REMEDIAL INVESTIGATION/FEASIBILITY STUDY
BEDFORD VILLAGE WELLS
SHOPPING ARCADE SITE
WESTCHESTER COUNTY, NEW YORK

REMEDIAL INVESTIGATION REPORT
VOLUME NO. 1

Prepared For

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

By

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REMEDIAL INVESTIGATION REPORT APPROVAL FORM

BEDFORD VILLAGE WELLS
SHOPPING ARCADE SITE
WESTCHESTER COUNTY, NEW YORK

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S.0 EXECUTIVE SUMMARY

In 1978, a New York State Department of Environmental Conservation (NYSDEC) investigation of contamination of municipal water supply wells by volatile organic chemicals initiated concern regarding disposal of the solvent tetrachloroethene from dry cleaning establishments to on-site sanitary and drainage systems. As a result of this concern, the Westchester County Department of Health (WCDH) conducted a county wide survey of these potential sources of chemical releases which included the dry cleaner located in the Shopping Arcade in Bedford Village, New York. In 1979, because of suspected releases of chemical contamination from the dry cleaning establishment, a study was conducted in Bedford Village by WCDH and a number of samples were collected from private wells in the vicinity of the Shopping Arcade and the dry cleaner. Analysis of these samples identified an area of contaminated ground water located in the Village Green area immediately downgradient of the Arcade. Chemical analyses of the samples indicated the presence of high concentrations of tetrachloroethene and its breakdown compounds trichloroethene and cis-1,2-dichloroethene.

Between 1982 and 1984, studies performed by NYSDEC showed fluctuating levels of the volatile organic chemical contamination in the private water supply wells and in 1985, the Shopping Arcade building and the Theater building installed granular activated carbon (GAC) treatment filters.

In 1986, WCDH and United States Environmental Protection Agency (USEPA) investigations confirmed that volatile organic contamination existed in the private wells and low concentrations of volatile organic chemicals also appeared east and southeast of the Arcade in water supply wells which were previously uncontaminated.

Based on the aforementioned findings and the nature of the chemicals found, the source of contamination was thought to be from the dry cleaning establishment formerly located in the Shopping Arcade. It was suspected that the dry cleaner in the Arcade disposed of waste/wastewater containing the solvent tetrachloroethene into the Arcade's sanitary system which discharges to a leaching field behind the Arcade building and the adjacent Exxon gasoline station. In addition, surface soils behind the dry cleaner were believed to have also been contaminated from past disposal practices and that contamination may have entered the stormwater drainage system in the vicinity of the

site. The drainage system becomes an open drainage ditch which eventually discharges to a series of surface water bodies (wetlands and ponds) in the study area before entering the Mianus River.

As a result of these findings, NYSDEC as part of the New York State Superfund Program, placed the Shopping Arcade Site on the State Superfund List and retained the services of Dvirka and Bartilucci Consulting Engineers to conduct a Remedial Investigation and Feasibility Study (RI/FS). The goals of the RI/FS were to determine/verify the nature, source and extent of contamination in the vicinity of the Arcade, assess impacts on human health and the environment, and depending on the results of the investigation, identify, evaluate and select a long-term, cost-effective remedial action to mitigate contamination.

A separate RI/FS was also conducted simultaneously at the Hunting Ridge Mall Site located approximately one mile southwest of the Shopping Arcade. The results of the Hunting Ridge Mall study, which also involved contamination by a suspected dry cleaner and was similar in scope to the investigation of the Shopping Arcade, is contained in a separate report.

The Remedial Investigation of the Shopping Arcade Site, which is the subject of this report, was conducted from June 1987 to April 1989, and comprised a multi-phase, multi-matrix sampling program including ground water, surface water, stormwater drainage system sediment, surface water sediment, surficial soils, septic tank sludge and supernatant samples. Phase IA, conducted in August 1987, and Phase IB, conducted in May and June 1988, evaluated potential sources, surficial contamination and possible routes of migration. Information from these phases was used to design the Phase II investigation. Phase IIA, conducted from August 1987 to December 1987, and Phase IIB, conducted from April 1988 to January 1989, characterized the hydrogeology and ground water quality underlying the study area as well as provide an assessment for the potential for further migration.

