

Health Consultation

FEDERAL CREOSOTE SITE

MANVILLE, MIDDLESEX COUNTY, NEW JERSEY

CERCLIS NO. NJ0001900281

APRIL 24, 1998

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

FEDERAL CREOSOTE SITE

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Prepared by:

Exposure Investigation and Consultation Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Background and Statement of Issues

The Region II US Environmental Protection Agency (EPA) has requested that the Agency for Toxic Substances and Disease Registry (ATSDR) determine if consumption of vegetables grown in the soil at the Federal Creosote Site poses a health threat [1]. The question was posed to ATSDR by a resident of the site at a public meeting on January 21, 1998.

ATSDR has written several health consultations on the site addressing the public health impact of creosote contamination [2,3,4]. The Federal Creosote site is a 35-acre site that once housed a wood treating plant that operated until 1957. Railroad ties were treated with creosote at the site, and the waste was disposed of in two lagoons on site. A residential community consisting of 137 homes was constructed over the former wood treating facility beginning in the mid-1960s [5].

In May 1997, ATSDR provided a health consultation to the EPA on soil sampling results collected by a consultant for the Borough of Manville [3]. The sampling identified polycyclic aromatic hydrocarbons (PAHs), a constituent of creosote, at concentrations up to 2 percent in subsurface soils. In October 1997, EPA/ERT collected a single surface soil sample (0-3 inches) from over two dozen properties on site for PAH analysis [5]. Subsurface soil samples were also collected and analyzed for PAHs [5]. Sampling locations in most cases were selected based on likely areas of exposure.

Total PAH concentrations in the subsurface soils ranged from non-detect to 74,243 parts per million (ppm). One property had a total PAH surface soil concentration of 758 ppm. Another property had a total PAH surface soil concentration of 504 ppm. The remainder of the properties had PAH levels ≤ 120 ppm [5].

In a health consultation assessing the data collected in May and October of 1997, ATSDR concluded that the PAHs detected in the surface soils on site did not pose an acute (short-term) health threat [3]. Several residential properties did contain PAHs in the surface soil at levels that represent a potential long-term health concern [3]. However, sampling was limited to only one surface soil sample per property, and additional sampling was recommended to assess the public health threat [3].

Discussion

Residents who garden on site are potentially exposed to PAHs through (1) direct dermal contact with soil (2) incidental ingestion of soil or dust, and (3) ingestion of vegetables grown in soils containing PAHs. Dermal absorption and soil/dust exposure scenarios were discussed in a previous ATSDR health consultation [3] and will not be further discussed in this document. However, the cumulative effect from all exposure pathways will be considered in this health consultation. [Copies of the previous health consultation are available at the Manville Municipal Building in Manville, New Jersey].

PAHs may be adsorbed (i.e. adhere to) and/or assimilated by plant leaves. A portion of the PAHs adsorbed onto the leaves will be washed off by rain or chemically oxidized to other products [6]. The PAHs assimilated by vegetation may be translocated, metabolized, or possibly photo degraded within the plant. Depending on the concentration in soils, PAH assimilation may exceed metabolism and degradation resulting in accumulation of PAHs in the plant tissue [6].

Concentrations of PAHs in vegetation are generally less than concentrations in the soil where they grow. A study by Wang and Meresz (1981) analyzing beets, onions, and tomatoes showed that concentration ratios (concentration in vegetation/concentration in soil) ranged from 0.0001 to 0.085 for benzo(a)pyrene (B(a)P) and 0.001 to 0.183 for total PAHs [6]. Using the maximum and minimum concentration ratios calculated by Wang and Meresz (0.001 and 0.183), and assuming vegetables were grown on site in soils containing total PAHs at 758 ppm, the vegetables may contain total PAHs ranging from 0.758 to 138 ppm.

The amount and type of vegetables that people grow and consume can vary greatly. However, it is estimated that among those who consume home-grown vegetables in the northeast (~10% of the population), the median and 90th percentile home-grown vegetable rates are approximately 50 and 420 grams per day, respectively [7]. Given these ingestion estimates, even if the range of concentrations for PAHs in the vegetables are on the low end of the 0.758 to 138 ppm range, they are likely to increase their total PAH intake to unacceptable levels. Considering that dose calculations done in a previous ATSDR health consultation showed that long-term exposure to PAHs in the surface soil presented an unacceptable health risk, additional exposure to vegetables grown on site would only add to the risk [3].

As stated in the January 16, 1998 health consultation for this site, the health risk estimates were based on limited surface soil sampling. The full extent of PAH contamination will not be known until sampling data is available this Summer.

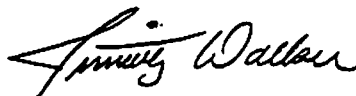
Conclusions

Based on the limited information and assumptions used, ATSDR concludes the following:

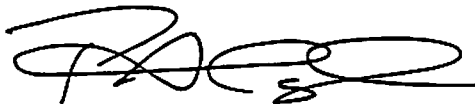
1. There is a potential for toxicologically relevant amounts of PAHs to adhere to, or be taken-up by, edible portions of vegetables grown on site.
2. The consumption of vegetables grown on site may add to the risk posed by exposure to PAHs in on-site soils.

Recommendations

1. Ensure that future sampling of the residential yards include areas where residents have vegetable gardens.



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References

- [1] Verbal request from EPA Region II to ATSDR in January 1998.
- [2] ATSDR Health Consultation, Manville Creosote Site (A.K.A. Federal Creosote Site, April 22, 1997.
- [3] ATSDR Health Consultation, Federal Creosote Site, May 1997.
- [4] ATSDR Health Consultation for the Federal Creosote Site, January 16, 1998.
- [5] EPA Federal Creosote Site Analysis, November 1997.
- [6] Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment-A Review. Journal Of Environmental Quality, Volume 12, October-December 1983.
- [7] Exposure Factors Handbook, U.S. EPA, Chapter 12. August 1996.