# Environmental
## PRODUCTS & SERVICES, INC.

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December 6, 1995

Mr. Jason Feingold
Project Engineer, Sites Management Section
Hazardous Materials Management Division
State Of Vermont Department Of Environmental Conservation
103 South Main Street/West Building
Waterbury, Vermont 05671-0404

RE: Cumberland Farms, Inc., Lyndonville, Vermont, Site #95-1803

Dear Mr. Feingold:

Enclosed is a copy of the report detailing the Subsurface Hydrogeological Investigation performed by Environmental Products & Services for Cumberland Farms, Inc. at the above site. Our client has instructed us to forward this document to you for your review.

You may contact me with any questions or comments at 862-1212 or FAX at 860-7445.

Sincerely,

Marcia G. Wolosz, Project Coordinator/Geologist
/Enc.

cc: Mr. William Lovely, Project Manager, Cumberland Farms, Inc.

*CUMBERLAND FARMS, INC.*
*Village Of Lyndonville, Town Of Lyndon, Caledonia County, Vermont*
*Vermont DEC Site #95-1803*

# *SUBSURFACE HYDROGEOLOGICAL INVESTIGATION*
*September/October 1995*

**DATED:**
**November 9, 1995**

**Prepared For:**

**Mr. William Lovely**
**Cumberland Farms, Inc.**
**777 Dedham Street**
**Canton, Massachusetts 02021**

**Prepared By:**

**ENVIRONMENTAL PRODUCTS & SERVICES, INC.**
**2 Flynn Avenue**
**Burlington, Vermont 05401**

Environmental
PRODUCTS & SERVICES, INC.

*CUMBERLAND FARMS, INC.*
*Village Of Lyndonville, Town Of Lyndon, Caledonia County, Vermont*
*Vermont DEC Site #95-1803*

*SUBSURFACE HYDROGEOLOGICAL INVESTIGATION*
*September/October 1995*

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*Village Of Lyndonville, Town Of Lyndon, Caledonia County, Vermont*
*Vermont DEC Site #95-1803*

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## APPENDIX



###

*CUMBERLAND FARMS, Inc.*
*Broad Street*
*Village Of Lyndonville, Caledonia County, Vermont*
*Vermont DEC Site #95-1803*

# *SUBSURFACE HYDROGEOLOGICAL INVESTIGATION*
# *September 21, 1995*

## 1.0 INTRODUCTION

### 1.1 Project Background

The Village of Lyndonville was in the process of replacing a municipal sewer system in the early summer of 1995 when petroleum contamination was encountered in the presumed downgradient direction from the Cumberland Farms, Inc. Gas Station/Convenience Store (CFI) and the adjacent Carmen's Ice Cream.

The Vermont Department of Environmental Conservation, Sites Management Section (DEC-SMS) responded to these findings with a site walkover on June 27, 1995. It was conducted by Mr. Tim McNamara, a UST inspector for the DEC-SMS. After visiting the site, the DEC-SMS requested that CFI perform a site investigation on their property. Cumberland Farms therefore contracted with Environmental Products & Services, Inc. (EP&S) to carry out the necessary investigation.

### 1.2 Project Objective

When hydrocarbons are suspected of being in the subsurface, an investigation is required to assess the nature, extent and potential impact of the contamination. Mr. Feingold stated that it would be necessary for Cumberland Farms to:

- Define the source of the petroleum contamination, and all possible preferential pathways for contaminant migration;
- Define the degree and extent of contamination to the soil;
- Determine the degree and extent of contamination, if any, to the groundwater;
- Perform an assessment of the site to determine the potential for sensitive receptors to be impacted by the contamination;
- Determine the origin and previous use of the abandoned iron utility pipe found in the Broad Street excavation;

- Determine the need for a long term treatment and/or monitoring plan which addresses any identified contamination present at the site.

### 1.3 Scope Of Work

In order to meet the goals outlined above, EP&S developed the following work plan:

- Advance three soil borings;
- Examine the composition and texture of the subsurface soils;
- Obtain representative soil samples at five foot intervals below the surface up to and including penetration of the saturated zone;
- Analyze the soils for vapor phase contamination;
- Install three monitoring wells in the boreholes;
- Develop the monitoring wells;
- Survey the monitoring well locations and elevations;
- Obtain groundwater elevations;
- Obtain representative groundwater samples for laboratory analysis of target compounds;
- Construct a groundwater flow map, appropriate dissolved phase contamination maps, and site maps to assess site hydrogeology;
- Research the local geology, topography, and hydrology;
- Research the site history and surrounding area;
- Research the location of subsurface utility, water and sewer lines.

This proposed scope of work was accepted by Mr. Feingold on behalf of the DEC-SMS on September 15, 1995.

# 2.0 PHYSICAL SETTING

## 2.1 Site Location

The Cumberland Farms, Inc. Gas Station and Convenience Store operation is located on Broad Street (Vermont State Route 5) in the Village Of Lyndonville, Town Of Lyndonville, Caledonia County, Vermont. Lyndonville is approximately 7 miles north of St. Johnsbury, Vermont, 20 miles west of the New Hampshire border, and 35 miles south of the U.S./Canadian border.

## 2.2 Site History

The site under investigation has been owned by Cumberland Farms since the early 1980s. Historically, the property has served as a gas station.

As outlined in Mr. McNamara's report, CFI installed a total of 3 steel underground storage tanks (USTs) on thier property in 1983. The tanks are tightness tested annually and inventory records are monitored on a regular basis to detect any product releases. The tanks were last tested on April 26, 1995. Mr. McNamara's review of several months of the most recent inventory records did not reveal "any obvious continuing patterns of product loss".

## 2.3 Neighboring Sites

As the main thoroughfare through the Village of Lyndonville, Broad Street contains a mix of residential and small commercial enterprises. CFI's property is bounded to the north by Carmen's Ice Cream. As described in the DEC-SMS correspondence, the building is a former freight station currently owned by the Canadian Pacific Railroad Corporation (CPRC). Mr. Nate Fournier and Mrs. Fran Fournier, operators of Carmen's, are renting the facility from the CPRC, but are in the process of purchasing the property.

Private residencs are found along the south and west sides of Broad Street. Toward the northwest are small shops and professional offices. The U.S. Post Office is situated on the northwest corner of Broad Street and Center Streets. A few doors north of the Post Office is Western Auto, which was a gas station at one time. Adjacent to Carmen's Ice Cream on its northern boundary is a park area that includes a tourist information bulletin board.

The CPRC railroad tracks and right-of-way bound the CFI property to the east. A freight train was observed passing through the area while site work was being conducted.

## 2.4 Water, Sewer And Other Underground Utilities

The Village of Lyndonville's major conduits for potable water, sanitary and storm sewer services lie beneath the surface of Broad Street. The water main is situated along the center of the main street. The pipes are buried to a depth of approximately 6 ft. to 8 ft. below surface grade (bsg). The newly installed sanitary sewer line parallels the west side of Broad Street.

Storm sewers currently flow into the Village's sewage treatment plant, located about a mile to the south of the site, but will soon be separated once the new construction is completed. Storm drainage will discharge into the Passumpsic River. A storm sewer grate is located at the northwestern edge of the CFI property, at a distance of about 50 ft. away from the convenience store. Mr. McNamara of the VTDEC had noted in his report that when the new sewer trench was dewatered, the discharge ran into this storm drain.

The Village has no maps that specifically show the location of underground municipal lines. The Assistant Foreman, Mr. Scott Townsend, and Mr. Dennis Mixon, a Foreman for Leach Engineering, one of the Village's contractors, were able to inform EP&S about the presence of many old clay tile lines that were tied into the original sewer network. However, they could only guess at the location of most of these pipes. In fact, a one-inch diameter iron pipe was noted by Mr. McNamara to be sticking out of the excavation's east pit wall. Some thought it to be an old water main. Mr. Townsend said it might be related to the CPRC, which had installed its own network of subsurface lines when it owned most of the Village's property. However, Mr. Randy White, the Railroad's Roadmaster could not shed any light from the CPRC's perspective about the old pipes present in the area.

## 3.0 SURFICIAL SETTING

### 3.1 Topography

The landscape of the Lyndonville area is described by moderate relief round hills and valleys. The highest point is Pudding Hill, 4.25 miles to the northeast. A benchmark indicates that the hill is 447 meters above sea level. The lowest point is found along the banks of the Passumpsic River. In the vicinity of the sewage treatment plant, the elevation decreases to 212.6 meters. The total relief for the area is 234 meters.

Small lakes and swamps left by melting glacial ice, as well as unconsolidated material carried by the glaciers and deposited when the ice melted are also characteristic of the topography in this area. As an example, an esker has also been mapped near the site. A gravel pit 3 miles to the northwest attests to the economic importance to the Lyndonville area of the unconsolidated material left by glacial meltwaters and later fluvial activity.

### 3.2 Drainage

Drainage of the area is accomplished by small brooks and streams flowing from the higher elevations in a dendritic pattern. The small glacially formed bodies of water, such as Chandler Pond and Bean Pond to the west are similarly being drained, contributing small tributary streams to the larger channels. Swamps dot the area; an example can be found in the vicinity of the sewage treatment plant.

The major river involved in this area of study is the Passumpsic River. It flows from north to south, beginning approximtely 1 mile to the north at the confluence of Miller Run from the

northwest and Quimby Brook from the northeast. The stream flows in a meandering pattern. Ultimately, the Passumpsic discharges into the Connecticut River, 5 miles south of St. Johnsbury.

### 3.3 Climate

The site under investigation is in the humid northeast United States, where rainfall occurs year round. As a result, precipitation is the primary source of recharge to the shallow aquifer. A range of 40 in. per year is common in the humid northeast. Water not entering the subsurface leaves the area as runoff.

## 4.0 GEOLOGY

### 4.1 Surficial Geology

Surficial deposits in and around the Village of Lyndonville are due to a combination of glacial and fluvial activities. Regionally, the CFI site is situated along the northeast edge of the northernmost extent of the Connecticut Valley Lake. This was part of a series of glacial and post-glaical lakes that covered the State of Vermont more than 11,000 years ago. Recent alluvium consisting of fluvial sands and gravels have local economic signficance. Gravels have also been deposited as a result of post-glacial fluvial processes. Well sorted sands defined by the absence of pebbles and boulders reflect littoral sediments deposited in a glaciolacustrine environment.

### 4.2 Bedrock Geology

The geologic setting for the Lyndonville area is the Connecticut Valley-Gaspe Synclinorium. The rocks are part of the Waits River Formation, which is comprised of quartzose and micaceous crystalline limestone. Interbeds of quartz-muscovite phyllite or schist are common features of the Waits River Formation. It is Lower Devonian in age. The Gile Mountain Formation is also locally present. In this unit, the main beds and the interbeds of the Waits River Formation are reversed. The CFI site may be underlain by the Standing Pond Volcanic Member of the Waits River. The volcanics are characterized by amphibolite-garnet schists, and pillow lava structures have been mapped near St. Johnsbury.

No outcrops were observed on site of Cumberland Farms or elsewhere in the area of investigation.