Phases IA and IB comprised the sampling of the Shopping Arcade sanitary system (one sample), the Exxon gasoline station sanitary system (one sample), the stormwater drainage system in the vicinity of the Arcade including two catch basins on Route 22 and Court Road (two samples), the drainage ditch along the north side of Court Road to which the drainage system discharges (three samples), wetlands/ponds upgradient and downgradient of the point to which the drainage ditch discharges (eight samples) and the Mianus River to which the wetland/pond system discharges (four samples). In addition,

soils were sampled behind the former location of the dry cleaner and at the Shopping Arcade's sanitary system leaching field (3 samples). Phase IA was comprised of approximately an equal number of analyses for Hazardous Substance List (HSL) compounds and volatile organic chemicals (VOCs), as was the Phase IB analyses.

Phase IIA and IIB involved the installation and sampling of 13 monitoring wells in and contiguous to the Shopping Arcade Site at nine locations, as well as the sampling of two existing/abandoned water supply wells, one owned by the Exxon gasoline station and one owned by the Bedford School. Soil samples were obtained during the construction of seven monitoring wells, all of which were located downgradient of the Shopping Arcade. A total of 21 ground water samples were collected from the monitoring wells (including the Exxon and Bedford School wells). The Phase IIA sampling program was comprised of approximately an equal number of HSL and VOC analyses, while Phase IIB was comprised of only VOC analyses.

In addition to the Phase I and II monitoring programs, as a result of concerns expressed by local residents regarding the quality of drinking water from private wells, a third phase not included in the original scope of work was undertaken (Water Supply Sampling Program) which involved the sampling of 39 private (residential and commercial) wells in the study area. This sampling program, which involved analysis primarily for VOCs, nitrates, and a limited number of analysis for HSL compounds, was conducted in October and November 1988.

The findings of the Remedial Investigation sampling program, health risk assessment and recommendations for potential remedial action to be considered in the Feasibility Study, are as follows:

Source/Sanitary System Contamination

The analysis of wastewater supernatant in the septic tank of the sanitary system that serves the Shopping Arcade (no sludge was found in the septic tank) showed low concentrations of solvents typically used in dry cleaning and their breakdown products. This, together with the results obtained from analysis of soils behind the former location of the dry cleaning establishment and at the Arcade's sanitary disposal system leaching field, indicate that there is little continuing contamination resulting from the past dry cleaning operation, and little residual contamination in the soil resulting from prior discharges. However, elevated concentrations of copper (1,750 ug/l), silver (332 ug/l) and phenol (46.8 ug/l) were detected in the Shopping Arcade's septic tank supernatant that

exceeded effluent discharge standards. Although copper, silver, and phenol have not been found in ground water downgradient of the site at levels that exceed their respective ground water standards, the elevated concentrations of these parameters in the septic tank supernatant are still in contravention of effluent discharge standards.

Sampling of the Exxon gasoline station sanitary system septic tank sludge detected high levels of benzene (1,700 ug/kg) toluene (300,000 ug/kg), xylene (37,000 ug/kg) and other volatile aromatic hydrocarbons such as ethyl benzene (37,000 ug/kg) and 1,4–dichlorobenzene (2,500,000 ug/kg). The high levels of all of these compounds significantly exceed the guidelines for soil and sediment based on the New Jersey Department of Environmental Protection (NJDEP) "action levels" for Total Volatile Organic (TVO) compounds. In addition, an elevated level of lead (1,000 mg/kg) was found in the sludge that exceeded the NJDEP "action level" for lead of 100 mg/kg. Since benzene, toluene and xylene (as well as lead) continue to be found in the ground water downgradient of the site at concentrations that exceed ground water standards, it is possible that the sanitary system and underlying soil could be a continual source of this contamination.

