMENTS.

b) THE ROLE OF MICRO-LAYERS IN THE TRANSPORT AND CONCENTRATION OF EMITTED CHEMICALS INTO THE BIOSPHERE SHOULD BE INCORPORATED IN THE ANALYSIS.

c) MODELING OF INTERPHASE TRANSPORT AND FATE OF CHEMICALS EMITTED FROM INCINERATION SHOULD BE COUPLED WITH FIELD VALIDA-

TIONS.

Conclusion 7:

Exposures of organisms to chemicals originating from liquid hazardous waste incinerators take place through various pathways, which differ according to transport processes and the habits of the organisms involved. Such exposure pathways will certainly include absorption through lungs or gills, skin, and food chains. The exposure will vary over time and in the dose attributable to each chemical. The relative proportions of chemicals in the mixture to which organisms are actually exposed is likely to be different from what was initially emitted by the incinerator, because of the differential influences of transport, phase distribution, and chemical reaction dynamics on the individual emitted chemicals. The accurate determination of exposures, which are subject to these many variables, is very difficult. The efforts of the Agency to assess such exposures have been inadequate and were based on either individual judgments or computer models without adequate experimental or field verification.

RECOMMENDATION 7:

THE EVALUATION OF EXPOSURE DURATIONS AND CONCENTRATIONS SHOULD BE BASED ON BOTH A DETAILED ASSESSMENT OF TRANSPORT PROCESSSES PLUS THE HABITS OF THE EXPOSED ORGANISMS. THE ROLE OF FOOD CHAINS REQUIRES PARTICULAR ATTENTION.

Conclusion 8:

Currently available data and simulations are inadequate for the evaluation of the dynamics of incinerator products in terres-

trial systems. Thus subsequent exposure assessments to biota and humans in the ecosystem are unreliable.

RECOMMENDATION 8:

THE TRANSPORT AND FATE OF INCINERATOR PRODUCTS IN TERRESTRIAL ECOSYSTEMS NEEDS TO BE EVALUATED BY STATE-OF-THE-ART FIELD MONITORING IN CONJUNCTION WITH IMPROVED SIMULATIONS.

Conclusion 9:

The toxicities of emissions and effluents from land-based or ocean-based incinerators are largely unknown.

RECOMMENDATION 9:

THE TOXICITIES OF REPRESENTATIVE EMISSIONS AND EFFLUENTS FROM INCINERATORS SHOULD BE TESTED, AT A MINIMUM, ON SENSITIVE LIFE STAGES OF REPRESENTATIVE AQUATIC AND TERRESTRIAL VERTEBRATES, INVERTEBRATES AND PLANTS OF ECOLOGICAL IMPORTANCE.

Conclusion 10:

The assessment of biological and ecological effects of incineration products is a very complex undertaking. It does not make sense to rely exclusively on laboratory studies, partial field studies or complex field studies alone. Laboratory studies are most readily conducted and evaluated, but are incomplete by their every nature.

RECOMMENDATION 10:

THE ASSESSMENT OF POTENTIAL EFFECTS OF INCINERATION PRODUCTS REQUIRES A COORDINATED APPROACH INVOLVING BOTH LABORATORY TOXICITY STUDIES AND FIELD ASSESSMENTS. THESE INVESTIGATIONS NEED TO BE COUPLED IN A RESEARCH STRATEGY WHICH PAYS ATTENTION TO BOTH SHORT-TERM AND LONG-TERM EFFECTS.

Conclusion 11:

No documentation exists that the operation of liquid hazardous waste incinerators on land or at sea has produced obvious adverse ecological effects. However, monitoring programs used to date were few and narrow in scope.

RECOMMENDATION 11:

APPROPRIATELY DESIGNED FIELD STUDIES ARE NEEDED TO PROVIDE ASSURANCE THAT THE LONG-TERM OPERATION OF INCINERATORS DOES NOT PRODUCE SIGNIFICANT ADVERSE ECOLOGICAL EFFECTS.

Conclusion 12:

No documentation exists for an obvious health hazard from environmental exposure to the products of incineration of toxic wastes. However, monitoring programs used to date were few and narrow in scope.

Recommendation 12:

THE POSSIBLE LONG-TERM CONSEQUENCES TO HUMAN HEALTH OF A CONTINUING PROGRAM OF INCINERATION SHOULD BE EVALUATED.