## 5.0 HYDROGEOLOGY

### 5.1 Unconsolidated Aquifer

The shallow aquifer underlying the CF site is comprised primarily of brown sands whose grains range in size from coarse to fine. The middle section (10 ft.-12 ft.) of the vertical interval examined contains the medium to coarser sands. The sediments become finer at the bottom of each borehole, where fine sands and silts predominate. There is evidence of graded bedding, particularly in MW #3, but the lack of a continuous section makes it difficult to see this in greater

detail. Overall, the stratigraphy of the shallow aquifer is consistent with a vertical profile representative of Recent stream deposits.

### 5.2 Bedrock Aquifer

Drilling operations did not penetrate deep enough into the bedrock to determine its hydrogeology since the deep aquifer was not a direct focus of this study. Refusal was not encountered in any of the boreholes during the course of this investigation, indicating that bedrock in this area lies deeper than the 19 ft. penetrated by the drill rig. However, a review of the literature indicates that the metamorphic rocks underlying the Lyndonville area do not contain primary porosity. Although the foliation found in the phyllites and schists can act as zones of weakness, other minerals are formed during metamorphism, filling any void spaces. Recrystallization of quartz and limestone would also obliterate any primary porosity. Therefore, the presence of a highly fractured media in the bedrock aquifer is not apparent from the published descriptions of these rocks.

### 5.3 Groundwater Flow

Hydraulic head measurements on October 30, 1995 ranged from 11.17 ft. to 12.57 ft. below the top of the PVC casing for an average water table elevation of 11.87 ft. below the top of casing. MWs #1 and #2 were about equal at 11.17 and 11.60 ft., respectively. MW #3 was slightly lower, at 12.57 ft. hydraulic head.

Groundwater flow calculated using the triangulation method shows that water in the subsurface flows to the southwest beneath the floodplain of the Passumpsic River. The groundwater eventually discharges into the main stream at a distance of approximately 1,000 ft. away from the site. The gradient is a shallow .013 ft./ft.

A velocity calculation based on knowledge of the gradient and estimated hydraulic conductivity of the aquifer materials indicates that water will flow through the unconsolidated well sorted medium and coarse grained sands at an average hydraulic conductivity of 0.371 ft./day. Projections for the fine sands and silts are .035ft./day. This suggests that groundwater will flow through the saturated zone at an average rate of 0.20 ft./day.

## 6.0 INVESTIGATION

### 6.1 Soil Borings

Advancement of three soil borings took place on September 21, 1995. Specific locations were sited by an EP&S Hydrogeologist. MW #1's location was chosen to reflect upgradient (background) conditions. MW #2 was installed in a downgradient location, at the western edge of the Cumberland Farms, Inc.'s property. A soil boring advanced in the area of the tank pit became MW #3.

A 4.25 inch (I.D.) hollow stem auger was used to create the borings through unconsolidated material. A split spoon sampler driven by a 140 pound weight was dropped from a height of thirty inches to obtain undistrubed soil samples from the intervals of 5-7 ft., 10-12 ft. and 15-17 ft. in all three boreholes. EP&S' Site Hydrogeologist documented a description of each sample according to the (Visual) Unified Soil Classification System. The number of hammer blows needed to drive the split spoon device 6-in., 12-in., 18-in., and 24-in. at each level was recorded to provide an indication of the characteristics of the soils being penetrated.

### 6.2 Soil Gas Analysis

An H-Nu meter with a 10.2 e.V. lamp and calibrated with Isobutylene was used for field analysis of the soils to detect the presence of vapor phase hydrocarbons. The soils were tested at the time they were brought to the surface by the split spoon device. A sample of the unconsolidated material was placed into a glass jar, sealed tightly and allowed to heat in a warm area. The H-Nu tip was then inserted into the headspace to determine the presence of volatile organic compounds. In addition, the breathing zone around the drilling area was monitored during borehole advancement.

### 6.3 Monitor Well Installation

A monitoring well was constructed in each of the boreholes as depicted in the "Drill Logs" section of this report. Each well was constructed of #10 (.010 in.) slot Schedule 40 PVC, 2 in. diameter screen that was joined to risers of the same material and diameter. The annular space around each well was filled with a #1 sized clean sand pack to filter out fine grained material from the well and to restore the natural flow of water in the aquifer. On average, 3 ft. of bentonite was put into each borehole to seal off each monitoring well and to provide protection against infiltration of surface water and potential contaminants. An 8 in. round curb box was emplaced at grade over each well for further protection and surrounded by a cement collar to carry runoff away from the well opening.

### 6.4 Well Development

Upon completion, the wells were purged to restore natural aquifer conditions prior to sampling. An airlift pump system powered by a Honda 5.5 portable generator was connected to a 1 in. solid PVC pipe which was lowered into the well to remove the groundwater. A clean flexible hose acted as the conduit between the pipe and the pump.

### 6.5 Well Surveying

The monitor well locations were surveyed and plotted on a base map. The casing elevations were then measured using an arbitrary elevation of 100.00 ft. to determine the height of the top of each well casing, with the reference point of measurement marked on each riser. The northwest corner of the convenience store building was used as the benchmark location.

### 6.6 Groundwater Elevations

Once the three wells had been completed, developed and surveyed, hydraulic head measurements were obtained, using a water sensitive tape. The depth of water was measured from the top of the casing, then subtracted from the casing height to calculate the groundwater elevations. The data was then plotted for presentation on a contour map to show the groundwater flow conditions at the site.

### 6.7 Groundwater Sampling, Analysis, And Observations

At the same time that water elevations were measured, representative water samples were evacuated from all of the wells. Each monitoring location was first purged of three well volumes to insure that only aquifer water would be available for sampling. The samples were sent to the Toxikon Corporation of Woburn, Massachusetts, following standard Chain of Custody procedures for analysis of Benzene, Toluene, Ethylbenzene and Xylene compounds. The analysis requested was a USEPA-Method 503.1 for Volatile Aromatic Unsaturated Organic Compounds. Testing for the presence of Methyl tert-butyl-ether (MTBE) was also requested. However, the laboratory performed a USEPA-Method 502.1 (Halogenated Hydrocarbons) analysis on the samples, instead of the requested Aromatic Hydrocarbon test. It was therefore necessary for EP&S to return to the site on October 30, 1995 to obtain a new round of water table measurements and samples for resubmission to Toxikon, and the appropriate analysis.
Identification of the gross type of petroleum hydrocarbons potentially present in the shallow aquifer was done using the Modified USEPA-Method 8100 Total Petroleum Hydrocarbon analysis from separate samples obtained from each of the three wells.

Lastly, the groundwater was observed for the presence of free phase floating product at the time of drilling and sampling.

## 7.0 SITE CONTAMINATION

### 7.1 Dissolved Phase Contamination:USEPA-Method 503.1/BTEX/MTBE

Analysis of representative groundwater samples from each of the three monitoring locations shows that MWs #2 and #3 had detectable levels of Benzene, Toluene, Ethylbenzene and Xylenes (Total) compounds. The highest dissolved phase concentration, 20,958 µg/l was found to be present in the former and present tank pit area, as represented by MW #3. MW #2 registered a total dissolved phase BTEX concentration of 480 µg/l.

At a site total of 10,240 µg/l, the Xylenes account for nearly 50% of the dissolved phase plume. The other main VOC contributor to the plume is the Toluene fraction, which comprises 31% of the hycrocarbons present. Ethylbenzene and Benzene each make up 6.6% and 0.12%, respectively. All other BTEX compounds totaled 2,800 µg/l for the site. MW #1 was found to be non-detect for all of the compounds targeted by the USEPA-Method 503.1 analysis.

Methyl tert-butyl-ether (MTBE) was below the limits of detection in all three monitoring locations.

### 7.2 Total Dissolved Phase Contamination:TPH By Modified USEPA-Method 8100

In addition to the Aromatic Hydrocarbon test performed on the groundwater samples, a Modified Total Petroleum Hydrocarbon test was run on a separate water sample obtained from each of the three wells. The purpose of this analysis was to "fingerprint" the gross type of petroleum contamination present within the subsurface.

The only petroleum hydrocarbon fuel that registered positively for the site was Gasoline. It was found to be present in MW #2 at a total concentration of 7.3 mg/l and in the dissolved phase of the tank pit area, as represented by MW #3, at a total of 43.8 mg/l. All other fuel parameters were below the limits of detection.

### 7.3 Vapor Phase Contamination

MWs #2 and #3 recorded concentrations of VOCs above background levels. The highest level of vapor phase contamination was noted from the soils of MW #2 at the 5 ft.-7 ft. (below surface grade) interval, where 1,500 ppm of VOCs were recorded. 500 ppm of vapor phase VOCs were noted from the 10 ft.-12 ft. interval. At the 15 ft.-17 ft. vertical section, a total of 12 ppm of VOCs were recorded.

The soil pores of MW #3 showed the highest VOC reading for that location in the 10 ft.-12 ft. bsg zone, where 170 ppm was noted. At 5 ft.-7 ft., 15 ppm of VOCs was measured from the soil pores, and none were recorded in the saturated zone of 15 ft.-17. ft. bsg.

MW #1 was non-detect for all vertical intervals subjected to headspace analysis.

### 7.4 Free Product Contamination

Free phase product floating on top of the water table was not observed at any time during site work, either during drilling operations, or at the time of both sampling events.

### 7.5 Nature Of Contamination

All of the BTEX compounds noted for this site are easily volatized. The dissolved phase BTEX contaminants will travel through the saturated zone along with the groundwater, which will tend to take a path of least resistance through aquifer materials. Higher permeability soils, such as coarse sands and gravels often backfilled into trenches where public service lines have been placed can enhance groundwater transport through an area. A highly mobile compound, such as MTBE can move at an even greater rate than the BTEXs and is therefore often found as the leading edge of a gasoline contaminant plume in more recent spill events.

For this reason, the target compounds are subjected to guidance values for groundwater and drinking waters by the State of Vermont, as shown in the following chart:

| Compound: | Drinking Water | Groundwater |
|---|---|---|
| Benzene | 1.0*/5.0 | 5 |
| Toluene | 1,000 | 2.42 |
| Ethylbenzene | 700 | 680 |
| Xylenes (Total) | 10,000 | 400 |
| MTBE | 40* | NL |

Notes: All levels in µg/l of Maximum Concentration Levels.
* = Vermont Health Advisory Level.
NL = Not Listed

## 8.0 CONCLUSIONS

### 8.1 Evaluation Of Site Conditions

Results of this investigation indicate that petroleum hydrocarbons are present on site of the CFI Gas Station/Convenience Store. The contaminants can be found in both the shallow groundwater and soils. The petroleum fuel responsible for site conditions has been identified as Gasoline. Only MW #3 reflects the presence of BTEX compounds at levels above the regulatory limits set by the State of Vermont for drinking water supplies and groundwater.

The plume is centered in the area where the underground storage tanks (USTs) are located. The majority of the BTEX compounds are found here, with a minor amount conentrated next to the pump islands at the Broad Steet edge of the property. Background results indicate that an upgradient source of petroluem hydrocarbons from the east does not appear to be a factor at this site.