Stormwater Drainage System Contamination

Sampling of the sediment in the catch basins as part of the stormwater drainage system serving the vicinity of the Shopping Arcade along Route 22 and Court Road and samples from the stormwater drainage ditch along Court Road, showed little contamination. The only sample locations that showed slightly elevated concentrations of volatile organic chemicals/analytes of concern was in the catch basin at the intersection of Court Road and Route 22 and where the stormwater drainage ditch merges with the outlet of the pond north of Court Road. The following analytes of concern were detected in the catch basin sediment sample: trichloroethene (5.0 ug/kg); 1,1–dichloroethene (7.0 ug/kg); 1,1,1–trichloroethane (5.0 ug/kg); benzene (6.0 ug/kg); toluene (9.0 ug/kg); 2–butanone (21.0 ug/kg); chlorobenzene (6.0 ug/kg) and 4–methyl–2–pentanone (7.0 ug/kg), and the ditch/pond confluence sample contained tetrachloroethene (5.0 ug/kg); 1,2–dichloroethene (9.0 ug/kg); benzene (3.0 ug/kg); toluene (41.0 ug/kg); total xylenes (52.0 ug/kg); and vinyl chloride (3.0 ug/kg). The pond sediment sample also contained several polycyclic aromatic hydrocarbons (PAHs) including pyrene (1,300.0 ug/kg), benzo (k) fluoranthene (930.0 ug/kg), benzo (a) anthracene (530.0 ug/kg), fluoranthene (922.0 ug/kg), benzo (b) flouranthene (690.0 ug/kg) and phenanthrene (280.0 ug/kg). These contaminant levels are not considered significant in relation to the "action levels" established by the New Jersey Department of Environmental Protection (NJDEP) used in

determining the need for evaluation of remediation. (The guidance value for total PAHs/base neutral compounds is 10,000 ug/kg).

Wetland/Pond Contamination

Results of sediment samples obtained from the wetlands and ponds north and south of Court Road to which the stormwater drainage system discharges show little contamination. Overall it appears that the sediment in the three ponds sampled within the study area contain only low concentrations of the organic compounds of concern and there does not appear to be a concern for future significant releases to the study area and Mianus River from these sediments. Low levels of only two analytes of concern (1,1,1-trichloroethane [11 ug/kg] and benzene [3 ug/kg]) were found only in the pond sediment north of Court Road; however, elevated levels of phenols (740 ug/kg) were found in the last pond in series (Long Pond) located north of Pound Ridge Road as well as the first pond located north of Court Road (4,590 ug/kg). These concentrations of phenols/acid extractable compounds are less than the level established for evaluation of clean up which is 10,000 ug/kg.

Mianus River Contamination

Except for 2-butanone (methyl ethyl ketone), which was found in both upstream and downstream samples of water and sediment, the Mianus River showed little contamination. However, the sediment sample obtained at the confluence of the wetland/pond system discharge to the river contained elevated concentrations of several PAHs including fluoranthene (780.0 ug/kg), phenanthrene (520.0 ug/kg), benzo(a)pyrene (560.0 ug/kg) and pyrene (580.0 ug/kg), the total of which is substantially less than the NJDEP "action levels" for cleanup. In addition, a slightly elevated concentration of silver (28.0 ug/l) was found in the surface water sample taken at this location; but is less than the standard established for this metal.

A review of the analytical results generated from the Mianus River sampling illustrates relatively unrelated low level occurrence of organic chemical contamination from analytes of concern in the Mianus River, as well as those in the other surface waters in the study area. It does not appear that the Shopping Arcade Study Area is significantly contributing to contamination found in the Mianus River, however, it does appear that an unidentified source(s) of 2-butanone exists upgradient and possibly in the vicinity of the study area. The presence of PAH compounds most likely result from coal tar and asphaltic compounds in roadway/surface runoff.

