DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date JUN 3 1987

From Environmental Health Scientist
Health Sciences Branch, OHA

Subject Health Assessment: Kin-Buc Landfill Endangerment (SI-87-081; NPL)
Edison Township, New Jersey

To Mr. William Q. Nelson
Public Health Advisor
EPA Region II
Through: Director, OHA
Health Assessment Coordination Activity, OHA
Acting Chief, Health Sciences Branch OHA

EXECUTIVE SUMMARY

The Environmental Protection Agency (EPA) requested that the Agency for Toxic Substances and Disease Registry (ATSDR) review the final draft report of Kin-Buc Landfill Endangerment Assessment. The assessment appears to be based on data from many sources and the quality of the data cannot be verified. Relatively little data were collected on air levels of contaminants. The air data are apparently from the site or directly adjacent to it. The levels detected were quite low, probably similar to background levels in an urban area; however, it is not clear if the sample collection methods were adequate to characterize the air quality. Food chain contamination with PCBs, cadmium, and possibly other heavy metals, should be considered. This can be pursued in conjunction with State agencies which are already very active in this research. The toxicological issues addressed in the assessment are reasonable, but conclusions about groundwater contamination and movement need to be further considered. There is too much uncertainty reflected in the discussion and, perhaps in the data, to be very useful in assessing potential health risks. Assumptions underlying the risk estimates for leachate contact are

unreasonable and should be reexamined, and conclusions about risk from ingestion of groundwater should be reworded to reflect the uncertainties pointed out in the document.

DOCUMENTS REVIEWED

Kin-Buc Landfill Endangerment Assessment. Preview Draft Report Volume 1 and 2. PRC Engineering report to EPA Office of Waste Programs Enforcement.

BACKGROUND

Kin-Buc Landfill, Edison Township, New Jersey, received municipal and industrial wastes for 20 years. More than 100 toxic contaminants have been identified in the groundwater, surface water, sediment, and air, with major pathways of release being groundwater and surface transport of leachate, and volatilization into the air. The EPA requested that ATSDR answer specific questions about Kin-Buc landfill:

1. Is the assessment appropriate from the landfill;

2. Is air-monitoring satisfactory;

3. Is selection and use of indicator chemicals appropriate;

4. Should food chain contamination of Raritan River, New York Harbor, and Atlantic Coastal Shelf be considered in the assessment;

5. Are the toxicological issues reasonable;

6. Do we concur on estimates of risk?

The Kin-Buc Landfill, Edison Township, New Jersey, received municipal and industrial wastes between 1947 and 1968, but is not now formally closed. More than 100 toxic contaminants have been identified in the groundwater,

surface water, sediment, and air, with major pathways of release being groundwater and surface transport of leachate, and volatilization into the air. Hazardous wastes deposited in the landfill were not listed and there are only rough estimates of quantities of materials in the site. Hazardous waste in the landfill may be in the form of liquid, solid, or drummed liquid. The site lies adjacent to the Raritan River and partially surrounded by marshes. There is an industrial park, but no residential areas adjacent to the landfill.

DISCUSSION

We are responding to questions EPA specifically asked ATSDR to consider.

1. Is the assessment appropriate? The form of the assessment is appropriate to determine if there are any existing or potential health risks to the public from releases at Kin-Buc Landfill; however, the document is organized or written in a manner that makes it difficult to analyze the data or analyze risk and exposure issues. The data, in some instances, lacked adequate details, such as sampling location for air data, and in many place, the document hedges about how well the data actually identifies and characterizes chemicals that are, or may have been disposed, in the landfill. If the database is truly inadequate, then one should ask if the conclusions reached in the assessment would be any different with the kind of data likely to develop with additional environmental sampling. If it seems that the conclusions would be quite different, then appropriate data collection should be considered.

   Additionally, the quality of the data and the interpretation of exposure likelihood and toxicity profoundly affect the utility of the conclusions. Specific details and limitations are addressed below.

