

Health Assessment for

HIGGINS FARM

CERCLIS NO. NJD981490261

FRANKLIN TOWNSHIP, SOMERSET COUNTY, NEW JERSEY

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Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

HIGGINS FARM
SOMERSET COUNTY
FRANKLIN TOWNSHIP, NEW JERSEY

Prepared By:
Environmental Health Service
New Jersey Department of Health

Prepared For:
Agency for Toxic Substances and Disease Registry (ATSDR)

OBJECTIVES

The Higgins Farm Site was the object of an Interim Removal Measure (IRM) performed by the Environmental Protection Agency (USEPA) in 1986. The main Remedial Investigation and Feasibility Study (RI/FS) is presently in the first year of the work plan. The objectives of this Health Assessment, based upon the current stage of site remediation are to:

- * Assess the nature and magnitude of health effects associated with the site, and determine the site's degree of public health concern;
- * Identify, if necessary, immediate actions necessary to minimize exposure to hazards and contamination associated with the site;
- * Identify, if necessary, deficiencies in information and/or data relating to the site;
- * Review remedial activities in the context of potential public health implications;
- * Document the concerns of the community with regard to the site;
- * Assess whether additional health study or investigation of the site is warranted.

SUMMARY

The Higgins Farm site comprises an area of approximately 74.5 acres located in Franklin Township, Somerset County, New Jersey. Contamination is emanating from an area of buried drums known to contain pesticides, volatile organic chemicals, and isomers of

The underlying aquifer is extensively used as a sole source aquifer for nearby residents in the area. Site related contamination has been detected in potable wells in the area. Other affected media at the site include soils and surface water. Exposure through use of contaminated groundwater is likely to have occurred. USEPA performed an Interim Removal Measure in 1986 to provide potable water to residents and control the release of hazardous substances. The Higgins Farm site was added to the NPL in March of 1989, and is currently ranked 102 of NPL sites in New Jersey. ATSDR and NJDOH consider this site to be of public health concern. This site is being evaluated for follow-up health study and evaluation.

SITE DESCRIPTION

The Higgins Farm site is located in a rural area of Franklin Township, Somerset County, New Jersey. The site occupies approximately 74.5 acres, and is off of N.J. Route 518 which runs approximately north and south. Most of the site is southeast of this thoroughfare. Much of the site consists of open grazing and pasture land, is relatively flat, and is poorly drained. There are two residences on the site, while others border the site to the northwest and northeast. Trap Rock Industries Kingston Quarry borders the site to the south.

In December 1985, the Franklin Township Health Department investigated a complaint of alleged medicinal-smelling well water by a nearby resident, and discovered the well was contaminated with chlorobenzene. During a subsequent investigation by the New Jersey Department of Environmental Protection (NJDEP) several drum burial sites were discovered, the closest approximately 40 yards from the affected domestic well. Analysis of the contents of an exposed drum revealed chlordane, naphthalene, and arsenic.

In April 1986, the property owner hired a contractor to excavate approximately fifty drums without NJDEP approval or knowledge. The excavated drums were punctured, and waste was emptied into an excavation pit. Liquids were then pumped into holding tanks, and visibly contaminated soils were placed into roll-off containers.

In March 1987, the EPA instituted a CERCLA Emergency Action, the first phase of which provided bottled water to the users of 29 potable wells in the vicinity. An Interim Well Restriction Area, which encompasses an approximately quadrilateral area of six thousand by five thousand feet, was established. The second phase included the installation of a clay berm around the site to contain run-off, the construction of a pole-barn to house four roll-off containers, the pumping of contaminated liquids from the excavation pit into holding tanks, the lining and backfilling of the pit, the remediation of the vegetative stress, and securing the area with a fence.

In 1989, carbon filtration units were supplied by residents whose domestic wells were in the restriction zone. At that time, delivery of bottled water was discontinued. Well restrictions were removed by NJDEP in August 1989.

SITE VISIT

On May 8, 1989, personnel from the New Jersey Department of Health's Environmental Health Service (NJDOH/EHS), accompanied by the Franklin Township Health department, visited the Higgins Farm site. The farm is an active cattle husbandry operation which, according to local authorities, raises Charolais beef cattle for breeding purposes. The number of cattle on the property appeared to have recently increased.

Most of the on-site residences belong to members of the owners family. The property owner, Mr. Higgins resides at the Higgins Disposal site, another NPL site. There are a few rental houses in the general vicinity of the barns which are occupied. Near one of the houses were grape vines and what might be or have been housing for migrant farm workers.

