Health Assessment for

BOG CREEK FARM SITE (BCFS) NATIONAL PRIORITIES LIST (NPL) SITE

HOWELL TOWNSHIP, MONMOUTH COUNTY, NEW JERSEY

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

SUMMARY

The Bog Creek Farm Site (BCFS), located in a rural area of Howell Township, Monmouth County, New Jersey, is on the National Priorities List (NPL). Farmingdale, the nearest urban area, is 3 miles to the north. Although the site lies on a 12-acre tract of land, the waste disposal area consists of only 4 acres. In 1973 and 1974, various chemical wastes were reportedly dumped at the site, including lacquer thinners, paint solvents and resins, disinfectants, animal carcasses, and residential debris. Two residences are located on-site, and a total of 300 residences are located within 1 mile of the site. Sampling and analysis of on-site and off-site groundwater, surface water, and sediments and of on-site waste and soil revealed several contaminants, primarily volatile organic compounds (VOCs), semi-volatile organic compounds, and heavy metals. Site contamination appears to be greatest immediately adjacent to an on-site waste-disposal trench.

The September 30, 1985, Record of Decision (ROD) addresses the first of two operable units for the BCFS and proposes 1) removing waste water and sediments from the pond and bog and regrading and covering the pond and bog to prevent reponding, 2) treating on-site waste water on site and discharging it to a nearby stream, 3) excavating waste deposits and contaminated soil that has total VOCs exceeding 10,000 parts per million and incinerating materials on-site or off-site, 4) grading and covering excavated areas with a compacted soil cap, 5) enclosing the site with a security fence; and (6) implementing a monitoring program to assess the effectiveness and reliability of the remedial action. After the site remediation is completed, further analyses will be conducted to determine the impact of remaining contaminated soil and the need for additional site remediation. This and groundwater contamination will be addressed in a ROD on the second operable unit.

A potential public health threat exists from dermal absorption, ingestion, or inhalation of contamination from groundwater, surface water, sediment, waste, and soil.

BACKGROUND

The 12-acre BCFS is located in Howell Township, Monmouth County, New Jersey, approximately 3 miles south of Farmingdale (Figure 1). In 1973 and 1974, wastes, reported to have included lacquer thinners, paint solvents and resins, disinfectants, animal carcasses, and residential debris, were dumped into a 4-acre area of open land and excavated pits.

In December 1974, the owner of this site allegedly pumped waste from disposal pits, hauled the wastes to the Kin-Buc landfill in Edison, New Jersey, and backfilled the pits. Since 1974, test pits, trenches, and monitoring wells have been installed on-site as part of the site investigation program to help determine the nature and extent of contamination. To date no response or enforcement actions have taken place at BCFS.

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS
Values given in parts per billion [ppb], except where noted)

GROUNDWATER ON-SITE, 1984

Contaminant	Maximum Concentration
Benzene	49,700
Chloroform	2,300
1,2-Dichlorobenzene	190
1,1-Dichloroethene	383
1,1-Dichloroethane	17
Ethylbenzene	44,900
Methylene chloride	6,300--
2-Methylphenol	290
Tetrachloroethene	10,100
1,1,1-Trichloroethane	12,900
Trichloroethene	7,270
Toluene	59,000
Total Xylenes	142,000

--Contaminant also detected in laboratory blank.

SURFACE WATER ON-SITE, 1984

Contaminant	Maximum Concentration
Benzene	20,000
1,1-Dichloroethane	1,600
Chloroform	4,700
Methylene Chloride	960
Toluene	28,000
Trichloroethene	2,600
1,1,1-Trichloroethane	5,000
Vinyl Chloride	550
Total Xylenes	28,000

SOIL ON-SITE, 1984*

Contaminant	Maximum Concentration
Chlordane	6,000
Chromium	718,000
4,4'-DDT	26,000
Lead	116,000
PCB-1242	1,460

*Information on other contaminants and levels were not provided to ATSDR.

