BARNES MUNICIPAL AIRPORT
THE CITY OF WESTFIELD, MA

GROUNDWATER MANAGEMENT PLAN

JANUARY, 1990

PREPARED BY
DUFRESNE-HENRY, INC.
WESTFORD, MA

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

EXECUTIVE SUMMARY

Land Use

The Barnes Municipal Airport is owned and operated by the City of Westfield. The Airport is located in the northeast quadrant of Westfield. The Airport is surrounded by a mixture of industrial, residential, and business zoned districts.

On the Airport property land use includes a terminal building, runway, paved parking aprons, storage and maintenance hangars, and a restaurant. There are four F.B.O.s in operation at the airport; Northeastern Air, Charis Air, Airflyte, and the A.F.M. Corporation. The northwestern quadrant is occupied by the Massachusetts Air National Guard base.

Utilities

The Airport receives its water supply from the Westfield municipal water system. The City uses wells as their source of water. Two of these city wells are located in the southeast quadrant of the airport.

The Airport maintains its own subsurface waste disposal system. The system handles all of the sewage derived from the restroom facilities and restaurant. The system has never failed according to airport personnel. There are plans to hook up into the City sewer system which ends approximately 500 feet from the terminal building.

Storm water runoff at the Airport is collected in the area surrounding the terminal building and piped to a retention area or Arm Brook. The Airport is to construct new above ground fuel storage tanks and remove all

underground storage tanks on airport property. The new fuel storage facility will include a spill protection berm to prevent groundwater contamination.

Hazardous Materials

There are no known large quantities of hazardous materials on the Airport property. An inspection of the maintenance areas by Dufresne-Henry personnel indicates a relatively clean operation. Airport personnel are aware of potential dangers of the solvents, paints and lubricants in use and have instituted procedures for their storage, usage and disposal. All waste oil is collected in drums and hauled off site by a licensed hauler. At the airport refueling is done on the parking aprons utilizing fuel trucks.

Hydrogeology

The Airport is located on top of the Barnes aquifer. The subsurface stratigraphy consists of coarse to fine sand. The aquifer is generally unconfined. Depth to groundwater is generally within 40 feet of the surface. Groundwater beneath the Airport within the Barnes aquifer flows in a southerly direction. The City wells 7 & 8 are located in this aquifer. The western perimeter of the zone of contribution for wells 7 & 8 runs down the middle of runway 2-20.

Based on a review of available data, groundwater quality is good. There were some trace amounts of trichloroethane found in city wells 7 & 8 in the fall of 1988. Extensive groundwater monitoring is being conducted at the airport by the MANG base. Their study will provide a complete groundwater status.

2. EXISTING CONDITIONS

This section describes existing conditions and systems which are pertinent to the groundwater environment. Land use at and near the Barnes Municipal Airport is characterized. Airport utility systems, water supply, sewerage and drainage, are also described. Underground storage tanks at the Airport are discussed as are the use and handling of hazardous materials.

2.1 LAND USE

The Barnes municipal airport is owned and operated by the City of Westfield. The airport is located in the northeast quadrant of Westfield, north of the Massachusetts Turnpike and east of Southampton Road (Rt.10 & 202). The site location is shown in Fig #1.

2.1.1 PAST USE

The airport was formed by the Aviation Citizens of Westfield in 1923 on a 27 acre parcel owned by Vincent E. Barnes. In 1927 the land was donated to the city to develop a municipal airport. In 1947 the airport leased a parcel of land to the north to the Massachusetts Air National Guard (MANG). The 104th Tactical Fighter Group continues to operate in this location. Since then the airport has developed into a important general aviation airport for the community and local industry.

2.1.2 PRESENT USE

The land surrounding the airport is primarily zoned for industry and

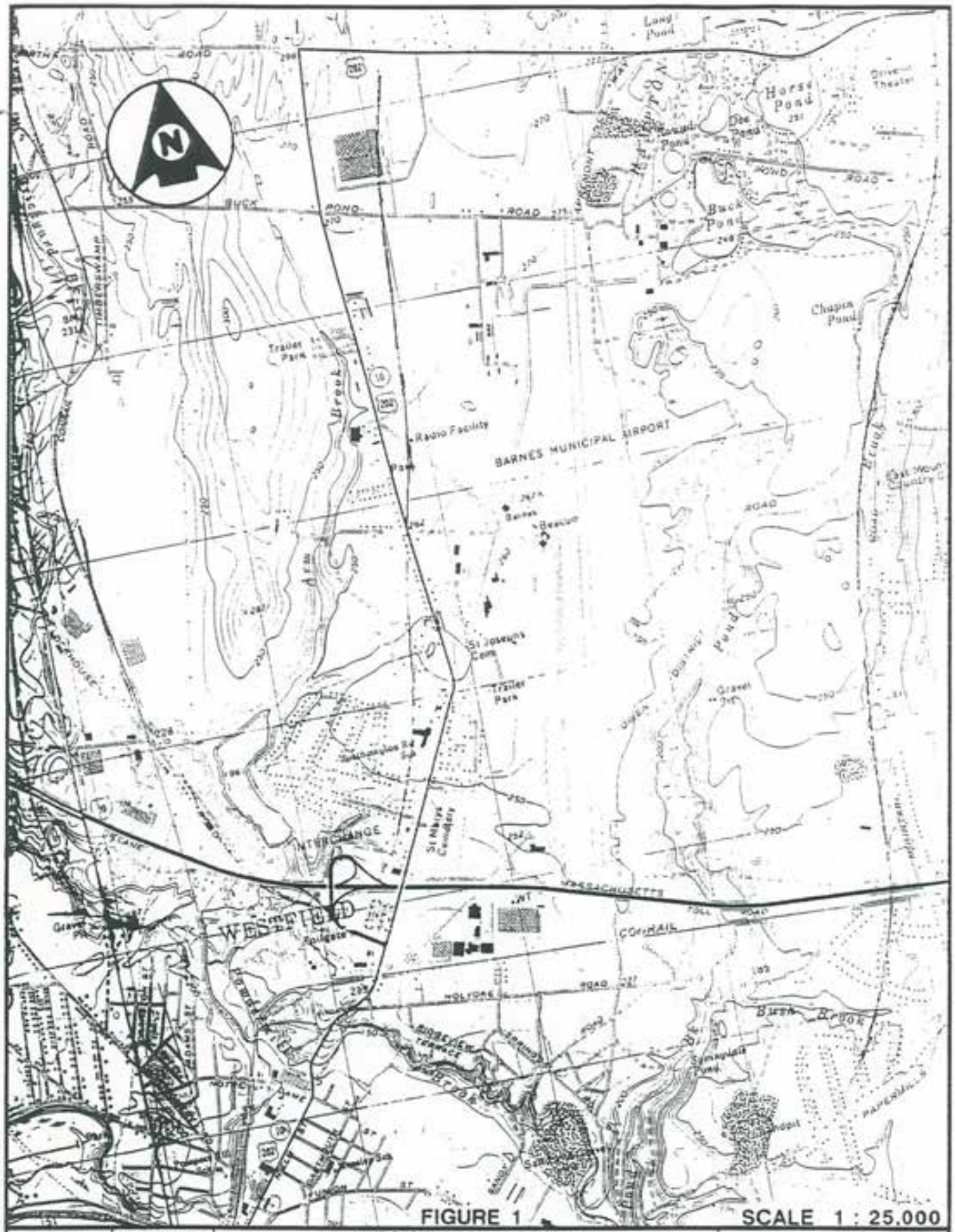


FIGURE 1 SCALE 1 : 25,000

Client No.	917046
Proj. Mgr.	DFE
Date	JAN 90

WESTFIELD AIRPORT

LOCATION MAP

WESTFIELD MASSACHUSETTS

Dufresne-Henry Inc.

A

BRUNING 44-232 45337-13

business as shown in Fig #2. There are some small portions zoned for residential to the south and some limited industry along Southampton Road and Buck Pond Road.

All general aviation functions including FAA administrative facilities, airport management offices, F.B.O.s, airport maintenance facilities, aircraft parking aprons, and aircraft storage hangars are located in the southwest portion of the airport. The hub of the southwest quadrant is the terminal building. Located in the terminal building is the airport administration offices, boarding areas, restaurant, and the Northeastern Air service counter. Northeastern is one of four F.B.O.s operating out of Barnes Airport. Their facilities include an avionics maintenance hangar and two storage hangars adjacent the terminal building (see Fig #3). Charis Air is located across the parking apron just north of the terminal building. Charis Air operates two hangars, one for storage and the other for aircraft maintenance, and business services. Airflyte Inc. is the third and newest F.B.O. operating out of the Barnes airport. Airflyte is located to the south of the terminal building and the city hangars. Ground access to Airflyte is via Airport Drive. Their facilities include a newly built hangar used for aircraft maintenance and storage. Future expansion planned for the southwest quadrant includes a new terminal building, hangars, and increased parking for aircraft and automobiles.

The northwest quadrant is occupied the MANG base. The base facilities include operations buildings, hangars for storage and maintenance, a fuel farm, aircraft parking aprons, navigation aids, and base support services. The base gains access to the airport runways through their own taxiway that connects with the northern end of runway 2-20. Ground access to the base

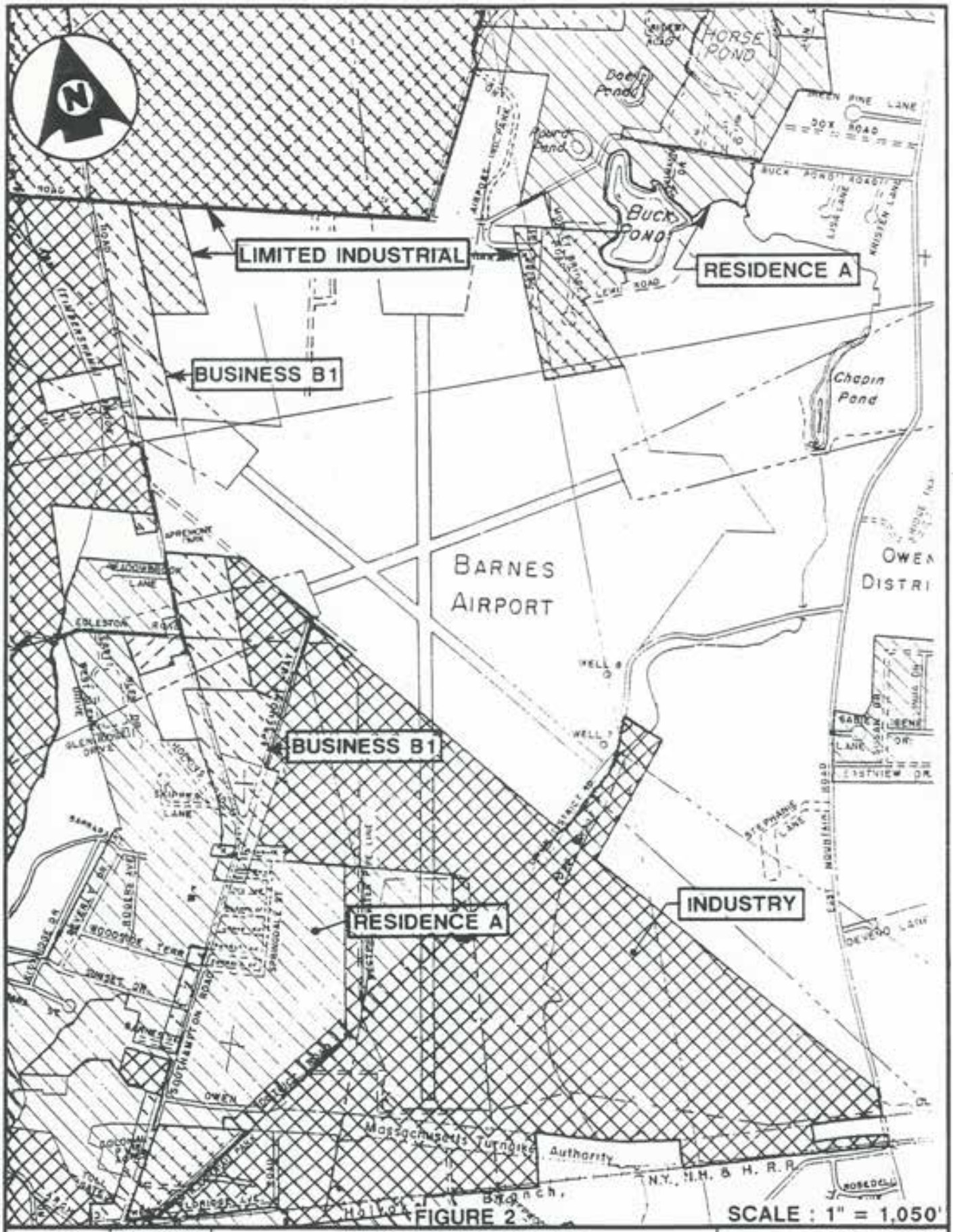


FIGURE 2

Client No.	917046
Proj. Mgr.	DFE
Date	JAN 90

WESTFIELD AIRPORT

ZONING MAP

WESTFIELD MASSACHUSETTS

Dufresne-Henry Inc.

A

BRUNING 44-232 45337-13

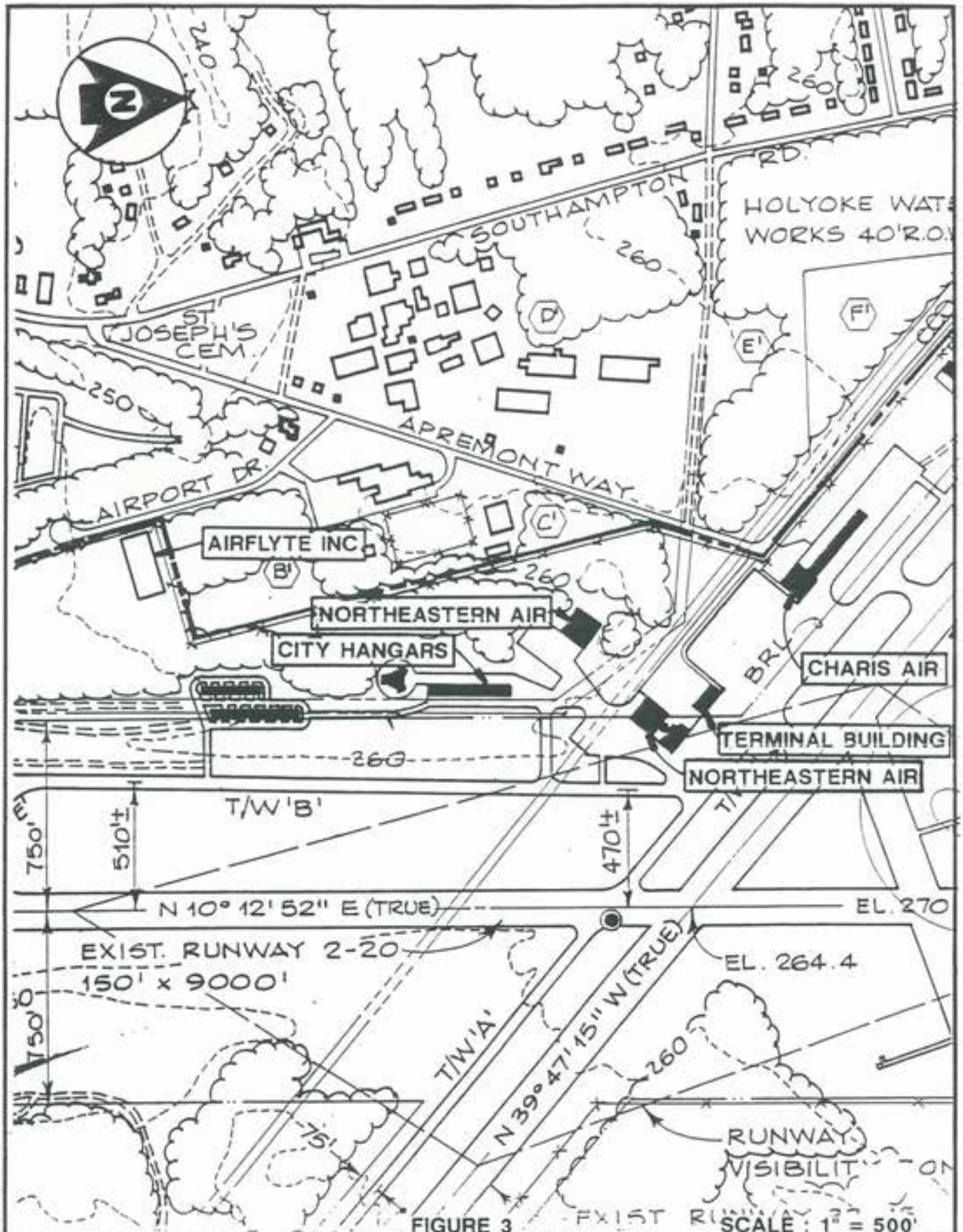


FIGURE 3

SCALE : 1" = 500'

Client No.	917046	WESTFIELD AIRPORT	Dufresne-Henry Inc.
Proj. Mgr.	DFE	**SOUTHWEST QUADRANT**	
Date	JAN 90	WESTFIELD MASSACHUSETTS	A

BRUNING 44-232 45337-13

is restricted and all vehicles must pass the sentry gate at Buck Pond Road. These restrictions keep the MANG operations independent of public aviation procedures.