The primary drum burial site is located in the northern part of the acreage with a secondary site situated close by. This part of the property is forested, and closely adjoins the properties of several of the owner's neighbors. Another entrance to the property, several hundred yards south on N.J. Route 518 from the location of the nearest cluster of residences, leads to an area of several houses, barns, and shacks. Most of the off-site residences nearby are located in a row starting near the back of the drum burial site. These houses continue north on Route 518. There are several fields that appear to be under cultivation, but that did not appear to use irrigation.

During the site visit, an inspection of the drum burial area from outside the fence was conducted. The vegetation inside the fence showed characteristics of stress. The area inside the fence appeared to be slightly elevated above the area immediately outside the fence. Neither the on-site pond nor the second drum burial site were viewed on this visit.

The owner of the off-site residence closest to the site, who had been the person who had originally filed the complaint with the Local Health Department concerning his drinking water, was interviewed. He mentioned that he and two other members of his family had suffered persistent skin disorders for a period of years which had resolved about the time they no longer utilized untreated water. He also reported that Mr. Higgins continues to allow a hunting club to use his property during deer hunting season.

COMMUNITY CONCERNS

The concerns of the community with regard to the Higgins Farm site focus upon the past activities that have occurred on the site, and with the current condition of the site. Residents are concerned because they know that waste disposal activities have allegedly occurred since the 1960's. One neighbor had taken the owner of the farm site to court previously for allegedly dumping bulk liquids in the woods nearby.

Additional issues raised by the community may be summarized as follows:

- * There are concerns about whether all existing sources of on-site contamination have been identified.
- * The existence of another property owned by Mr. Higgins in the area (Higgins Disposal Service) which is also a NPL hazardous waste site. Higgins Farm may have been used for the disposal of wastes from this business. Residents maintain medical and lab wastes may have been dumped at the site.
- * Inquiries about the nature and extent of contamination, and plans for remediation have been expressed by both the community and local officials.
- * The community was apprehensive about the imposition of the well restriction area, and the necessity/adequacy of providing charcoal filtration units to the households under such restrictions.

The drum burial site, with its pole barn contaminant storage area, is readily visible from several nearby houses and serves as a constant reminder to the local residents of the contaminants stored there. They have been told that this facility is likely to remain for decades, or until such time as a suitable disposal facility for dioxins becomes available.

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

The EPA site inspection report notes that approximately 50 drums are housed on-site and contain solvents, pesticides, other organic chemicals, and heavy metals. Additional drums were discovered on the ground in the southeast wooded section of the property. A summary of the characteristics of the tank, roll-off and pond liquids state that, in general most of the wastes seem to be a mix of gasoline, heating oil, wood preservative, caustic and solvents, with some toxic metals. The liquid waste excavated from the site has been estimated to amount to 1205 gallons and is characterized as toxic, persistent, soluble, and highly volatile.

The groundwater in this area is contained in a Triassic age formation which is hydraulically connected to the more fractured sandstone formation. According to the New Jersey Geological Survey (NJGS) the presence of major fault zones in the areas of concern increase the range of interconnections of fractured segments. The direction of groundwater flow in the area is considered to be to the west but dewatering from quarry operations may affect this flow. The depth to bedrock is 400 feet. The depth to groundwater is 10 feet, and the distance to the nearest well from the drum burial site is 120 feet.

The soils in this locale vary from sandy loam to stratified sand and gravel. The depth of contaminated soils known to date is 420 feet.

Potable wells in the area vary from less than a 100 feet to 500 feet in depth. Between 3,000 and 4,100 people rely on private well-water within a three-mile radius as their only source of potable water. Several of these wells have already been found to be contaminated.

Media that have been sampled on or near the site include private potable wells, surface water, soils, air, and the contents of drums, tank, and roll-offs. Three private wells nearby have demonstrated contaminant levels for volatile and semi-volatile organics well above Maximum Contaminant Levels (MCL) for drinking water in New Jersey. On-site and off-site air is also affected. Air sampling done after the pit release of some liquid waste indicated that there had been ambient air contamination. The indoor basement air of the nearest neighbor's home has demonstrated accumulation of organic chemical vapors according to USEPA samples in 1987. Accumulations indoor of organic chemicals was postulated to be due to migration of soil gas rather than from use of the groundwater.

Contaminants were detected in a small pond in the southeast corner of the site, that was reported to be covered with an oily sheen. The drums, tank liquids and roll-off containers were contaminated with volatile organics, pesticides, semi-volatile organics, heavy metals, as well as ignitable and corrosive wastes. Soils contained pentachlorophenol, dieldrin, and low levels of furans and dioxins. Some vegetative stress is still evident in the drum site area, but there are reputedly no habitats of endangered species within the local environs.

