



Health Assessment for



ADDENDUM TO
HEALTH ASSESSMENT FOR
HELEN KRAMER LANDFILL
MANTUA TOWNSHIP, GLOUCESTER COUNTY, NEW JERSEY
AUGUST 25, 1969



PURPOSE OF ADDENDUM

This addendum was prepared to address issues which have arisen since the Health Assessment that was prepared on April 2, 1987. These issues are presented in the section entitled "Community Health Concerns".

SUMMARY

Hazardous substances from the Helen Kramer Landfill in Mantua Township, New Jersey are present in low concentrations in air, sediments, surface water and soils north of the site. Exposure to contaminants in surface water and sediments is expected to be incidental since residents receive water from a treated municipal supply. Airborne contaminants from the site are not expected to reach Hidden Acres Township Park or a proposed housing development, Heather Glen, in concentrations which may present threats to public health, but this has not been confirmed by off-site monitoring. Low concentrations of polyaromatic hydrocarbons, n-nitrosodiphenylamine and phthalates were present in soils at the site of the proposed housing development. Ingestion of moderate quantities of contaminated soil by area residents is unlikely. Although these contaminants may not pose a substantial threat to public health due to their low concentrations, exposure to contaminated soil, surface water, sediment and air should be minimized.

BACKGROUND

Site Description and History

The Helen Kramer Landfill is located in Mantua Township, Gloucester County, New Jersey. The landfill accepted a variety of domestic and industrial wastes from 1963 until it was closed 1981. An RI/FS was completed by EPA Region II in September, 1986. The results of the RI indicated that ground water and surface water in the vicinity of the landfill were contaminated with hazardous substances, including heavy metals and organic compounds. Organic compounds were also detected in air above leachate pools by State personnel in 1981.

The Agency for Toxic Substances and Disease Registry (ATSDR) reviewed a Site Safety Plan for the Helen Kramer Landfill in August, 1986 and completed a Health Assessment for the site in April, 1987. In the Health Assessment, ATSDR recommended that additional samples be collected in surface water and sediments adjacent to the site.

Current Community Health Concerns

Several issues have recently developed requiring the preparation of a Health Assessment Addendum for the site. A housing development (Heather Glen) is proposed for construction approximately 1600 feet north-northeast of the landfill. Edwards Run, a stream contaminated by the landfill, borders the western edge of the proposed housing development. Consultants were retained by the developer and by East Greenwich Township in order to estimate the risk to human health for future residents of the development from the landfill contaminants. The Township is also concerned about the

effects of the landfill contaminants in air and surface water on citizens who utilize the Hidden Acres Township Park, located about 1500 feet northwest of the landfill. Edwards Run borders the northern portion of the park.

Consultants for EPA conducted air contaminant dispersion analyses as part of the risk assessment in the Remedial Investigation. The consultant retained by the Township presented two issues regarding these analyses. They stated that the EPA consultant used an inappropriate air contaminant dispersion equation for conducting the risk assessment, and they also stated that volumetric contaminant concentrations were incorrectly converted to mass per volume concentrations. The Township's consultants concluded that EPA's quantitative risk assessment underestimated the risk to citizens from contaminants in air.

EPA Region II requested that ATSDR evaluate the threat to human health from contaminants in surface water, sediments, soils and air for residents of the proposed housing development and for citizens who utilize the park. Additional surface water, sediment and soil monitoring data was collected and provided to ATSDR. The data package contained some quality assurance and quality control information (sampling blank analyses, spikes and recoveries, and holding times).

PATHWAYS ANALYSES

1. Air

ATSDR evaluated the two issues raised by the Township's consultant: the appropriate use of air contaminant dispersion analyses for health assessment and conversion of volumetric to mass per volume contaminant concentrations (parts per billion to micrograms per cubic meter).

