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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date AUG 14 1987

From Environmental Engineer
Environmental Engineering Branch, OHA

Subject Health Assessment: Pepe Field NPL Site (SI-87-149)
Town of Boonton, Boonton Township, Morris County, New Jersey

To Mr. William Q. Nelson
Public Health Advisor
EPA Region II
Through: Director, Office of Health Assessment
Health Assessment Coordination Activities, OHA
Chief, Environmental Engineering Branch, OHA

EXECUTIVE SUMMARY

The Environmental Protection Agency (EPA) Region II, has submitted a Final Draft of the Remedial Investigation Report for Pepe Field, a National Priorities List (NPL) site, and requested a Health Assessment based on the findings of the report. The data submitted indicate that most of the detected contaminants appear to be either residues or degradation products of vegetable oil, soap, and margarine wastes disposed of in the fill. Their presence, at the detected levels, does not present a significant human health hazard. The detected low concentration of organic and inorganic contaminants and the lack of demonstrated exposure routes for surface soil, ground water, and surface water do not present an imminent or substantial health hazard. Further monitoring of ambient air for hydrogen sulfide and methane in and around the site ~~are~~ is recommended, especially if the park is to be re-opened for public use.

SITE DESCRIPTION AND BACKGROUND

The Pepe Field site is located in a residential area in the Town of Boonton, Boonton Township, Morris County, New Jersey, between Wootton Street and Hillside Avenue, west of County Route 511. The site, a former marshy area covering approximately three acres, was used by the E.F. Drew Company as a landfill from the 1920's until 1950. The company disposed of unknown quantities of diatomaceous earth filter residue from edible oil processing/purification; incinerator ash from burning of wood and paper; boiler ash; lime sludge from oil removal processes; salt residues from glycerin processing; and soap residue from the manufacture of cleansing and soap products for household and industrial use, produced at their processing plant in Boonton. From 1950 until the mid-1960's the site remained an open, unused area until the Town of Boonton purchased the property. During the mid-1960's the Town filled and covered the site with up to 10 feet of soil in preparation for construction of a recreational facility. This facility included tennis courts, a baseball field, a playground area, and a refreshment stand. In 1969, the Town implemented an odor abatement plan for the area which consisted of a 14 foot gravel curtain drain extending 150 feet around the southwestern end of the site and a pumphouse, with a sump for leachate collection and treatment with hydrogen peroxide. The pumphouse discharges into an adjacent storm sewer that also receives flow from a drainage pipe which diverts a former relocated stream. The storm sewer discharges into a culvert which ultimately discharges into the Rockaway River upstream of the Jersey City Reservoir, a potable water source. Presently, the recreational field is inactive and is enclosed by a 4 foot chain link fence, although access can be gained through a break in the enclosure.

In September 1984, the Superfund Implementation Group (SIG), Center for Environmental Health (CEH), of the Centers for Disease Control (CDC), reviewed and provided comments on results from previous samplings and concluded that the concentrations of the contaminants identified in both soil and surface water did not present a significant human health hazard.

The Environmental Protection Agency (EPA), Region II, has now requested that the Agency for Toxic Substances and Disease Registry (ATSDR) perform a Health Assessment of the subject site based on findings presented in the February 1987 Remedial Investigation Report prepared by EA Engineering, Science, and Technology, Inc., for the New Jersey Department of Environmental Protection.

DOCUMENTS REVIEWED

ATSDR Pepe Field files, Boonton New Jersey, Region II.

Final Draft, Remedial Investigation Report; Pepe Field, Boonton, New Jersey, prepared EA Engineering, Science, and Technology, Inc., for the New Jersey Department of Environmental Protection, dated February 1987.

SITE CONTAMINANTS

During the remedial investigation, air, soil vapor, surface and subsurface soil, fill and waste material, leachate, ground water and down gradient surface water were all sampled in order to characterize the current on-site contamination. Tables I through III list the major (i.e., most prevalent and/or toxic) contaminants detected in each of the environmental media discussed above, along with an applicable comparison standard, if available. Most of the other detected contaminants appear to be either residues or degradation products of wastes disposed of in the fill whose presence, at the detected levels, do not present a significant human health hazard.