Table 1 presents the maximum concentration of contaminants that were found in private potable wells. Table 2 presents the maximum concentration of the contaminants of concern that were detected in the soils and ponded surface water on-site. Table 3 presents the maximum concentration of contaminants of concern that were identified in liquids in the excavation pit, holding tank, and roll-off container. Table 4 presents the chemicals that were

located in the vicinity of the closest residence to the site.

QUALITY ASSURANCE/QUALITY CONTROL

A variety of samples have been taken by a number of agencies and analyzed by different laboratories. Quality assurance/quality control (QA/QC) information was not available for review or evaluation.

DEMOGRAPHICS

This area of Franklin Township is a semi-rural but developing community of single-family homes. Within a three-mile radius, there is a population of between 3000 and 4100 people, and approximately 545 private potable wells. The distance from the drum burial site to the nearest potable well is forty yards. The former well restriction area encompasses an area of about one mile square. The area around the site is increasing in population. A new development of approximately sixty single family homes, and several office buildings is being constructed just north of the site on Route 518.

Potential trespassing is minimized by the presence of an electric cattle fence around the site perimeter. The interim storage area is well fenced. Although hunters may use the site during hunting seasons, there are no reports of trespassing or vandalism on the site.

The site is within several miles of a commercial/industrial center, and there are some fields nearby in agricultural production. Within a three-mile radius, there are several farms which produce sod, animal feed, as well as fruits and vegetables for human consumption. According to a 1986 NJDEP memo, these farms do not use groundwater for irrigation, and their water sources are derived from streams and ponds which are not considered to be in the contaminant pathway.

The Delaware & Raritan Canal and the Millstone River flow to the west of the site, approximately two miles away. The canal is used for water recreation. The nearest surface water is Carter's Brook which flows within 2000 feet of the site and, according to local authorities, is sometimes used by children for recreational activities. The Millstone River is approximately 1.5 miles to the south. There is a pond in the southeast corner of the property.

A historic landmark (Washington's Headquarters) is located to the southwest of the site, between the Higgin's Farm Site and Higgin's Disposal Site.

ENVIRONMENTAL DATA GAPS

The RI/FS for the Higgins Farm Site has not been completed. For the purposes of formulating a comprehensive Health Assessment, the following deficiencies in site information and data are identified.

The groundwater under and near the site has not been fully characterized. The direction of the groundwater, along with the nature and extent of groundwater contamination will be defined in Phase I investigations. Existing hydrogeology reports indicate that it is not certain whether surface waters to the south/southwest would necessarily be the receptacle for the plume. Groundwater movement near the site is complicated by dewatering activities of nearby quarries and the presence of perched aquifers.

According to local officials, contamination of domestic potable wells do not seem to follow a reliable dispersion pattern, and may be more related to well depth than actual distance from the site. Due to the length of time that pollutants may have been released at this site, the vagaries of local groundwater flow, and the extremes of depth from one well to another, it would be appropriate to conduct a wider pattern of domestic potable well sampling.

Monitoring of off-site surface water may be indicated due to their potential to be groundwater discharge areas, and because of their importance as a source of human exposure.

Soil contamination on-site also merits additional characterization and delineation. Soil samples may be taken over a broader area to insure that pollutants are not migrating off-site, especially to the fields in agricultural production just across the road from the drum burial site. Samples are also needed from the access roads, topographic depressions, and drainage ditches. Further electromagnetic investigation may be necessary to determine whether there are additional buried drums heretofore undetected in other sections of the site. Future analyses that are conducted on the site should address the presence of dioxins and furans, and possibly radiologicals, due to the potential presence of radiologic waste. Areas throughout the site need to be sampled to detect "hot spots". Given that the owner of this site had contracts with medical and chemical research and development companies and that such waste was documented at the other site owned by Mr. Higgins, there could be some infectious, radiological or other laboratory wastes on this site. Not all drums have been sampled and perhaps not all disposal areas on-site have been discovered.

The acreage used for cattle grazing as well as any areas where fruits and vegetables for human consumption are grown should be tested. Results of the fat sampling of the on-site cattle must be acquired and the disposition of these cattle must be confirmed. If there is a significant amount of hunting on-site, an analyses of the

It is noted. Given the concentrations of contaminants in some of the soil and water, the bioaccumulation potential of some of these substances, and the fact that a large amount of meat may be eaten by hunters and their families over a brief period of time, significant exposures could result.