The plume location and geometry are in keeping with what is known about the site's history. Petroleum contamination is not uncommon in areas where USTs have been stored, and is also usually noted adjacent to pump islands. The relative percentages of BTEX compounds found in the subsurface indicate that the hydrocarbons are representative of residual contamination. No free product was found on site, and the Benzene fraction of the plume is considerably lower than the other BTEX compounds, indicating that degradation has been going on for many years. The absence of the gasoline additive MTBE further points toward an older spill on the CFI site, since this octane enhancer was not introduced into gasoline mixtures until 1983. Also, the newer tanks installed by CFI have passed all of their tightness fit tests, and inventory records examined by the DEC-SMS do not show evidence of product loss from these fuel storage tanks.

## 8.2 Impacts To The Health And Safety Of Neighboring Residents, Neaby Sites And Structures

Although the area is characterized as a residential/small business and professional location, it is not expected that adverse impacts to the health and safety of the people who live and work in this part of the Village of Lyndonville would occur. There are no individual potable water supply wells, since drinking water is provided by the municipality.

The network of water and sewer lines can provide a preferred pathway for groundwater flow. At the calculated velocity rate, it would take about two years to reach the nearest receptor. However, there were no reports of fuel odors or contaminated water downgradient of the site at the time the water lines and new sewer lines were being installed. This is most likely due to the fact that the saturated zone is not encountered until 11 ft. bsg, while the public works conduits are situated between 6-8 ft. Thus, groundwater flow through preferred migratory pathways appears to be restricted in this area.

The presence of an older subsurface network can potentially provide another migration pathway, but since there are no records indicating the exact locations of these structures, it is difficult to assess their role in the overall groundwater flowpaths. Although the use of the old pipe uncovered by the excavation cannot be determined, it is not deemed significant, since the municipality now supplies all of the public works services to the area.

The vapor phase contamination adsorbed to the soil pores of the CFI site is not expected to enter low areas, such as basements, since none are located adjacent to the area where significant VOC readings were reocrded. The building closest to MW #2 is the convenience store, which does not have a cellar. Reports of gasoline odors have not been noted by any of the store's employees, which may be a further indication that VOCs have not diffused through the building's foundation.

Also, it can be seen from the results of this investigation that the majority of vapor phase contamination is in the shallow subsurface zone, where it is essentially out of reach of the aquifer's saturated zone. At the water table interface with the vadose zone, the VOC concentrations were relatively low, indicating that the soil pores, in all probability, are not contributing a significant amount of hydrocarbons to the dissolved phase. Similarly, no adverse impacts to the deep aquifer are expected, since easy pathways into the bedrock are most likely not present in the metamorphic and volcanic rocks.

As for the petroleum contamination presumed to be present on the Carmen's Ice Cream property, it would seem that CFI is not a likely source of these fuel odors. With a localized concentration of BTEX compounds, and a groundwater flowpath in the direction opposite the former railroad facility, it seems unlikely that Carmen's Ice Cream is a receptor of petroleum hydrocarbons located on CFI's property. Therefore, another source upgradient and north or west of the CFI site must be found to address the problems believed to be associated with the former railroad freight building.

## 9.0 RECOMMENDATIONS

In light of the findings of this Subsurface Hydrogeological Investigation, EP&S recommends the following:

- Have the Canadian Pacific Railroad Corporation conduct a similar investigation on their property. The Corporation's history needs close examination to determine if any spills from trains passing through on the nearby train tracks have occurred;

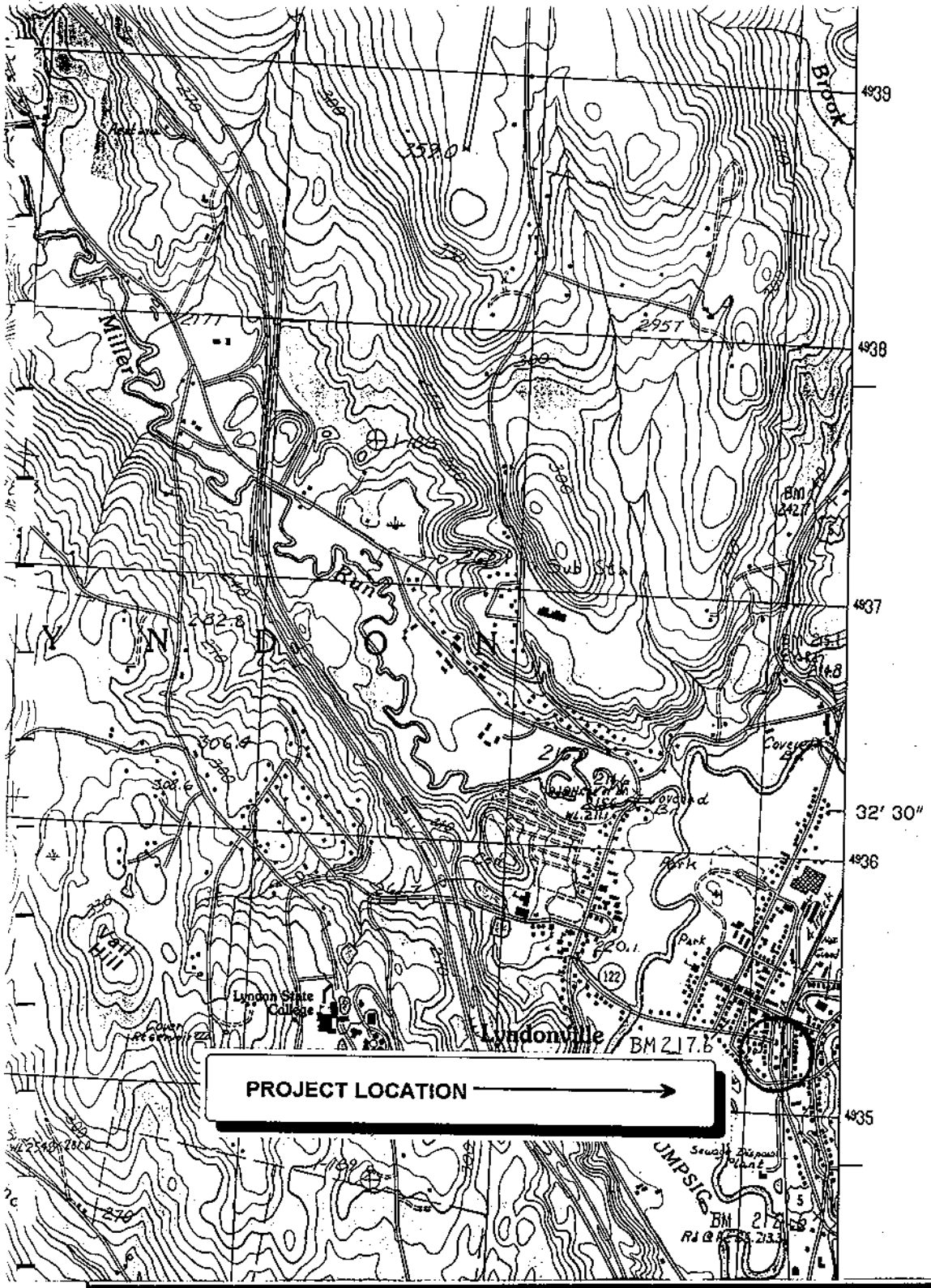
- Monitor the Cumberland Farms site. Obtain water quality data and groundwater elevations in six months to assess changes, if any, to the site conditions established by this investigation.

Marcia G Wolosz

**ENVIRONMENTAL PRODUCTS & SERVICES, INC.**
Marcia G. Wolosz, M.S.
Project Coordinator/Geologist

November 9, 1995
Date

# (A) MAPS




## Environmental Products & Services, Inc.

# SITE LOCATION MAP

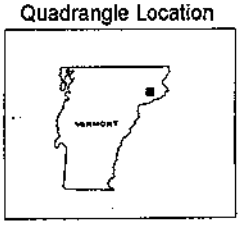
| | |
|---|---|
| **Figure No.:** 1 | **Quadrangle:** Lyndonville, VT |
| **Project No.:** VO237 | **PREPARED BY:** Geoscience |
| **Client:**<br>Cumberland Farms, Inc.<br>777 Dedham Street<br>Canton, Massachusetts 02021 | **Project location:**<br>Cumberland Farms, Inc.<br>Village Of Lyndonville, Caledonia County, VT<br>VT DEC Site # 95-1803 |