Regarding the issue of the proper equation for converting volumetric gas concentrations in air to mass per volume concentrations, ATSDR consulted four references. Two of the references (Thibodeaux, 1979, and Stern, 1968) indicated that the molecular weight of the compound should be located in the denominator of the equation when converting from parts per billion to micrograms per liter. Two other references (Wark and Warner, and American Congress of Government Industrial Hygienists) indicated that the molecular weight should be located in the numerator of the same equation. From this comparison, it is easy to understand how the issue regarding the proper equation arose between the two consultants. At least two of the references reviewed by ATSDR contain incorrect equations. ATSDR conducted a dimensional analysis of the conversion and determined that the correct equation contains the molecular weight in the numerator. Therefore, the conversions conducted by Environ are correct.

ATSDR also reviewed the air contaminant dispersion analyses conducted by both consultants. It is ATSDR policy that while environmental fate and transport analyses may be used to synthesize available information or to identify data gaps, they should not be used as a basis for public health decisions without confirmation by environmental monitoring data. Therefore, the following discussion on air contaminant dispersion is

presented in an effort to resolve the current issue regarding discrepancies in estimated threats to public health and to serve as a basis for developing an air monitoring program to confirm the evaluation of health effects.

The air contaminant dispersion analysis method used by Environ, the Township's consultant, is described in abbreviated form on pages 42 through 45 of the Superfund Exposure Assessment Manual, EPA/540/1-88/001, dated April 1988. References were not provided by the EPA consultant for the Gaussian air contaminant dispersion method used in the RI/FS risk assessment.

ATSDR independently estimated the airborne contaminant concentrations using the method previously described in the Superfund Exposure Assessment Manual. Source emission rates estimated by ATSDR were quite similar to those estimated by Environ, the Township's consultant. ATSDR's estimated concentrations of hazardous gases at the park and at the proposed housing development were similar to those obtained by Environ for several contaminants. ATSDR obtained higher concentrations for some contaminants migrating from the North Lagoon and lower concentrations for some contaminants migrating from the swamp. The reasons for the differing results are that ATSDR used a slightly lower wind speed and a different set of atmospheric conditions (Pasquill Stability Class) than did Environ. ATSDR conducted a brief estimate using the wind speed and stability class used by Environ and obtained results similar to Environ's results.

The results of the analyses conducted by ATSDR indicate that the estimated concentrations of non-carcinogenic air contaminants are at least two orders of magnitude below Recommended Exposure Limits developed by the National Institute of Occupational Safety and Health (NIOSH) and also at least two orders of magnitude below Permissible Exposure Limits promulgated by the Occupational Safety and Health Administration (OSHA). Therefore, the analyses indicate that non-carcinogenic air contaminants may not present threats to human health at the park or at the proposed housing development.

The ATSDR analyses also indicate that estimated concentrations of suspected carcinogenic contaminants at the park and at the proposed housing development are below NIOSH Time-Weighted Averages (TWAs) and are below OSHA Permissible Exposure Limits (PELs). However, NIOSH recommends that concentrations of these contaminants be reduced to Lowest Feasible Limits (LFLs) or Lowest Detection Limits (LDLs).

Results of the ATSDR air contaminant dispersion analyses are shown in Attachment I.

Although the results of the air dispersion analyses obtained by ATSDR and Environ are similar for some contaminants, ATSDR does not endorse the quantitative risk assessment conducted by Environ. ATSDR does not conduct risk assessments. ATSDR does not evaluate risk assessments conducted by other organizations. ATSDR has statutory authority to conduct health assessments only; risk assessments are conducted by EPA. The two types of

assessments differ in their methods and objectives.

ATSDR must again emphasize that environmental fate and transport analyses should not be used as a basis for public health decisions without appropriate sampling data to confirm the results.