The A.F.M. Corporation, is located just to the northeast of airport property. A.F.M. specializes in corporate aircraft and private charters. They operate three hangars used for maintenance and storage. There is also approximately 82,000 square feet of aircraft parking apron associated with their facilities. A portion of the A.F.M. land to the south is leased by the MANG as an engine testing facility and munitions storage. The northeast quadrant is separated from the rest of the airport by the three runways so there is little interaction of ground support services.

The southeast quadrant is currently undeveloped due to lack of ground access and unfavorable topography. Most of the airport's drainage flows to the southeast and into Pond brook. The City of Westfield has two of its production wells in the southeast quadrant. These wells limit the type and size of development which could take place.

2.2 UTILITIES

Three airport utilities are discussed in this section: water supply, sewerage, and drainage. The airport is served by the Westfield municipal water supply system. Wastewater generated by the airport is disposed through an on-site subsurface disposal system. Stormwater runoff is collected throughout the airport by catch basins and either piped off site or leached into the soil.

2.2.1 WATER SUPPLY SYSTEM

The Westfield water system is supplied by eight wells located throughout the city. Two of these wells, numbers 7 and 8, are located just easterly of the airport. In 1989, Dufresne-Henry conducted a hydrogeologic analysis to determine zones of contribution to all of the City's wells. The zones of contribution were delineated based on existing data and on criteria for "Zone II" contained in the Massachusetts Department of Environmental Protection (DEP) "Guidelines and Policies for Public Water Systems."

As shown on Figure #4, the cumulative zone of contribution for wells 7, 8 and wells to the south encompasses the eastern portion of the airport. Thus, the majority of airport activity including all the civil airport buildings are not included.

2.2.2 SEWERAGE SYSTEM

The airport relies on subsurface disposal for their wastewater. The leaching field is located in the wooded area across from the terminal parking lot (Figure #5). Wastewater is generated by the restaurant and terminal rest rooms. The system has never failed according to airport personnel. Charis Air operates their own septic system located adjacent to the south side of their maintenance hangar. The system handles the office washrooms and hangar sinks. The MANG base is split in two different sectors. The northern half of the base is serviced by public sewer connected at Buck Pond Road. The southern half of the base uses the base's leaching field. The base has plans to hook up the southern half to the northern sector by means of a lift station. The AFM Corporation relies on

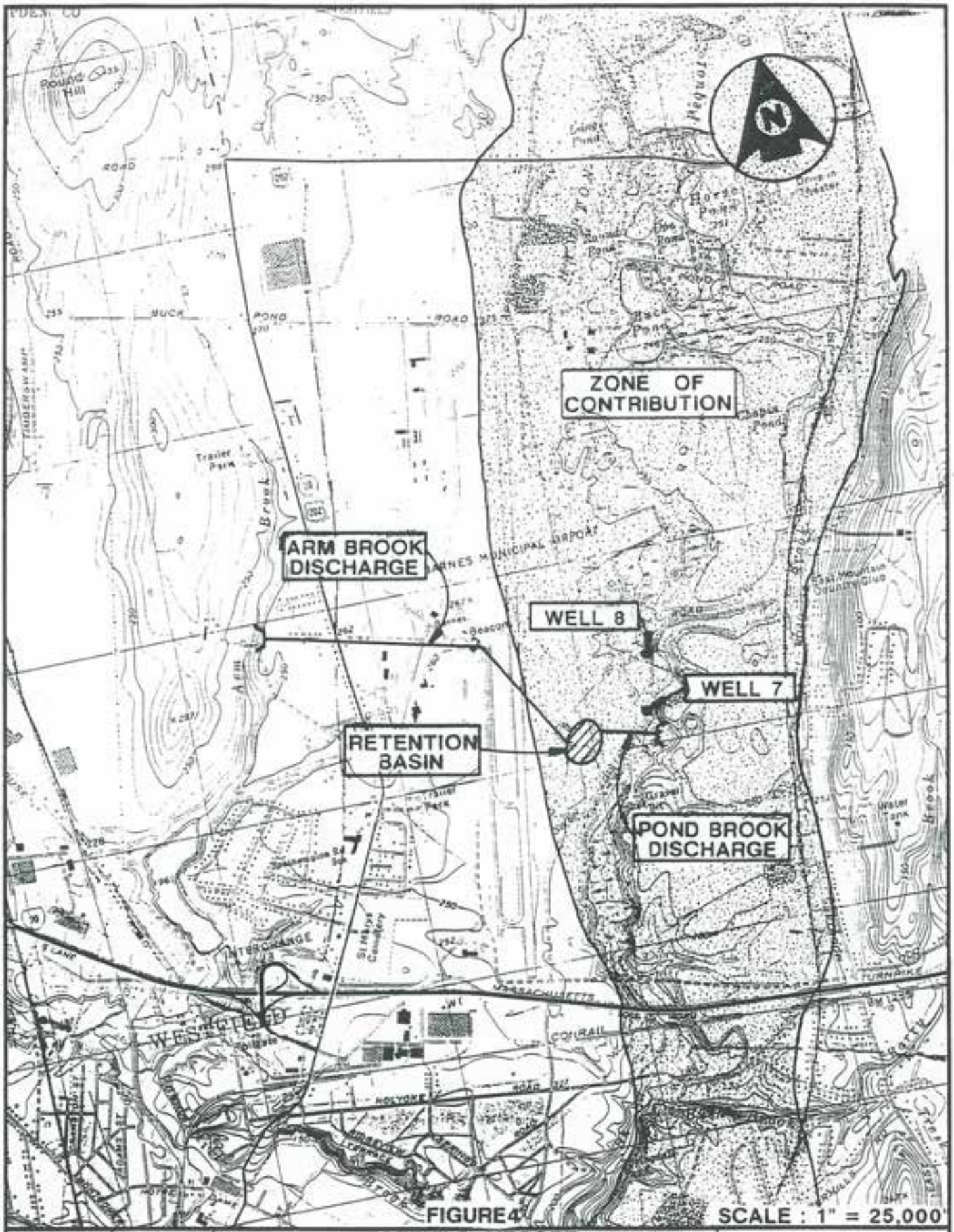


FIGURE 4

SCALE : 1" = 25,000'

Client No.	917046
Proj. Mgr.	DFE
Date	JAN 90

WESTFIELD AIRPORT

ZONES OF CONTRIBUTION FOR CITY WELLS

WESTFIELD MASSACHUSETTS

Dufresne-Henry Inc.

A

BRUNING 44-232 45337-13

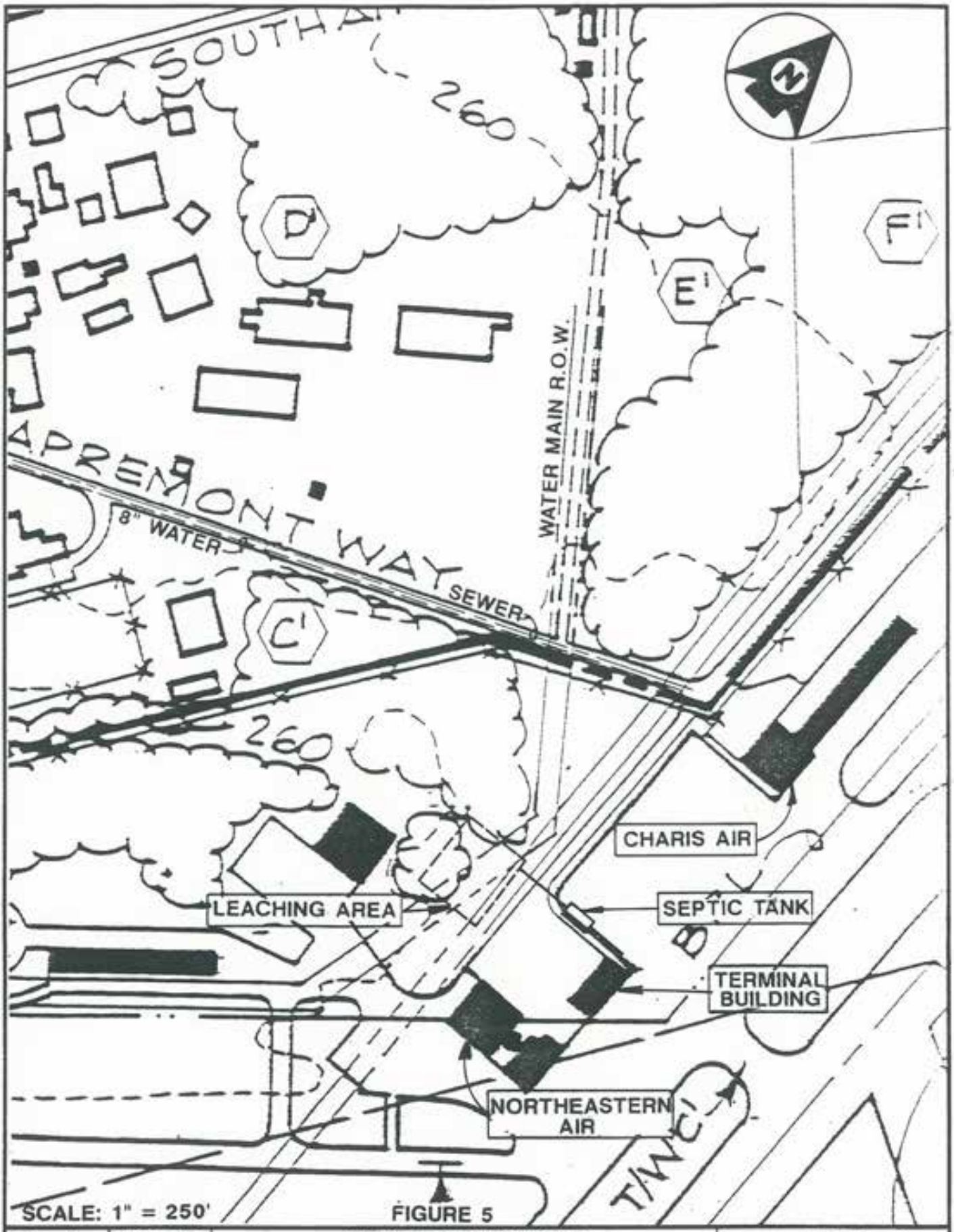


FIGURE 5

Client No.	917046
Proj. Mgr.	DFE
Date	JAN 90

WESTFIELD AIRPORT

UTILITIES LOCATION

WESTFIELD MASSACHUSETTS

Dufresne-Henry Inc.

A

BRUNING 44 232 45337-13

their own septic system. Their leaching field is located on the eastern side of their number two hangar. The system handles washrooms and sinks from the maintenance hangars.

The City has installed sewer up to the end of Apremont Way approximately 500 feet from the terminal building. There are future plans to extend the sewer to the terminal building and down Airport Drive. This extension would eliminate the need for leaching fields in the airport's southwestern quadrant.

2.2.3 DRAINAGE SYSTEM

Stormwater runoff is collected around the terminal area by a series of catch basins located on the apron in front of the terminal and in the terminal parking lot. Runoff collected is then piped to one of two discharge points (See Figure #4). The first discharge point is to the southwest across Rte 10 & 202 into Arm brook. The second line collects drainage from the southern half of the terminal area and discharges it into a retention basin at the southern end of runway 33-15. The water is then piped underneath runway 33-15 and into Pond Brook.

The MANG base also has two discharge points for their drainage. In the southeastern half of the base stormwater is collected and piped across Rt 10 & 202 into Arm Brook north of the terminal discharge point. The northwestern half of the base including aircraft parking aprons uses a collection system that discharges across runway 2-20 into a swale just north of the engine testing facility and south of the AFM corporation.

2.3 UNDERGROUND STORAGE TANKS

In April of 1986 the office of the state fire marshall initiated a survey of underground storage tanks (USTs) at Barnes airport. There were eleven USTs located on airport property (see Figure #6). Tanks 1, 2, and 3 are located behind the Northeastern storage hangar. These tanks are owned and operated by the airport. Each tank has a capacity of 10,000 gallons, two of which contain type 100LL aviation fuel and the third Jet A fuel. All three tanks are steel installed twenty to thirty years ago. There is no leak detection for any of these three tanks. The other eight USTs on airport property are operated by Northeastern Air. Tanks 4 and 5 located between the Northeastern hangar and the terminal building are currently empty, but were once used to store aviation fuel ten or more years ago. Tank number 6 is located next to the maintenance trailer and stores gasoline. Tanks 7, 8, 9, 10, and 11 are located adjacent to the southern side of the Northeast Air maintenance hangar. Tanks 7 and 8 have a capacity of 4,000 gallons and were once used for aviation fuels. Tank 7 was converted to be used for waste oil, but was recently abandoned. Tanks 9, 10 and 11 are 100 gallon tanks used to store oils. These tanks have not ben used in 10 or more years. All of these eight tanks are steel constructed with no known leak detection. The ages range from twenty to thirty years.

There is currently a plan to remove all USTs on airport property. Tanks 1, 2, and 3 would be replaced by new above-ground tanks with leak containment facilities. All other USTs would be removed and disposed off site.