0 1000 2000 4000

*scale in feet*

Approx. scale: 1" = 2000 ft

Quadrangle Location

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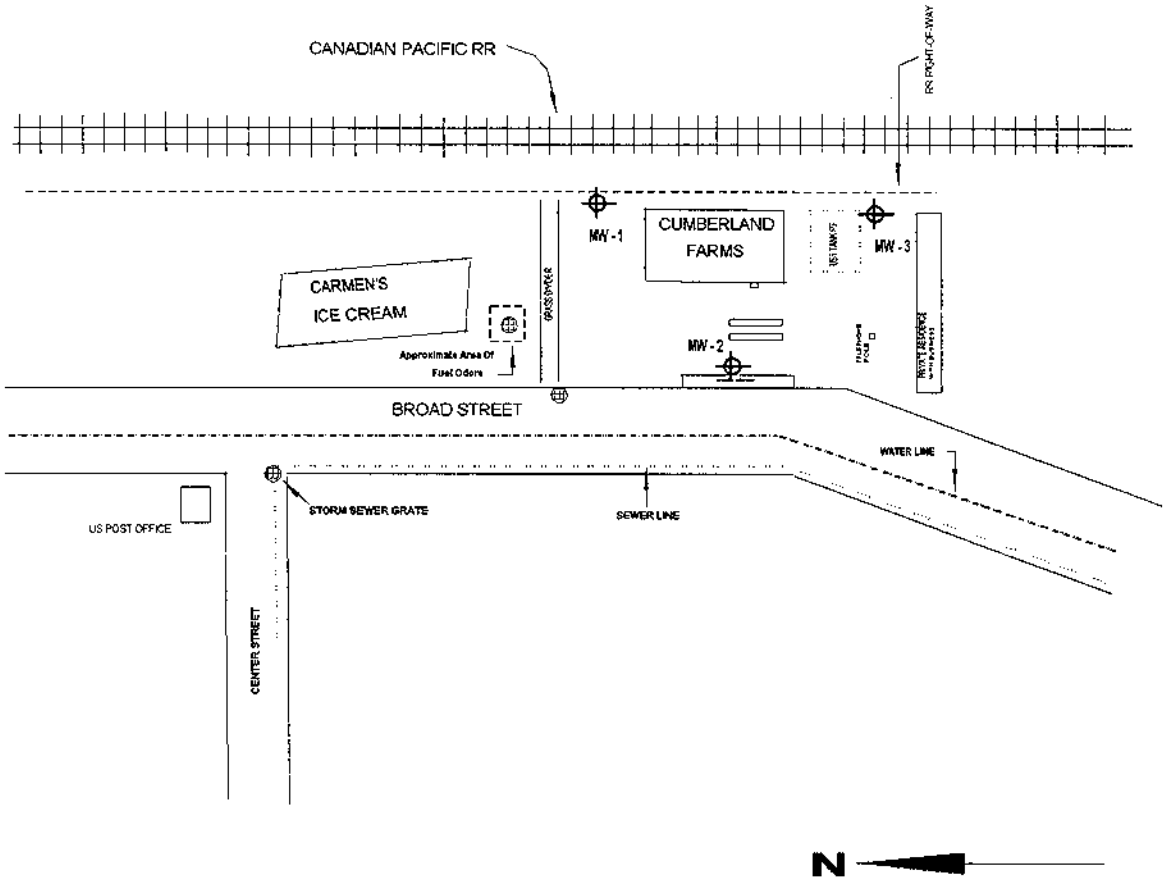
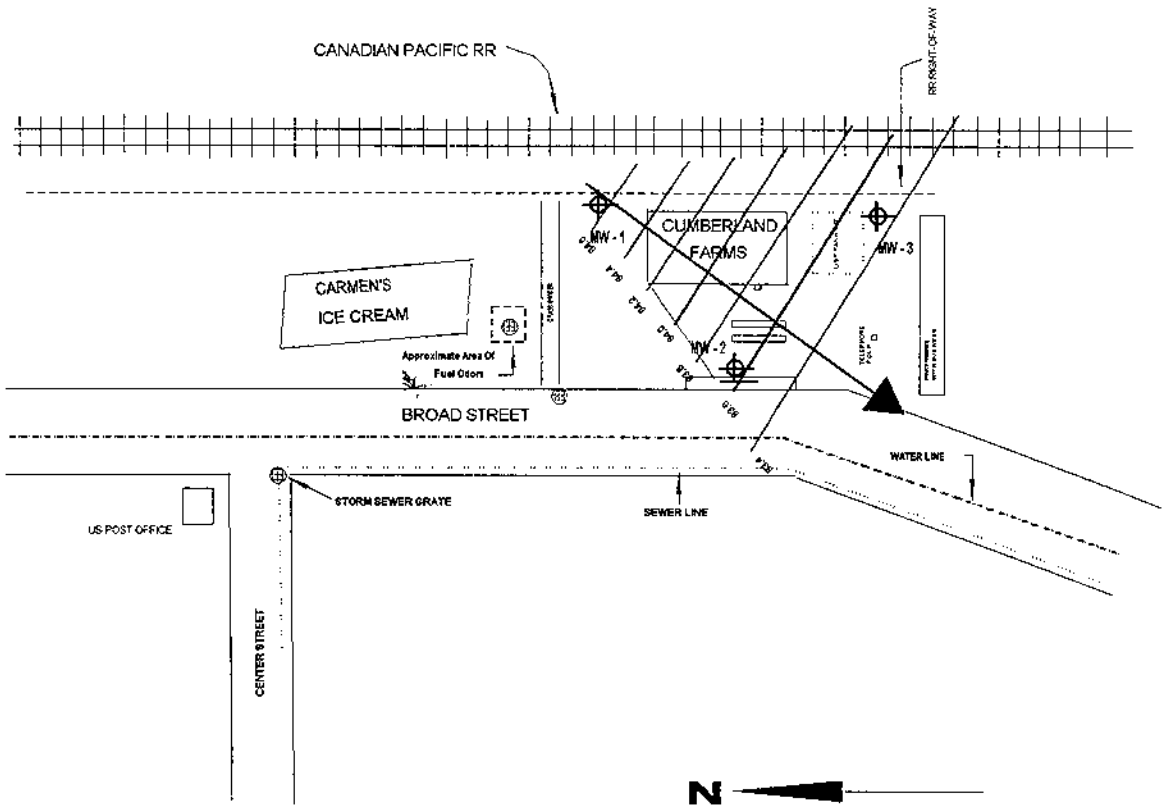
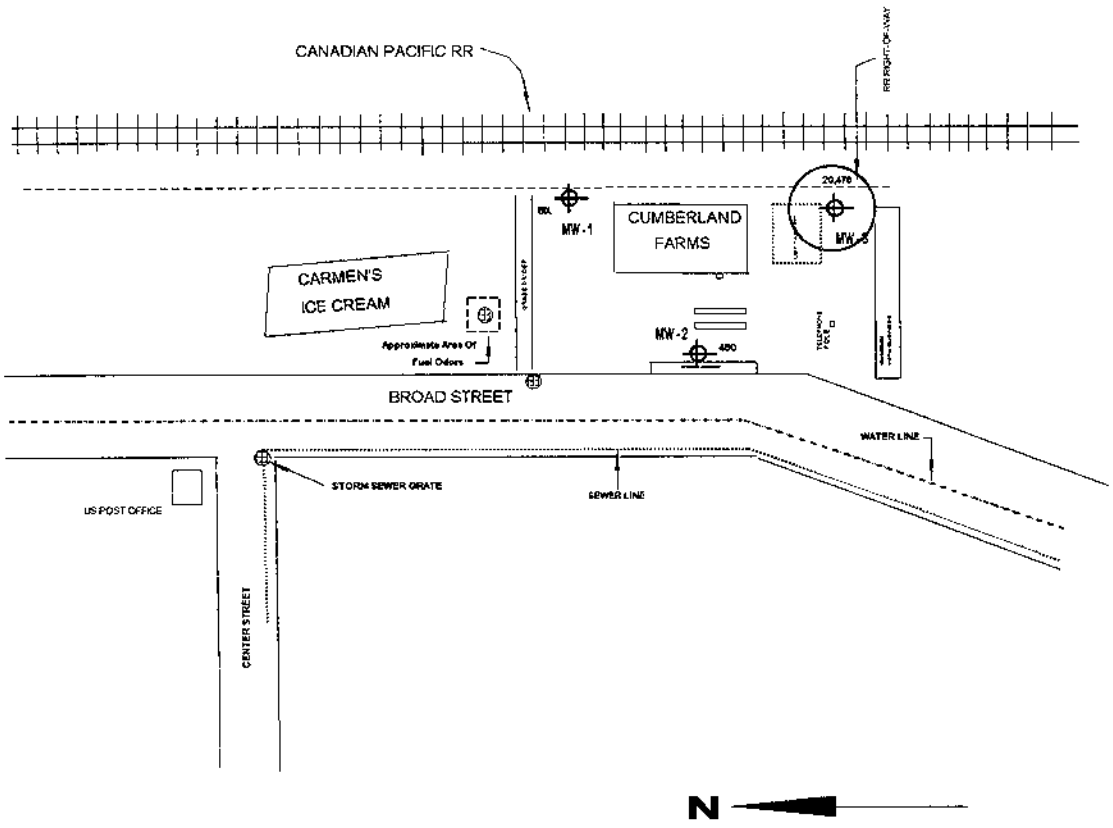
Source: USGS 7.5 min.




| | | |
|---|---|---|
| *Environmental Products & Services, Inc.*<br>*Burlington, Vermont* | DATE: 9/21/95 | PROJECT NO: VO237 |
| **SITE DETAILS**<br>**Cumberland Farms, Inc.**<br>Village Of Lyndonville, Caledonia County, Vermont<br>Vermont DEC Site #95-1803 | SCALE: 1 In. = 80 Ft. | FIGURE NO: 2 |
| | DRAWN BY:<br>Geoscience | CLIENT: Cumberland Farms, Inc.<br>777 Dedham Street<br>Canton, Massachusetts 02021 |




| | | |
|---|---|---|
| *Environmental Products & Services, Inc.*<br>*Burlington, Vermont* | DATE: 10/30/95 | PROJECT NO: VO237 |
| **GROUNDWATER FLOW MAP**<br>**Cumberland Farms, Inc.**<br>Village Of Lyndonville, Caledonia County, Vermont<br>Vermont DEC Site #96-1803 | SCALE: 1 In. = 80 Ft.<br>Contour Interval: 0.2 Ft.<br>DRAWN BY: Geoscience | FIGURE NO: 3<br>CLIENT: Cumberland Farms, Inc.<br>777 Dedham Street<br>Canton, Massachusetts 02021 |




| | | |
|---|---|---|
| *Environmental Products & Services, Inc.*<br>*Burlington, Vermont* | DATE: 10/30/95 | PROJECT NO: VO237 |
| **TOTAL DISSOLVED PHASE BTEX CONCENTRATION MAP**<br>**Cumberland Farms, Inc.**<br>Village Of Lyndonville, Caledonia County, Vermont<br>Vermont DEC Site #95-1803 | SCALE: 1 In. = 80 Ft. | FIGURE NO: 4 |
| | Contour Interval: 20,000 ug/l | CLIENT: Cumberland Farms, Inc.<br>777 Dedham Street<br>Canton, Massachusetts 02021 |
| | DRAWN BY:<br>Geoscience | |

# (B) TABLES

**Table 1**

## Groundwater Elevation Data - October 30, 1995

**CUMBERLAND FARMS**
**Village Of Lyndonville, Caledonia County, Vermont**
**Vermont Site #95-1803**

| Monitoring Well No. | Casing Elevation (ft.) | Casing Elevation To Benchmark (ft.) | Top Of Casing To Groundwater (ft.) | Groundwater Elevation (ft.) |
|---|---|---|---|---|
| BM | 100.00 | 0.43 | | |
| 1 | 4.60 | 95.83 | 11.17 | **84.66** |
| 2 | 5.21 | 95.22 | 11.60 | **83.62** |
| 3 | 4.42 | 96.01 | 12.57 | **83.44** |

Notes: All elevations are in reference to an arbitrary benchmark (BM) of 100.00 ft. using the northeast corner of the convenience store building.

These values represent site specific changes in elevation (in feet) and do not represent elevations above mean sea level.

TOC = Top Of Casing marked in black.

**Table 2**

## Total Volatile Organic Compounds In Soils - September 21, 1995

**CUMBERLAND FARMS**
**Village Of Lyndonville, Caledonia County, Vermont**
**Vermont Site #95-1803**

| Monitor Well No. | Depth (ft.) | PID Reading | Background Reading |
|---|---|---|---|
| 1 | 5 to 7 | 0 | 0.2 |
| | 10 to 12 | 0 | 0 |
| | 15 to 17 | 0 | 0.4 |
| **Total MW #1:** | **3 Samples** | **0** | |
| 2 | 5 to 7 | 1500 | 0.3 |
| | 10 to 12 | 500 | 0 |
| | 15 to 17 | 12 | 0 |
| **Total MW #2:** | **3 Samples** | **2,012** | |
| 3 | 5 to 7 | 15 | 0 |
| | 10 to 12 | 170 | 0 |
| | 15 to 17 | 0 | 0 |
| **Total MW #3:** | **3 Samples** | **185** | |

Notes: Recorded with an H-Nu Meter, 10.2 e.V. lamp
Jar Headspace Readings
Background measurements taken of ambient air prior to each sampling event.