2. Surface Water

Several suspected carcinogens and non-carcinogenic hazardous substances were detected in Edwards Run adjacent to the proposed housing development and the park (see Attachment II). Concentrations of all contaminants were fairly low. Heavy metals except silver were below Maximum Contaminant Levels. Trans 1,2-dichloroethene was present in concentrations below the proposed Maximum Contaminant Level of 0.1 mg/L. Although several carcinogens were detected in low concentrations, prolonged ingestion of significant quantities of surface water from Edwards Run is not expected to occur since residents receive water from a municipal system. Therefore, the carcinogenic risk to human health is expected to be minimal. However, since there is no safe minimum exposure to carcinogens currently recommended by EPA, incidental exposure to Edwards Run should be minimized.

3. Sediments

Sediments adjacent to the park and proposed housing development are contaminated with heavy metals, organic compounds that are known, suspected or potential carcinogens and organic non-carcinogens. Heavy metals are within expected ambient concentrations for an estuary stream, with the exception of cadmium. Cadmium is present in concentrations exceeding the AIC. However, the elevated concentrations of cadmium that were detected in stream sediments do not pose a significant health risk since it is unlikely that area residents would ingest significant quantities of stream sediment. Concentrations of 4-methylphenol (p-cresol), phenol and toluene are below Rfd values and are not expected to present a health concern. Trace concentrations of pesticides were detected, but are within expected ambient concentrations (Edwards, 1973). Low concentrations of suspected, potential or known carcinogens were present, primarily consisting of polyaromatic hydrocarbons. While there is no current recommended safe exposure level for carcinogens, exposure to stream sediments is expected to be incidental. Again, these exposures should be minimized. See Attachment II for sediment contaminants and potential health concerns.

4. Soils

Soils in the vicinity of the proposed housing development are contaminated with phthalates, n-nitrosodiphenylamine and polyaromatic hydrocarbons. Concentrations of all contaminants are low. The Remedial Investigation contained no soil sampling results in the vicinity of the landfill, therefore, the source of the compounds could not be determined. Soils in urban and suburban environments frequently contain low concentrations of PAHs from a variety of sources. Trace concentrations of pesticides were detected, but were within expected ambient concentrations.

PUBLIC HEALTH IMPLICATIONS

1. Polyaromatic Hydrocarbons

Some polyaromatic hydrocarbons (PAHs) have been demonstrated to be carcinogenic to test animals in high concentrations in air. As a class of compounds, they are highly soluble in adipose tissue and lipids, and hence can be absorbed through intact skin. Benzo(a)pyrene (present in soils at the proposed housing development) produced stomach and mammary tumors when administered orally to mice. Therefore, ingestion of moderate quantities of contaminated soil would be of concern. Skin cancers have also been induced when PAHs were applied dermally on laboratory animals. It is the opinion of ATSDR's senior toxicologist that prolonged contact with PAHs in soil at concentrations below 100 ppm is not a significant health concern.

2. N-Nitrosodiphenylamine

N-nitrosodiphenylamine is a carcinogen in laboratory animals and is moderately toxic by ingestion. It is also an eye irritant. The dermal absorption potential of this compound is unknown. Prolonged ingestion of n-nitrosodiphenylamine produced inflammation and cancer of the bladder. Prolonged contact with soils containing this compound would be of some public health concern.

3. Phthalates

Diethyl and dioctyl phthalates were present in soils in low concentrations. Dermal contact with dioctyl phthalate may produce skin irritation. Dioctyl phthalate is a possible teratogen when administered orally. Diethyl phthalate is also a possible teratogen when administered orally. Soil concentrations are below Rfd values, therefore, ingestion of diethyl phthalate may present minimal health risk since the health effects described above occur at high doses and it is unlikely that area residents would ingest significant quantities of soil. The potential for dermal absorption of diethyl phthalate is unknown.

CONCLUSIONS

1. Air contaminant dispersion analyses indicate that non-carcinogenic airborne contaminants may not reach the park and the proposed housing development in concentrations detrimental to human health. Concentrations of carcinogens at the park and proposed housing development may be below NIOSH TWAs and OSHA PELs, but NIOSH recommends that exposure to airborne carcinogens be minimized. Air monitoring has not been conducted at receptors to confirm these results.