WASTE SAMPLES ON-SITE, 1984
(Values given in parts per million [ppm])

Contaminant	Maximum Concentration
Benzene	8,900 ppm
2-Butanone	5,200 ppm
Ethylbenzene	4,700 ppm
Lead	19,060 ppm
Methylene chloride	26,000 ppm
1,1,1-Trichloroethane	8,800 ppm
Trichloroethene	5,500 ppm
Tetrachloroethene	6,800 ppm
Toluene	180,000 ppm
Total Xylenes	14,000 ppm

SEDIMENT ON-SITE, 1984

Contaminant	Maximum Concentration
Benzene	128,000~
Bis(2-ethylhexyl)phthalate	250,000~
4,4'-DDD	79
Ethylbenzene	22,000
Heptachlor epoxide	129
Methylene chloride	67,619~
Toluene	279,629~
1,1,1-Trichloroethane	35,000
Trichloroethene	16,000
Total Xylenes	161,111

~-Contaminant also detected in laboratory blank.

PHYSICAL HAZARDS

There are no known physical hazards associated with BCFS.

DEMOGRAPHICS OF POPULATION NEAR SITE

BCFS is located in Howell Township, which had a 1980 population density of 1.6 persons per acre. Farmingdale, located approximately 3 miles north of the site, is the nearest urban area and had a total population in 1980 of 1,348. Lakewood, with a 1980 population of 32,300, is located 4 1/2 miles south of the site. According to the Farmingdale, NJ, Quadrangle map, photorevised in 1970 by the U.S. Geological Survey, approximately 300 residences and approximately 900 residents are within 1 mile of the site. The residences nearest to the site include two on-site residences and

several homes located approximately 500-feet northwest of the site on Squankum Park Road. Groundwater is the sole source of potable water for residents within the site area.

Agricultural activities within the site area include horse breeding, the raising of nursery stock, and the production of vegetables, grain, sod, and flowers. Woodlands, a riding stable, and a field for the cultivation of grain border the BCFS.

Recreational land uses in the area include the Allaire State Park, which is approximately 1/2 mile east of the site and is heavily used by golfers, fishermen, small game and deer hunters, and horseback riders.

Future land use within the site area may include a proposed 770-acre Manasquan Reservoir System. This reservoir would draw water from a section of the Manasquan River downstream from the Squankum/Manasquan confluence.

EVALUATION

A. SITE CHARACTERIZATION (DATA NEEDS AND EVALUATION)

1. Environmental Media

Monitoring programs for groundwater, surface water, sediment, and air were sufficient to characterize adequately the nature and extent of on-site and off-site contamination.

2. Land Use and Demographics

Land use and demographic data were sufficient to enable ATSDR to assess adequately the public health impacts of the BCFS.

3. Quality Assurance/Quality Control

The conclusions contained in this report are based on the data package supplied to ATSDR. The accuracy of these conclusions depends on the reliability and comprehensiveness of the data contained in the materials reviewed.

ENVIRONMENTAL PATHWAYS

Environmental pathways by which contaminants may migrate to off-site areas include groundwater and surface-water flow, wind- and water-induced soil erosion, sediment transport, fugitive dusts, volatilized organic chemicals, and bioaccumulation in plants and animals. The site remediation proposed in the ROD should help reduce surface water, sediment, soil, and air-related pathways of contaminant migration.

Three major aquifers underlie the site area: the Upper Kirkwood, the Lower Kirkwood, and the Vincentown. The Upper Kirkwood Aquifer (the water table aquifer) flows north-northeast and discharges into the North Branch of Squankum Brook, the on-site bog and pond. A 30-foot confining layer separates the Upper Kirkwood Aquifer from the Lower Kirkwood Aquifer. The Lower Kirkwood Aquifer flows east, most likely discharging into the Manasquan River. The Lower Kirkwood Aquifer is pressurized, and this creates an upward hydraulic gradient between the Lower and Upper Kirkwood aquifers, minimizing the migration of contaminants from the upper to the lower aquifer. The Vincentown Aquifer is deep and is not likely to be influenced by the site or influence the hydrology of the Kirkwood aquifers.

Monitoring indicates that groundwater beneath the site has been impacted by contaminants from BCFS, especially downgradient from the waste trench. Results of groundwater monitoring indicate that the groundwater contaminant plume is limited to the water table aquifer.

Groundwater is the sole source of potable water within the site area. Most older residences in the area have wells that draw groundwater from the Upper Kirkwood Aquifer. Of the five residential wells sampled during the Remedial Investigation (RI), four were screened in the shallow aquifer. Although both on-site potable water supply wells are less than 50-feet deep they are located upgradient from the contaminant plume. Off-site residential wells are located either upgradient from the site or on the far side of the North Branch of Squankum Brook, which serves as a hydrologic barrier to flow in the Upper Kirkwood Aquifer.