## Table 3

**Dissolved Phase Contamination In Groundwater - October 30, 1995**
**BTEX/MTBE COMPOUNDS**
**CUMBERLAND FARMS**
**Village Of Lyndonville, Caledonia County, Vermont**
**Vermont Site #95-1803**

| Monitor Well No. | Compound | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|
| | Benzene | Toluene | Ethylbenzene | Xylenes (Total) | Other | MTBE | |
| 1 | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 2 | 4 | 52 | 20 | 380 | 24 | BDL | 480 |
| 3 | 22 | 6,460 | 1,360 | 9,860 | 2,776 | BDL | 20,478 |
| | | | | | | | **20,958** |

Notes: All results reported in micrograms per liter (ug/l).
USEPA Method 503.1/MTBE Analysis
BDL = Below Detectable Levels

## Table 4

**Total Petroleum Hydrocarbons In Groundwater - September 21, 1995**
**CUMBERLAND FARMS**
**Village Of Lyndonville, Caledonia County, Vermont**
**Vermont Site #95-1803**

| Monitor Well No. | PETROLEUM HYDROCARBON | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Fuel Oil | | | |
| | JP-4 | Gasoline | Kerosene | Diesel | #2 | #4 | #6 | Waste Oil |
| 1 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| 2 | BDL | 7.3 | BDL | BDL | BDL | BDL | BDL | BDL |
| 3 | BDL | 43.8 | BDL | BDL | BDL | BDL | BDL | BDL |

Notes: All results in milligrams per liter (mg/l).
Modified USEPA-Method 8100 Analysis
BDL = Below Detectable Levels

**CUMBERLAND FARMS, INC.**
**Village Of Lyndonville, Caledonia County, Vermont**
**Vermont Site #95-1803**

**Table 5**
**Groundwater Velocity Calculation**
**Shallow Aquifer**

$$V_s = \frac{ki}{n}$$

$V_s$ = Groundwater Velocity

k = Hydraulic Conductivity. Estimated from published values at an average of 10 ft./day for medium to coarse well sorted sands and 1 ft./day for fine sands and silts.

i = Groundwater Gradient. Calculated average = .013 ft./ft.

n = Porosity. Estimated from published values at an average of 35% for medium to coarse well sorted sand and 40% for fine sands and silts.

**Medium To Coarse Well Sorted Sands**

$$Vs = \frac{(10)(.013)}{.35}$$

**$V_s$ (*average*) = 0.371 ft./day**

**Fine Sands & Silts**

$$Vs = \frac{(1)(.013)}{.40}$$

**$V_s$ (*average*) = 0.0325 ft./day**

**Site Average = 0.20 ft./day**

# (C) DRILL LOGS

# Environmental
PRODUCTS & SERVICES, INC.

**Subsurface Log**

Monitoring Well No: 1
Sheet: 1 of 1

Date Started: September 21, 1995
Date Finished: September 21, 1995

Method Of Investigation:
4" OD Augered Soil Borings
2" Monitoring Wells

Client: Cumberland Farms
Location: State Route 5, Village of Lyndonville, Vermont

Project No.: V0237
Proj. Mgr: John Roberts
Geologist: Marcia Wolosz

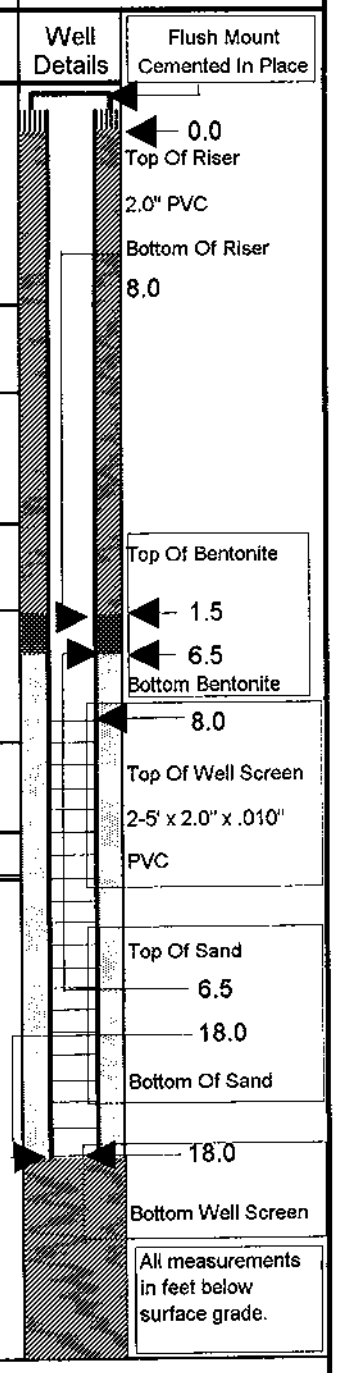
Drilling Co.: Tri State Drilling & Boring, Inc.
Driller: Neal Faulkner Helper: Dave Quagliaroli
Drill Rig: Mobil B-52

Weather: Cloudy, Damp. Mid-60's

| Depth (Ft.) | Sample No. | Blow Counts (Ft.) 6 | 12 | 18 | 24 | Recovery (In.) | H-Nu (ppm) B/D/S/HS | Sample Description |
|---|---|---|---|---|---|---|---|---|
| 1–5 | | | | | | | | |
| | 1 | 7 | 6 | 5 | 6 | 13 | 0.2/0.2/0.2/0 No Odor | Brown coarse sand and gravel. Round to sub-angular particles. Coarse (to pebble) at 20%. Dry. |
| 7–9 | | | | | | | | |
| 10 | 2 | 4 | 3 | 3 | 2 | 14 | 0/0/0/0 No Odor | 0-1" Brown coarse sand and gravel. Wet. 1"-14" Brown fine sand. Damp. |
| 12–14 | | | | | | | | |
| 15 | 3 | 3 | 3 | 4 | 5 | 24 | 0.4/0.4/0.4/0 No Odor | 0"-16" Brown fine sand. Saturated. 16"-24" Brownish gray fine sand and silt. Saturated. |
| 17 | | | | | | | | End boring. Set well. |
| 18–20 | | | | | | | | Well developed with airlift pump system powered by Honda 5.5 portable generator. Connected to 1" solid PVC via clean flexible hose. Developed until dry, approximately 1 hour. |

Top Of Casing = 4.60 Ft.

Groundwater Elevation = 11.17 Ft. bsg




Sample Types: Continuous Split Spoon Sampler. 2" HSA
140 lb. Hammer, 30" Fall.
* B=Background; D=Drilling; S=Spoon; HS= Headspace

Backfill Well Key
Cement
Sand (#1)
Native Fill
Bentonite

# Environmental
PRODUCTS & SERVICES, INC.

**Subsurface Log**

Monitoring Well No: 3
Sheet: 1 of 1

Date Started: September 21, 1995
Date Finished: September 21, 1995

Method Of Investigation:
4" OD Augered Soil Borings
2" Monitoring Wells

Client: Cumberland Farms
Location: State Route 5, Village of Lyndonville, Vermont

Project No.: V0237
Proj. Mgr: John Roberts
Geologist: Marcia Wolosz

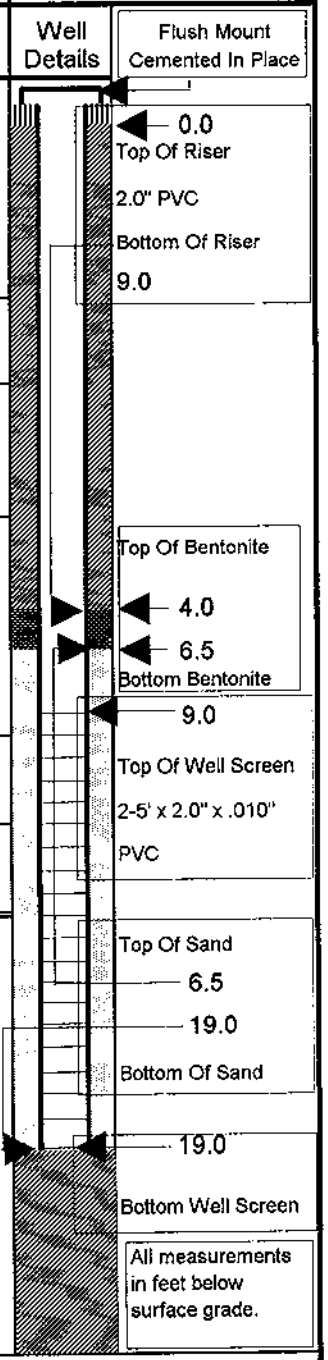
Drilling Co.: Tri State Drilling & Boring, Inc.
Driller: Neal Faulkner Helper: Dave Quagliaroli
Drill Rig: Mobil B-52

Weather: Cloudy, Damp. Mid-60's

| Depth (Ft.) | Sample No. | Blow Counts (Ft.) 6 | 12 | 18 | 24 | Recovery (In.) | H-Nu (ppm) B/D/S/**HS*** | Sample Description |
|---|---|---|---|---|---|---|---|---|
| 1–5 | | | | | | | | Surface = Asphalt. |
| 5–7 | 1 | 10 | 10 | 4 | 6 | 16 | 0/0/0/**15** Slight Fuel Odor | Brown coarse sand and gravel fill. Dry. |
| 7–10 | | | | | | | | |
| 10–12 | 2 | 5 | 6 | 5 | 6 | 18 | 0/1/16/**170** Fuel Odor | 0"-3" Dk. gray coarse sand and gravel fill. 3"-7" Tan medium sand. Dry. 7"-11" Lt. brown medium sand. Damp. 11"-18" Brown fine sand. Damp. |
| 12–15 | | | | | | | | |
| 15–17 | 3 | 4 | 3 | 3 | 4 | 21 | 0/0/0/0 No Odor | 0"-2" Brown fine sand. Wet. 2"-14" Brown fine silty sand. 14"-21" Brown sand. Saturated. |
| 17–18 | | | | | | | | End boring. Set well. |
| 19–20 | | | | | | | | Well developed with airlift pump system powered by Honda 5.5 portable generator. Connected to 1" solid PVC via clean flexible hose. Developed until dry, approximately 1 hour. |

Top Of Casing = 4.42 Ft.
Groundwater Elevation = 12.57 Ft. bsg

Well Details




Sample Types: Continuous Split Spoon Sampler. 2" HSA
140 lb. Hammer, 30" Fall.
* B=Background; D=Drilling; S=Spoon; **HS**=Headspace

Backfill Well Key
Cement
Sand (#1)
Native Fill
Bentonite

# (D) LABORATORY WATER QUALITY ANALYSES

Received: 11/01/95 11/02/95 15:15:25

REPORT TO
ENVIRONMENTAL PRODUCTS & SERV
13 AIRPORT ROAD, SUITE 103
PLATTSBURGH, NY 12901
518-562-5656; 5593 (FAX)
ATTEN MARCIA WOLOSZ

PREPARED BY
TOXIKON CORPORATION
15 WIGGINS AVE
BEDFORD, MA 01730
ATTEN PAUL LEZBERG
PHONE (617)275-3330

CERTIFIED BY

CONTACT RICHG

CLIENT EPS NY SAMPLES 4
COMPANY ENVIRONMENTAL PRODUCTS & SERV
FACILITY 13 AIRPORT ROAD, SUITE 103
PLATTSBURGH, NY 12901

MA CERT # M-MA064: TRACE METALS, SULFATE,CYANIDE,RES. FREE CHLORINE, Ca, TOTAL ALK., TDS, pH, THMs, VOC, PEST.,NUTRIENTS, DEMAND. O&G, PHENOLICS, PCBs . CT DHS #PH-0563, NY #10778 FL HRS E87143, NJ DEP 59538, NC DNR286, SC 88002, NH 204091-C.