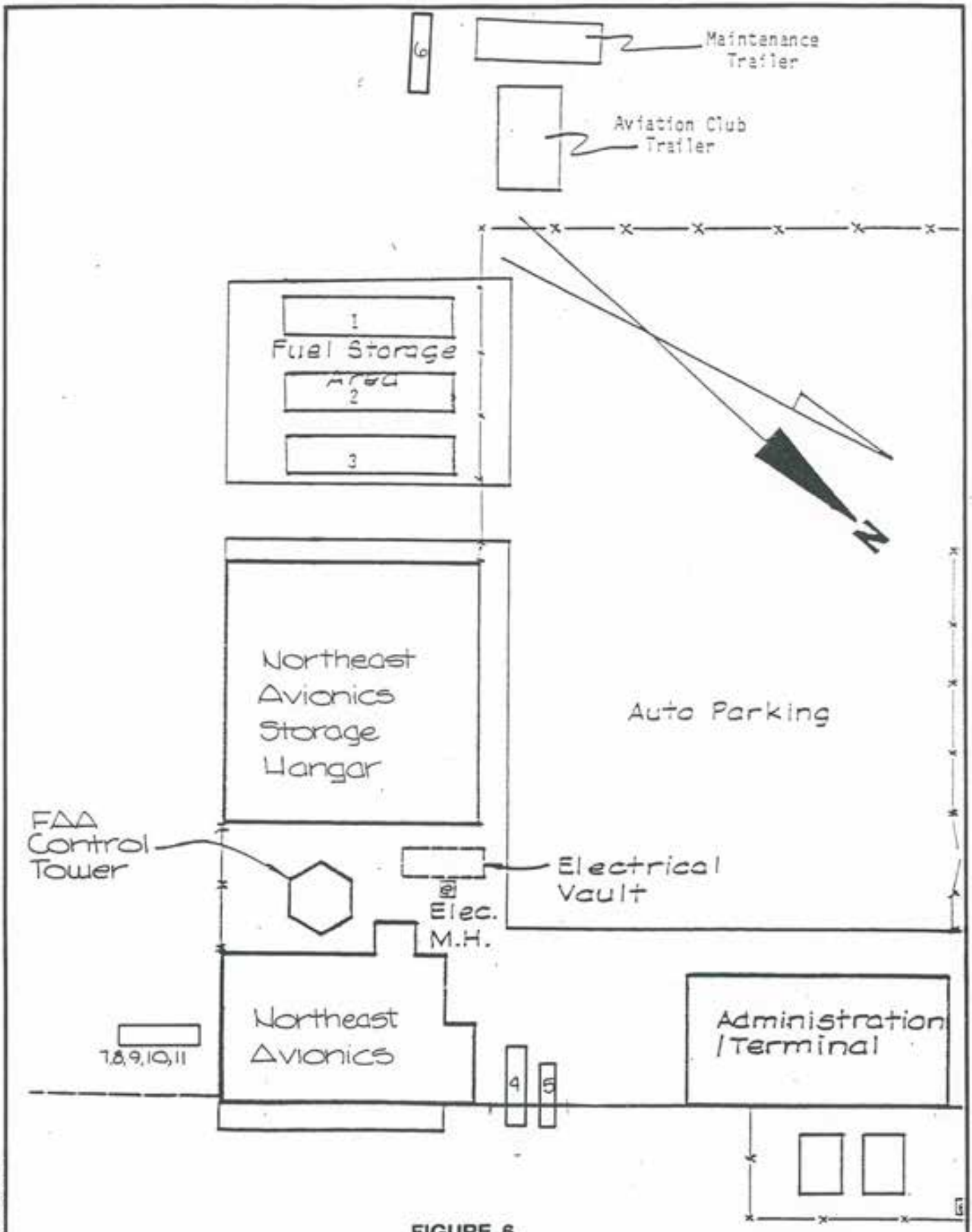


FIGURE 6

Client No.	917046	WESTFIELD AIRPORT **UNDERGROUND STORAGE TANK LOCATIONS** WESTFIELD MASSACHUSETTS	Dufresne-Henry Inc.
Proj. Mgr.	DFE		
Date	JAN 90		A

BRUNING 44-232 45337-13

The MANG Base operates a fuel farm on the west side of the base. The farm is located along the Base's main drive approximately 300' from the Buck Pond Road Sentry Post. There are eleven USTs located on Base property as of July of 1988. The tanks are all unprotected steel ranging in age from 3 to 38 years and from 500 to 25,000 gallons in capacity. Nine of the eleven tanks are used for fuel such as gasoline, diesel, and JP-4. All nine tanks passed inspection and testing on October 16, 1987. The other two tanks containing waste oil or solvents were not tested. The fuel farm is currently being monitored by the Base as part of their Installation Restoration Program. The Base has installed a set of monitoring wells in the farm and downgradient. These wells will be sampled and analyzed during the investigation.

The A.F.M. corporation operates ten USTs on their property. The tanks range from six to thirteen years in age and 250 to 30,000 gallons in capacity. Three of their tanks are unprotected steel, two tanks are fiberglass, and the other five are protected steel. The tanks are used to store gasoline, diesel, kerosene, and used oil. Three of the tanks passed inspection and testing on November 25, 1987. There is no groundwater monitoring system around these tanks although A.F.M. is located several hundred feet upgradient of MW-1, 2, and 3 installed at the eastern end of the abandoned runway.

2.4 USE OF HAZARDOUS MATERIALS

There are no known large quantities of hazardous materials on the airport property. Routine maintenance and repair requires the use of several potential hazardous materials in small quantities. An inspection

of the maintenance areas by Dufresne-Henry personnel indicates a relatively clean operation. Airport personnel are aware of the proper disposal of wastes such as paints, solvents, and lubricants.

Solid waste generated by the terminal facility is trucked to the city landfill by airport personnel. The terminal generates approximately 1-1/2 cubic yards of solid waste each day. The airport also uses a 1-1/2 cubic yard dumpster which is emptied once a week.

All waste oil generated by the airport is stored in 55-gallon drums to be removed by a licensed hauler from Connecticut. Charis Air generates three 55-gallon drums of waste oil every four months. They also operate a parts washer which is maintained by Safety-Kleen. Safety-Kleen is a private licensed hauler that services part washers. This washer is emptied and refilled by Safety-Kleen personnel every eight weeks with the old solvent being removed off site. The Charis Air maintenance hangar has floor drains, but their discharge point is unknown.

Northeastern Air also uses a licensed hauler to remove all waste oil. The Northeastern hangars have floor drains, but again their discharge location is unknown. Airflyte Inc. has been a F.B.O. at the airport for only six months and has generated 25 gallons of waste oil. Airflyte has incorporated the use of a rack containment system in case of accidental spills of their waste oil drums. Airflyte's hangar is a new facility, but all of the floor drains are plugged to prevent leakage into the ground. The A.F.M. Corporation also makes use of a licensed hauler for all waste oil. They generate a 55-gallon drum of waste oil every six months. A.F.M. also has their floor drains plugged so spills are cleaned up and the absorbent material disposed of in their dumpster.

2.5 FUEL SPILL PROCEDURES

Refueling of aircraft is done by mobile fuel trucks on the aircraft parking aprons. At the present time fuel spill recovery is accomplished by using absorbent blankets. The blankets are laid out around the spill to prevent further migration and to absorb the fuel. Once used the blanket is disposed of off site. Northeastern Air has their own set of containment blankets stored at their service desk. The other F.B.O.s rely on the airport personal for fuel spill clean up. In the case of a major spill the MANG base is called in for assistance. There is no designated area for refueling of aircraft. Therefore fuel spills could occur anywhere on the aircraft parking aprons. In order to minimize the environmental impact of fuel spills refueling should take place at specific locations designed to capture accidental spillage. Another step would be to equip each refueling truck with absorbent blankets for immediate use in case of emergency.

3.0 SITE HYDROGEOLOGY

The airport lies above the Barnes aquifer, an extensive, buried-valley outwash formation believed to lie along the course of the preglacial Connecticut River. These sand and gravel deposits form a highly transmissive aquifer favorable for development of well supplies. The Barnes aquifer runs north-south through Westfield passing underneath the airport. The general groundwater flow in the vicinity of the airport is to the south toward the Westfield River. The aquifer ranges in thickness from 50 to 250 feet. This provides abundant depth for well development. The City has developed six production wells in the Barnes aquifer, two of which

are on airport property (wells 7 & 8).

3.1 GROUNDWATER MONITORING

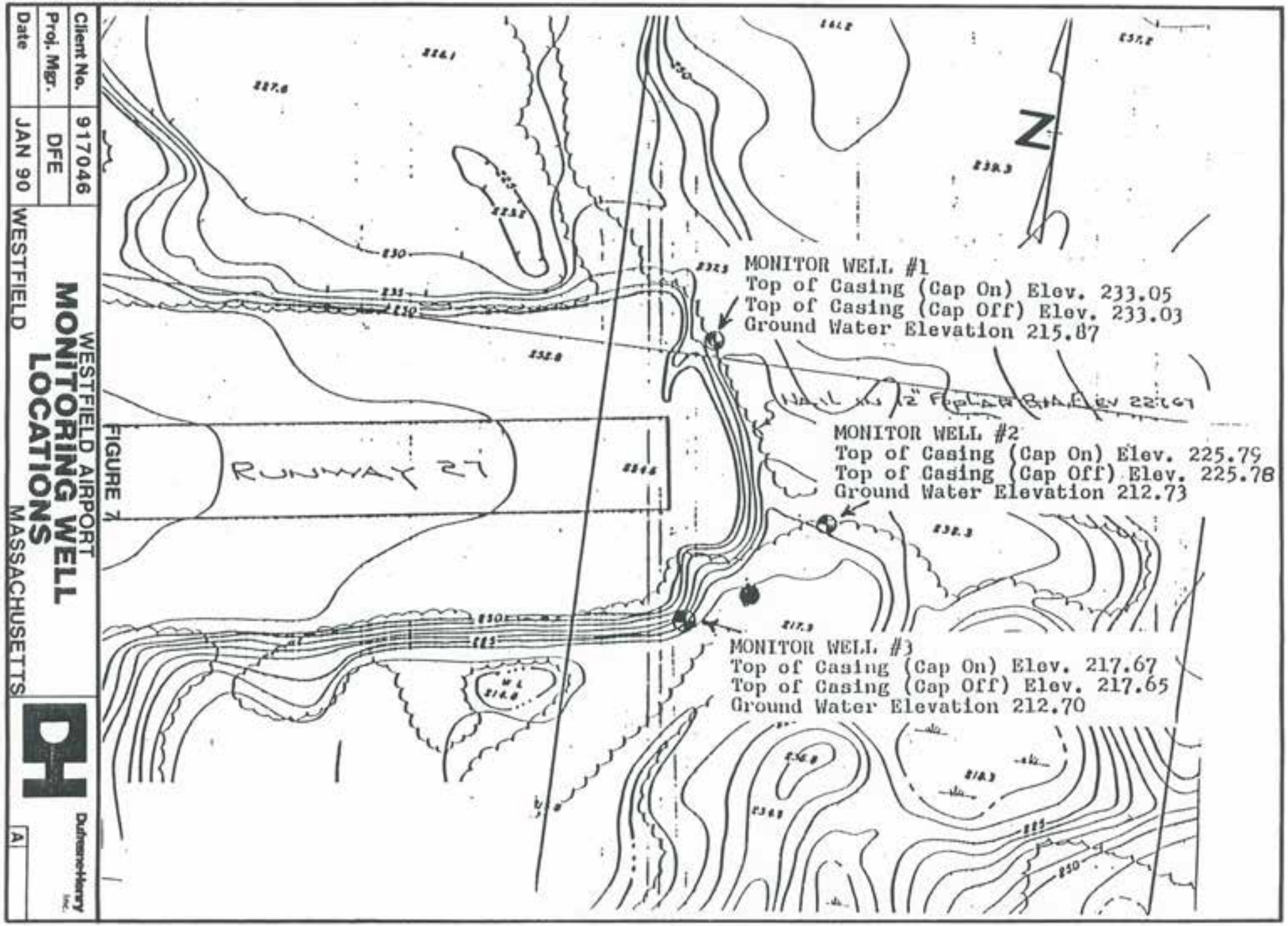
3.1.1 MONITORING WELL PROGRAM

The airport installed three monitoring wells MW-1,MW-2,and MW-3, at the eastern end of the abandoned runway in 1987 (see Figure #7). These wells were installed in response to traces of VOCs discovered in downgradient city wells 7 and 8. The wells were sampled on November 6, 1987 by airport personal (Tighe & Bond 2/6/88).

TABLE #1 METALS ANALYSIS
Monitoring wells at end of abandoned runway
October 1987

PARAMETER DESCRIPTION	CONCENTRATIONS (PPM)			
	MW#1	MW#2	MW#3	MCL
Arsenic	0.816	0.808	1.28	0.1
Barium	1.5	6.4	2.5	1.0
Cadmium	0.010	0.010	0.016	0.01
Chromium	0.18	0.32	0.45	0.05
Lead	0.36	0.27	0.39	0.05
Mercury	<0.0005	<0.0005	<0.0005	0.002
Selenium	<0.050	<0.050	<0.050	0.01
Silver	<0.01	<0.01	<0.01	0.05
Cyanide	<0.02	<0.02	<0.02	N/A

BRUNING 44-232 45337-13



The MANG has initiated an extensive monitoring well program in response to their installation restoration report of March 1989. The program has targeted all old sites of possible contamination. The base has already started to perform soil borings and install wells at these sites (see Fig #8). These wells will provide valuable information on groundwater flow and quality for the airport.

Westfield has a series of monitoring wells around production wells 7 and 8 in the southeast quadrant of the airport. Sampling of monitoring wells upgradient from the production wells would provide an early warning of contamination. This procedure could prevent contaminants from entering the Westfield water distribution system from wells 7 and 8.

3.1.2 GROUNDWATER QUALITY

During the City's 1987 annual sampling of their wells small traces of a VOC were discovered in wells 7 and 8. Well 8 was temporarily shut down due to the discovery of small amounts of trichloroethane (see Appendix 1A). In response, three monitoring wells were installed at the end of the abandoned runway. The site was selected by the D.E.Q.E. because of reported dumping at the end of the abandoned runway. The wells were installed by Charles E. Pratt & Sons on October 6, 1987 (see Figure #7). The wells were sampled on November 6, 1987 by Tighe & Bond personnel and tested in their lab for PCBs, heavy metals, and VOCs. The samples showed traces of arsenic, barium, cadmium, chromium, lead and oil and grease at or above the Massachusetts MCLs for Drinking Water (see Table #1). The lab found no PCBs in any of the samples tested. The VOC analysis indicated 10.3 ppb of methylene chloride in MW-2. This was the only VOC detected

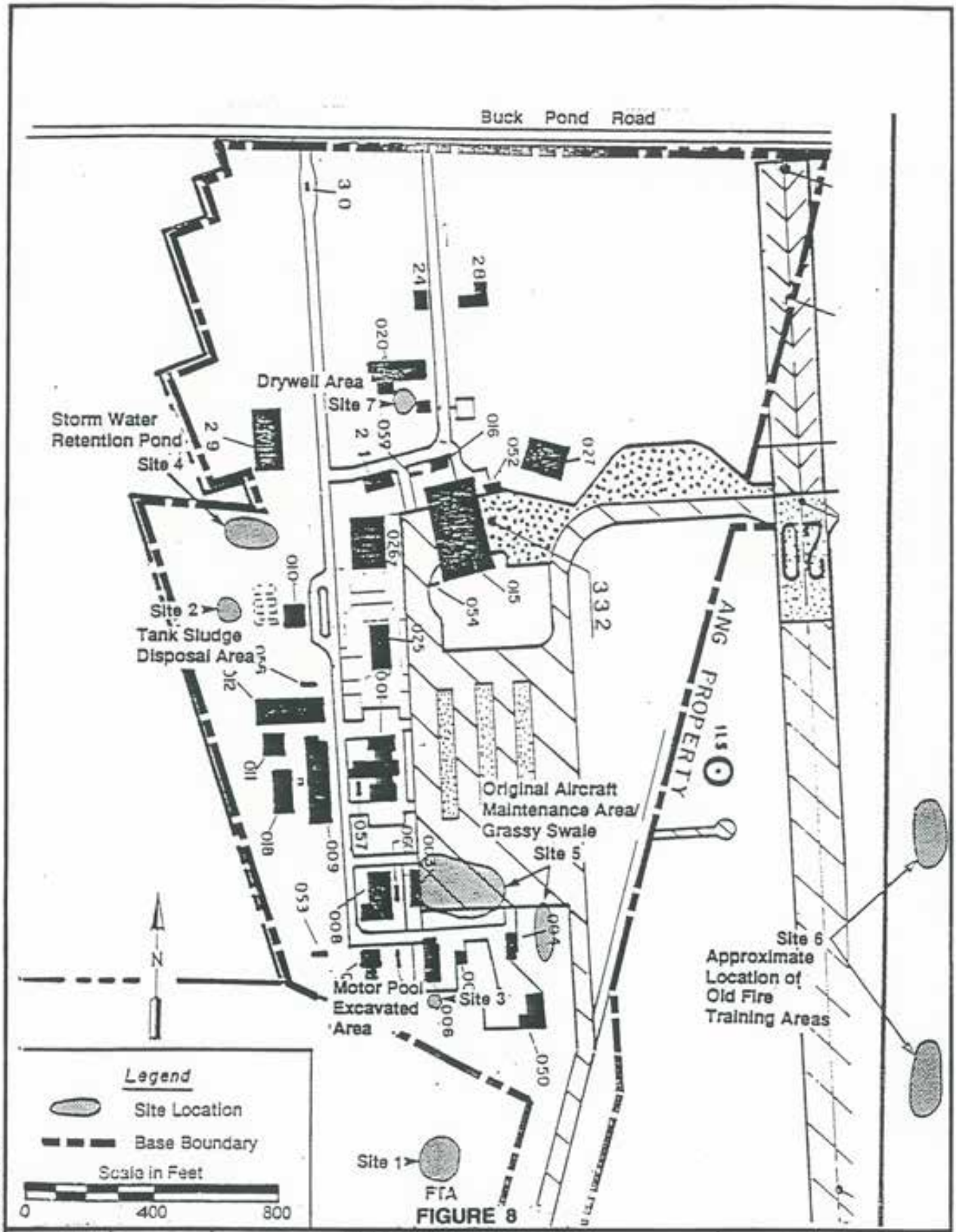


FIGURE 8

Client No.	917046
Proj. Mgr.	DFE
Date	JAN 90

WESTFIELD AIRPORT
MANG BASE TESTING LOCATIONS
WESTFIELD MASSACHUSETTS

Dufresne-Henry Inc.