Subsurface Soil Contamination

Low levels of contaminants were found in the soils of five (MW-1B, MW-3M, MW-5S, MW-5B and MW-11) of the seven monitoring well boreholes that were sampled. All of the wells were located downgradient of the Shopping Arcade and one exploratory borehole (MW-11) was located behind the former location of the dry cleaner. The highest concentrations of contaminants were found at MW-3M directly in front of the Arcade building. Three of the four samples collected contained detectable levels of contaminants. In the 5-7 foot sample, 6 ug/kg of toluene was detected. The 15-17 foot sample contained 22 ug/kg of trichloroethene and 32 ug/kg of toluene and the 20-22 foot sample (bedrock was encountered at 23 feet) contained 34 ug/kg of trichloroethene and 50 ug/kg of toluene.

In addition, an exploratory source boring (MW-11) drilled directly behind where the former dry cleaning establishment was located contained low levels of the indicated contaminants at the indicated depths: tetrachloroethene (10.4 ug/kg) at 0-2 feet; trichloroethene (7.4 ug/kg) at 4-6 feet; trichloroethene (6.1 ug/kg) at 22-24 feet; and trichloroethene (5.7 ug/kg) at 30-32 feet.

All of the aforementioned levels are not considered significant in relation to "action levels" established by the New Jersey Department of Environmental Protection (NJDEP) used in determining the need for remediation.

Ground Water Contamination

Based on the results of sampling monitoring wells and water supply wells in the study area, three areas of ground water contaminated primarily by the dry cleaning chemical, tetrachloroethene and its breakdown compounds (as well as benzene, toluene and xylene compounds) have been identified. The first area consisting of elevated levels of contamination comprising tetrachloroethene and its breakdown compounds exists in the unconsolidated/overburden deposits in front of the Shopping Arcade. This fairly high contaminated "pocket" of contamination is centered around MW-3M where a total average (average of Phase IIA and IIB sampling results) concentration of tetrachloroethene and its breakdown products was found to be 213 ug/l. In addition, ground water in this area (at MW-2M and MW-3M) contains elevated levels of lead, chromium and barium that exceed ground water standards.

The second area of ground water contamination consisting of mainly tetrachloroethene and its degradation compounds is the large primary plume of significantly contaminated ground water in bedrock migrating/extending northeastward from the vicinity of the Shopping Arcade's private water supply well downgradient to approximately monitoring well MW-6B. The dimensions of this plume are approximately 800 feet in length and 200 feet in width at its widest point. The total average (average of Phase IIA and IIB sampling results) concentrations of tetrachloroethene and its breakdown compounds in this plume range between a low of 146 ug/l at MW-6B to a high of 746 ug/l at the Shopping Arcade water supply well. Other high values recorded were 468 ug/l at MW-1B, 284 ug/l at the Exxon gasoline station water supply well and 216 ug/l (as well as 514 ug/l of BTX contamination) in an abandoned water supply well that once served the Banks building located directly opposite/downgradient of the Exxon station as well as the Arcade.

The third area of ground water contamination, or secondary plume, is a portion of the primary plume of contaminated ground water in the bedrock that has migrated perpendicular to Court Road in a southeasterly direction along the east side of Route 22 near the center of the village. Concentrations of tetrachloroethene and its breakdown products ranged from a total averaged level of 26 ug/l in the private water supply well at a residence at 11 Court Road to 85 ug/l in the private water supply well serving the Fire Department building on the Village Green.

Based on the nature of the chemicals detected and the location of the dry cleaning establishment, all three areas of ground water contamination most likely resulted from prior discharges of tetrachloroethene to the Shopping Arcade's sanitary system, direct disposal to surface soils and contamination of the area's stormwater drainage system. The benzene, toluene and xylene compounds found in the ground water are most likely due to prior discharges of these contaminants to the Exxon gasoline station's sanitary system, underground fuel tank leakage and spills at the Exxon station and possibly the Bedford School, as well as roadway runoff. The lead contamination (and possibly chromium and barium) in ground water in the immediate vicinity of the Arcade and Exxon station is most likely due to contaminants released by the Exxon gasoline station as mentioned above. Based upon historic information and data obtained during the Remedial Investigation, it appears that contamination will persist in the subsurface environment of the study area above standards and guidance values established for ambient ground water quality.