Although monitoring results indicate that area residential wells have not been impacted by site contamination, groundwater contaminants may migrate and in the future impact potable-supply wells located on-site. The ROD does not include any provisions for addressing site-related groundwater contamination or for direct remediation of groundwater contamination, although the latter will be addressed in the ROD for the second operable unit.

Horizontal migration of groundwater contaminants has increased the size of the contaminant plume and has resulted in the movement of contaminants into surface water-bodies that serve as groundwater-discharge points. Samples of surface water and sediment indicate the greatest contaminant levels are in the on-site bog and pond. Contaminant levels in the North Branch of the Squankum Brook decrease markedly with distance from the site. From the available data, the site does not appear to have an appreciable impact on the Manasquan River.

The ROD includes provisions for draining and treating surface water from the bog and pond; excavating and incinerating contaminated sediments; and grading, capping with clean soil, and revegetating these areas. These measures should reduce the surface-water and sediment-related pathways for contaminant migration.

VOCs were detected in on-site surface and subsurface soils and wastes. The highest contaminant levels were detected immediately adjacent to and beneath the waste-disposal trench. Surface-water runoff and wind erosion may transport soil contaminants to off-site areas.

Remedial actions proposed in the ROD include the excavation of contaminated waste deposits and soil that have VOC levels in excess of 10,000 ppm. Although such measures would remove the most highly contaminated waste and soil, a considerable amount of contamination would remain. Excavated areas are to be graded, covered with a compacted soil cap, and the cap vegetated. A security fence will be installed around the perimeter of the site, and a monitoring program will then be implemented. Although the proposed remediation should be adequate to reduce soil erosion and surface-water runoff, the remaining contaminated soil would serve as a contaminant reservoir. The U.S. Environmental Protection Agency (EPA) will address the remaining contaminated soil as a separate operable unit in a forthcoming ROD.

Air samples collected in 1983 showed airborne VOCs but at concentrations below levels likely to be of public health concern. Air monitoring conducted in 1984 during the RI field activities showed high levels of organic vapors during waste excavations.

During site remedial activities that involve soil or waste excavations, contaminants may be released into the atmosphere through the volatilization of VOCs or the generation of fugitive dusts. The site's vegetative cover and high-water table should, however, appreciably reduce the generation of dust. Once site remediation is completed, the site should have very little impact on air quality.

Contaminants in soil, sediments, groundwater, and surface water may bioaccumulate in food-chain entities, such as edible plants and animals. Although small game hunting is reportedly a common recreational activity, on-site hunting has not been reported in the area. Edible species of fish were not found during aquatic-life studies on the North Branch of Squankum Brook. Although the ROD does not specifically address the bioaccumulation pathway of contaminant migration, proposed remedial activities should reduce the site's impact on local wildlife.

C. HUMAN EXPOSURE PATHWAYS

Ingestion of contaminated groundwater, surface water (including leachate), soil, sediments, and contaminated food-chain entities are all potential routes of human exposure to site-associated contaminants. Other possible pathways of human exposure include dermal absorption from groundwater, surface water, soil, and sediments or inhalation of volatilized contaminants and fugitive dusts.

Groundwater

BCFS is located in a rural area of New Jersey where local residents rely on groundwater as a source of potable water. Contaminants were detected at levels likely to be of of public health importance in on-site monitoring wells but not in on-site or off-site residential wells. Although human exposure to contaminated groundwater is not likely to occur under current conditions, remedial workers may be exposed during activities that include groundwater extraction and treatment. Ingestion and dermal contact with contaminated groundwater, and inhalation of contaminants volatilized from groundwater during extraction, may result in human exposure to contaminants at levels that may adversely affect human health.

Surface Water

Although surface water within the area is not used as a source of potable water, human exposure to surface-water contaminants is possible because access to the site and the contaminated pond and bog is not restricted. Contaminant levels that are likely to be of public health concern were detected in on-site and off-site surface water. Dermal absorption, inhalation, and incidental ingestion of contaminants from the on-site pond and bog or impacted sections of the North Squankum Brook may occur during wading, swimming, or other recreational activities.

Soil

The highest levels of on-site contaminants were detected in subsurface soil and waste mixtures. Since on-site wastes are covered by several feet of soil, contact with contaminated wastes is unlikely, however, during site remedial activities which involve excavation or site regrading, human exposure to contaminated wastes is possible. Ingestion or dermal contact with contaminated wastes and soil may adversely affect human health.

