

**PHASE II LIMITED ENVIRONMENTAL SITE ASSESMENT  
FORMER TYSON FOODS PROCESSING PLANT  
9943 Old Ocean City Boulevard  
BERLIN, MARYLAND 21811**

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## TABLE OF CONTENTS

<b>1.0</b>	<b>Introduction</b> .....	<b>2</b>
<b>2.0</b>	<b>Methodology</b> .....	<b>2</b>
<b>3.0</b>	<b>Findings – Soil Sampling</b> .....	<b>3</b>
<b>4.0</b>	<b>Findings – Groundwater Sampling</b> .....	<b>4</b>
<b>5.0</b>	<b>Previous MDE OCP Cases</b> .....	<b>5</b>
<b>6.0</b>	<b>Potential Off-site Sources</b> .....	<b>7</b>
<b>7.0</b>	<b>Site Specific Water Level Information</b> .....	<b>15</b>
<b>8.0</b>	<b>Regional Geology</b> .....	<b>17</b>
<b>9.0</b>	<b>Regional Hydrology</b> .....	<b>17</b>
<b>10.0</b>	<b>Site Geology Hydrology and Soils</b> .....	<b>19</b>
<b>11.0</b>	<b>Site Hydrology &amp; Proximate Water Supply Wells</b> .....	<b>19</b>
<b>12.0</b>	<b>Conclusions</b> .....	<b>21</b>
<b>13.0</b>	<b>Recommendations</b> .....	<b>23</b>
<b>14.0</b>	<b>Limitations</b> .....	<b>23</b>

Appendix A – Laboratory Analysis  
Appendix B – Site Vicinity Map/Boring Location Sketch  
Appendix C – Boring Logs  
Appendix D – EDR Report  
Appendix E – GPR Survey



## 1.0 Introduction

Froehling & Robertson, Inc. (F&R) was contracted to perform a Limited Phase II Environmental Site Assessment on the Tyson Foods, Inc. Processing Plant located at 9943 Old Ocean City Boulevard in Berlin, Maryland. The objective of this assessment was to eliminate the Tyson Berlin Plant as the potential source of the trace benzene and MTBE contamination detected in groundwater wells located in the area of the Tyson Plant. This assessment was designed to assist the Maryland Department of the Environment (MDE) Oil Control Program (OCP) in closing all currently open case files at the Tyson Berlin Plant. In order to accomplish this objective Tyson Foods, F&R and MDE representatives met on several occasions and developed an approved Scope of Services.

The Scope of Services included the installation of twenty (20) monitoring wells for the purpose of testing soil and groundwater for the presence of selected Volatile Organic Compounds (VOC's), including benzene and Methyl Tertiary Butyl Ether (MTBE) and selected oxygenates. To determine water quality in separate shallow aquifers, eleven (11) of the wells were installed to a depth of twenty-five (25) feet and nine (9) wells were installed to a depth of forty (40) feet below ground surface. The location of each well was chosen to correspond closely with all the potential on-site sources and provide geographic coverage of the site. In addition, a Ground Penetrating Radar (GPR) survey was conducted to determine the location of previously closed in place Underground Storage Tanks (USTs) located in the South East portion of the site. The GPR survey also served to verify no additional USTs were located at the site.

## 2.0 Methodology

The location and depth of the monitoring wells were predetermined by the MDE and plotted on a site map. The approximate location of each monitoring well is detailed on Drawing # 1 located in Appendix B. F&R installed two (2)-inch diameter PVC pipe with twenty (20) feet of slotted screen in the twenty-five (25) foot wells and ten (10) feet of slotted screen in the forty (40) foot wells. The wells were installed in accordance with MDE requirements and in general accordance with ASTM D-5092-04 Standard Practice for Design and Installation of Groundwater Monitoring Wells. Each well was protected at the surface with flush mounted curb-boxes in pavement areas and lockable protective casings in the lawn and grass areas. After proper pavement development of the wells, F&R obtained one (1) groundwater sample from each well. Each groundwater sample was placed in an EPA approved container appropriate for the analysis requested, placed on ice and shipped to the laboratory. These samples were then analyzed for Volatile Organic Compounds (VOC's) including BTEX, Methyl Tertiary Butyl Ether (MTBE) and selected oxygenates. F&R also obtained one (1) composite soil sample from each well location during well installation. Each soil sample was analyzed for Volatile Organic Compounds (VOC's) including BTEX, Methyl Tertiary Butyl Ether (MTBE) and selected oxygenates. All soils were screened with a Photo Ionization Detector (PID) during the well installation process.