2. Concentrations of hazardous compounds in surface water and sediment do not present acute threats to humans in the vicinity of Edwards Run. Some long-term risk may occur due to the presence of suspected, potential or known carcinogens present in low concentrations in the stream. Exposure to these contaminants is expected to be incidental rather than prolonged and consistent. Silver exceeds the Maximum Contaminant Level in water.

3. PAHs, n-nitrosodiphenylamine and phthalates are present in low concentrations in soils at the proposed housing development. It is the opinion of ATSDR that the current concentrations are of little public health concern, but as stated previously, there are no levels of exposure to carcinogens that are currently recommended by EPA and caution must prevail in developing recommendations.

4. The remedial actions proposed by EPA should significantly reduce the release of contaminants into air and surface water in the future if the remedial systems are properly designed, constructed and maintained.

RECOMMENDATIONS

1. Conduct air monitoring at the park and the proposed housing development when the wind is blowing from the landfill to these areas. Consult the Philadelphia National Oceanic and Atmospheric Administration office for information on the optimal time periods to conduct this sampling, since the prevailing winds do not blow from the landfill to the park or to the proposed housing development (see Wind Rose in Remedial Investigation).
2. Restrict exposure to Edwards Run by placing a fence between the park and the stream and between the proposed housing development and the stream. Post warnings on the fence.
3. Restrict exposure to soils in the proposed housing development by providing several inches of clean soil cover over contaminated soils. Cut and fill operations during housing construction may minimize the need to transport clean soil cover. Restrict recharge of contaminants to soils within the 100-year floodplain by constructing a berm sufficient to prevent flooding.

PREPARER OF CONSULTATION

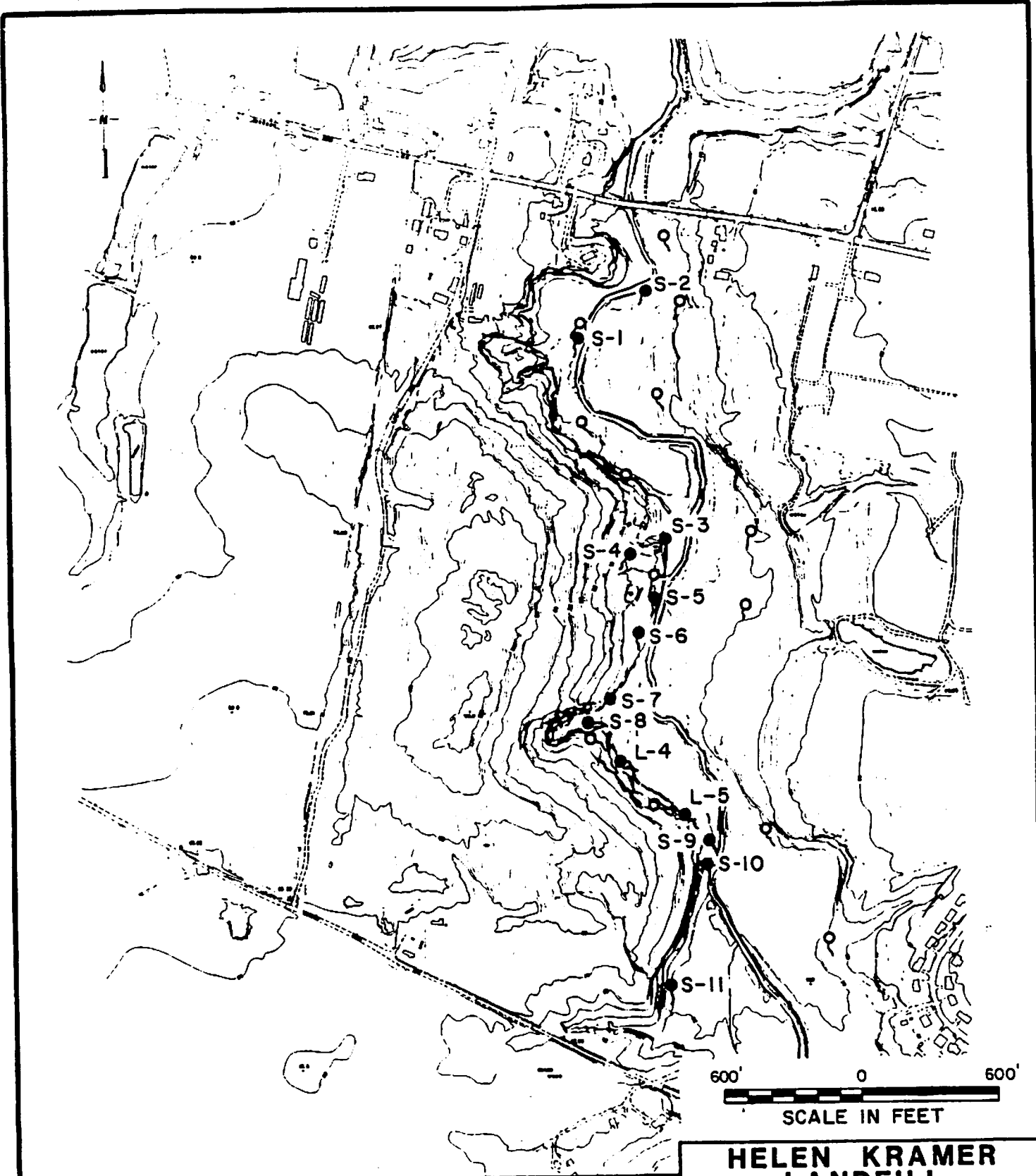
Joseph L. Hughart, P.G.
Environmental Health Scientist
Environmental Engineering Branch
Office of Health Assessment
Agency for Toxic Substances and Disease Registry