WORK ID CFI-LYDENVILLE,VT.
TAKEN 10/30/95
TRANS
TYPE WATER
P.O. #
INVOICE under separate cover

VERIFIED BY:

**SAMPLE IDENTIFICATION**

01 MW#1
02 MW#2
03 MW#3
04 TB

**TEST CODES and NAMES used on this workorder**

503 VOL AROM UNSAT ORG COMP
MTBE MTBE

Received: 11/01/95 Results by Sample

SAMPLE ID MW#1 SAMPLE # 01 FRACTIONS: A
Date & Time Collected 10/30/95 10:30:00 Category WATER

| | | |
|---|---|---|
| MTBE | ND | |
| ug/L | DL=0.5 | |

Received: 11/01/95 Results by Sample

SAMPLE ID MW#1 FRACTION 01A TEST CODE 503 NAME VOL AROM UNSAT ORG COMP
Date & Time Collected 10/30/95 10:30:00 Category WATER

| | RESULT | LIMIT |
|---|---|---|
| Benzene | ND | 0.50 |
| Trichloroethene | ND | 0.50 |
| Toluene | ND | 0.50 |
| Tetrachloroethene | ND | 0.50 |
| Chlorobenzene | ND | 0.50 |
| Ethylbenzene | ND | 0.50 |
| p-Xylene | ND | 0.50 |
| o-Xylene | ND | 0.50 |
| Styrene | ND | 0.50 |
| Isopropylbenzene | ND | 0.50 |
| Bromobenzene | ND | 0.50 |
| N-Propylbenzene | ND | 0.50 |
| 2-Chlorotoluene | ND | 0.50 |
| m-Xylene | ND | 0.50 |
| 4-Chlorotoluene | ND | 0.50 |
| 1,3,5-Trimethylbenzene | ND | 0.50 |
| T-Butylbenzene | ND | 0.50 |
| 1,2,4-Trimethylbenzene | ND | 0.50 |
| S-Butylbenzene | ND | 0.50 |
| 1,3-Dichlorobenzene | ND | 0.50 |
| 1,4-Dichlorobenzene | ND | 0.50 |
| 4-Isopropyltoluene | ND | 0.50 |
| 1,2-Dichlorobenzene | ND | 0.50 |
| N-Butylbenzene | ND | 0.50 |
| 1,2,4-Trichlorobenzene | ND | 0.50 |
| Napthalene | ND | 0.50 |
| Hexachlorobutadiene | ND | 0.50 |
| 1,2,3-Trichlorobenzene | ND | 0.50 |

Notes and Definitions for this Report:

DATE RUN: 10/31/95
INSTRUMENT: V1
ANALYST: ST
DIL. FACTOR: 1
Units = ug / L

ND = not detected at detection limit

Received: 11/01/95 Results by Sample

SAMPLE ID MW#2 SAMPLE # 02 FRACTIONS: A
Date & Time Collected 10/30/95 11:05:00 Category WATER

| | |
|---|---|
| MTBE | ND |
| ug/L DL=1.0 | |

SAMPLE ID MW#2 FRACTION 02A TEST CODE 503 NAME VOL AROM UNSAT ORG COMP
Date & Time Collected 10/30/95 11:05:00 Category WATER

| | RESULT | LIMIT |
|---|---|---|
| Benzene | 4.0 | 1.0 |
| Trichloroethene | ND | 1.0 |
| Toluene | 51.6 | 1.0 |
| Tetrachloroethene | ND | 1.0 |
| Chlorobenzene | ND | 1.0 |
| Ethylbenzene | 20.0 | 1.0 |
| p-Xylene | ND | 1.0 |
| o-Xylene | 32.4 | 1.0 |
| Styrene | ND | 1.0 |
| Isopropylbenzene | ND | 1.0 |
| Bromobenzene | ND | 1.0 |
| N-Propylbenzene | ND | 1.0 |
| 2-Chlorotoluene | ND | 1.0 |
| m-Xylene | 348 | 50 |
| 4-Chlorotoluene | ND | 1.0 |
| 1,3,5-Trimethylbenzene | ND | 1.0 |
| T-Butylbenzene | ND | 1.0 |
| 1,2,4-Trimethylbenzene | ND | 1.0 |
| S-Butylbenzene | 21.4 | 1.0 |
| 1,3-Dichlorobenzene | ND | 1.0 |
| 1,4-Dichlorobenzene | ND | 1.0 |
| 4-Isopropyltoluene | ND | 1.0 |
| 1,2-Dichlorobenzene | ND | 1.0 |
| N-Butylbenzene | ND | 1.0 |
| 1,2,4-Trichlorobenzene | ND | 1.0 |
| Napthalene | 2.4 | 1.0 |
| Hexachlorobutadiene | ND | 1.0 |
| 1,2,3-Trichlorobenzene | ND | 1.0 |

Notes and Definitions for this Report:

DATE RUN: 10/31/95
INSTRUMENT: V1
ANALYST: ST
DIL. FACTOR: 2
Units = ug / L

ND = not detected at detection limit

Received: 11/01/95 Results by Sample

SAMPLE ID MW#3 SAMPLE # 03 FRACTIONS: A
Date & Time Collected 10/30/95 10:45:00 Category WATER

| | |
|---|---|
| MTBE | ND |
| ug/L | DL=10.0 |

SAMPLE ID MW#3 FRACTION 03A TEST CODE 503 NAME VOL AROM UNSAT ORG COMP
Date & Time Collected 10/30/95 10:45:00 Category WATER

| | RESULT | LIMIT |
|---|---|---|
| Benzene | 22.0 | 10 |
| Trichloroethene | ND | 10 |
| Toluene | 6460 | 10 |
| Tetrachloroethene | ND | 10 |
| Chlorobenzene | ND | 10 |
| Ethylbenzene | 1360 | 50 |
| p-Xylene | ND | 10 |
| o-Xylene | 3800 | 50 |
| Styrene | ND | 10 |
| Isopropylbenzene | 26.0 | 10 |
| Bromobenzene | ND | 10 |
| N-Propylbenzene | ND | 10 |
| 2-Chlorotoluene | ND | 10 |
| m-Xylene | 6060 | 50 |
| 4-Chlorotoluene | ND | 10 |
| 1,3,5-Trimethylbenzene | ND | 10 |
| T-Butylbenzene | ND | 10 |
| 1,2,4-Trimethylbenzene | ND | 10 |
| S-Butylbenzene | 2660 | 50 |
| 1,3-Dichlorobenzene | ND | 10 |
| 1,4-Dichlorobenzene | ND | 10 |
| 4-Isopropyltoluene | ND | 10 |
| 1,2-Dichlorobenzene | ND | 10 |
| N-Butylbenzene | ND | 10 |
| 1,2,4-Trichlorobenzene | ND | 10 |
| Napthalene | 90.0 | 10 |
| Hexachlorobutadiene | ND | 10 |
| 1,2,3-Trichlorobenzene | ND | 10 |

Notes and Definitions for this Report:

DATE RUN: 10/31/95
INSTRUMENT: V1
ANALYST: ST
DIL. FACTOR: 20
Units = ug / L

ND = not detected at detection limit

SAMPLE ID TB SAMPLE # 04 FRACTIONS: A
Date & Time Collected 10/30/95 Category WATER

| | |
|---|---|
| MTBE | ND |
| ug/L | DL=0.5 |

SAMPLE ID TB FRACTION 04A TEST CODE 503 NAME VOL AROM UNSAT ORG COMP
Date & Time Collected 10/30/95 Category WATER

| | RESULT | LIMIT |
|---|---|---|
| Benzene | ND | 0.50 |
| Trichloroethene | ND | 0.50 |
| Toluene | ND | 0.50 |
| Tetrachloroethene | ND | 0.50 |
| Chlorobenzene | ND | 0.50 |
| Ethylbenzene | ND | 0.50 |
| p-Xylene | ND | 0.50 |
| o-Xylene | ND | 0.50 |
| Styrene | ND | 0.50 |
| Isopropylbenzene | ND | 0.50 |
| Bromobenzene | ND | 0.50 |
| N-Propylbenzene | ND | 0.50 |
| 2-Chlorotoluene | ND | 0.50 |
| m-Xylene | ND | 0.50 |
| 4-Chlorotoluene | ND | 0.50 |
| 1,3,5-Trimethylbenzene | ND | 0.50 |
| T-Butylbenzene | ND | 0.50 |
| 1,2,4-Trimethylbenzene | ND | 0.50 |
| S-Butylbenzene | ND | 0.50 |
| 1,3-Dichlorobenzene | ND | 0.50 |
| 1,4-Dichlorobenzene | ND | 0.50 |
| 4-Isopropyltoluene | ND | 0.50 |
| 1,2-Dichlorobenzene | ND | 0.50 |
| N-Butylbenzene | ND | 0.50 |
| 1,2,4-Trichlorobenzene | ND | 0.50 |
| Napthalene | ND | 0.50 |
| Hexachlorobutadiene | ND | 0.50 |
| 1,2,3-Trichlorobenzene | ND | 0.50 |

Notes and Definitions for this Report:

DATE RUN: 10/31/95
INSTRUMENT: V1
ANALYST: ST
DIL. FACTOR: 1
Units = ug / L

ND = not detected at detection limit

TEST CODE 503 NAME VOL AROM UNSAT ORG COMP

EPA Method: 503.1 Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography.

Reference: EPA Methods for the Determination of Organic Compounds in Drinking Water. EPA/600/4-88/039. December 1988.

TEST CODE MTBE NAME MTBE

Method not available.