### 3.0 Findings – Soil Sampling

The composite soil samples obtained from the subject site were each tested for the following parameters: Target Compound List – Volatile Organic Compounds via EPA Method SW846/8260 and including selected oxygenates, BTEX and MTBE. Units of concentration are given in milligrams per kilogram (mg/kg) for each of the tests conducted on the soil samples. All of the composite soil sample results were Below the Quantitation Limit (BQL) for each analysis. Table 1 provides an overview of the soil sampling and analysis results. The detailed Certificates of Analysis are in Appendix A. It should be noted that the methylene chloride detected in some of the soil samples is attributed to laboratory contamination. The laboratory blanks for these analytical runs also had methylene chloride present at similar levels. Methylene Chloride is the analytical solvent used in the analysis of the samples collected on this project.

**Table 1 – Soil Boring Information**

Boring No.	Boring Depth	Analysis Results (mg/kg)
MW-1	25'	BQL
MW-2	40'	BQL
MW-3	25'	BQL
MW-4	40'	BQL
MW-5	25'	BQL
MW-6	40'	BQL
MW-7	25'	BQL
MW-8	40'	BQL
MW-9	25'	BQL
MW-10	25'	BQL
MW-11	25'	BQL
MW-12	40'	BQL
MW-13	25'	BQL
MW-14	40'	BQL
MW-15	25'	BQL
MW-16	40'	BQL
MW-17	25'	BQL
MW-18	40'	BQL
MW-19	25'	BQL
MW-20	40'	BQL



#### 4.0 Findings – Groundwater Sampling

The groundwater samples obtained from the subject site were analyzed for the following parameters: Target Compound List – Volatile Organic Compounds via EPA Method SW846/8260 and including selected oxygenates, BTEX and MTBE. Units of concentration are given in micrograms per liter (ug/l) for each of the tests performed on the groundwater samples. The analysis found low levels of tert-Butyl alcohol (TBA) in MW-1, MW-3 and MW-16. Benzene was detected at low levels in MW-10 and MW-16 and low levels of Isopropylbenzene were also detected in MW-16. Table 2 provides an overview of the groundwater sampling and analysis results. The detailed Certificates of Analysis are in Appendix A.

**Table 2 – Monitoring Well Information**

Well No.	Well Depth	Sample Results (ug/l)
MW-1	25'	TBA-63 ug/l
MW-2	40'	BQL
MW-3	25'	TBA-43 ug/l
MW-4	40'	BQL
MW-5	25'	BQL
MW-6	40'	BQL
MW-7	25'	BQL
MW-8	40'	BQL
MW-9	25'	BQL
MW-10	25'	Benzene-5 ug/l
MW-11	25'	BQL
MW-12	40'	BQL
MW-13	25'	BQL
MW-14	40'	BQL
MW-15	25'	BQL
MW-16	40'	Benzene-12 ug/l Isopropylbenzene-29 ug/l TBA-119 ug/l
MW-17	25'	BQL
MW-18	40'	BQL
MW-19	25'	BQL
MW-20	40'	BQL

tert-Butyl alcohol (TBA) -unregulated constituent  
Benzene Groundwater Standard - 5 ug/L  
Isopropylbenzene Groundwater Standard - 66 ug/L



All of the levels detected are below applicable Maximum Contaminant Levels (MCL) or groundwater protection standards except the 12 ug/l of benzene detected in MW-16. The low levels of contamination encountered and the sporadic distribution is consistent with previous sampling conducted at the site (related to UST removal and closure). In each of the previous cases the MDE OCP concluded that no further action was required and closed each case. A more detailed description of the previous cases is provided in Section 5.0 of this report.