Health Effects Reviewer:
Kenneth G. Orloff, Ph.D.
Senior Toxicologist
Health Sciences Branch
Office of Health Assessment
Agency for Toxic Substances and Disease Registry

REFERENCES

- Agency for Toxic Substances and Disease Registry, Toxicological Profiles for Cadmium, Chloroform and N-Nitrosodiphenylamine, ATSDR, Atlanta, GA, 1988.
- American Congress of Government Industrial Hygienists, Engineering Field Guidance Manual, 1982.
- Edwards, Clive A., Environmental Pollution by Pesticides, Plenum press, New York, NY, 1973.
- Sax, N. Irving and Richard Lewis, Hazardous Chemicals Desk Reference, Van Nostrand Reinhold, New York, NY, 1987.
- Sittig, Marshall, Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd Ed., Noyes Publications, Park Ridge, NJ, 1985.
- Stern, Arthur C., Air Pollution, 2nd Ed., Academic Press, New York, NY, 1968.
- Thibodeaux, Louis J., Chemodynamics, John Wiley and Sons, New York, NY, 1979.
- United States Environmental Protection Agency, Superfund Exposure Assessment Manual, EPA/540/1-88/001, April, 1988.
- Wark, Kenneth and Cecil F. Warner, Air Pollution, Its Origin and Control, 2nd Ed., Harper and Row, New York, NY, 1981.

ATTACHMENT I
AIR CONTAMINANT DISPERSION ANALYSES




600' 0 600'
 SCALE IN FEET

**HELEN KRAMER
 LANDFILL**

SEEP LOCATION MAP

LEGEND

- S-1 SEEP SAMPLE LOCATION
- UNSAMPLED SEEPS

drawn <i>RAM</i>	approved <i>SMS</i>	drawing no.
checked <i>KVL</i>	date <i>5-28-89</i>	FIGURE 5-7
 r. e. wright associates, inc. earth resources consultants <small>harrisburg pennsylvania</small>		