A

BRUNING 44-232 45337-13

during the sampling (see Appendix #1B). During 1988 the City continued to sample Wells 7 and 8. The samples taken on October 25, 1988 showed a slight trace of trichloroethane in Well 7. The concentration was 2 ppb, (the Massachusetts drinking water MCL is 200 ppb).

Three monitoring wells were installed by the Berkshire Development Corporation in their 21E study for the parcel of land leased by Northeast Metals. Northeast Metals is located along Apremont Way approximately 1500 feet south of the Airport Terminal Building (see Figure 9). The parcel of land is within the Barnes Aquifer and the recharge area of Wells 7 and 8. The wells were sampled by Associated Environmental Scientists, Inc. and submitted to Tighe & Bond Laboratories on October 31, 1986. The analysis indicated 2 VOCs present; 10.2 ppb of 1,1 dichloroethane and 3.52 ppb of toluene (see Appendix 1C). This site is downgradient from the Airport Terminal Building.

The Digital Equipment Corporation (DEC) has installed six monitoring wells at their Southampton Road plant. This site is located across Buck Pond Road just north of the Mang Base. It is our understanding that these wells were installed per order of the DEP in response to five underground storage tanks removed in July of 1988. The six wells were installed in August of 1988, then sampled on September 2 and October 3, 1988. The results of the first round indicated the presence of petroleum hydrocarbons present in all wells with 1,1,1,-trichloroethane present in wells ECS-7 and ECS-8. The results of the second round of testing indicated no detectable levels of any contaminants.

The DEC site was reported to lie on top of a groundwater divide.

Groundwater in the northern sector of DEC flows to the northeast, while in the southern sector, groundwater flows to the south towards the MANG Base.

A 21E Site Assessment was conducted at the MicroAbrasives Corporation located along Southampton Road just west of the MANG Base. The study included (5) monitoring wells installed between July 28 and August 1 of 1988. The wells were sampled and no VOCs were detected (see Appendix 1D). The groundwater flow was reported to flow away from Arm Brook towards the southeast and the Airport.

The MANG has installed monitoring wells throughout the base. These wells will be used to sample the groundwater for the Spring of 1990. This work is part of an ongoing site assessment at the base scheduled for completion in 1991. The results from this testing will provide abundant information of the groundwater activity at the Airport.

4.0 RECOMMENDED ACTIONS AND PROCEDURES

4.1 PROPOSED FACILITY DESIGN CRITERIA

Proposed Phase I (1986-1991) airport related facilities include:

- A new terminal building
- Airport maintenance building
- Increased automobile parking
- New access road
- Hangars
- Parking aprons
- Realignment of taxiway "G"
- Centralized fuel farm

The following are recommendations regarding the proposed facilities:

1. All proposed facilities, once designed, should be reviewed for groundwater contamination potential. Items such as drains and new paved areas should be considered and design modifications made to minimize potential problems.
2. New or present underground fuel tanks should meet current, state-of-the-art criteria including double containment structures, automatic spill monitoring capability with remote alarm and spill recovery capability with accordance to Ordinance No. 913 Section 8-217 of the City of Westfield (See Appendix 2).
3. Groundwater protection procedures during construction including containment of temporary fuel storage, placement of hay bales for temporary erosion control and prohibition of heavy equipment maintenance over permeable soils should be imposed on all contractors.

4.2 HAZARDOUS MATERIALS HANDLING AND DISPOSAL

At present, the only known location at the Airport where hazardous materials are used is in the terminal/maintenance building. As discussed above, the cleaning of aircraft parts is accomplished with the use of solvents and degreasers. This takes place in a closed system where chemicals are filtered and reused. Spent chemicals are regularly removed for disposal by a licensed hauler.

Our recommendations to the Airport regarding hazardous materials are:

1. Create and maintain a thorough list of all hazardous materials used at the Airport. Airport tenants should be required to

provide this information and update it regularly. Information should include the nature of the material, trade-name, its use, handling, storing and disposal procedures, and specialized safety requirements and emergency procedures with manufacturers emergency telephone numbers. The manufacturer's material safety data sheet (MSDS) should contain the above required information.

2. Airport personnel should become familiar with regulatory requirements, particularly, licensing requirements (see Section 4.4).

3. Hazardous waste products such as oils, greases, paint and solvents stored at the Airport should continue to be stored in above-ground tanks. Any new above-ground storage tanks should be indoor and secured and set in a bermed area to contain leaks. All tanks should be properly labeled. Contents should be disposed of in compliance with DEP Hazardous Waste Regulations.

4. All hazardous materials used at the Airport must be stored in leakproof containers in secured areas. All containers must be properly labeled.

5. The Airport should include in all lease agreements a clause regulating hazardous materials and hazardous materials and hazardous waste consistent with the recommendations of this report.

4.3 FUEL STORAGE SYSTEMS

Should the Airport in the future desire additional underground storage tanks, as a minimum, the following features should be required:

a. double containment structure(s)

b. a monitoring well system and automatic leak sensing device with remote alarm within secondary containment.

c. product recovery capability with secondary containment.

d. monitoring well(s) outside secondary containment.

Fuel storage systems should comply with regulations put forth by the City of Westfield's Aquifer Protection Regulations Ordinance No. 900 (See Appendix B)

Recommend procedures for existing tanks are as follows:

1. Test all UST's in compliance with DEP Regulations and Section 8-218 of Westfield Ordinance No. 913.

A standard closure plan should be developed for future closure of any fuel storage facility. The plan should include a final leakage test, the legal removal and disposal of the tank and inspection of the surrounding soils during removal excavation. Discolored soils should be tested with a field instrument such as a photoionization detector and, if contaminated, removed and disposed of according to DEP Hazardous Waste Regulations. The tank excavation area should be backfilled with clean fill.

4.4 TRAINING OF AIRPORT PERSONNEL

All airport personnel should receive training regarding the storage, handling and use of hazardous materials. Training can be coordinated with that received by the fire and police personnel of the Town.

Classroom instruction should include determining which materials are considered hazardous, discussions of health and safety considerations and risks, procedures for safe handling of hazardous materials, legal requirements and liabilities and record keeping. Field training would

consist of filling, emptying and checking tanks, inventory assessment, equipment operations, emergency procedures and maintenance procedures. Emergency training would add to the above communications procedures, documentation of emergency events and practice drills.

Training should continually be evaluated and updated as necessary.

4.5 ACCIDENTAL FUEL SPILLS

In the event of an accidental fuel spill, the local fire department and the Western District Office of DEP must be notified. The spill should be fully documented with a report written which includes the following information:

- time, date, weather conditions
- material spilled, amount, location
- private parties involved, names of individuals
- description of nature of spill (i.e., overflow from fuel tank fill operations)
- names and times of agencies notified
- names and times of agency personnel responding
- cleanup procedures instituted, estimate amount of product recovery

Spilled product should be covered with oil absorbent material (i.e., Speedy-Dry) to recover as much product as possible. Saturated absorbent material should be transferred to leakproof bags and replaced as necessary.

If the spill has seeped into the ground or into the drainage system, the extent of contamination should be assessed. Remediation efforts such as soil removal or cleaning of catch basins may be necessary. All

contaminated materials must be disposed of in accordance with DEP Hazardous Waste Regulations and Westfield Ordinance 913 Section 8-219.

4.6 AIRPORT TENANTS

The Airport derives revenue from a small restaurant located in the terminal/maintenance building.

As recommended in Section 4.2, the Airport should add to all lease agreements a clause regulation the use of hazardous materials by tenants. Tenants should submit information regarding hazardous materials they use or hazardous wastes they generate. To the best of our knowledge, the restaurant does not generate hazardous wastes.

4.7 GROUNDWATER MONITORING PROGRAM

The Airport may wish to institute a Groundwater Monitoring Program within its own facilities. At least one monitoring well should be located upgradient of Airport facilities although wells installed as part of the MANG base site assessment could be used for this purpose.

Downgradient wells should also be installed to monitor groundwater leaving the Airport property. Annual sampling of monitoring wells should be part of the program and analysis should screen for VOCs using (EPA Method 524) and EDB (EPA Method 504).

APPENDIX 1
WATER QUALITY ANALYSIS

APPENDIX 1A
WESTFIELD CITY WELL DATA

QUARTER 3rd

VOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS

Lab Name Tighe & Bond MA. Certification# M-014 Lab Sample ID 88-10-307, 07A
Collector Name ML-T&B City/Town Westfield
Date Sample Collected 10/25/88 PWS Name Westfield Water Department
Date Sample Received by Lab 10/25/88 PWS ID# 1329000
Date Analyzed 10/27/88 No. Of Sources entering the distribution system at this point 1
Sample: Ground X Surface
Sample Treated: Yes No X Source Name(s) Well #7 ID# 1329000
Type Of Treatment:

*Composite sample: Yes No X
If Yes: List all source ID# _____, _____, _____, _____, _____

Source Status:
Active X Inactive _____ Seasonal _____
Backup use _____ Emergency Use Only _____
Other _____

Analytical Method: 502.1 1, 502.2 2, 503.1 3, 504 4, 524.1 5, 524.2 6

CONTAMINANTS	ANALYTICAL METHOD	**RESULT ug/L	MCL ug/L	Detection Limits (ug/L)
Benzene	5	ND	5	0.5
Carbontetrachloride	5	ND	5	0.5
1,1-Dichloroethylene	5	ND	7	0.5
1,2-Dichloroethane	5	ND	5	0.5
para Dichlorobenzene	5	ND	75	0.5
Trichloroethlyene	5	ND	5	0.5
1,1,1, Trichloroethane	5	2	200	0.5
Vinyl Chloride	5	ND	2	0.5
Bromobenzene	5	ND		0.5
Bromodichloromethane	5	ND		0.5
Bromoform	5	ND		0.5
Bromomethane	5	ND		0.5
Chlorobenzene	5	ND		0.5
Chlorodibromomethane	5	ND		0.5
Chloroethane	5	ND		0.5
Chloroform	5	ND		0.5
Chloromethane	5	ND		0.5
o-Chlorotoluene	5	ND		0.5
p-Chlorotoluene	5	ND		0.5
Dibromomethane	5	ND		0.5
m-Dichlorobenzene	5	ND		0.5
o-Dichlorobenzene	5	ND		0.5
trans-1,2 Dichloroethylene	5	ND		0.5
cis-1,2, Dichloroethylene	5	ND		0.5
Dichloromethane	5	ND		0.5
1,1 Dichloroethane	5	ND		0.5
1,1 Dichloropropene	5	ND		0.5
1,3 Dichloropropene	5	ND		0.5
1,2 Dichloropropane	5	ND		0.5
1,3 Dichloropropane	5	ND		0.5
2,2 Dichloropropane	5	ND		0.5
Ethylbenzene	5	ND		0.5
Styrene	5	ND		0.5
1,1,2 Trichloroethane	5	ND		0.5
1,1,1,2 Tetrachloroethane	5	ND		0.5
1,1,2,2 Tetrachloroethane	5	ND		0.5
Tetrachloroethylene	5	ND		0.5
1,2,3 Trichloropropane	5	ND		0.5
Toluene	5	ND		0.5
m-Xylene	5	ND		0.5
o-Xylene	5	ND		0.5

QUARTER 3rd

VOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS

Lab Name Tighe & Bond MA. Certification# MA014 Lab Sample ID 88-10-107,UMA
Collector Name ML-T&B City/Town Westfield
Date Sample Collected 10/25/88 PWS Name Westfield Water Department
Date Sample Received by Lab 10/25/88 PWS ID# 1329000
Date Analyzed 10/27/88 No. Of Sources entering the distribution system at this point 1
Sample: Ground X Surface
Sample Treated: Yes No X Source Name(s) Well #8 ID# 1329000
Type Of Treatment:

*Composite sample: Yes No X
If Yes: List all source ID# _____, _____, _____, _____, _____, _____

Source Status:
Active X Inactive _____ Seasonal _____
Backup use _____ Emergency Use Only _____
Other _____

Analytical Method: 502.1 1, 502.2 2, 503.1 3, 504 4, 524.1 5; 524.2 6

CONTAMINANTS	ANALYTICAL METHOD	**RESULT ug/L	MCL ug/L	Detection Limits (ug/L)
Benzene	5	ND	5	0.5
Carbontetrachloride	5	ND	5	0.5
1,1-Dichloroethylene	5	ND	7	0.5
1,2-Dichloroethane	5	ND	5	0.5
para Dichlorobenzene	5	ND	75	0.5
Trichloroethlyene	5	ND	5	0.5
1,1,1, Trichloroethane	5	ND	200	0.5
Vinyl Chloride	5	ND	2	0.5
Bromobenzene	5	ND		0.5
Bromodichloromethane	5	ND		0.5
Bromoform	5	ND		0.5
Bromomethane	5	ND		0.5
Chlorobenzene	5	ND		0.5
Chlorodibromomethane	5	ND		0.5
Chloroethane	5	ND		0.5
Chloroform	5	ND		0.5
Chloromethane	5	ND		0.5
o-Chlorotoluene	5	ND		0.5
p-Chlorotoluene	5	ND		0.5
Dibromomethane	5	ND		0.5
m-Dichlorobenzene	5	ND		0.5
o-Dichlorobenzene	5	ND		0.5
trans-1,2 Dichloroethylene	5	ND		0.5
cis-1,2, Dichloroethylene	5	ND		0.5
Dichloromethane	5	ND		0.5
1,1 Dichloroethane	5	ND		0.5
1,1 Dichloropropene	5	ND		0.5
1,3 Dichloropropene	5	ND		0.5
1,2 Dichloropropane	5	ND		0.5
1,3 Dichloropropane	5	ND		0.5
2,2 Dichloropropane	5	ND		0.5
Ethylbenzene	5	ND		0.5
Styrene	5	ND		0.5
1,1,2 Trichloroethane	5	ND		0.5
1,1,1,2 Tetrachloroethane	5	ND		0.5
1,1,2,2 Tetrachloroethane	5	ND		0.5
Tetrachloroethylene	5	ND		0.5
1,2,3 Trichloropropane	5	ND		0.5
Toluene	5	ND		0.5
m-Xylene	5	ND		0.5
o-Xylene	5	ND		0.5

Fee

Regular

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

[illegible] (mg. per liter)

RECEIVED
JUN 20 1985
WATER DEPT.