### 5.0 Previous MDE OCP Cases

Each of the previous OCP cases involved the voluntary closure of an underground storage tank (UST) on the Tyson Plant. In total, five (5) underground storage tanks have been taken out of service either by abandonment in place or removal. The following is a detailed breakdown of each tanks status:

Tank #	Size (gals)	Contents	OCP CASE #	Status
001	3,000	Diesel	93-0030-WO	Abandoned in Place – 1992
002	2,000	Gasoline	93-0030-WO	Abandoned in Place – 1992
003	12,000	Diesel	None	Removed - 1988
004	2,000	Heating Oil	04-0232-WO	Abandoned in Place – 2003
005	2,000	Heating Oil	04-1683-WO	Abandoned in Place – 2004

The Maryland Department of the Environment (MDE) issued a Notice of Compliance regarding the closure of Tanks #001 and #002 on March 23, 1994. The Notice of Compliance letter from the MDE states that one (1) monitoring was installed and sampled. Based on the low levels of the dissolved petroleum contamination in the groundwater and the site characteristics no further corrective action was required and the case was closed. While both Tanks #001 and #002 were not abandoned in place until 1994, according to Mr. Bill Davis (Tyson Environmental and Wastewater Manager) and internal company records both Tanks #001 and #002 were emptied and taken out of service in 1983. It is important to note that the only know source of benzene or MTBE on the Tyson site was removed from service over twenty (20) years ago.

No documentation is available regarding the removal of Tank #003. However, a letter dated July 7, 1993 was sent to the MDE OCP explaining that tank #003 was removed in 1988 when the new cooler was constructed. Also, the recent GPR survey found no evidence of a third tank present at the Tyson Plant. The soil and groundwater sampling in the area of Tank #003 did not indicate any significant residual benzene or MTBE contamination.



Regarding Tank #004, on December 29, 2003 the MDE OCP issued a Notice of Compliance letter regarding the closure of Case No. 04-0232-WO. On October 14, 2003 Tank #004 was abandoned in place by TPH Industries. According to the URS Corporation report dated November 7, 2003, the UST was pumped and cleaned, opened and filled with concrete slurry. All supply, return and vents lines were either removed or capped in place and all unearthed soil was properly disposed of in accordance of applicable laws and regulations. Two (2) soil and two (2) groundwater samples were collected and analyzed for TPH-GRO, TPH-DRO and Volatile Organic Compounds (VOC) by SW846-8260. Only TPH-DRO was detected in one soil sample at levels above the MDE Generic Numeric Cleanup Standard. This soil sample was from the topsoil collected above the UST. The groundwater samples obtained from both the center and southwest sides of the UST indicated levels of total petroleum hydrocarbons – diesel range organics above the MDE Generic Groundwater Numeric Cleanup Standard for Type I and II Aquifers. No detections of VOCs were noted in the groundwater and no detections of VOCs above the Generic Numeric Cleanup Standard were noted in the soil samples. Total petroleum hydrocarbon – gasoline range organic were not detected in any sample. The report concluded that the site did not exhibit any of the seven risk factors mentioned under the Risk Determination chapter of the OCP's February, 2003 document and requested closure of the case. MDE issued a Notice of Compliance for this UST dated December 29, 2003 and indicated no further action was required and closed the case.

Tank #005 was abandoned in place on May 24-25, 2004. According to the URS Corporation report dated June 21, 2004, the UST was pumped out, cleaned and filled with concrete slurry. All supply, return and vents lines were either removed or capped in place and all unearthed soil was properly disposed of in accordance of applicable laws and regulations. Groundwater samples were obtained from both the east and west sides of the UST. Results of the groundwater samples indicated elevated levels of benzene, naphthalene, and total petroleum hydrocarbons – diesel range organics above the MDE Generic Groundwater Numeric Cleanup Standard for Type I and II Aquifers. The URS report concludes that the site does not exhibit any of the seven risk factors mentioned under the Risk Determination chapter of the OCP's February, 2003 document and requested closure of the case. It is important to note that the site conditions and analytical results for this tank abandonment and the three previous Tyson UST closures are similar and no major changes in the site characteristics have occurred. Therefore, it is reasonable to assume that MDE OCP case no. 04-1683-WO will be closed as well.

Given the site history and absence of active benzene and MTBE sources on the Tyson property, an overview of the potential off-site sources is provided in Section 6 – Potential Off-site Sources.