TOXIKON
15 Wiggins Ave., Bedford, MA 01730
Telephone: (617) 275-3330
Fax: (617) 275-1136

# CHAIN OF CUSTODY RECORD

WORK ORDER #: 11-11-004

DUE DATE : 11-2-95

COMPANY: Environmental Products & Services
ADDRESS: 13 Airport Rd. Suite 103
Plattsburgh NY 12901
PHONE #: (518) 562-5656 FAX #: (518) 562-5593
P.O. #: NA -
PROJECT MANAGER: Marcia Wolosz
PROJECT ID/LOCATION: Cumberland Farms, Lyndonville, VT

| SAMPLE TYPE | CONTAINER TYPE |
|---|---|
| 1. WASTEWATER | P - PLASTIC |
| 2. SOIL | G - GLASS |
| 3. SLUDGE | V - VOA |
| 4. OIL | |
| 5. DRINKING WATER | |
| 6. WATER (GW/MW/SW) | |
| 7. OTHER (SPECIFY | |

| TOXIKON # | SAMPLE IDENTIFICATION | SAMPLE TYPE | CONTAINER SIZE | CONTAINER TYPE | CONTAINER # | SAMPLING DATE | SAMPLING TIME | PRESERVATIVE | ANALYSES: 5035 / MTBE | SPECIAL INSTRUCTIONS/ COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MW#1 | GW | 40ml | V | 2 | 10/30/95 | 10:30 | HCl | ✓ | |
| 2 | MW#2 | GW | 40ml | V | 2 | 10/30/95 | 11:05 | HCl | ✓ | |
| 3 | MW#3 | GW | 40ml | V | 2 | 10/30 | 10:45 | HCl | ✓ | |
| 4 | TB3 | " | " | V | 2 | " | — | | ✓ | |

SAMPLED BY: John Tarlow
DATE: 10 - 30 - 95
TIME: 10:30 - 11:05

QUOTATION #:

RELINQUISHED BY:
DATE: - -
TIME: - -

RECEIVED BY:
DATE: 11 - 1 - 95
TIME: 11 - 50

RELINQUISHED BY:
DATE: - -
TIME: - -

RECEIVED FOR LAB BY:
DATE: - -
TIME: - -

METHOD OF SHIPMENT: FEDEX

COOLER TEMPERATURE

☒ RUSH ..... BUSINESS DAY TURN AROUND
☐ ROUTINE

*Sample disposal information*

Are there any other known or suspected contaminants in these samples other than those listed above?
Yes ____ No ____ If Yes, 1st Known ____

SAMPLE ID MW#1 FRACTION 05A TEST CODE GC PET NAME PETROLEUM SCAN BY GC
Date & Time Collected 09/21/95 18:00:00 Category WATER

## TPH by Modified EPA Method 8100

| PARAMETER | RESULT |
|---|---|
| JP-4 | ND |
| Gasoline | ND |
| Kerosene | ND |
| Diesel | ND |
| No. 2 Fuel Oil | ND |
| No. 4 Fuel Oil | ND |
| No. 6 Fuel Oil | ND |
| Waste Oil | ND |
| Petroleum Constituent | ND |
| Total Petro. Hydrocarbons | ND |

DETECTION LIMIT

| | |
|---|---|
| Water Matrix | 1.0 mg/L |
| Solid Matrix | * |

Notes and Definitions for this Report:

EXTRACTED 09/28/95
DATE RUN 10/04/95
ANALYST PL
INSTRUMENT HP 5

N.O.S. = Not Otherwise Specified
ND = Compound(s) not detected above detection limit

Comments

SAMPLE ID MW#2 FRACTION 07A TEST CODE GC PET NAME PETROLEUM SCAN BY GC
Date & Time Collected 09/21/95 18:45:00 Category WATER

## TPH by Modified EPA Method 8100

| PARAMETER | RESULT |
|---|---|
| JP-4 | ND |
| Gasoline | 7.3 mg/L |
| Kerosene | ND |
| Diesel | ND |
| No. 2 Fuel Oil | ND |
| No. 4 Fuel Oil | ND |
| No. 6 Fuel Oil | ND |
| Waste Oil | ND |
| Petroleum Constituent | ND |
| Total Petro. Hydrocarbons | 7.3 mg/L |

DETECTION LIMIT

| | |
|---|---|
| Water Matrix | 1.0 mg/L |
| Solid Matrix | * |

Notes and Definitions for this Report:

EXTRACTED 09/28/95
DATE RUN 10/04/95
ANALYST PL
INSTRUMENT HP 5

N.O.S. = Not Otherwise Specified
ND = Compound(s) not detected above detection limit

Comments

SAMPLE ID MW#3 FRACTION 06A TEST CODE GC PET NAME PETROLEUM SCAN BY GC
Date & Time Collected 09/21/95 18:30:00 Category WATER

## TPH by Modified EPA Method 8100

| PARAMETER | RESULT |
|---|---|
| JP-4 | ND |
| Gasoline | 43.8 mg/L |
| Kerosene | ND |
| Diesel | ND |
| No. 2 Fuel Oil | ND |
| No. 4 Fuel Oil | ND |
| No. 6 Fuel Oil | ND |
| Waste Oil | ND |
| Petroleum Constituent | ND |
| Total Petro. Hydrocarbons | 43.8 mg/L |

DETECTION LIMIT

| | |
|---|---|
| Water Matrix | 1.0 mg/L |
| Solid Matrix | * |

Notes and Definitions for this Report:

EXTRACTED 09/28/95
DATE RUN 10/04/95
ANALYST PL
INSTRUMENT HP 5

N.O.S. = Not Otherwise Specified
ND = Compound(s) not detected above detection limit

Comments

TEST CODE 502_1 NAME VOC IN H2O BY PURGE & TRAP

EPA METHOD: 502.1 Volatile Halogenated Organic Compounds in Water
by Purge and Trap Gas Chromatography. Rev 2.0.

REFERENCE: Methods for the Determination of Organic Compounds in
Drinking Water. EPA/600/4-88-039. December 1988

TEST CODE EPETW NAME EXTRACTION GC PET WATER

Method not available.

TEST CODE GC_PET NAME PETROLEUM SCAN BY GC

EPA Method: 8100 Modified

Reference: Test Methods for Evaluating Solid Waste: Physical/Chemical
Methods. EPA SW-846 (Third Edition) 1986.
Office of Solid Waste, USEPA.

This method utilizes analytical procedures consistent with EPA Method 8100. The identity of petroleum contaminants is subject to comparison with commercially supplied standards.

ASTM D-3328

RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

TEST CODE MTBE NAME MTBE

Method not available.

# TURNKEY

225 Wildwood Ave., Woburn, MA 01801
Telephone: (617) 933-6615
Fax: (617) 933-8136

# CHAIN OF CUSTODY RECORD

WORK ORDER #: 95-09-43

DUE DATE: 10-3-95

COMPANY: Environmental Products & Services Inc
ADDRESS: 11 Airport Park Blvd Suite 107
New Windsor, New York 12553
PHONE #: (518) 562-4636 FAX #: (518) 562-6593
P.O. #:
PROJECT MANAGER: Marcia Wolosz
PROJECT ID/LOCATION: Cumberland Farms / Vernon

SAMPLE TYPE: 1. WASTEWATER, 2. SOIL, 3. SLUDGE, 4. OIL, 5. DRINKING WATER, 6. WATER (GROUNDWATER), 7. OTHER (SPECIFY)
CONTAINER TYPE: P - PLASTIC, G - GLASS, V - VOA

| TOXIKON # | SAMPLE IDENTIFICATION | SAMPLE TYPE | CONTAINER SIZE | CONTAINER TYPE | CONTAINER # | SAMPLING DATE | SAMPLING TIME | PRESERVATIVE | ANALYSES: 8021-1014 / MTBE | ANALYSES: 8021-8100 (TPH) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Trip Blank | GW | 40 ml | VOA | 2 | 9/21/95 | | HCl | X | | |
| 2 | MW #1 | GW | 40 ml | VOA | 2 | 9/21/95 | 1800 | HCl | X | | |
| 3 | MW #3 | GW | 40 ml | VOA | 2 | 9/21/95 | 1810 | HCl | X | | |
| 4 | MW #2 | GW | 40 ml | VOA | 2 | 9/21/95 | 1845 | HCl | X | | |
| 5 | MW #4 | GW | 1 L | Glass | 1 | 9/21/95 | 1830 | None | | X | |
| 6 | MW #5 | GW | 1 L | Glass | 1 | 9/21/95 | 1870 | None | | X | |
| 7 | MW #2 | GW | 1 L | Glass | 1 | 9/21/95 | 1845 | None | | X | |

SAMPLED BY: Marcia Wolosz — DATE: 9-21-95 TIME: 19-00

RELINQUISHED BY: Marcia Wolosz — DATE: 9-22-95 TIME: 16-00

RELINQUISHED BY: — DATE: - - TIME: - -

METHOD OF SHIPMENT

RECEIVED BY:

RECEIVED BY:

RECEIVED FOR LAB BY:

COOLER TEMPERATURE

DATE: - - TIME: - -

DATE: 9-22-95 TIME: 10:00

DATE: - - TIME: - -

SPECIAL INSTRUCTIONS:

☐ RUSH ..... BUSINESS DAY TURN AROUND
☒ ROUTINE

*Sample disposal information*

Are there any other known or suspected contaminants in these samples other than those listed above?
Yes No If Yes 1st Known

# (E) REFERENCES

# State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD>Voice
1-800-253-0195 Voice>TDD

AGENCY OF NATURAL RESOURCES
**Department of Environmental Conservation**
**Hazardous Materials Management Division**
**103 South Main Street / West Building**
**Waterbury, Vermont 05671-0404**
**802-241-3888**
**FAX 802-241-3296**

September 15, 1995

William Lovely
Cumberland Farms, Inc.
777 Dedham Street
Canton, Massachusetts 02021

RE: Petroleum contamination on Broad Street in Lyndonville, Vermont (Site #95-1803)

Dear Mr. Lovely:

The Vermont Department of Environmental Conservation, Sites Management Section (SMS) has reviewed the August 25, 1995 Environmental Products & Services, Inc. workplan for the initial site investigation at the above referenced site. This workplan includes the installation of three monitoring wells, data collection, depth to water measurements, site surveying, research, and a summary report. The SMS approves of this scope of work as submitted.

Please keep the SMS informed of all scheduled work to be performed at this site, and forward the deliverable summary report to the SMS as soon as it has been reviewed. Feel free to call with any questions or comments.

Sincerely,

Jason Feingold, Project Engineer
Sites Management Section

CC: Marcia G. Wolosz, Environmental Products & Services, Inc.
JPF:wp51/CPU/951803r1

ONS. Emile Vas 7/28/95

# State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
RELAY SERVICE FOR THE HEARING IMPAIRED
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AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Hazardous Materials Management Division
103 South Main Street / West Building
Waterbury, Vermont 05671-0404
802-241-3888
FAX 802-241-3296

RECEIVED
JUL 21 1995
CUMBERLAND FARMS
CONSTRUCTION DEPARTMENT

July 18, 1995

RECEIVED
JUL 31 1995
CUMBERLAND FARMS
ENVIRONMENTAL DEPARTMENT

Richard Longton
Cumberland Farms, Inc.
777 Dedham Street
Canton, MA 02021

RE: Petroleum contamination on Broad Street in Lyndonville, Vermont (Site #95-1803)

Dear Mr. Longton:

The Vermont Department of Environmental Conservation (DEC), Sites Management Section (SMS) has reviewed the June 27, 1995 trip report from the Management & Prevention Section regarding petroleum contamination encountered during the replacement of a municipal sewer system on Street in Lyndonville, Vermont. A DEC inspector was present onsite to investigate a report of observed petroleum contamination on Broad Street, downgradient of the Cumberland Farms Station, and the Carmen's Ice Cream parlor, which is currently owned by the Canadian Pacific Railroad Company (CPRC).

The inspector screened stockpiled soils excavated on Broad Street for volatile organic compounds (VOCs) using a photoionization detector (PID). These soils demonstrated peak levels of 50 ppm. Groundwater, in contact with contamination, was estimated to be approximately thirteen feet below the ground surface. A heavy odor or petroleum emanating from the ground was noted during the inspection.