Westfield

COLLECTOR: [illegible]

SOURCE A #7 Well - 329-[illegible]
SOURCE B Sackett Res. near Gatehouse - [illegible]
SOURCE C G.P. Well #1, off South Holyoke Rd. - 329-01G
SOURCE D " " " #2, " Union St. - 329-02G
SOURCE E " " " #3, Shaker Rd. - 329-03G
SOURCE F " " " #4, " " - 329-04G

	A	B	C	D	E	F
SAMPLE NO.	570041	042	043	044	045	046
DATE OF COLLECTION	5/20/85					
DATE OF RECEIPT	5/22/85					
TURBIDITY	5.0	0.0	2.1	0.3	0.7	0.3
SEDIMENT	0	1	0	0	0	0
COLOR	20	10	15	5	10	5
ODOR	0	0	0	0	0	0
pH	7.3	6.5	7.8	7.4	8.0	8.0
ALKALINITY-TOTAL(CaCO3)	32	6	44	36	60	67
	Well #7	Reservoir	Well #1	Well #2	Well #5	Well #6
HARDNESS(CaCO3)	40	7	50	47	84	75
CALCIUM(Ca)	13.	1.4	17.	14.	29.	26.
MAGNESIUM(Mg)	1.8	0.8	3.7	2.9	2.6	2.1
SODIUM(Na)	3.0	3.0	10.	7.5	9.6	7.5
POTASSIUM (K)	0.4	0.6	0.6	0.7	0.6	0.8
IRON(Fe)	.75	.00	.22	.00	.00	.00
MANGANESE(Mn)	.02	.00	.00	.00	.01	.00
SULFATE(SO4)	5	1	9	5	11	7
CHLORIDE(Cl)	5.0	4.0	16	13	16	15
SPEC. COND.(micromhos/cm)	105	37	172	140	228	210
NITROGEN(AMMONIA)	.02	.01	.01	.01	.01	.01
NITROGEN(NITRATE)	0.6	0.0	1.2	0.8	3.2	1.5
NITROGEN(NITRITE)	.002	.001	.001	.002	.002	.001
COPPER(Cu)	.00	.00	.07	.00	.06	.01

RECEIVED
JUN 11 1985
Western Region
Department of Environmental Quality Engineering

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

WA[illegible] per liter)

Westfield

COLLECTOR D. Loban

SOURCE A G.P. Well 5, North West Fld. - 329-05G
SOURCE B Well 8 - 329-06G
SOURCE C
SOURCE D
SOURCE E
SOURCE F

	A	B	C	D	E	F
SAMPLE NO.	570847	848				
DATE OF COLLECTION	5/20/85					
DATE OF RECEIPT	5/22/85					
TURBIDITY	0.4	0.3				
SEDIMENT	0	0				
COLOR	5	5				
ODOR	0	0				
pH	6.9	8.0				
ALKALINITY-TOTAL(CaCO3)	18	50				
	Wt ≤5	Wt ≤8				
HARDNESS(CaCO3)	21	52				
CALCIUM(Ca)	4.7	17				
MAGNESIUM(Mg)	2.1	2.1				
SODIUM(Na)	4.6	3.1				
POTASSIUM (K)	1.1	0.4				
IRON(Fe)	.00	.00				
MANGANESE(Mn)	.00	.00				
SULFATE(SO4)	3	3				
CHLORIDE(Cl)	8.0	6.0				
SPEC. COND.(micromhos/cm)	71	131				
NITROGEN(AMMONIA)	.01	.01				
NITROGEN(NITRATE)	0.4	0.7				
NITROGEN(NITRITE)	.003	.002				
COPPER(Cu)	.05	.00				

Regular

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

WATER SUPPLY ANALYSIS (mg/ per liter)

Westfield

COLLECTOR BILL

SOURCE A Well #7 near Gatehouse - 329-03S
SOURCE B Sackett Res. near Gatehouse - 329-04S
SOURCE C G.P. Well # 1, off So. Holyoke Rd. - 329-01G
SOURCE D " " " # 2, " Union St. - 329-02G
SOURCE E " " " # 3, Shaker Rd. - 329-03G
SOURCE F " " " # 4, " " - 329-04G

	A	B	C	D	E	F
SAMPLE NO.	577192	193	194	195	196	197
DATE OF COLLECTION	5/20/87					
DATE OF RECEIPT	5/21/87					
TURBIDITY	0.1	0.6	0.1	0.3	0.0	0.1
SEDIMENT	0	0	0	0	0	0
COLOR	0	5	5	0	0	5
ODOR	0	0	0	0	0	0
pH	8.1	6.2	7.0	7.1	7.5	8.1
ALKALINITY-TOTAL(CaCO3)	56	4	52	37	68	63
	Well #7	Reservoir	Well #1	Well #2	Well #3	Well #4
HARDNESS(CaCO3)	64	7	76	54	108	99
CALCIUM(Ca)	21.	1.6	24.	17.	39.	36.
MAGNESIUM(Mg)	2.7	0.7	3.8	2.8	2.4	2.1
SODIUM(Na)	3.7	2.9	6.4	6.8	8.4	6.7
POTASSIUM (K)	0.3	0.3	0.2	0.3	<0.2	<0.2
IRON(Fe)	<.04	.07	<.04	<.04	<.04	<.04
MANGANESE(Mn)	<.03	<.03	<.03	<.03	<.03	<.03
SULFATE(SO4)	12	4	19	14	19	18
CHLORIDE(Cl)	5.0	3.0	12	13	16	12
SPEC. COND.(micromhos/cm)	153	34	188	151	253	212
NITROGEN(AMMONIA)	<0.02	<0.02	0.03	0.03	<0.02	<0.02
NITROGEN(NITRATE)	0.8	<0.1	1.3	1.0	3.6	1.7
NITROGEN(NITRITE)	<.002	<.002	<.002	<.002	<.002	<.002
COPPER(Cu)	<.03	<.03	.03	<.03	<.03	<.03

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING
WATER SUPPLY ANALYSIS (mg/ per liter)

COLLECTOR Whalen

SOURCE A G.P. Well #1 off So. Holyoke Rd. - 329-01G
SOURCE B " " " #2 " Union St. - 329-02G
SOURCE C " " " #3 Shaker Rd. - 329-03G
SOURCE D " " " #4 " " - 329-04G
SOURCE E " " " #5 North West Rd. - 329-05G
SOURCE F " " " #6 " " " - 329-06G

	A	B	C	D	E	F
SAMPLE NO.	574328	329	330	331	332	333
DATE OF COLLECTION	6/10/86					
DATE OF RECEIPT	6/12/86					
TURBIDITY	0.4	0.1	0.1	0.1	0.1	5.6
SEDIMENT	0	0	0	0	0	0
COLOR	0	5	5	5	0	15
ODOR	0	0	0	0	0	0
pH	6.8	6.7	7.3	7.7	6.3	6.2
ALKALINITY-TOTAL(CaCO3)	44	36	71	55	19	11
	Well #1	Well #2	Well #3	Well #4	Well #5	Well #6
HARDNESS(CaCO3)	42	36	109	97	22	14
CALCIUM(Ca)	11.	10.	38.	35.	5.7	3.4
MAGNESIUM(Mg)	3.4	2.6	3.3	2.1	2.0	1.2
SODIUM(Na)	11.	7.6	8.5	8.3	4.5	3.2
POTASSIUM (K)	0.9	0.7	0.9	1.1	1.2	0.8
IRON(Fe)	<.04	<.04	<.04	<.04	<.04	.52
MANGANESE(Mn)	<.03	<.03	<.03	<.03	<.03	<.03
SULFATE(SO4)	13	12	21	17	7	6
CHLORIDE(Cl)	9.0	16	14	5.0	4.0	2.0
SPEC. COND.(micromhos/cm)	172	142	232	207	72	47
NITROGEN(AMMONIA)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
NITROGEN(NITRATE)	1.0	0.9	3.3	1.8	0.5	0.1
NITROGEN(NITRITE)	<.002	<.002	<.002	<.002	<.002	<.002
COPPER(Cu)	<.03	<.03	<.03	<.03	<.03	.05

Regular

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING
WATER SUPPLY ANALYSIS (mg/ per liter)

Westfield

COLLECTOR D. Lobban

SOURCE A Tekoa Res. near Gatehouse - 329-03S
SOURCE B Sackett Res. near Gatehouse - 329-04S
SOURCE C
SOURCE D
SOURCE E
SOURCE F

	A	B	C	D	E	F
SAMPLE NO.	574186	187				
DATE OF COLLECTION	5/27/86					
DATE OF RECEIPT	5/29/86					
TURBIDITY	0.3	0.4				
SEDIMENT	0	0				
COLOR	35	10				
ODOR	0	0				
pH	6.0	6.0				
ALKALINITY-TOTAL(CaCO3)	3	3				
HARDNESS(CaCO3)	7.0	4.0				
CALCIUM(Ca)	1.9	1.5				
MAGNESIUM(Mg)	0.5	0.7				
SODIUM(Na)	3.5	2.8				
POTASSIUM (K)	0.4	0.5				
IRON(Fe)	.09	.08				
MANGANESE(Mn)	<0.03	<0.03				
	Tekoa Res	Sackett Res				
SULFATE(SO4)	5	5				
CHLORIDE(Cl)	13	6.0				
SPEC. COND.(micromhos/cm)	36	35				
NITROGEN(AMMONIA)	<0.02	<0.02				
NITROGEN(NITRATE)	<0.1	<0.1				
...OGEN(NITRITE)	<0.002	<0.002				
COPPER(Cu)	<0.02	<0.02				

Regular

THE COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

WATER SUPPLY ANALYSIS (mg/ per liter)

Westfield

COLLECTOR J. Rait

SOURCE A G.P.W. #1, off S. Holyoke Rd. - 329-01G
SOURCE B " " " #2, " Union St. - 329-02G
SOURCE C " " " #3, Shaker Rd. - 329-03G
SOURCE D " " " #4, " " - 329-04G
SOURCE E " " " #5, N. West Rd. - 329-05G
SOURCE F " " " #8, " " " - 329-09G

	A	B	C	D	F	
SAMPLE NO.	564527	528	529	530	531	532
DATE OF COLLECTION	5/2/83					
DATE OF RECEIPT	5/6/83					
TURBIDITY	0.2	0.7	0.5	0.2	4.8	0.2
SEDIMENT	0	0	0	0	2	0
COLOR	5	5	2	0	13	0
ODOR	0	0	0	0	0	0
pH	7.5	7.1	7.5	8.0	6.6	8.3
ALKALINITY-TOTAL(CaCO3)	61	40	69	69	14	54
HARDNESS(CaCO3)	78	57	125	120	14	65
CALCIUM(Ca)	25.	18.	46.	44.	3.8	22.
MAGNESIUM(Mg)	3.6	2.9	2.5	2.4	0.9	2.4
SODIUM(Na)	7.6	5.4	10.	7.7	2.7	3.1
POTASSIUM (K)	0.7	0.6	0.5	0.5	0.4	0.3
IRON(Fe)	.03	.02	.05	.00	.16	.02
MANGANESE(Mn)	.00	.00	.00	.00	.00	.00
SULFATE(SO4)	13	11	13	10	4	7
CHLORIDE(Cl)	13	13	18	16	2.0	6.0
SPEC. COND.(micromhos/cm)	173	132	222	209	39	131
NITROGEN(AMMONIA)	.02	.02	.01	.02	.01	.01
NITROGEN(NITRATE)	0.8	1.0	1.8	1.6	0.0	0.7
NITROGEN(NITRITE)	.001	.000	.000	.000	.001	.004
COPPER(Cu)	.00	.03	.03	.00	.03	.00

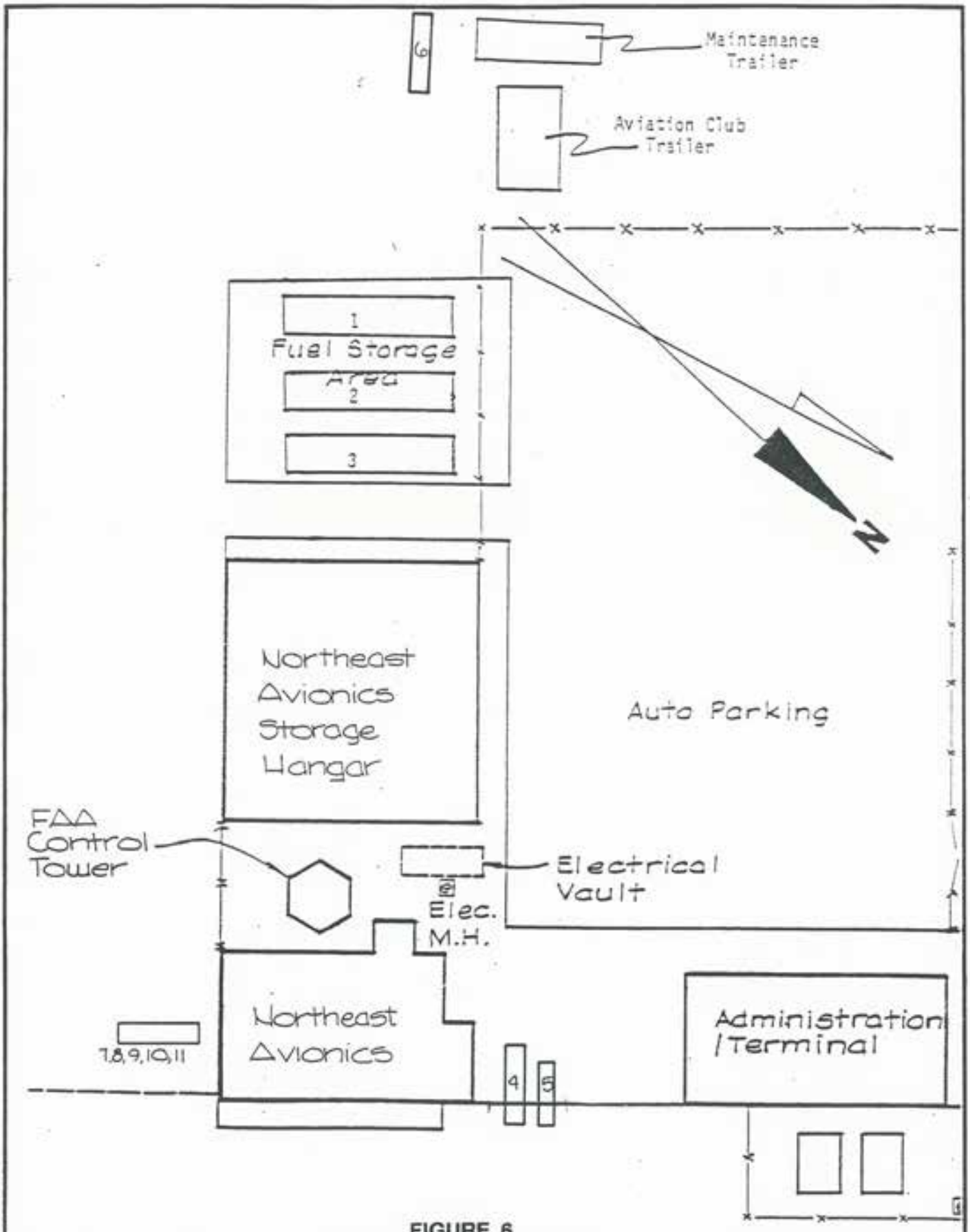


FIGURE 6

Client No.	917046	WESTFIELD AIRPORT **UNDERGROUND STORAGE TANK LOCATIONS** WESTFIELD MASSACHUSETTS	Dufresne-Henry Inc.
Proj. Mgr.	DFE		
Date	JAN 90		A

BRUNING 44-232 45337-13

APPENDIX 1B
MONITORING WELLS MW-1, MW-2, MW-3

TIGHE & BOND CONSULTING ENGINEERS ENVIRONMENTAL SPECIALISTS

John W. Powers
David G. Healey
Ronald A. Michalski
Michael R. Parsons
Philip W. Sheridan

Dennis H. Bianchi
Thomas C. Couture
James S. O'Reilly

Emeriti
Edward J. Bayon
George H. McDonnell

TIGHE & BOND, INC. LABORATORY
Mass. Certificate C 8212/Conn. Certificate No. PH-0494

Barnes Airport
Westfield, MA 01085
Attn: George Gifford

Job No.: 40088-4-50
Report No.: 13798
Date: December 23, 1987
Approved By:

Sample Description
C67268 - MW#1 Grab
C67269 - MW#2 Grab
C67270 - MW#3 Grab

Parameter	Units	C67268	C67269	C67270
Lab Number		C67268	C67269	C67270
Collector		KAE-T&B	KAE-T&B	KAE-T&B
Date Received		11-6-87	11-6-87	11-6-87
Date Completed		12-15-87	12-15-87	12-15-87
Arsenic	mg/L	0.816	0.808	1.28
Barium	mg/L	1.5	6.4	2.5
Cadmium	mg/L	0.010	0.010	0.016
Chromium	mg/L	0.18	0.32	0.45
Lead	mg/L	0.36	0.27	0.39
Mercury	mg/L	<0.0005	<0.0005	<0.0005
Selenium	mg/L	<0.050	<0.050	<0.050
Silver	mg/L	<0.01	<0.01	<0.01
Cyanide	mg/L	<0.02	<0.02	<0.02
Oil and Grease	mg/L	58.6	10.6	23.0

50 Payson Avenue
Easthampton, Mass. 01027
TEL. 413-527-5600
413-533-3991

TIGHE & BOND
CONSULTING ENGINEERS

TIGHE & BOND LABORATORY
Easthampton, Massachusetts 01027
Mass. Certificate No. C 8212/Conn. Certificate No. PH-0494

Barnes Airport, Westfield, Massachusetts

Sample Description
C67268 - MW#1 Grab
C67269 - MW#2 Grab
C67270 - MW#3 GRab

Job No.: 40088-4-50
Report No.: 13798
Date: December 23, 1987
Approved By:

Concentrations reported as micrograms per Liter (ug/L) which is equivalent to parts per billion.