## 6.0 Potential Off-site Sources

As of May 28, 2004, there were at least 24 MDE OCP case sites within 0.625 mile and an additional 9 UST sites within 0.375 mile of the Tyson Plant. The following is a discussion of each of these sites, with information including distance, direction, and site status.

### UP GRADIENT

**Former Oltman Plumbing Company**  
**9844 Main Street**  
**1/4 - 1/2 mile North-Northwest of the Subject Site**

This site is north-northwest of the Tyson property and is at a higher gradient. The OCP Case information indicates that the listing is from MDE Case Year 2001. The case information indicates that the site has a tank removal/abandonment action performed in 2001, that the tank contained motor/lube oil, that there was no release or cleanup, and that the case has been closed. The site is up gradient of the Tyson site in terms of groundwater directional flow. A listing of this type indicates that the site has an incident, such as a leak, that would have caused an MDE response; however, based on the case information for the OCP Case, no leak occurred.

**Alpha Beverages, Inc. T/A Cheers/Ocean Petroleum/ Cheers/C. W. Lord, Inc.**  
**9923 Old Ocean City Blvd.**  
**1/4 - 1/2 West-Northwest of the Subject Site**

There are four listings for this site. This site is to the west-northwest of the Tyson property and is of an equal grade. One of the listings for the site is the UST registrations with MDE. The following is a listing of the tanks registered at this site:

Facility ID	Tank #	Size (gals)	Contents	Status
8987	001	6,000	Gasoline	Permanently Out of Use
8987	002	6,000	Gasoline	Permanently Out of Use
8987	003	6,000	Gasoline	Permanently Out of Use
8987	004	1,000	Kerosene	Permanently Out of Use
8987	005	10,000	Gasoline	Currently in Use
8987	006	6,000	Gasoline	Currently in Use
8987	007	10,000	Gasoline	Currently in Use
8987	008	2,000	Gasoline	Permanently Out of Use



There are three OCP case listings for this site. The first listing for this site is an OCP case from 1998. It is described as a 'Transfer Accident', cleanup was performed, and the case has since been closed. The second case is from 2000. This case involves well and/or groundwater contamination due to motor or lube oil. The case information indicates that cleanup of the site was performed, and the case has since been closed. The third listing for this site is an OCP Case from MDE Case Year 2002, which is listed as Compliance Inspections, and that a release and cleanup was not reported. This listing indicates that the case is still open for this site.

**Berlin Nursing & Rehabilitation Center  
9715 Healthway Drive  
1/4 - 1/2 East-Northeast of the Subject Site**

There are two OCP case listings for this site. This site is east-northeast of the Tyson property and is up gradient. The first listing for this site is an OCP case from 1999. This listing involves a tank removal and/or abandonment containing motor/lube oil. There was a release and cleanup. The case was closed. The second listing for this site is an OCP case from 2003, which lists that there was no release, that no cleanup was performed, and that the case has since been closed.

**DOWN GRADIENT**

**Seitz Automotive/Park's Exxon  
Old Ocean City Boulevard  
Adjacent East of the Subject Site**

This site is located adjacent to the Tyson property directly to the east of the main plant gate. There are no known listings of this site with the Maryland Department of the Environment. According to Mr. Bill Davis, this site was a gas station until the late 1980's when the property was converted to an auto repair shop. The site is currently vacant. Based on the known usages of the site, including a gas station and automobile repair location, there is the potential for underground storage tanks at this site and also uncontrolled petroleum and oil releases due to previous site activities. Due to the fact that there are no known records regarding the removal of any UST's from this site, the possibility exists that the site contains unknown underground storage tanks. Due to the radius of influence created by the Tyson water production wells it is reasonable to suspect that uncontrolled releases from this site may be a contributing factor to the low level of benzene and TBA seen in MW-1, MW-3 and MW-10.