2. Is air monitoring satisfactory? It is not clear how close the samples sites were to probable sources of release in the landfill. Vague descriptions of the sampling locations ("east of landfill") and the partial capping of the landfill after samples were taken, greatly reduce the value of the measurements.

Off-site levels were estimated, using an air dispersion model. Models of this sort contain many assumptions, so, if there is no data to validate estimated concentrations, the results must be viewed with caution. The average air concentrations on-site were were low (5 to 12 ppb). As one would expect with dispersion and dilution in the air, the estimated off-site levels were much lower. If there is reason to believe that people off-site are exposed to significant levels of airborne contaminants coming from the site, air monitoring in the areas of concern would be the best approach to verify the existence and extent of the health risk. It may be difficult or expensive to collect data, due to technical obstacles in gathering off-site air quality data with sufficient precision and accuracy and low enough detection limits. One also needs background measurements to compare with the measurements in the surrounding communities.

The value of the on- and off-site air levels in estimating exposure and health risk depends on how well the samples represent actual average daily concentrations on-site. We cannot evaluate how well the data estimate this parameter, with only the information provided.

We also note that the American Conference of Governmental Industrial Hygienists (ACGIH) specifically recommends that their TLVs "are intended for use in the practice of industrial hygiene...and for no other use, e.g., in the evaluation or control of community air pollution nuisances, in estimating the toxic potential of continuous, uninterrupted exposures." We do not recommend the use of existing, but inappropriate, guidelines when there are no specific regulations

or guidelines. Use of ACGIH Short Term Exposure Limit in judging potential for acute toxicity at Superfund sites may be appropriate in some cases, such as for workers at a site.

3. Is selection and use of indicator chemicals appropriate? There is "art," as well as science, in selecting indicator chemicals. That is to say, that experience with their use and knowledge of toxicology help to select appropriate chemicals. It might be dangerous to blindly follow the method used to select the indicator chemicals. For example, TCE was not included in part because the two highest measurements were excluded. One concentration was 300 ppm. This is well above the ACGIH Short Term Exposure Limit of 200 ppm. If the 300 ppm level were accurate, and it persisted for for an extended period, this could pose a health risk to individuals on-site.

4. Should food chain contamination of Raritan River, New York Harbor, and Atlantic Coastal shelf be considered in the assessment? Yes. Lead, cadmium, and high levels of PCBs in groundwater, leachate and sediments on- and off-site could readily contribute to the already existing contamination of rivers and bays, and lead to human exposure from consumption of contaminated fish and shellfish. PCBs in concentrations up to 4,000 to 6,000 ppm were found in shallow wells in the refuse layer. This shallow water may drain into creeks or rivers. Elevated PCB levels were found in sediment samples in nearby creeks and in the Raritan river: 46 to 68 ppm in Edmonds Creek, Rum Creek, and Raritan River sediments.

PCB levels in edible fish and shellfish were not described as filet, fat basis, or whole animal. Without this data, we cannot interpret the health risk from consumption; however, if the levels do exceed FDA tolerances, consumption would constitute a health risk. Based on the reported sediment contamination, elevated levels in fish and shellfish would be quite likely. The entire Bay region (Upper and Lower New York Bay, Hudson Bay, Newark Bay Raritan Bay) has advisories in effect

for many fish, due to PCBs in fish tissue (New Jersey Department of Environmental Protection, 1985). A staged approach to assessing the location, nature and degree of contamination coordinated with other ongoing EPA or state projects--New Jersey, New York--could provide data in the most cost effective manner.

5. Are the toxicological issues reasonable? As mentioned in the document, the risk estimates assume 100 percent absorption and this is certainly not accurate. The conclusion should either state that the estimates are probably very conservative because of the "worst case" assumptions used, or there should be another "probable case" estimate. Estimates of exposure and health risk to workers assume that workers will not have any skin or respiratory protection. This is contrary to standard procedures. If there is a pathway for significant on-site exposure, workers must wear proper protective equipment. With these necessary precautions, there should not be any on-site worker exposure. Public access to the site is restricted, so they should not have an opportunity for exposure on-site.