TABLE I
SURFACE WATER

CONTAMINANT (COMPARISON STANDARD)	STORM SEWER BETWEEN SITE AND DISCHARGE TO ROCKAWAY RIVER (ug/l)	UPSTREAM OF DRAINAGE DITCH IN ROCKAWAY RIVER (ug/l)	DOWNSTREAM OF DRAINAGE DITCH IN ROCKAWAY RIVER (ug/l)
Arsenic (50 ug/l MCL)	ND	ND	ND
Barium (1500 ug/l PRMCL)	ND	30	30
Cadmium (5 ug/l PRMCL)	0.4-ND	1	2.3
Chromium (50 ug/l MCL)	3.1-8.4	4.6	4.1
Copper (1300 ug/l MCL)	14-15	ND	ND
Lead (50 ug/l MCL)	ND-11	11	ND
Mercury (2 ug/l MCL)	ND	ND	ND
Selenium (10 ug/l MCL)	ND	ND	ND
Benzene (5 ug/l PMCL)	ND-2	ND	ND
1,2-dichlorobenzene (620 ug/l PRMCL)	ND-3	ND	ND

TABLE II
SOIL CONTAMINANT RANGES

CONTAMINANTS	SURFACE SOILS (mg/kg)	COVER FILL (mg/kg)	SUBSURFACE SOILS (mg/kg)	WASTE MATERIAL (mg/kg)	COMPARISON RANGE (mg/kg)	STANDARD MEDIAN (mg/kg)
Arsenic	1.7-3.2	0.7-3.5	ND-4.5	0.2-6.9	0.1-194	11
Cadmium	2.4-3.7	1.7-3.7	0.7-2.6	0.6-5.9	0.01-7	0.5
Chromium	14.1-27.3	10.2-92.2	8.7-31.7	14.8-1450	5-3000	100
Lead	40-61	9.8-200	5.6-20	17-1800	<1-888	29
Mercury	ND-0.2	ND-0.2	ND-0.2	ND-1.6	0.01-4.6	0.098
Nickel	19-22	20-160	4.6-28	39-1300	0.01-1530	50
Tin	0.52-2.9	ND-3	ND-0.9	ND-110	1-200	10
Benzene	ND-.001	0.002-0.175	ND-0.002	ND-0.075	NA	NA
Chlorobenzene	ND	ND	ND	ND-0.079	NA	NA
1,2-dichlorobenzene	ND	ND	ND	ND-2.8	NA	NA
Ethylbenzene	ND	ND	ND	ND-0.029	NA	NA

TABLE III
ON-SITE GROUND WATER CONTAMINANT RANGES

CONTAMINANTS	UPPER AQUIFER (ug/l)	LOWER AQUIFER (ug/l)	LEACHATE BEFORE TREATMENT (ug/l)	COMPARISON STANDARD (ug/l)
Arsenic	ND	ND	ND-84	50 (MCL)
Barium	22-132	7-131	60-1700	1000/1500 (MCL/PRMCL)
Cadmium	0.7-2.7	ND-1	1-40	10/5 (MCL/PRMCL)
Chromium	ND-13	ND-17	15-520	50/120 (MCL/PRMCL)
Copper	ND	ND-160	44-2200	1300 (PRMCL)
Cyanide	ND	ND	ND	NA
Lead	ND-11	ND-24	15-374	50/20 (MCL/PRMCL)
Mercury	ND-1.8	ND-0.3	ND-0.6	2 (MCL)
Selenium	ND	ND	ND	10/45 (MCL/PRMCL)
Benzene	ND	ND	ND	5 (PMCL)
Chlorobenzene	ND	ND	ND	60 (PRMCL)
1,2-dichlorobenzene	ND	ND	ND	620 (PRMCL)
Ethylbenzene	ND	ND	ND	680 (PRMCL)

<u>Notes on Tables I-III</u>

ND- Not Detected

NA- Not Available

MCL- Maximum Contaminant Level

PMCL- Proposed Maximum Contaminant Level

PRMCL- Proposed Recommended Maximum Contaminant Level

...uality investigations at the Pepe Field site focused on the ... of hydrogen sulfide, thiols (methanethiol and ethanethiol), and ... Based on the results of the air sampling and analysis portion of ... investigation, it appears that most hydrogen sulfide and thiol ...trations in the breathing zone were too low to be detected ...ntally with an acceptable level of precision and accuracy. Two ...ed point sources, one along the east side of the tennis court and ...her at the east edge of the concrete wall in the paved playground ...ere identified and found to emit hydrogen sulfide (maximum detected ...ntration 960 ppb) and methane (maximum detected concentration 17,000 ...nto the ambient air. Hydrogen sulfide concentrations up to 15 ppm ...lso detected inside the leachate pumphouse. Apart from the ...iate vicinity of these point sources, detectable levels (i.e., 2 to 5 ...f hydrogen sulfide were encountered in 14 of the 80 samples taken in ...eathing zone. Thiols were not detected (detection limit - 10 ppb).