Water Supply Contamination

As described above, sampling of community and private wells in the study area revealed significant contamination of water supply based upon exceedance of ambient ground water standards and guidelines and drinking water standards, both within the boundary of the Shopping Arcade property and along Route 22 and in the Village Green, and Court Road. Although there is some contamination of benzene, toluene and xylene, most likely caused by reported gasoline and fuel leaks/spills at the Exxon gasoline station and Bedford School in the study area, most of the contaminants found in this investigation appear to be related to dry cleaning solvents and its degradation products. Based on trends in the levels of contaminant, it appears that in general the contaminant concentrations in the Shopping Arcade Study Area have slightly declined, most likely due to the cessation of waste discharges and periodic clean out/pump out of the Arcade's sanitary system. However, the most recent analytical results indicate that some private water supply wells (especially at the Arcade and Exxon station) showed increases in some contaminants.

Overall, a large portion of the study area still contains contaminated ground water that is above standards established by New York State for both ambient ground water and drinking water. Because it appears that this is basically residual contamination after the cessation of source releases, it is expected that the contaminant levels will persist for some time above standards established for drinking water, and thereby will continue to impair water supply until they are eventually displaced from the subsurface environment underlying the study area.

Health Risk Assessment

Carcinogenic and non-carcinogenic risks were computed for human receptors using domestic wells which utilize ground water as a source for water supply.

Results of non-carcinogenic risk estimation indicate that the average non-carcinogenic risk for the entire study area, as measured by the hazard index value, is well below the United States Environmental Protection Agency (USEPA) recommended acceptable ceiling of 1. However, non-carcinogenic risks (hazard index values) for exposure to ground water drawn from wells located within the bedrock contaminant plume downgradient of the Shopping Arcade Site approach the limit of 1. In addition, hazard index values calculated for residential exposure to untreated ground water taken from wells located at the Shopping Arcade are slightly above the acceptable limit.

Calculated increased lifetime cancer risk posed to human receptors using domestic wells which are supplied by ground water are examined using two approaches.

The first approach utilizes ground water data from monitoring wells screened at different zones of the water bearing strata. Results of this approach indicate that the carcinogenic risk posed by ground water in the overburden is well within the USEPA recommended acceptable range of 10^{-4} to 10^{-7}.

The carcinogenic risks lie in the range of 7.28×10^{-4} to 3.17×10^{-4} for the bedrock water bearing strata. These values of computed risk are slightly higher than the highest USEPA recommended value of 10^{-4}. Individual carcinogenic risks calculated for specific compounds indicate that the contaminants of concern which lead to this high carcinogenic risk for ground water in the bedrock are breakdown products associated with the dry cleaning solvent tetrachloroethene, specifically 1,2–dichloroethene and vinyl chloride.

The second approach toward evaluating the risks posed by ground water use involves computation of carcinogenic risks based upon data available at receptor points prior to filtration. Average increased lifetime cancer risk calculated for the entire study area falls within the range of 1.06×10^{-4} to 3.07×10^{-4}. These values fall slightly above the USEPA acceptable range of 10^{-4} to 10^{-7}.

In order to further identify areas within the study area which may pose greater or lesser risks due to ground water exposure, the study area is broken down into exposure scenarios based upon detected levels of contamination. Results of this analysis indicate that the lowest risk is posed for human receptors at points located hydraulically upgradient and laterally away from the suspected source. This scenario, as well as the scenarios which include wells within the overburden plume and wells along the fringe of the bedrock plume, all have calculated increased lifetime cancer risks within the acceptable range of 10^{-4} to 10^{-7}.

Data collected from wells located within the bedrock contaminant plume resulted in calculated increased lifetime cancer risks in the range of 2.59×10^{-3} to 7.05×10^{-3}. Within this plume, untreated ground water from the Shopping Arcade well has a calculated increased cancer risk of 2.50×10^{-3} to 5.83×10^{-3}, and untreated water from the abandoned Banks building well, across from the Shopping Arcade, has a calculated increased cancer risk of 4.83×10^{-3} to 1.03×10^{-2}. Review of data tables for these

scenarios indicates that the contaminants giving rise to these elevated risks include tetrachloroethene and its breakdown product 1,2–dichloroethene for the Shopping Arcade well, and tetrachloroethene, 1,2–dichloroethene and benzene for the abandoned Banks building well.