The statement was made that there may be unacceptable (to whom?) risk about on- and off-site exposure to airborne PCBs. These levels should be validated with on-site measurements before action is taken, based on this conclusion. Calculated volatilization of PCBs from soil and water in the environment have been unreliable, due to unvalidated assumptions about sorption and movement.

Groundwater: Data comparing upgradient and down gradient monitoring revealed that some metals and organic chemicals were slightly higher in upgradient monitoring wells. The evidence does not support the conclusion that "the bedrock aquifer has been contaminated to a low level." This is possible, but not unequivocal.

The discussion of human toxicity to PCB does not consider critical evidence and, therefore, makes an unsupportable conclusion. Reviews

of the Yusho Disease incident did not conclude that PCBs were responsible for the observed effects. There is compelling evidence that the oil was contaminated with furans. This group of compounds is much more toxic to humans than PCBs.

There is ample evidence that the shallow sand and gravel aquifer beneath the site is contaminated with leachate from organic matter, organic chemicals, and some heavy metals.

The concentrations of chemicals in the bedrock aquifer may show contamination at very low levels. Inadequate data on background levels of organic chemicals in the aquifer preclude any conclusions about whether the observed levels are normal variation in the water or very low level contamination from the landfill.

The document is confusing about the the possibility and likelihood of movement of contaminants in the sand and gravel aquifer south across the Raritan River into the major aquifers. This is a critical point in assessing future risk of exposure. The risk estimates assume that the untreated contaminated water is consumed. With this assumption, it is critical to know the extent, direction, and speed of movement of any plume of contaminants in groundwater.

6. Do we concur with risk estimates? The document lists three tables of calculated risks: carcinogenic and noncarcinogenic risks associated with ingestion of groundwater, and carcinogenic risk to workers associated with direct contact with leachate.

It should be noted that EPA is reconsidering the development of the cancer potency factor for arsenic. The new assessment may change the quantitative estimates of cancer risk, although it will probably not affect the ultimate conclusion about general magnitude of risk.

Section 3-17 points out that the data quality is questionable, that the assumption of 100 percent absorption overestimates (probably to a very great extent) true absorption. The "most probable case" is not at all probable and that the realistic worst case is not necessarily realistic, but is descriptions of data used to calculate possible exposures using average and maximum water concentrations. Because of these limitations, it is hard to support the use of a quantitative rather than a qualitative estimate. The method used to calculate the risks is otherwise a standard EPA procedure.

In calculating risk from contact with leachate, it was apparently assumed that there is 100 percent transdermal absorption, no protective equipment, and that this exposure is equivalent to ingestion. The highest estimated risk was 1/1000 for PCBs. Epidemiological evidence from high level exposures in occupational settings--with inhalation and direct skin contact exposure--shows that this estimated level of risk for PCB exposure is far in excess of the demonstrated cancer rates.

CONCLUSIONS

The assessment appears to be based on data from many sources and the quality of the data cannot be verified.

Relatively little data were collected on air levels of contaminants. The data are apparently from the site or directly adjacent to it. The levels detected were quite low, easily within what one might expect to find for most chemicals as background levels in an urban area; however, it is not clear if the method to collect the air samples was adequate to characterize the air quality.

Food chain contamination with PCBs, cadmium, and possibly other heavy metals should be considered. This can be pursued in conjunction with State agencies which are already very active in this research.

The toxicological issues are reasonable, but conclusions about groundwater contamination and movement need to be further considered.

Risk estimates for leachate contact are not reasonable.

Conclusions about risk from ingestion of groundwater should be reworded to reflect the uncertainties pointed out in the document.

REFERENCES

New Jersey Department of Environmental Protection. Office of Science and Research. 1985. A study of toxic hazards to urban recreational fisherman and crabbers. Belton, Thomas et al., Christiani, D.C., D. Kriebel, N.J. Fox, and E.L. Baker. 1986. Persistently elevated polychlorinated biphenyl levels from residual contamination of workplace surfaces. Am. J. Industrial Medicine: 10:143-151.

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