**Rayne's Sand & Gravel, Inc.  
10011 Old Ocean City Boulevard  
<1/8 mile East of Subject Site**

This site is east of the Tyson site and considered down gradient. This site formerly contained two (2) underground storage tanks, which were removed but a date or whether the UST's leaked is unknown. Below is the pertinent information regarding the two (2) UST's:

Facility ID #	Tank #	Size	Contents	Status
3013011	001	2,000 gallon	Diesel	Removed
3013011	002	550 gallon	Gasoline	Removed

**Perdue, Inc. and Perdue Feed Mill  
114 Bryan Avenue  
1/8 – 1/4 mile South of Subject Site**

There are two listings for this site, under the names Perdue, Inc. and Perdue Feed Mill. This site is south of the Tyson plant and the listing indicates that the site had the first OCP case opened in 1991 and the second in 1994. No fuel type is listed in either of the case files. The case information for both cases indicates that the no release was reported, no cleanup was reported, and that both case were closed.

**Rite Aid  
10119 Old Ocean City Boulevard  
1/8 – 1/4 mile East of Subject Site**

This site is east of the Tyson site and had a tank (not stated whether above ground or underground) that was utilized for the storage of motor/lube oil and was either removed or abandoned. The listing indicates that the tank had a release in MDE Case Year 1999, that cleanup took place at the site, and that the case has since been closed.

**Mr. Salah Ramadan and Shop Kwik  
10130 Old Ocean City Boulevard  
1/8 – 1/4 mile East of Subject Site**

There are two listings for this site. The first listing for this site is under the name Mr. Salah Ramadan and is an OCP Case opened on the site in MDE Case Year 1997. The case information indicates that there was a new installation of a tank for the storage of Motor/Lube Oil, that there was no release and no cleanup. The second listing for the site is under the name Shop Kwik and lists the registered tanks at the site. The following is a listing of the tanks registered at this site:



Facility ID #	Tank #	Size	Contents	Status
1195	001	12,000 gallon	Gasoline	Currently In Use
1195	002	12,000 gallon	Gasoline	Currently In Use

There is no information listed regarding the age of the UST's and whether there have been any releases. There is no Leaking Underground Storage Tank listing for this site.

**Berlin Goose Creek Food Store/Texaco/Your Store/Driver John Webb**  
**10137 Old Ocean City Boulevard**  
**1/8 – 1/4 mile East of Subject Site**

There are three listings for this site. The first listing for this site is under the name Berlin Goose Creek Food Store and is lists the registered tanks at the site. The following is a listing of the tanks registered at this site:

Facility ID #	Tank #	Size	Contents	Status
6013107	001	10,000 gallon	Gasoline	Currently In Use
6013107	002	10,000 gallon	Gasoline	Currently In Use
6013107	003	10,000 gallon	Gasoline	Currently In Use
6013107	004	6,000 gallon	Kerosene	Currently In Use
6013107	005	6,000 gallon	Diesel	Currently In Use

A second listing for the site is an update the facility name and the owner information. There is no Leaking Underground Storage Tank listing for this site. The third listing for the site is an OCP Case from the MDE Case Year 2001 under the name Texaco. This listing indicates that there was a release at the site, that a cleanup took place at the site, and that the case was closed. This listing also indicates that there were compliance inspections. No information is given on what type of release occurred. The fourth listing for the site is an OCP Case from the MDE Case Year 2004 under the name Driver John Webb. This listing indicates that there was a release at the site, that no cleanup was reported, and that the case is still open.

No information is given on what type of release occurred; however, based on the inclusion of the tank truck driver name in the listing, it can be assumed that a spill occurred during either the filling or emptying of a storage tank. The site is located to the east of the Tyson site, of a higher grade in relation to the Tyson site and should be considered to be down gradient of the Tyson site in terms of groundwater directional flow. OCP Case listings of this type typically indicate that the site has an incident, such as a leak, that would have caused an MDE response. Based on the fact that two OCP cases have occurred at this site and one case is still open, it is possible that this site may have impacted the groundwater in the Berlin area.



**Kwik Shop-Exxon/Exxon**  
**10140 Old Ocean City Blvd.**  
**1/4 - 1/2 mile East of the Subject Site**

There are two listings for this site, under the names Kwik Shop – Exxon and Exxon. This site is east of the Tyson property and the listing indicates that the site had the first OCP Case opened on the site in MDE Case Year 2002 and the second in MDE Case Year 2001. No fuel type is listed in either of the case files. The case information for both cases indicates that the no release was reported, no cleanup was reported, and that both cases were closed.