It should be noted that, with the exception of untreated ground water from the Shopping Arcade well, the dermal route of exposure yields risks which are well within the acceptable range recommended by USEPA. Accordingly, ingestion and inhalation are the exposure routes of concern.

Remedial action to address the areas of contamination, routes of migration and potential receptors identified in this report will be addressed in the next phase of this investigation which is referred to as the Feasibility Study. The Feasibility Study will identify potential remedial alternatives, evaluate these alternatives based on effectiveness, implementability and cost, and select a remedial action plan which will include a conceptual design, preparation of a cost estimate, and schedule for implementation.

Section 1

1.0 INTRODUCTION

As part of the State of New York's efforts to clean-up inactive hazardous waste sites, the New York State Department of Environmental Conservation (NYSDEC) entered into a contract with the firm of Dvirka and Bartilucci Consulting Engineers of Syosset, New York to undertake a Remedial Investigation and Feasibility Study (RI/FS) for the Bedford Village Wells-Shopping Arcade Site located in Westchester County, New York (see Figure No. 1-1). The RI/FS for this site is being conducted with funds allocated under the New York State Superfund Program. The purpose of the overall RI/FS process is to determine the nature and extent of contamination at the site, the sources of contamination, the risk to public health and the environment, and to perform a Feasibility Study (FS) which will identify and evaluate mitigation alternatives, and recommend a cost-effective, environmentally sound and long-term remedial action. The Remedial Investigation (RI) portion of the project, which comprises primarily the field program and health risk assessment, began in August 1987 and was completed in April 1989. This report presents the results of the Remedial Investigation. After finalization of this report, the Feasibility Study will be undertaken. The Feasibility Study will take approximately five months to complete, after which, a second report describing the results of this study and recommended remedial action(s) will be prepared.

1.1 Site Background

In 1978, the Westchester County Department of Health (WCDH) became aware of ground water contamination and potential drinking water problems in areas where present and past dry cleaning establishments have been located. An investigative program was established which collected numerous well samples throughout the County. The results of the initial investigation revealed contaminated wells in Katonah Village, Armonk Village and Bedford Village (Shopping Arcade). Contaminated wells located at and contiguous to the Hunting Ridge Mall Site, also located in Bedford Village, were discovered by WCDH in 1983. The sources of contamination at these sites were suspected to be dry cleaning establishments which disposed of wastes into sanitary and stormwater drainage systems. Both Bedford Village sites involve private water supply well contamination.

1.1.1 General Description

The Bedford Village Wells - Shopping Arcade Site is located in the Village business district (see Figure No. 1-2) where a dry cleaner had operated several years ago. The results of the Westchester County Department of Health testing program first revealed (April 1979) that three wells were contaminated with varying amounts of tetrachloroethene (11 to 470 ug/l), trichloroethene (2 to 80 ug/l), as well as cis-1,2-dichloroethene (4 to 51 ug/l). These wells serve the Bedford Theatre Building, the Bedford Shopping Arcade and an Exxon gasoline station. Initially, all three wells were placed under "boil water" notices by the Department of Health; however, monitoring data obtained from the Phase I study conducted by the New York State Department of Environmental Conservation in 1983 showed only the Shopping Arcade well to have unacceptable levels (greater than 50 ug/l) of tetrachloroethene.

Prior to this investigation, the most recent (1986) analytical data has shown that the levels of volatile organic chemicals (VOCs) in the three wells continued to fluctuate. Trace concentrations of these chemicals had also been found in water samples obtained to the east and southeast of the Arcade. Based on these findings and the nature of the chemicals found, the source of contamination was thought to be from the dry cleaner formerly located in the Shopping Arcade, however, the extent of the problem had not been defined. Granular activated carbon (GAC) filters have been installed on the water supply systems of the Shopping Arcade, Theatre Building and the Exxon gas station by the property owners. Where properly maintained, these systems appear to effectively reduce contaminant concentrations to levels which are below New York State Drinking Water Requirements. All other contaminated wells are under "boil water" notices issued by the WCDH.