Food-chain Entities

Because access to the site is unrestricted and small game hunting may be conducted on-site, another potential pathway for human exposure to contaminants is through the consumption of food-chain entities that may bioaccumulate contaminants. Without sampling data for surface soil, a full evaluation of this pathway of human exposure is not possible.

Airborne Contamination

Inhalation of VOCs and contaminated fugitive dusts may be a human exposure pathway. On-site workers and nearby residents may be exposed to VOCs and fugitive dusts during on-site remedial activities that include soil-disturbing activities.

PUBLIC HEALTH IMPLICATIONS

Although remedial actions proposed in the ROD may protect public health at the Bog Creek Farm site, provisions are not included to address the groundwater contamination or contaminated wastes and soils that remain on-site after remediation. ATSDR understands that these issues will be addressed in a ROD covering the second operable unit.

Groundwater--Although local residents rely on groundwater as a source of potable water, most recent monitoring data from domestic wells do not indicate the presence of site-related contaminants. Site contaminants are unlikely to migrate to nearby residential wells. If remedial activities include the extraction and treatment of groundwater, remedial workers who do not use adequate personal protective equipment may be exposed to groundwater contaminants through dermal and inhalation pathways of exposure.

Surface Water--Although surface water in the site area does not serve as a source of potable water, the site does lie in an an area where recreational activities could result in contact with contaminated surface water. Because the ROD does not address the impact of contaminated groundwater on North Squankum Brook contaminants may remain at levels that could adversely affect public health.

Soils, Sediments, and Wastes--On-site soil and wastes within the immediate vicinity of the waste trench have contaminants at levels likely to be hazardous to public health. Sediments in the on-site pond and bog also had contaminants at levels of probable public health concern. The ROD calls for the removal of contaminated sediments which should reduce the public health impact of this media. Although the ROD proposes the removal of the most highly contaminated waste and soil, remaining contaminated waste and soil may be of public health concern.

Air--Remedial workers, trespassers, and nearby residents may receive exposures by inhalation of VOCs volatilized from wastes, soil, or sediments during remedial activities involving the excavation of contaminated environmental media. The extraction or treatment of contaminated groundwater or surface water may also result in volatilization of contaminants that may pose a health risk.

CONCLUSIONS AND RECOMMENDATIONS

From the information reviewed, ATSDR concludes that this site is of potential public health concern because of the potential risk to human health resulting from possible exposure to hazardous substances that may result in adverse human health effects. Although remedial action proposed by the ROD may protect public health for the target operable unit, completion of the proposed remedial actions will not address groundwater, or all soils and wastes with contaminant levels of probable public health concern.

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, the BCFS, Howell Township, Monmouth County, New Jersey, has been evaluated for appropriate follow-up with respect to health effects studies. Although direct access to the site is unrestricted, no populations can be defined as being exposed and there are no indications that human exposures to on-site contaminants are currently occurring. Therefore, this site is not being considered for follow-up health studies at this time. If data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring, ATSDR will reevaluate this site for any indicated follow-up.

ATSDR recommends the following to protect public health.

1. Prevent future exposures to contaminated groundwater by either removing contamination from groundwater or restricting groundwater use.

2. Provide adequate training and safety equipment to protect remedial workers from exposure to site contaminants.

3. Include the following elements in the remediation workplan.

   Provide adequate personal protective equipment that meets the standards of Occupational Safety and Health Administration (OSHA) for workers conducting remedial activities in and around the site.

   Follow appropriate precautionary guidelines, regulations, and advisories from the National Institute for Occupational Safety and Health (NIOSH) and OSHA.

   Employ methods of dust suppression if remedial activities will involve ground-disturbing activities. Appropriate real-time, peripheral-air monitoring should be done during working hours in addition to on-site air monitoring. Levels of contaminants in the ambient air at the periphery of the site should not exceed National Ambient Air Quality Standards (NAAQS) or NIOSH recommendations. All actions to prevent exposures to contaminants associated with BCFS during remediation should help protect individuals living and working on these sites.