Indoor air of the basements of additional surrounding residences should be tested as some positive findings have already occurred. Outdoor air monitoring for volatile and dust-borne contaminants is needed at selected sites such as the border of the fenced-in drum burial area or at the edge of the grazing areas near the rental properties.

EXPOSURE PATHWAYS

Contaminated media at the Higgins Farm site include groundwater, soils, surface water and possibly, indoor air. The primary human exposure pathway was/is the utilization of contaminated groundwater for domestic purposes. It is probable significant exposure occurred through this pathway. Homes in the well restriction area were originally placed on bottled water by USEPA, and have, in addition, been equipped with carbon filtration systems.

Inhalation of contaminated ambient or indoor air may be a significant exposure pathway. The presence of organic chemicals in a basement area has been documented and may be due to volatilization resulting from domestic activities, or intrusion of soil gases.

Dermal contact or aspiration of contaminated soils is a pathway of concern for residents, workers, hunters, and trespassers on-site. The possibility of off-site migration of contaminated soils and/or fugitive dusts exists pending results of the RI.

Contact with on-site surface water may represent a human exposure pathway, although current data suggests this is of relatively secondary concern. The nearest off-site downslope surface water is Carter's Brook which lies 2,000 feet to the east of the drum burial site, occasionally used by children for recreation. The Millstone River and Delaware & Raritan Canal are two miles to the south and are used for fishing, boating and swimming. There is currently no data suggesting off-site surface water has been impacted by the site.

Workers at the site may have previously been exposed to significant levels of contaminants. During the site investigation by NJDEP of the unauthorized clean-up attempts in early 1986, a lack of protective gear by the workers performing the operation was noted by the NJDEP inspector. Employees of the farm may currently be engaged in some activities that would expose them to contaminated areas.

... complete identification of the rate of the cattle raised...
... exposure through ingestion of...
... meat products may be occurring. Hunters who utilize
the site may also be exposed through ingestion of contaminated
game.

PUBLIC HEALTH IMPLICATIONS

At the present stage of investigation and characterization, there are many variables which effect the accurate determination of the site's public health implications and consequent degree of public health concern. These include: the length of time that the site was operated as a waste depository, the quantity of the wastes deposited, the nature of the contaminants deposited on site, and the general lack of information associated with an early stage of investigation.

Exposure to contaminated groundwater is likely to have occurred; the duration and magnitude of such exposure is presently unknown.

The account of one nearby resident concerning the persistent skin problems suffered by himself and his family, suggest that at least some individuals may have experienced symptoms of exposure. Although the resident sought medical consultation for the skin conditions, he does not recall any diagnostic procedures that were performed to characterize the problem. However, the skin problems reportedly ceased after the resident stopped bathing in and drinking the contaminated potable water.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the information reviewed, ATSDR and NJDOH have concluded that the Higgins Farm Site site is of public health concern because of the risk to human health resulting from probable exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Environmental Contamination and Physical Hazards Section above, human exposure to volatile organic chemicals, heavy metals, pesticides, and isomers of dioxin is may be occurring and has probably occurred in the past via the domestic use of contaminated groundwater.

In accordance with CERCLA as amended, the Higgins Farm site has been evaluated for appropriate follow-up with respect to health effects studies. Since human exposure to on-site and off-site contaminants may now be occurring and has probably occurred in the past, this site is being considered for follow-up health effects studies. After consultation with Regional EPA staff and State, and Local Health and Environmental Officials, the Division of Health Studies, ATSDR, and the New Jersey Department of Health will

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The emergency actions and interim measures undertaken by USEPA and NJDEP, specifically the delivery of bottled water to residents, the institution of a well restriction area, and the installation of carbon filters to afflicted households, are adequate to minimize the exposure of residents to contaminated groundwater. No additional emergency actions are recommended at this time.

When indicated by public health needs, and as resources permit, the evaluation of additional relevant health outcome data and community health concerns, if available, is recommended.

CERTIFICATION

This Health Assessment was prepared by the New Jersey State Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health assessment was initiated.



Technical Project Officer, SPS, RPB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this Health Assessment and concurs with its findings.