Lab Number	C67268	C67269	C67270
Collector	KAE-T&B	KAE-T&B	KAE-T&B
Date Received	11-6-87	11-6-87	11-6-87
Date Analyzed	11-20-87	11-20-87	11-20-87

EPA METHOD 624
GC/MS FRACTION-VOLATILE COMPOUNDS

1V.	Acrolein	ND*	ND*	ND*
2V.	Acrylonitrile	ND*	ND*	ND*
3V.	Benzene	ND	ND	ND
4V.	Bis(Chloromethyl) Ether	ND	ND	ND
5V.	Bromoform	ND	ND	ND
6V.	Carbon Tetrachloride	ND	ND	ND
7V.	Chlorobenzene	ND	ND	ND
8V.	Chlorodibromomethane	ND	ND	ND
9V.	Chloroethane	ND	ND	ND
10V.	2-Chloroethylvinyl Ether	ND	ND	ND
11V.	Chloroform	ND	ND	ND
12V.	Dichlorobromomethane	ND	ND	ND
13V.	Dichlorodifluoromethane	ND	ND	ND
14V.	1,1-Dichloroethane	ND	ND	ND
15V.	1,2-Dichloroethane	ND	ND	ND
16V.	1,1-Dichloroethylene	ND	ND	ND
17V.	1,2-Dichloropropane	ND	ND	ND
18V.	1,2-Dichloropropylene	ND	ND	ND
19V.	Ethylbenzene	ND	ND	ND
20V.	Methyl Bromide	ND	ND	ND
21V.	Methyl Chloride	ND	ND	ND
22V.	Methylene Chloride	ND	10.3	ND
23V.	1,1,2,2-Tetrachloroethane	ND	ND	ND
24V.	Tetrachloroethylene	ND	ND	ND
25V.	Toluene	ND	ND	ND
26V.	1,2-Trans-Dichloroethylene	ND	ND	ND
27V.	1,1,1-Trichloroethane	ND	ND	ND
28V.	1,1,2-Trichloroethane	ND	ND	ND
29V.	Trichloroethylene	ND	ND	ND
30V.	Trichlorofluoromethane	ND	ND	ND
31V.	Vinyl Chloride	ND	ND	ND

ND = Parameter not detected at sensitivity level of instrument which is less than 10 ug/L (ppb)
ND*= Parameter not detected at sensitivity level of instrument which is less than 1000 ug/L (ppb)

TIGHE & BOND
CONSULTING ENGINEERS
ENVIRONMENTAL SPECIALISTS

John W. Powers
David G. Healey
Ronald A. Michalski
Michael R. Parsons
Phillip W. Sheridan

Dennis H. Bianchi
Thomas C. Couture
James S. O'Reilly

Emeriti
Edward J. Bayon
George H. McDonnell

TIGHE & BOND LABORATORY
Mass. Certificate No. C8212/Conn. Certificate No. PH-0494

Polychlorinated Biphenyls

Barnes Airport
Westfield, Mass.

Job No.: 40088-A-50
Report No.: 13798
Date: December 23, 1987
Approved By:

Sample Description
C67268 - MW#1 Grab
C67269 - MW#2 Grab
C67270 - MW#3 Grab

All results are reported as parts per billion unless listed otherwise.

Lab Number		C67268	C67269	C67270
Collector		KAE-T&B	KAE-T&B	KAE-T&B
Date Received		11-6-87	11-6-87	11-6-87
Date Extracted		11-6-87	11-6-87	11-6-87
Date Analyzed		11-9-87	11-9-87	11-9-87
Parameter	Units			
18P. PCB-1242	ug/L	ND	ND	ND
19P. PCB-1254	ug/L	ND	ND	ND
20P. PCB-1221	ug/L	ND	ND	ND
21P. PCB-1232	ug/L	ND	ND	ND
22P. PCB-1248	ug/L	ND	ND	ND
23P. PCB-1260	ug/L	ND	ND	ND
24P. PCB-1016	ug/L	ND	ND	ND

ND = Parameter not detected at sensitivity level of instrument which is 1 part per billion (ppb)

50 Payson Avenue
Easthampton, Mass. 01027
TEL. 413-527-5600
413-533-3991

APPENDIX 1C
21E STUDY FOR NORTHEAST METALS SITE

TIGHE & BOND LABORATORY
Easthampton, Massachusetts 01027
Mass. Certificate No. C 8212/Conn. Certificate No. PH-0494

Associated Environmental Scientists

Sample Description	Job No.:	40087-4-50
CS8829 - Water Composite (MW1, MW2, & MW3) AES # 861002	Report No.:	10732
	Date:	NOvember 5, 1986

Concentrations reported as micrograms per Liter (ug/L) which is equivalent to parts per billion.

Lab Number	CS8829
Collector	Client
Date Received	10-28-86
Date Analyzed	11-3-86

GC FRACTION-VOLATILE COMPOUNDS

1V.	Acrolein	ND*
2V.	Acrylonitrile	ND*
3V.	Benzene	ND
4V.	Bis(Chloromethyl) Ether	ND
5V.	Bromoform	ND
6V.	Carbon Tetrachloride	ND
7V.	Chlorobenzene	ND
8V.	Chlorodibromomethane	ND
9V.	Chloroethane	ND
10V.	2-Chloroethylvinyl Ether	ND
11V.	Chloroform	ND
12V.	Dichlorobromomethane	ND
13V.	Dichlorodifluoromethane	ND
14V.	1,1-Dichloroethane	10.2
15V.	1,2-Dichloroethane	ND
16V.	1,1-Dichloroethylene	ND
17V.	1,2-Dichloropropane	ND
18V.	1,2-Dichloropropylene	ND
19V.	Ethylbenzene	ND
20V.	Methyl Bromide	ND
21V.	Methyl Chloride	ND
22V.	Methylene Chloride	ND
23V.	1,1,2,2-Tetrachloroethane	ND
24V.	Tetrachloroethylene	ND
25V.	Toluene	3.52
26V.	1,2-Trans-Dichloroethylene	ND
27V.	1,1,1-Trichloroethane	ND
28V.	1,1,2-Trichloroethane	ND
29V.	Trichloroethylene	ND
30V.	Trichlorofluoromethane	ND
31V.	Vinyl Chloride	ND

ND = Parameter not detected at sensitivity level of instrument which is less than 1 ug/L (ppb)
ND*= Parameter not detected at sensitivity level of instrument which is less than 100 ug/L (ppb)

Connecticut State Department of Health

APPROVED PUBLIC HEALTH LABORATORY

This is to certify that the laboratory described below has been approved by the State Department of Health pursuant to applicable provisions of the Public Health Code and General Statutes of Connecticut, for making the examinations, determinations, or tests specified below which have been authorized in writing by that Department.

NORTHEAST LABORATORIES, INC.
Name of Laboratory

Located at 129 Mill Street *in* Berlin, Connecticut 06037
registered in the name of William W. Ullmann, Ph.D. *and*

This certificate is issued in the name of William W. Ullmann, Ph.D., Director
Alan C. Johnson, Co-Director *who has been designated by the registrant to be in charge of the laboratory work covered by this certificate of approval as follows:*

Potable Water, Sewage and/or Effluent, Trade Waste and/or Effluent, Soil

Examination for:
- Bacteria
- Plankton (not in soil)
- Inorganic Chemicals
  - Minerals
  - Nutrients
  - Trace Metals
  - Demand
  - Asbestos (not in water or sewage)
  - Cyanide & Misc. (F^-, etc.)
- Organic Chemicals
  - Gross Hydrocarbons
  - Purgeable Halocarbons
  - Purgeable Aromatics
  - Pesticides
  - Polychlorinated biphenyls

Air

Examination for:
- Inorganic Chemicals
  - Nutrients
  - Trace Metals
  - Photochemical oxidants
  - Asbestos
  - Formaldehyde and/or urea
  - Carbon monoxide
  - Nitrogen dioxide
  - Sulfur dioxide and Suspended Particulates

This certificate expires December 31, *19* 87 *and is revocable for cause by the State Department of Health.*

Dated at Hartford, Connecticut, this 3rd *day of* February, *19*86

(continued on page 2)

Douglas D. Lloyd, M.D.
Commissioner of Health

No. PH-0606

Northeast Laboratories, Inc.

ADDRESS Berlin

APPROVAL NO. PH-0606

STATE OF CONN. - DEPT. OF HEALTH SERVICES

Laboratory Division

Laboratory Standards Section

WATER LABORATORY IMPROVEMENT PROGRAM - 1986
VOLATILE AROMATIC SERIES

VOLATILE AROMATIC COMPOUND	SAMPLE NUMBER	TARGET VALUE (µg/l)	*ACCEPTABLE RANGE FOR QUANTITATION OF PARAMETER (µg/l)	SCORING					
				YOUR RESULT (µg/l)	DETECTION (POSSIBLE TOTAL 35%)	IDENTIFICATION (POSSIBLE TOTAL 15%)	QUANTITATION (POSSIBLE TOTAL 25%)	VERIFICATION (POSSIBLE TOTAL 25%)	TOTAL SCORE
nzene	1	1.5	0.3 - 2.7	0.8	35	15	25	25	100
	2	11.8	7.6 - 16.0	10.9	35	15	25	25	100
luene	1	2.8	0.8 - 4.8	1.8	35	15	25	25	100
	2	7.4	4.6 - 10.2	6.0	35	15	25	25	100
hylbenzene	1	15.2	8.6 - 21.8	17.0	35	15	25	25	100
	2	2.4	1.4 - 3.4	3.3	35	15	25	25	100
lorobenzene	1	3.3	1.5 - 5.1	2.2	35	15	25	25	100
	2	8.9	7.3 - 10.5	8.0	35	15	25	25	100
2 - dichlorobenzene	1	18.5	10.3 - 26.7	6.2	35	0	0	25	60
	2	3.6	1.0 - 6.2	1.2	35	15	25	25	100
3 - dichlorobenzene	1	15.6	8.8 - 22.4	10.9	35	15	25	25	100
	2	3.2	0.6 - 5.8	10.1	35	15	0	25	100
4 - dichlorobenzene	1	3.0	0.8 - 5.2	1.8	35	15	25	25	100
	2	11.1	6.7 - 15.5	1.1	35	15	0	25	75

*± SD of mean

FINAL SCORE FOR EVALUATION - 93%

LABORATORY NAME Northeast Laboratories, Inc.

ADDRESS 129 Mill Street - Berlin

APPROVAL NO. PH-0606

STATE OF CONN. - DEPT. OF HEALTH SERVICES

Laboratory Division

Laboratory Standards Section

WATER LABORATORY IMPROVEMENT PROGRAM - 1986
VOLATILE ORGANIC SERIES

VOLATILE ORGANIC COMPOUND	SAMPLE NUMBER	TARGET VALUE (µg/l)	*ACCEPTABLE RANGE FOR QUANTITATION OF PARAMETER (µg/l)	SCORING					
				YOUR RESULT (µg/l)	DETECTION (POSSIBLE TOTAL 35%)	IDENTIFICATION (POSSIBLE TOTAL 15%)	QUANTITATION (POSSIBLE TOTAL 25%)	VERIFICATION (POSSIBLE TOTAL 25%)	TOTAL SCORE
Chloroform	1	16.7	8.7 - 24.7	10.4	35	15	25	25	100
	2	3.3	0.8 - 5.8	1.8	35	15	25	25	100
1,2 Dichloroethane	1	18.0	10.6 - 25.4	3.7	35	15	0	25	75
	2	5.3	2.3 - 8.3	4.1	35	15	25	25	100
1,1,1 Trichloroethane	1	2.0	1.0 - 3.0	2.3	35	15	25	25	100
	2	19.9	14.3 - 25.5	26.0	35	15	0	25	75
Carbon Tetrachloride	1	15.9	10.3 - 21.5	2.2	35	15	0	25	75
	2	2.7	1.5 - 3.9	2.5	35	15	25	25	100
Bromodichloromethane	1	14.7	6.9 - 22.5	9.6	35	15	25	25	100
	2	2.9	1.3 - 4.5	2.6	35	15	25	25	100
Trichloroethylene	1	10.1	7.1 - 13.1	9.2	35	15	25	25	100
	2	5.2	3.8 - 6.6	5.1	35	15	25	25	100
Dibromochloromethane	1	3.0	1.4 - 4.6	2.4	35	15	25	25	100
	2	27.9	19.5 - 36.3	29.0	35	15	25	25	100
Bromoform	1	2.2	0.5 - 4.0	1.6	35	15	25	25	100
	2	20.5	15.3 - 25.7	16.9	35	15	25	25	100
1,1,2,2 Tetrachloroethylene	1	5.2	2.4 - 8.0	3.9	35	15	25	25	100
	2	17.4	10.4 - 24.4	22.9	35	15	25	25	100

* ± 2 SD of mean

FINAL SCORE FOR EVALUATION 96%

ORATORY NAME Northeast Laboratories

N Berlin

. APPROVAL NO. PH-0606

STATE OF CONN. - DEPT. OF HEALTH SERVICES
Laboratory Division
Laboratory Standards Section

WATER LABORATORY IMPROVEMENT PROGRAM - 1986
1,2 DIBROMOETHANE (EDB)

COMPOUND	Sample Number	Target Value (µg/l)	*Acceptable Range (µg/l)	Your Result (µg/l)	SCORE
1,2 dibromoethane	1	0.23	0.11 - 0.35	0.32	100
1,2 dibromoethane	2	0.12	0.06 - 0.18	0.09	100

* ± 2 SD of mean

FINAL SCORE FOR EVALUATION 100%

APPENDIX 1D
21E STUDY FOR MICROABRASIVES SITE

MPLE ID MW#1 FRACTION 010 TEST CODE 601602 NAME GC VOLATILE ORGANICS
Date & Time Collected 08/15/88 Category GROUNDWATER

ANALYST JAM DATE ANALYZED 08/27/88 FILE # _____
INSTRUMENT GC # 2 FACTOR 1.0 VERIFIED KES

EPA Method 601
PURGEABLE HALOCARBONS

CAS#	COMPOUND	RESULT	DETECTION LIMIT
75-27-4	Bromodichloromethane	ND	1.0
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	1.0
56-23-5	Carbon tetrachloride	ND	1.0
108-90-7	Chlorobenzene	ND	1.0
75-00-3	Chloroethane	ND	1.0
100-75-8	2-Chloroethylvinyl ether	ND	1.0
67-66-3	Chloroform	ND	1.0
74-87-3	Chloromethane	ND	1.0
124-48-1	Dibromochloromethane	ND	1.0
95-50-1	1,2-Dichlorobenzene	ND	1.0
541-73-1	1,3-Dichlorobenzene	ND	1.0
106-46-7	1,4-Dichlorobenzene	ND	1.0
75-71-8	Dichlorodifluoromethane	ND	1.0
75-34-3	1,1-Dichloroethane	ND	1.0
107-06-2	1,2-Dichloroethane	ND	1.0
75-35-4	1,1-Dichloroethene	ND	1.0
156-60-5	trans-1,2-Dichloroethene	ND	1.0
78-87-5	1,2-Dichloropropane	ND	1.0
10061-01-5	cis-1,3-Dichloropropene	ND	1.0
10061-02-6	trans-1,3-Dichloropropene	ND	1.0
75-09-2	Methylene chloride	ND	1.0
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0
127-18-4	Tetrachloroethene	ND	1.0
71-55-6	1,1,1-Trichloroethane	ND	1.0
79-00-5	1,1,2-Trichloroethane	ND	1.0
79-01-6	Trichloroethene	ND	1.0
75-69-4	Trichlorofluoromethane	ND	1.0
75-01-4	Vinyl chloride	ND	1.0

All results reported in micrograms per liter (ug/L).