Based on this information, the SMS has determined that additional work is necessary at the site in order to determine the severity of contamination present. Due to the possibility of contaminant impact to nearby receptors, the SMS is requesting that Cumberland Farms, Inc. retain the services of a qualified environmental consultant to perform the following:

1. Define the source of this petroleum contamination, and all possible preferential pathways for contaminant migration. Determine the origin and previous use of the abandoned iron utility pipe found in the Broad Street excavation.

2. Define the degree and extent of contamination to the soil. This may be accomplished by obtaining soil borings, digging test pits, or performing a soil gas survey.

3. Determine the degree and extent of contamination, if any, to groundwater. If soil is found to contain evidence of contamination at the water table, then a sufficient

number of monitoring wells should be installed in locations which will adequately define the severity of contamination at the site. All groundwater samples taken should be analyzed for BTEX, MTBE, and Total Petroleum Hydrocarbons (TPH) compounds.

4. Perform an assessment of the site to determine the potential for sensitive receptors to be impacted by the contamination. This should include basements of adjacent buildings, nearby surface water, and any public or private drinking water wells which are located within the vicinity of the site. If any water supplies appear at risk from this contamination, they should be sampled and analyzed using EPA 8020.

5. Determine the need for a long term treatment and/or monitoring plan which addresses any identified contamination present at the site. The need for such a plan should be based on the results of the above investigations.

6. Submit to the SMS a summary report which outlines the work performed as well as providing conclusions and recommendations. Included should be detailed well logs, analytical data, a site map, an area map, and a groundwater contour map.

Cumberland Farms, Inc. may want to coordinate these activities with W.R. Adams of the CPRC, as petroleum from their facility may be contributing to this contamination problem. Please have your consultant submit a preliminary workplan within fifteen days of your receipt of this letter so that it may be approved prior to the initiation of onsite work. Enclosed please find a list of consultants who perform this type of work in the area. The SMS appreciates your cooperation in addressing this petroleum contamination. If you have any questions or comments, please feel free to call.

Sincerely,

Jason Feingold, Project Engineer
Sites Management Section

CC: W.R. Adams, Canadian Pacific Railroad Company
DEC Regional Office
Dave Dill, Village Manager

JPF:wp51/CP_RAIL/951803b

# Trip Report

TO: Chuck Schver, HMMD Sites Management Section Chief

THROUGH: Ted Unkles, UST Program Coordinator T.U.

FROM: Tim McNamara, UST Inspector

DATE: 6/27/95

SUBJECT: Petroleum contamination found during sewer installation in Lyndon.

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## Inspection Information

Date of Inspection: 6/19/95 Type of Inspection: Investigation

Inspector: Tim M (802)

Contacts: Greg Monty, SCI Foreman, phone 626-1187 *
Dennis Mixon, Leach Eng., phone 626-1187
Les Downing, SCI Supv., phone 626-1187
Dolly Fournier, Carmen's Ice Cream
Fran Fournier, Carmen's Ice Cream
Nate Fournier, Carmen's Ice Cream
Tammie Lincolnhunt, Cumberland Farms, phone 626-9813
Dave Dill, Lyndon Village Manager, phone 626-5785 *
W.R. Adams, CP Railroad, phone 334-2155,

P.O. Box 857
Newport VT
05855

Alleged Violations found: 10 VSA, section 6616

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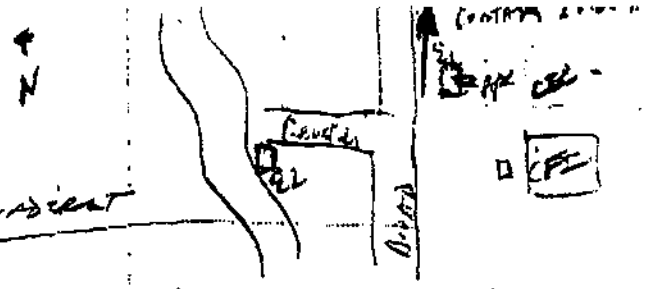
On 6/19/95 I stopped at the Broad Street construction site in Lyndonville located in front of Carmen's Ice Cream Shop. The purpose of the visit was to investigate a report from SCI (contractor for the Village of Lyndonville) of petroleum contamination found while excavating to install new sewer lines (see attached spill report HMM95-178).

I arrived on site at 1046. Weather conditions were extremely hot and fairly humid, with a high temperature of approximately 100 degrees F. I introduced myself to SCI Supervisor, Mr. Les Downing, SCI Foreman, Mr. Greg Monty, and Mr. Dennis Mixon of Leach Engineering. Both companies had been hired as contractors by the Village of Lyndonville to install the new sewer system. According to these workers, they had found petroleum contamination in soils and groundwater while excavating on 6/16/95.

I observed the work area to have a fairly heavy odor of petroleum which I estimated to be diesel, fuel oil, or possibly weathered gasoline. Groundwater was not visible at this time, but was estimated by the contractors to be at 13 feet. Earlier that week, a hose had been run to the bottom of the excavation for dewatering purposes. I observed a suction pump to be in use and discharging water from the






excavation. The water ran into a storm drain located approximately 40 yards to the south on Broad Street. The water being discharged had no visible petroleum sheen or odor, but was slightly foamy. I asked Mr. Downing to find out if the storm drain lead to the wastewater treatment plant, into the Passumpsic River (located several hundred yards to the west), or somewhere else. I explained that if it did discharge to the river, that the discharge would require a state permit and was otherwise illegal. At my request, Mr. Downing stated that they would excavate a few feet deeper in order to re-expose the water table.

Approximately four feet below ground surface in the excavation I observed an extremely corroded three inch diameter iron pipe sticking out from the east pit wall. Contractors stated they believed this to be an old water main. This was not confirmed, however.

Approximately 20 cu. yds. of soil had been removed and placed beside the excavation. I took soil vapor readings using plastic biggies and an Hnu at three locations in the soil pile. The following results include Mr. Downing's estimate of the soils' original depths:

Sample 1, near top: Avg. 22 ppm.
Sample 2, near top: Avg. 10 ppm.
Sample 3, near bottom: Avg. 50 ppm.

The contractors stated that they had excavated at several locations around the village and had not found any other contamination, I observed a recently excavated and backfilled area approximately 75 yards to the west on Center Street. I estimated this area to be hydrologically downgradient. I saw no evidence of contamination in that area and the contractors restated that they had observed none either.

Next I spoke with Ms. Dolly Fournier of Carmen's Ice Cream. Ms. Fournier gave me permission to inspect the Carmen's property for possible sources of the contamination. Based on it's appearance and proximity to the railroad tracks, I asked if the building had once been a railroad station. Ms. Fournier said that she believed so, but that her sister Fran would arrive shortly and might know more.

On the front wall (facing Broad St.) of the Carmen's building I noted a small Rockwell meter graduated in gallons - typical of a meter used to gauge petroleum storage tanks. The top portion of a pipe hung from the roof eave to about eight feet from the ground. The pipe appeared to be a vent pipe which had been disconnected. However, I saw no indication of underground piping exiting the ground in this area or any other area on the Carmen's property.

I told Ms. Fournier that I would return shortly since I wanted to inquire about the contamination at the adjacent Cumberland Farms facility located approximately 100 yards to the south on Broad Street (DEC UST File 6269813). According to the Cumberland Farms DEC UST file, the facility has three unprotected steel gasoline tanks, installed in 1983 with pressurized piping systems. No diesel or heating oil tanks are recorded at the site. Method of release detection for the USTs is recorded as annual tightness testing and inventory monitoring. The file showed the facility as overdue for testing, since, on the date of this visit, the most recent tightness test in the file was dated 4/20/94. All tanks and piping are shown to have passed this test. 4.26.95

At the Cumberland Farms Facility I introduced myself to store manager, Ms. Tammie Lincolnhunt. I explained that I was investigating a petroleum release near the neighboring property and that underground tanks at this facility would be a likely source. I requested inventory records and tightness test reports. After contacting her supervisor by telephone, Ms. Lincolnhunt handed me a box of records. I reviewed several past months of inventory reports. Although I did not attempt to evaluate the accuracy of their calculations, or establish acceptable variance of overages and shortages using the leak check formula, I did not note any obvious continuing patterns of product loss.

Ms. Lincolnhunt was unable to produce results from the most recent tightness test, which she said was conducted within the past few weeks. I asked if the test was conducted due to any unusual operating conditions, product loss, or if it was a routine test. She was not certain, but believed her supervisor, James Rust, had been complaining about product losses. I asked her to contact Mr. Rust and have all records of UST repairs and the most recent tightness test faxed to the HMMD within 24 hours.

I returned to Carmen's and spoke with Mrs. Fran Fournier. She told me that the Ice Cream shop was actually owned by CP Railroad and that she and her husband were in the process of negotiating a deal to purchase the property. She then gave me the name and phone number of her contact at CP Rail: W.R. Adams, 802-334-2155.

I asked Mrs. F. Fournier if she knew of any underground tanks on the property. She said that the building was currently only heated with electric space heaters, and that an above ground heating oil tank had been removed from a room in the building a few years ago. Mrs. F. Fournier showed me the room where she claimed the tank used to be located. The outside wall of this room is the same wall and location of the Rockwell meter and apparent vent pipe described above. There was no evidence of fuel oil or contamination in this room. I noted partially plugged holes in the outside wall consistent with entry points for a vent and fill pipe. The open end of an approximately 3/4 inch diameter aluminum tube was visible

in the floor in the area of the reportedly removed AST. This tube appeared to go through the floor. The end of the tube emitted a slight petroleum odor consistent with fuel oil. Mrs. F. Fournier suggested that her husband may know more about where the tube leads and stated that there is a crawlspace under the building.

I called Ted Unkles and give an update of the situation. Ted suggested I contact Dave Dill, Lyndonville Village Manager, to breif him.

I called Mr. Dill's office and left a message with the receptionist for him to stop by the site if it was possible.

At the excavation I spoke with Dennis Mixon of Leach Engineering. Mr. Mixon confirmed that the village storm drains are, to the best of his knowledge, tied into the sewage treatment plant. And, in fact, one reason the sewage system construction was being conducted was to separate the storm drains from the sewage system. I stated that the dewatering process could continue as long as the sewage treatment plant was informed and found it acceptable.

I talked with Les Downing who assured me that all excavated soils would be returned to the hole and that nothing wold be transported off-site.

Mr. Dill arrived on site and I informed him of the situation. He stated that he would brief the sewage treatment plant operators of the discharge.

Mr. Nate Fournier of Carmen's Ice Cream Shop arrived on site. Mr. Fournier and I accessed the crawl space under the building. We did not enter the crawlspace, but I could see the subfloor over which the AST was reported to have been located. I observed no evidence of contamination. I saw the 3/4 inch aluminum tube exiting the floor of the tank room, elbowing 90 degrees, then running east about 15 feet across the subfloor, and elbowing up at 90 degrees to enter another room inside the building. Mr. Fournier stated that he believed that room housed the furnace, but that he had never been able to access the room due to a locked door.

Mr. Fournier stated that he had lived in the area for sixty years and that the building had been a freight station in the past. He did not think that there were ever any underground tanks at the building, however. He also stated that the Cumberland Farms has been a gas station for a long time and that the previous owner may have sold diesel fuel.

I left the site at 1315.