...pplement the air sampling effort, soil gas samples were obtained over ...site at depths between 2 to 3 feet below land surface (bls) and ...zed for hydrogen sulfide, methanethiol, ethanethiol, and methane. ... the analysis of these soil vapor samples, hydrogen sulfide ...ntrations ranged up to 2,600 ppm, methanethiol up to 25 ppm, and ...nethiol up to 0.5 ppm. The highest methane concentration measured was ...rcent of the lower explosive limit.

...SSION

...rface soil, predominantly sand, at the Pepe Field site is underlain ... major geologic strata within 80 feet below land surface (bls). ...irst strata, a surficial fill placed over the buried waste material, ...sts of sand intermixed with granular ash material with trace amounts ...lag, and varies in thickness between 2 to 7 feet. The cover fill ... is underlain by waste material which typically appears as a black to ...gray, oily, ash material exhibiting a tarlike consistency with a ...ogen sulfide odor, and whose thickness ranges up to 13 feet. Beneath ...waste layer lies the third strata consisting of a shallow outwash sand

and gravel aquifer which is located between two, an upper and lower, silt layers. This strata has an average thickness of 16 feet. The upper silt layer sustains a shallow perched ground water system and serves as a retardant for vertical ground water migration beneath the site. Below the lower silt layer lies the fourth strata, a till aquifer, which is at least 35 to 40 feet thick. Recharge of the perched system is by surface infiltration through the cover fill and waste material, and is drained to the south by the gravel curtain. Ground water in the shallow outwash sand and gravel aquifer appears to underflow the gravel curtain, and is recharged by underflow from the till to the north and by leakage through the upper silt layer from the perched water table. The lower till aquifer is recharged from the till upgradient (north) of the site, as well as leakage through the lower silt.

Neither of these aquifers are presently used for private or public potable water supply in the vicinity of the site. The Town of Boonton obtains one-half of its potable water supply from six wells, with an average depth of 63 feet, located 2 miles northwest of the site and developed in a Quaternary aquifer which is not expected to be impacted by the site. Hence, the affected ground water does not appear to provide a route for human exposure to the identified contaminants. Further, the organic and inorganic species identified in the ground water (see Table I) samples are not present at concentrations exceeding the National Primary Drinking Water Standards (i.e., MCL'S, PMCL'S, and/or PRMCL'S) and therefore, do not present any significant human health hazard.

Pepe Field was originally a marshy area along a small stream that flowed across the site. In the 1940's the stream was relocated along the southern perimeter of the waste disposal site via a diversion pipe which today discharges untreated leachate into the Hillside Avenue storm sewer. Presently, the stream that previously flowed across Pepe Field is intercepted north of the site boundary, routed through the Wootton Street storm sewer, and then discharged into Crooked Brook. Hence, at present there are no on-site surface waters impacted by the site. However, treated leachate collected by the gravel curtain and untreated leachate from the 1940's stream diversion pipe are both discharged to the Hillside Avenue storm sewer. The Hillside Avenue storm sewer outfall surfaces and flows for 200-300 yards through a drainage ditch before discharging into the Rockaway River just north of the Jersey City Reservoir. However, as indicated by Tables I and III the concentrations of both organic and inorganic contaminants detected in the storm sewer discharge, and in the Rockaway River below the point of entry are insufficient to present a significant human health hazard.

The inorganic contaminants identified in the on-site surficial soil samples (depth ranging up to 1.5 feet), as shown in Table II, are not present at concentrations above the range of values reported for uncontaminated soil samples from the continental United States. The organic contaminants detected in the surficial soil samples were present in trace quantities (see Table II). Therefore, the contaminants present in the surficial soils do not present any significant human health hazard. The deeper strata (i.e., cover fill, waste material, and subsoils) are not available for exposure since they can not be readily accessed because of the upper layer of surface soil. Nevertheless, they do represent a potential exposure route, via leaching or soil disturbance, since the inorganic and organic contaminants detected in these strata are appreciably higher (see Table II). However, the monitoring performed to date has failed to demonstrate that the major site contaminants are being transported in significant amounts from the cover fill and/or waste material into the ground water or the leachate leaving the site.