OTES AND DEFINITIONS FOR THIS REPORT

All compounds analyzed using EPA Method 601 from Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, U.S. E.P.A., Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, July 1982

ND = Not detected
NA = Not analyzed
BQL = Compound detected below minimum quantitation limit

AMPLE ID MW#2 FRACTION 020 TEST CODE 601602 NAME GC VOLATILE ORGANICS
Date & Time Collected 08/15/88 Category GROUNDWATER

ANALYST JAM DATE ANALYZED 08/27/88 FILE #
INSTRUMENT GC # 2 FACTOR 1.0 VERIFIED KES

EPA Method 601
PURGEABLE HALOCARBONS

CAS#	COMPOUND	RESULT	DETECTION LIMIT
75-27-4	Bromodichloromethane	ND	1.0
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	1.0
56-23-5	Carbon tetrachloride	ND	1.0
108-90-7	Chlorobenzene	ND	1.0
75-00-3	Chloroethane	ND	1.0
100-75-8	2-Chloroethylvinyl ether	ND	1.0
67-66-3	Chloroform	ND	1.0
74-87-3	Chloromethane	ND	1.0
124-48-1	Dibromochloromethane	ND	1.0
95-50-1	1,2-Dichlorobenzene	ND	1.0
541-73-1	1,3-Dichlorobenzene	ND	1.0
106-46-7	1,4-Dichlorobenzene	ND	1.0
75-71-8	Dichlorodifluoromethane	ND	1.0
75-34-3	1,1-Dichloroethane	ND	1.0
107-06-2	1,2-Dichloroethane	ND	1.0
75-35-4	1,1-Dichloroethene	ND	1.0
156-60-5	trans-1,2-Dichloroethene	ND	1.0
78-87-5	1,2-Dichloropropane	ND	1.0
10061-01-5	cis-1,3-Dichloropropene	ND	1.0
10061-02-6	trans-1,3-Dichloropropene	ND	1.0
75-09-2	Methylene chloride	ND	1.0
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0
127-18-4	Tetrachloroethene	ND	1.0
71-55-6	1,1,1-Trichloroethane	ND	1.0
79-00-5	1,1,2-Trichloroethane	ND	1.0
79-01-6	Trichloroethene	ND	1.0
75-69-4	Trichlorofluoromethane	ND	1.0
75-01-4	Vinyl chloride	ND	1.0

All results reported in micrograms per liter (ug/L).

NOTES AND DEFINITIONS FOR THIS REPORT

All compounds analyzed using EPA Method 601 from Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, U.S. E.P.A., Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, July 1982

ND = Not detected
NA = Not analyzed
BQL = Compound detected below minimum quantitation limit

ceived: 08/15/88 Results by Sample

MPLE ID MW#3 FRACTION 03D TEST CODE 601602 NAME GC VOLATILE ORGANICS
Date & Time Collected 08/15/88 Category GROUNDWATER

ANALYST JAM DATE ANALYZED 08/27/88 FILE # _____
INSTRUMENT GC # 2 FACTOR 1.0 VERIFIED KES

EPA Method 601
PURGEABLE HALOCARBONS

CAS#	COMPOUND	RESULT	DETECTION LIMIT
75-27-4	Bromodichloromethane	ND	1.0
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	1.0
56-23-5	Carbon tetrachloride	ND	1.0
108-90-7	Chlorobenzene	ND	1.0
75-00-3	Chloroethane	ND	1.0
100-75-8	2-Chloroethylvinyl ether	ND	1.0
67-66-3	Chloroform	ND	1.0
74-87-3	Chloromethane	ND	1.0
124-48-1	Dibromochloromethane	ND	1.0
95-50-1	1,2-Dichlorobenzene	ND	1.0
541-73-1	1,3-Dichlorobenzene	ND	1.0
106-46-7	1,4-Dichlorobenzene	ND	1.0
75-71-8	Dichlorodifluoromethane	ND	1.0
75-34-3	1,1-Dichloroethane	ND	1.0
107-06-2	1,2-Dichloroethane	ND	1.0
75-35-4	1,1-Dichloroethene	ND	1.0
156-60-5	trans-1,2-Dichloroethene	ND	1.0
78-87-5	1,2-Dichloropropane	ND	1.0
10061-01-5	cis-1,3-Dichloropropene	ND	1.0
10061-02-6	trans-1,3-Dichloropropene	ND	1.0
75-09-2	Methylene chloride	ND	1.0
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0
127-18-4	Tetrachloroethene	ND	1.0
71-55-6	1,1,1-Trichloroethane	ND	1.0
79-00-5	1,1,2-Trichloroethane	ND	1.0
79-01-6	Trichloroethene	ND	1.0
75-69-4	Trichlorofluoromethane	ND	1.0
75-01-4	Vinyl chloride	ND	1.0

All results reported in micrograms per liter (ug/L).

OTES AND DEFINITIONS FOR THIS REPORT

All compounds analyzed using EPA Method 601 from Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, U.S. E.P.A., Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, July 1982

ND = Not detected
NA = Not analyzed
BQL = Compound detected below minimum quantitation limit

MPLE ID MW84 FRACTION 04D TEST CODE 601602 NAME GC VOLATILE ORGANICS
Date & Time Collected 08/15/88 Category GROUNDWATER

ANALYST JAM DATE ANALYZED 08/27/88 FILE # _____
INSTRUMENT GC # 2 FACTOR 1.0 VERIFIED KES

EPA Method 601
PURGEABLE HALOCARBONS

CAS#	COMPOUND	RESULT	DETECTION LIMIT
75-27-4	Bromodichloromethane	ND	1.0
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	1.0
56-23-5	Carbon tetrachloride	ND	1.0
108-90-7	Chlorobenzene	ND	1.0
75-00-3	Chloroethane	ND	1.0
100-75-8	2-Chloroethylvinyl ether	ND	1.0
67-66-3	Chloroform	ND	1.0
74-87-3	Chloromethane	ND	1.0
124-48-1	Dibromochloromethane	ND	1.0
95-50-1	1,2-Dichlorobenzene	ND	1.0
541-73-1	1,3-Dichlorobenzene	ND	1.0
106-46-7	1,4-Dichlorobenzene	ND	1.0
75-71-8	Dichlorodifluoromethane	ND	1.0
75-34-3	1,1-Dichloroethane	ND	1.0
107-06-2	1,2-Dichloroethane	ND	1.0
75-35-4	1,1-Dichloroethene	ND	1.0
156-60-5	trans-1,2-Dichloroethene	ND	1.0
78-87-5	1,2-Dichloropropane	ND	1.0
10061-01-5	cis-1,3-Dichloropropene	ND	1.0
10061-02-6	trans-1,3-Dichloropropene	ND	1.0
75-09-2	Methylene chloride	ND	1.0
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0
127-18-4	Tetrachloroethene	ND	1.0
71-55-6	1,1,1-Trichloroethane	ND	1.0
79-00-5	1,1,2-Trichloroethane	ND	1.0
79-01-6	Trichloroethene	ND	1.0
75-69-4	Trichlorofluoromethane	ND	1.0
75-01-4	Vinyl chloride	ND	1.0

All results reported in micrograms per liter (ug/L).

NOTES AND DEFINITIONS FOR THIS REPORT

All compounds analyzed using EPA Method 601 from Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, U.S. E.P.A., Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, July 1982

ND = Not detected
NA = Not analyzed
BQL = Compound detected below minimum quantitation limit

e 15 Tighe & Bond REPORT Work Order # 88-08-225
eived: 08/15/88 Results by Sample

PLE ID MW#5 FRACTION 050 TEST CODE 601602 NAME GC VOLATILE ORGANICS
Date & Time Collected 08/15/88 Category GROUNDWATER

ANALYST JAM DATE ANALYZED 08/27/88 FILE # _____
INSTRUMENT GC # 2 FACTOR 1.0 VERIFIED KES

EPA Method 601
PURGEABLE HALOCARBONS

CAS#	COMPOUND	RESULT	DETECTION LIMIT
75-27-4	Bromodichloromethane	ND	1.0
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	1.0
56-23-5	Carbon tetrachloride	ND	1.0
108-90-7	Chlorobenzene	ND	1.0
75-00-3	Chloroethane	ND	1.0
100-75-8	2-Chloroethylvinyl ether	ND	1.0
67-66-3	Chloroform	ND	1.0
74-87-3	Chloromethane	ND	1.0
124-48-1	Dibromochloromethane	ND	1.0
95-50-1	1,2-Dichlorobenzene	ND	1.0
541-73-1	1,3-Dichlorobenzene	ND	1.0
106-46-7	1,4-Dichlorobenzene	ND	1.0
75-71-8	Dichlorodifluoromethane	ND	1.0
75-34-3	1,1-Dichloroethane	ND	1.0
107-06-2	1,2-Dichloroethane	ND	1.0
75-35-4	1,1-Dichloroethene	ND	1.0
156-60-5	trans-1,2-Dichloroethene	ND	1.0
78-87-5	1,2-Dichloropropane	ND	1.0
10061-01-5	cis-1,3-Dichloropropene	ND	1.0
10061-02-6	trans-1,3-Dichloropropene	ND	1.0
75-09-2	Methylene chloride	ND	1.0
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0
127-18-4	Tetrachloroethene	ND	1.0
71-55-6	1,1,1-Trichloroethane	ND	1.0
79-00-5	1,1,2-Trichloroethane	ND	1.0
79-01-6	Trichloroethene	ND	1.0
75-69-4	Trichlorofluoromethane	ND	1.0
75-01-4	Vinyl chloride	ND	1.0

All results reported in micrograms per liter (ug/L).

OTES AND DEFINITIONS FOR THIS REPORT

All compounds analyzed using EPA Method 601 from Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, U.S. E.P.A., Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, July 1982

ND = Not detected
NA = Not analyzed
BQL = Compound detected below minimum quantitation limit

PLE ID MW#5 FRACTION 050 TEST CODE 601602 NAME GC VOLATILE ORGANICS
Date & Time Collected 08/15/88 Category GROUNDWATER

ANALYST JAM DATE ANALYZED 08/27/88 FILE #
INSTRUMENT GC # 2 FACTOR 1.0 VERIFIED YES

EPA Method 602
PURGEABLE AROMATICS

CAS#	COMPOUND	RESULT	DETECTION LIMIT
71-43-2	Benzene	ND	1.0
108-90-7	Chlorobenzene	ND	1.0
95-50-1	1,2-Dichlorobenzene	ND	1.0
541-73-1	1,3-Dichlorobenzene	ND	1.0
106-46-7	1,4-Dichlorobenzene	ND	1.0
100-41-4	Ethylbenzene	ND	1.0
108-88-3	Toluene	ND	1.0

All results reported in micrograms per liter (ug/L).

OTES AND DEFINITIONS FOR THIS REPORT

All compounds analyzed using EPA Method 602 from Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, U.S. E.P.A., Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, July 1982

ND = Not detected
NA = Not analyzed
SQL = Compound detected below minimum quantitation limit
B = Analyte detected in the laboratory blank

APPENDIX 2
WESTFIELD AQUIFER PROTECTION REGULATIONS

APPENDIX 2A
ORDINANCE No. 900; MARCH 21, 1985

ORDINANCE NO. 900 MAC REPLACES 7

CITY OF WESTFIELD

IN CITY COUNCIL MARCH 21, 1985

AN ORDINANCE AMENDING THE CODE OF ORDINANCES, CITY OF WESTFIELD, ADOPTED JANUARY 21, 1971.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF WESTFIELD, AS FOLLOWS:

That Appendix B-Zoning, Section 3A. Definitions, be amended by inserting therein the following:

Aquifer: Geologic formation composed of rock or sand and gravel that contains significant amounts of potentially recoverable potable water.

Groundwater: All the water found beneath the surface of the ground.

Hazardous Waste: A waste which is hazardous to human health or the environment as designated by the U.S. Environmental Protection Agency under40 CFR250 and the Regulations of the Massachusetts Hazardous Waste Management Act, M.G.L., Chapter21C.

Impervious Surfaces: Materials or structures on or above the ground that do not allow precipitation to infiltrate the underlying soil.

Leachable Wastes: Waste materials including solid wastes, sludge and pesticide and fertilizer wastes capable of releasing water-borne contaminants to the environment.

Trucking or Bus Terminal: Area used for loading, parking, storage, or repair of commercial vehicles used for motor freight or passenger transportation not including vehicles which are accessory to a permitted use.

Primary Aquifer Recharge Area: Areas which are underlain by surficial geologic deposits including glaciofluvial or lacustrine stratified drift deposits or alluvium or swamp deposits, and in which the prevailing direction of groundwater flow is toward the area of influence of water supply wells.

That Appendix B-Zoning, Section7C. Planned Unit Development Requirements, be amended by striking said Section7C.2. in its entirety and substituting in place thereof the following Section7C.2:

2. The tract shall be in common ownership or control and the plan for the tract shall be subject to the approval by the Planning Board under the Westfield Subdivision Regulations.

In each district in which a Planned Unit Development may be allowed, the following shall be the minimum area upon which a Planned Unit Development may be permitted:

Agriculture -	10	Contiguous Acres
Residence A -	10	Contiguous Acres
Residence B -	10	Contiguous Acres
Residence C -	10	Contiguous Acres
Business A -	5	Contiguous Acres
Business A1 -	5	Contiguous Acres
Business B -	5	Contiguous Acres
Business B1 -	5	Contiguous Acres
Industrial -	5	Contiguous Acres
Industrial - Limited	5	Contiguous Acres

That Appendix B-ZONING, Section 19, be amended by adding the following:

Section 19D. Aquifer Protection District.

1. Purpose

To promote the health, safety and welfare of the community by protecting and preserving the groundwater resources of Westfield from any use of land or structures which reduce the quality or quantity of its water resources.

2. Scope of Authority

The Aquifer Protection District is an overlay district and shall be superimposed on the other districts established by this ordinance. All uses, dimensional requirements and other provisions of the Westfield Zoning code applicable to such underlying districts shall remain in force and effect, except that where the Aquifer Protection District imposes greater or additional restrictions and requirements, such restrictions or requirements shall prevail. Any uses not permitted in underlying districts shall remain prohibited.