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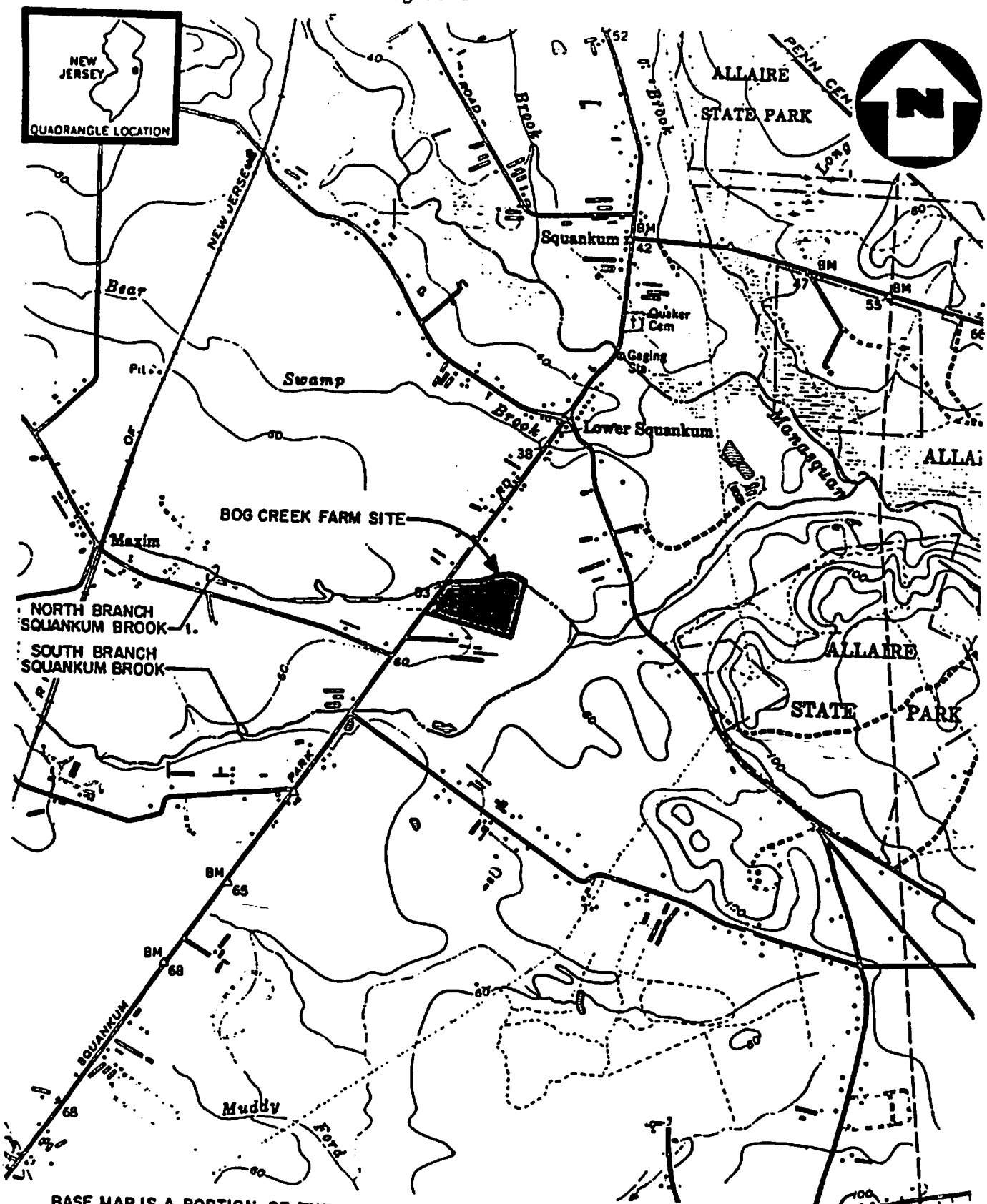
REFERENCES

Superfund Record of Decision, Bog Creek Farm, New Jersey. US EPA, Region II, September 30, 1985.

Remedial Investigation, Bog Creek Farm Site, Howell Township, New Jersey. NUS Corporation, August 1986.

Sittig. M., Handbook of Toxic and Hazardous Chemicals and Carcinogens. Second Edition, Noyes Publications, 1985.

Figure I



BASE MAP IS A PORTION OF THE U.S.G.S. FARMINGDALE, N. J. QUADRANGLE (7.5 MINUTE SERIES, 1954 - PHOTOREVISED 1970.) CONTOUR INTERVAL 20 FEET

LOCATION MAP
BOG CREEK FARM SITE, HOWELL TWP, NJ

SCALE: 1" = 2000'