1.1.2 Site History and Previous Investigations

1979 A Westchester County Department of Health (WCDH) testing program reveals three wells, located in the Theatre Building, the Shopping Arcade, and an adjacent Exxon gasoline station, are contaminated with varying amounts of tetrachloroethene, trichloroethene, and cis-1,2-dichloroethene. The WCDH places all three wells under "boil water" notices.

The Westchester County Commissioner of Health releases an "Information Bulletin" to certain dry cleaning establishments in Westchester County outlining proper storage and disposal methods of cleaning-wastes.

1980 The Westchester County Department of Health removes the "boil water" notice from the Exxon gasoline station.

1982 Updated sampling indicates that only the Shopping Arcade well has unacceptable (greater than 50 ug/l) levels of tetrachloroethene. WCDH removes the "boil water" notice from the Theatre Building well, but recommends sampling twice a year.

1983 Wehran Engineering submits the Bedford Village Wells Phase 1 Investigation Report. The Wehran report focuses only on the Shopping Arcade Site.

1984 Wehran Engineering completes the Bedford Village Wells Phase II Investigation Report for the New York State Department of Environmental Conservation. They conclude that volatile organic chemical (VOC) contamination still persists at the Shopping Arcade Site.

The Phase II report also contains sampling results for the Hunting Ridge Mall Site which was discovered in 1983. Although the Mall site is located just 4,000 feet southwest of the Shopping Arcade Site, researchers feel that the ground water contamination at the two sites is not related.

1985 The Shopping Arcade owner installs granular activated carbon (GAC) filters in May. The Theatre Building owner installs GAC filters in August.

1986 Sampling programs undertaken by the Westchester County Department of Health and the United Stated Environmental Protection Agency (USEPA) reaffirm the presence of VOCs in the three private wells. Low concentrations of VOCs also appear east and southeast of the Arcade in private wells which were previously uncontaminated.

NYSDEC requests five consulting firms to submit proposals for the Bedford Village Wells Remedial Investigation/Feasibility Study project.

1987 NYSDEC, with the cooperation of the Town of Bedford and the Westchester County Department of Health, selects Dvirka and Bartilucci (D&B) Consulting Engineers of Syosset, New York to undertake the project.

The State approves the Bedford Village Wells - Shopping Arcade Site and Hunting Ridge Mall Site RI/FS contract between D&B and the State of New York.

1.2 Nature and Extent of the Problem

The organic chemicals identified in the contaminated wells were primarily tetrachloroethene, trichloroethene and cis-1,2-dichloroethene. The source of these organic compounds, although unconfirmed, most probably originated from a former dry cleaning establishment located in the Arcade.

Additional sampling in the surrounding area has shown only trace amounts of contaminants or non-detectable levels of the same compounds. The extent of significant ground water contamination appeared to be limited to the area of and immediately contiguous to the Shopping Arcade in the vicinity of the suspected source. However, sampling by USEPA and the Town of Bedford indicated that low levels of volatile organic chemicals (10 ug/l) were present east and southeast of the Arcade. Based on this data, the extent of the problem had not been defined, nor was there sufficient data to characterize and confirm the source of contamination or ground water flow direction.

Since boring logs and water levels were not available at the site, ground water flow direction and the extent of the contaminant plume was to be determined by installing borings and constructing monitoring wells as part of this Remedial Investigation. In addition, there was the need for the identification of source(s) and its impact on the wetlands and streams downgradient of the Shopping Arcade resulting from possible discharges to the stormwater drainage system which serves the Arcade.

As mentioned previously, although it appears that the levels of ground water contamination have been generally declining, preliminary analysis of the data obtained from 1982 to 1986 does not indicate a clear trend of declining contamination for all wells. Based on this information, it was suspected that sources (including contaminated soils) may be continuing to release organic chemicals to the surrounding environment.