The air investigation found several locations where ambient air concentrations of hydrogen sulfide, generated from the decomposition of the waste material, were above the analytical limit of detection but not present at concentrations of significant (i.e., 50 ppm per "Clinical Toxicology of Commercial Products" 5th edition) human health hazard. In most areas, no hydrogen sulfide was detected in the ambient air. Soil vapor monitoring results indicate that hydrogen sulfide, methanethiol, and methane generated from the waste material have accumulated in the vadose zone of the soil strata (3-3.5 feet). Emissions from the soil, in unpaved areas, could therefore be potential routes for human exposure with the corresponding health implications depending on whether or not the amounts released are appreciable. Modeling techniques, which appear reasonable, were used to estimate potential levels of exposure based on soil vapor concentrations. The modeling estimates of mean-case exposure to hydrogen sulfide and the thiols indicate that concentrations of emissions would be below levels of human health concerns. Field investigations showed that concentrations of combustible gas in the soil vapor are in excess of the lower explosive limit. However, there are no obvious sources of ignition in the soil or direct evidence of methane accumulation in any of the structures at Pepe Field. Further investigations to assess combustible gas and hydrogen sulfide emissions, migration, and accumulation should be conducted.

CONCLUSIONS

1. The majority of contaminants detected appear to be either residues or degradation products of wastes (i.e., polycyclic aromatic hydrocarbons, phthalate esters, and organic acids) disposed of in the fill whose presence, at the detected levels, do not present a significant human health hazard.

2. The affected ground water does not appear to provide a route for human exposure to the identified contaminants. Further, the organic and inorganic species identified in the ground water samples (see Table III) are not present at concentrations exceeding the National Primary Drinking Water Standards (i.e., MCL'S, PMCL'S, and/or PRMCL'S) and therefore, do not present any significant human health hazard.

3. The low concentrations of both organic and inorganic contaminants detected in surface waters (i.e., commingled treated and untreated leachate, and storm water) impacted by the site (i.e., the storm sewer discharge and in Rockaway River below the its point of entry) are insufficient to present a significant human health hazard.

4. The inorganic contaminants identified in the on-site surficial soil samples are not present at concentrations above the range of values reported for uncontaminated soil samples from the continental United States. The organic contaminants detected in the surficial soil samples were present in trace quantities. Therefore, the contaminants present in the surficial soils do not present any significant human health hazard. The deeper strata (i.e., cover fill layer, waste material, and subsoils) are not readily available for exposure because of the upper layer of surface soil. Nevertheless, they do represent a potential exposure route, via leaching or soil disturbance, since the inorganic and organic contaminants detected in these strata are appreciably higher than all other media sampled. However, the monitoring performed to date has failed to demonstrate that the major site contaminants are being transported in significant amounts from the cover fill and/or waste material into the ground water or the leachate leaving the site.

5. The air investigation found several locations where ambient air concentrations of hydrogen sulfide were above the analytical limit of detection but not present at concentrations of significant human health hazard. In most areas no hydrogen sulfide was detected in the ambient air. Soil vapor monitoring results indicate that hydrogen sulfide, methanethiol, and methane generated from the waste material have accumulated in the vadose zone of the soil strata. Significant emissions from the soil, in unpaved areas, could therefore be potential routes for human exposure with the corresponding health implications depending on the amounts released. Further, concentrations of combustible gas in the soil vapor are in excess of the lower explosive limit. However, there are no obvious sources of ignition in the soil or direct evidence of methane accumulation in any of the structures at Pepe Field. Further investigations to assess combustible gas and hydrogen sulfide emissions, migration, and accumulation should be conducted.

RECOMMENDATIONS

1. Further assessment of hydrogen sulfide and methane concentrations in the breathing zone and in facility structures at the site during varying climatological conditions are warranted. These kinds of data are imperative to assess the human health implications of re-opening the park.

2. The geophysical data illustrated that a potential for waste materials extending beyond the boundary of the site, into residentially developed areas, exists. Such possibility should be assessed, coupled with hydrogen sulfide and methane investigations, to determine its human health implications.

3. Periodic monitoring of leachate leaving the site, during varying ground water conditions, should continue in order to better accurately define the possible impacts such discharge may have on surface waters and its potential human health implications.

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