3. Establishment of District

The Aquifer Protection District is herein established to include all specified lands within the City of Westfield. The intent of the Aquifer Protection District is to include lands lying within the primary recharge areas of groundwater aquifers which provide public water supply The map entitled "Aquifer Protection District, City of Westfield", on file with the City Clerk, delineates the boundaries of the district.

Where the bounds delineate are in doubt or in dispute, the burden of proof shall be upon the owner(s) of the land in question to show where they should be properly located. At the request of the owner(s) the City may engage a professional hydrogeologist to determine more accurately the location and extent of an aquifer or primary recharge area, and may charge the owner(s) for all or part of the cost of the investigation.

4. Prohibited Uses

a. Business and industrial uses, not agricultural, which manufacture, process, store or dispose of hazardous materials or wastes as a principal activity, including but not limited to metal plating, chemical manufacturing, wood reserving and furniture stripping.

b. Trucking or bus terminals, motor vehicle gasoline sales.

c. Car washes, except when located on public water and sewer.

d. Solid waste landfills, dumps, junk and salvage yards, with the exception of the disposal of brush and stumps.

e. Business and industrial uses, not agricultural, which involve the on-site disposal of process wastes from operations.

f. Disposal of liquid or leachable wastes, except for:

(1) the installation or enlargement of a subsurface waste disposal system for a residential dwelling, and;

(2) agricultural operations, including land application and storage of manure, and;

(3) Business or industrial uses which involve the on-site disposal of wastes from personal hygiene and food preparation for residents, patrons and employees.

g. Underground storage of oil, gasoline or other petroleum products excluding liquefied petroleum gases, unless such storage shall meet all requirements for secondary containment specified in 310 CMR 30.693.

h. Underground transmission of oil, gasoline or petroleum products excluding liquefied petroleum gases.

i. Stockpiles for roadsalt or other de-icing materials or disposal of salt-laden snow.

j. Outdoor storage of pesticides or herbicides.

k. The use of septic system cleaners which contain toxic chemicals, including but not limited to methylene chloride and 1-1-1 trichlorethane.

5. Restricted Uses

a. Excavation for removal of earth, sand, gravel and other soils shall not extend closer than five (5) feet above the annual high groundwater table. This section shall not apply to uses incidental to permitted use, including but not limited to providing for the installation or maintenance of structural foundations, freshwater ponds, utility conduits or on-site sewage disposal.

(1) Access road(s) to extractive operation sites shall include a gate or other secure mechanism to restrict public access to the site.

b. The use of sodium chloride for ice control shall be minimized, consistent with public highway safety requirements.

c. Commercial fertilizers, pesticides, herbicides, or other leachable materials shall not be used in amounts which result in groundwater contamination.

d. Above ground storage tanks for oil, gasoline or other petroleum products shall be placed within a building or placed on a diked, impermeable surface to prevent spills or leaks from reaching groundwater.

6. Area Regulations

a. In areas within the district which are not served by municipal sewerage systems, the minimum allowable lot size shall be 40,000 square feet.

b. For Planned Unit and Condominium Developments the maximum number of units in the development shall be computed by multiplying the total tract area (less wetlands) by 1.00 dwelling units per acres.

7. Drainage

a. All runoff from impervious surfaces shall be recharged on the site by being diverted toward areas covered it vegetation for surface infiltration to the extent possible. Stormwater infiltration basins must be designed to handle a 25-year storm. Dry wells shall be used only where other methods are infeasible, and shall be preceded by oil, grease and sediment traps to facilitate removal of contamination. Any and all recharge areas shall be permanently maintained in full working order by the owner.

8. Uses by Special Permit

The Planning Board shall act as Special Permit Granting Authority for this section of the ordinance

The following uses may be permitted by the Planning Board in accordance with these regulations and the regulations appearing in Section 6-3 thru 6-7 of this ordinance.

a. Business, residential,and industrial activities permitted in the underlying district (either by matter of right or by special permit) shall file application for a special permit.

(1) Procedure: In addition to meeting the requirements of Section 6 of this ordinance, the applicant must file, with the Planning Board, six (6) copies of a site plan, as outlined below.

(a) Said application and plan shall be prepared in accordance with the data requirements of the proposed development, including but not limited to:
A site plan, which shall show, but not be limited to:

provisions to prevent contamination of groundwater by petroleum products, hazardous materials or wastes
drainage recharge features and provisions to prevent loss of recharge
provisions to control soil erosion and sedimentation
provisions to prevent soil compaction
provisions to prevent seepage from sewer pipes

A complete list of chemicals, pesticides, fuels and other potentially hazardous materials to be used or stored on the premises in quantities greater than those associated with normal household use. Those businesses using or storing such hazardous materials shall file a definitive operating plan, which shall comply with the Design and Operations Guidelines specified in Section 19D-9 of this ordinance.

Evidence of compliance with the Regulations of the Massachusetts Hazardous Waste Management Act 310 CMR 30.
(b) The Planning Board shall refer, within 24 hours of receipt, copies of the application to the Board of Health, Conservation Commission, and the City Engineer, which shall review the application and following a vote of the Board/Department shall submit their recommendation and comments to the Planning Board. Failure of Boards/Departments to make recommendations within 60 days of the referral of the application shall be deemed to be lack of opposition.

After notice and public hearing, and after due consideration of the reports and recommendations of the Boards/Departments, the Planning Board may grant such a Special Permit provided that it finds that the proposed use:

is in harmony with the purpose and intent of this ordinance and will promote the purposes of the Aquifer Protection District;

is appropriate to the natural topography, soils and other characteristics of the site to be developed;

has adequate public sewerage and water facilities;

will not, during construction or thereafter, have an adverse environmental impact on groundwater resources in the district;

will not adversely affect the existing or potential quality and quantity of water in the Aquifer Protection District.

9. Design and Operations Guidelines

The Board of Health shall be charged with the enforcement of this section, 19-D-9.

Businesses and industries shall make provisions to protect against toxic or hazardous materials discharge or loss resulting from corrosion, accidental damage, spillage or vandalism including but not limited to the following:

I. Spill containment and clean-up provisions to prevent hazardous material spillage to the environment

II. Provisions for the prevention of corrosion and leakage of containers storing hazardous materials

III. Provisions for indoor, secured storage of hazardous materials and accumulated hazardous wastes, and for protection from vandalism

IV. Provisions for impervious floor surfaces where hazardous materials are used or stored with no drainage discharge to the environment

10. Nonconforming Uses

Nonconforming uses which were lawfully existing, begun or in receipt of a building or special permit, prior to the first publication of notice of public hearing for this ordinance, may be continued. Such nonconforming uses may be extended or altered, as specified in Mass. General Laws, Ch. 40a, Sec. 6, provided that there is a finding by the Board of Appeals that such change does not increase the danger of groundwater pollution from such use.

Applicants shall follow procedures specified in Section 19-D-8 of this ordinance.

Presented to the Mayor
For approval April 23, 1985
City Clerk

APPROVED BY THE MAYOR
April 23 19 85
MAYOR

A TRUE COPY ATTEST
CITY CLERK

APPENDIX 2B
ORDINANCE No. 913; FEBUARY 20, 1986

ORDINANCE NO. 913

CITY OF WESTFIELD

IN CITY COUNCIL February 20, 1986

AN ORDINANCE AMENDING THE CODE OF ORDINANCES, CITY OF WESTFIELD, ADOPTED JANUARY 21, 1971.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF WESTFIELD, AS FOLLOWS:

That Chapter 8 be amended by adding the following:

Article XII. Underground Storage and Hazardous Material Regulations

Section 8-212: Authority

The City of Westfield adopts the following measures under its home rule powers, its police powers to protect the public health and welfare, and its authority under MGL Chapter 40, Section 21.

Section 8-213: Definitions

A. Discharge: the spilling, leaking, pumping, emitting, or dumping of toxic or hazardous materials upon or into any land or waters of the City of Westfield.

B. Hazardous Material: any substance with such physical, chemical, or infectious characteristics as to pose a potential hazard to existing or potential water supplies or to human health. Hazardous materials include, but are not limited to, toxic chemicals,road salt, heavy metals, radioactive or infectious wastes, acids and alkalies, and products including, but not limited to, pesticides, petroleum products, herbicides, solvents, and thinners.

C. Underground Storage: storage below ground level but not including storage in a free-standing container within a building.

Section 8-214: Prohibitions

A. The discharge of hazardous materials within the City of Westfield is prohibited with the following conditions:

1. Disposal of sanitary sewage to subsurface sewage disposal systems approved under Title 5 of the Massachusetts Environmental Code or to a wastewater treatment facility.

2. Application of fertilizers and pesticides in accordance with label recommendations and with regulations of the Massachusetts Pesticide Control Board.

3. Application of roadsalts or other deicing chemicals provided that such use is minimized and consistent with public highway safety standards.

4. Proper disposal of acceptable materials at facility or site which has received and maintained all legal approvals as specified in the Massachusetts Hazardous Waste Management Act, MGL, Ch. 21C Section 7.

B. The use of septic system cleaners containing toxic or hazardous materials is prohibited.

Section 8-215: Hazardous Material Registration and Controls

A. Every owner, or operator of a commercial, industrial or agricultural operation storing hazardous materials in quantities totaling more than 50 gallons liquid volume or 25 pounds dry weight shall register with the Board of Health a description of the types and quantities of hazardous materials stored, and the location and method of storage. Registration required by this subsection shall be submitted within sixty (60) days of the effective date of this ordinance, and annually thereafter.

B. The Board of Health may require that an inventory of hazardous materials be maintained on the premises and be reconciled with purchase, use, sales, and disposal records on a monthly basis.

C. Hazardous materials shall be stored in product-tight storage containers and shall be removed and disposed of in accordance with the Massachusetts Hazardous Waste Management Act, MGL, Ch. 21C.

D. The Board of Health shall require that containers of hazardous materials be stored on an impervious, chemical-resistant surface, that the storage area be enclosed with an impermeable dike, and that the containers be protected from weather, vandalism, corrosion and leakage.

Section 8-216: Permits for Existing and New Underground Storage Tanks

A. Every owner of an underground storage container for hazardous materials including petroleum products shall apply to the Board of Health for a permit to maintain a storage facility. Application shall be made within sixty (60) days of the effective date of this ordinance and shall contain the following information:

1) Name, address and telephone numbers of the owner and operator;
2) The type of materials stored;
3) Tank size and construction type for tank and piping;
4) Evidence of the date of installation and warranty;
5) Plot plan of the site, including location of the tank, pumping components, and any wells or water

B. Subsequent to the effective date of this ordinance, no new underground storage containers shall be installed unless the owner shall have first obtained a permit from the Board of Health. If the Board of Health determines that the proposed storage container constitutes a danger to a water supply, water body, public health or safety, the Board may deny the permit or may grant it subject to conditions which the Board determines are necessary.

C. These permits shall be in addition to any license or permit required by MGL, Chapter 148, as amended, or by any regulation issued thereunder. The fee for this permit, payable to the City of Westfield shall be ten dollars.

D. If the ownership of any underground storage tank is transferred, The new owner shall notify the Board of Health within ten working days.

Section 8-217: Underground Storage Tank Installation and Construction Standards

A. New underground storage containers shall be installed by a manufacturer's approved installation contractor in the presence of the head of the fire department or his agent. Newly installed underground storage containers shall be surrounded by at least twelve (12) inches of clean sand which shall also be placed between the tank and a firm base. Prior to covering, all newly installed underground storage containers shall be hydrostatically tested. Newly installed underground storage containers shall be protected from internal and external corrosion and shall be of a design approved by the Board of Health and the head of the fire department. The following container construction systems are considered to provide adequate corrosion protection:

1. UL-listed fiberglass reinforced plastic (FRP);

2. UL-listed steel tanks provided with cathodic protection;

3. UL-listed steel tanks with bonded fiberglass coating;

4. UL-listed double-walled steel tanks with cathodic protection or bonded fiberglass coating;

5. Other container construction providing equal or better protection against leakage than the above mentioned containers and approved by the Board of Health and the head of the fire department.

Section 8-218: Testing of Underground Storage Tanks

A. All underground storage containers shall be tested 15 years after installation date, and annually beginning:

1) Upon expiration of the tank manufacturer's warranty;
2) If no warranty exists, 15 years after the installation date;
3) If no satisfactory evidence of the installation date exists, annual testing shall begin upon order of the Board of Health.

It is strongly recommended that underground tanks be removed following expiration of manufacturer's warranty or twenty years after installation. All testing of underground storage containers shall be administered by qualified persons approved by the Board of Health, which shall be notified prior to administering a test. The owner of an underground storage container shall, within one week of their receipt, supply to the Board of Health and to the head of the fire department a certified copy of all test results. Acceptable tests shall include:

1. Submission of Petro-Tite (Kent-Moore) Pressure Test results;

2. Submission of certified daily inventory records or automatic metering records which have undergone a leak detection statistical analysis a professionally qualified person who has been approved by the Board of Health.

3. Submission of results of other test system approved by Board of Health.

If any of the testing specified in this subsection discloses a leak, the owner of the storage container shall immediately comply with the requirements of Sections 8 and 9 of this ordinance. If any owner fails or refuses to complete a required test, the Board of Health may require repair or removal of the container.

Section 8-219: Report of Leaks or Spills

A. Any person who is aware of any spill or loss of a toxic or hazardous material shall report such spill or loss immediately to the head of the fire department, and within two (2) hours to the Board of Health.

Section 8-220: Removal or Repair of Underground Storage Tanks

A. All leaking storage containers must be emptied by the owner or operator within 24 hours of leak detection and removed or repaired by the owner or operator as specified by the Board of Health.

B. No underground storage container shall be removed, or repaired unless the Board of Health has issued written instructions to protect public health and safety during the removal or repair, or unless the head of the fire department or Board of Health determine that an emergency exists.

C. All underground storage containers which the owner has decided to take out of service for a period of less than six (6) months shall promptly notify the Board of Health of the decision and, subject to the directions of the head of the fire department, have all the product and vapors removed from the container. Before any such container may be restored to service, the owner shall notify the Board of Health and the fire department which may require that the owner have the container tested, at the owner's expense. Any owner of a container which has been or will be out of service for a period greater than six (6) months shall, subject to the directions of the head of the fire department, have all the product and vapors removed from the container, and have the container removed or filled with inert material, and have the fill pipe removed or capped.

Section 8-221: Enforcement

A. The Board of Health and its agents may enter upon privately-owned property for the purpose of performing their duties under this ordinance.

B. Any person who violates any provision of this ordinance shall be punished by a fine of not more than $300. Each day or portion thereof during which a violation continues shall constitute a separate offense. If more than one, each condition violated shall constitute a separate offense. Upon request of the Board of Health, the City Council and the City Solicitor shall take such legal action as may be necessary to enforce this ordinance.

Section 8-222: Costs

A. In every case the owner shall assume responsibility for costs incurred necessary to comply with this ordinance.* The Board of Health may charge the owner for expenses incurred in the enforcement of this ordinance.

* The owner shall be responsible for all costs of recovering and properly disposing of any product that has leaked and for all costs of restoring the environment, including groundwater and surface water to an acceptable condition.

Section 8-223: Variances

A. The Board of Health may with approval of the City Council vary the application of any provision of this ordinance, unless otherwise required by law, in any case when, in its opinion, the applicant has demonstrated that an equivalent degree of environmental protection required under this ordinance will still be achieved.

B. In granting a variance, the Board of Health will take into consideration the direcion of the groundwater flow, soil conditions, depth to groundwater, size, shape, and slope of the lot, and existing and future water supplies.

C. Any denial of a variance shall be in writing and shall contain a brief statement of the reasons for the denial.

Section 8-224: Severability

A. The invalidity of any provision of this ordinance shall not affect the validity of the remainder.

Presented to the Mayor
For approval April 3, 1986
City Clerk

APPROVED BY THE MAYOR
April 3, 1986
George A. Hoyle
MAYOR