Division Director, DHAC, ATSDR

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REFERENCES

Superfund Documents:

USEPA Potential Hazardous Waste Site Inspection Report
NJGS reports
NJ Water Supply Authority documents

File reviews:

Franklin Township files
NJDOH files
NJDEP files

Personal Interviews:

Franklin Township Health Officer
Franklin Township Environmental Officer
Neighboring resident

Sampling Results:

NJDEP Environmental Testing and Certification reports
Cal Analytical results
NYTEST Environmental Lab results

TABLE 1 - Groundwater Monitoring Data for the Site at the former Wilson Farm

Maximum Detected Concentrations

Compound ug/L	Sampling Event			MCL
	NJDEP 4/86	NJDEP 8/86	Contractor 11/88	
Benzene	68	480	314	1
Chlorobenzene	412	770	580	4
1,2-Dichloroethane	395	210	11	2
1,2-Dichloroethene	-	-	43.90	10
1,1,2,2-Tetrachloroethane	11	-	-	NA
Tetrachloroethene	309	110	62.90	1
Trans-1,2-dichloroethane	28	2	-	2
Trichloroethene	22	3	12.9	1
1,1,2-Trichloroethane	-	2,300	70	NA
1,1,2-Trichloroethene	2,924	-	-	NA
Vinyl Chloride	-	120	-	-
Total Xylenes	9	-	-	44
1,2-Dichlorobenzene	35	38	39.8	600
Naphthalene	8	-	-	NA
N-Nitrosodiphenylamine	4	-	-	NA
2-Methylnaphthalene	17	-	-	NA
Metals mg/L				
Chromium	0.043	0.004	*	0.5
Mercury	0.006	-	*	0.002
Selenium	0.013	-	*	0.01

* = Not Analyzed ; MCL = Maximum Contaminant Level; NA = Not Available

TABLE 3 - Maximum Concentration Detected in Soil and Pond Water for Selected Chemicals of Concern; Higgins Farm Site.

Compound	Maximum Concentration Detected	
	Soil (mg/kg)	Pond (ug/L)
Methylene Chloride	18	-
1,1,2,2-Tetrachloromethane	4.4	-
Chloroform	11	-
Trichloroethane	-	0.82
Naphthalene	58	-
Pentachlorophenol	77,000	-
Dibutylphthalate	94	-
Phenanthrene	2,100	-
Flouranthene	3,000	-
Anthracene	530	-
Pyrene	1,600	-
Benzo(a)anthracene	1,100	-
Chrysene	2,000	-
Acenaphthalene	190	-
N-nitrosodiphenyl amine	170	-
Pesticides	(mg/kg)	(ug/L)
Dieldrin	11,000	-
Endrin	150	-
beta-BHC	500	-
Metals	(ug/kg)	(mg/L)
Antimony	15	-
Arsenic	6.7	-
Beryllium	2	-
Cadmium	1.9	-
Chromium	18	100
Copper	130	-
Lead	140	-
Nickel	14	-
Zinc	119	60
Dioxins	(ug/kg)	(ug/L)
2,3,7,8-TCDD	9.23	-

TABLE 2, Continued - Surface Soil and Ponds Surface Water
Contaminants of Concern; Higgins Farm Site.

Compound	Maximum Concentration Detected	
	Soil (mg/kg)	Pond (ug/L)
Chlorodibenzofurans	(ug/kg)	(ug/L)
Hexa-	5.2	-
Hepta-	34.7	-
Octa-	65.4	-

Data from May 1986 Sampling Event; NJDEP

TABLE 3 - ANALYSIS OF ROLL-OFF CONTAINER, HOLDING TANK, AND EXCAVATION PIT CONTENTS: HIGHTS FARM SITE.

Compound ug/L	Roll-off Container	Holding Tank	Excavation Pit
Chloroform	-	35.300	-
Toluene	-	37.000	-
Total Xylenes	-	224.000	-
Acenaphthene	1,630	-	-
Acenaphthylene	1,100	-	-
Bis(2-ethylhexyl) Phthalate	1,100	20,000	-
Naphthalene	7,600	-	-
2-methyl naphthalene	52,100	90,000	-
2,4-Dimethylphenol	-	32,000	-
Pentachlorophenol	248,000	2,340,000	158,000
4-Methylphenol	-	-	26
Di-n-Butylphthalate	5,600	20,000	21
2,4-Dinitrotoluene	-	-	27
Fluorine	1,750	28,000	-
Pesticides ug/L			
Chlordane	-	560,000	-
Endrin	-	72,000	-
Metals mg/L			
Arsenic	7.68	9.25	-
Beryllium	-	1.5	-
Cadmium	0.04	0.375	-
Chromium	0.9	575	-
Copper	1	25	-
Lead	-	7	8.25
Nickel	-	7	7
Zinc	-	24.8	-

Data from NJDEP sampling event: February, 1987

Table 1 - Contaminants Detected in Indoor Air* - Higgins Farm Site.

Maximum Concentrations Detected

Compound ug/m³

Acetone	390
Methylene Chloride	370
Toluene	100
Xylene	100

* = USEPA Sampling 1987; Residential Property.