**First Baptist Church of Berlin/Berlin First Baptist Church**  
**613 Williams Street**  
**1/4 - 1/2 mile South-Southeast of the Subject Site**

There are four listings for this site. This site is to the south-southeast of the Tyson property and is of an equal grade. Two of the listings for the site are the UST registrations with MDE. The following is a listing of the tanks registered at this site:

Facility ID	Tank #	Size (gals)	Contents	Status
6013120	001	550	Heating Oil	Currently In Use
6013120	002	1,000	Heating Oil	Currently In Use
10275	001	550	Heating Oil	Permanently Out of Use
10275	002	1,000	Heating Oil	Permanently Out of Use

The third listing for this site is an OCP Case from MDE Case Year 2000, which indicates that the site formerly contained an underground storage tank, and that the UST that was either removed or abandoned and contained heating oil. The case information indicates that the UST had a release, that cleanup of the site was performed, and that the case has since been closed. The site is down gradient of the Tyson site in terms of groundwater directional flow. A listing of this type indicates that the site has an incident, such as a leak, that would have caused an MDE response. The fourth listing for this site is an OCP Case from MDE Case Year 2001, which indicates that the site formerly contained an underground storage tank, and that the UST that was either removed or abandoned and contained heating oil. This listing states that there was no release, that no cleanup was performed in relationship with this UST, and that the case was closed.



**Berlin Library/ Worchester County Library (Berlin Branch)  
220 N. Main Street  
1/4 - 1/2 mile South-Southwest of the Subject Site**

There are two listings for this site. This site is to the south-southwest of the Tyson property and is of a higher grade. The two listings for the site are the UST registrations with MDE. The following is a listing of the tanks registered at this site:

Facility ID	Tank #	Size (gals)	Contents	Status
6017017	001	2,000	Heating Oil	Currently in Use
5062	001	2,000	Heating Oil	Currently in Use

There is no information listed regarding the age of the UST and whether there have been any releases. There is no Leaking Underground Storage Tank listing for this site.

**Berlin Fire Company/Berlin Vol. Fire Company  
214 N. Main Street  
1/4 - 1/2 mile South-Southwest of the Subject Site**

There are two listings for this site. This site is to the south-southwest of the Tyson property. The two listings for the site are the UST registrations with MDE. The following is a listing of the tanks registered at this site:

Facility ID	Tank #	Size (gals)	Contents	Status
5000	001	1,000	Heating Oil	Currently in Use
5000	002	550	Diesel	Permanently Out of Use
6013135	001	1,000	Heating Oil	Currently in Use
6013135	002	550	Diesel	Currently in Use

There is no information listed regarding the age of the UST and whether there have been any releases. There is no Leaking Underground Storage Tank listing for this site. Based on the available information, it is believed that the 550-gallon diesel UST has been removed.

**Delmarva Oil/Eunis Sorin  
209 N Main Street  
1/4 - 1/2 mile South-Southwest of the Subject Site**

The OCP case information indicates that the site had a release in 1998, which is listed as a 'Transfer Accident'. A cleanup was performed and that the case has since been closed. No fuel type is listed in the case file. A listing of this type indicates that the site had an incident occur that caused an MDE response.



**Berlin Co. (36323)/ Berlin Wire Center (36323)  
 301 West Franklin Avenue  
 1/4 - 1/2 mile Southeast of the Subject Site**

There are two listings for this site. The two listings are the UST registrations with MDE. There is no information regarding the age of the UST and whether there have been any releases. There is no Leaking Underground Storage Tank listing for this site. Based on the available information, it is believed that the 1,000 gallon heating oil and 550-gallon diesel UST's have been removed. The following is a listing of the tanks registered at this site:

Facility ID	Tank #	Size (gals)	Contents	Status
12796	001	1,000	Heating Oil	Permanently Out of Use
12796	002	550	Diesel	Permanently Out of Use
3012982	001	1,000	Heating Oil	Removed
3012982	002	550	Diesel	Removed
3012982	003	1,000	Diesel	Currently in Use

**Town of Berlin - Electric Power Plant and Public Works Department  
 319 William Street  
 1/4 - 1/2 mile South-Southeast of the Subject Site**

There are two listings for this site. The two listings for the site are the UST registrations with MDE. The following is a listing of the tanks registered at this site:

Facility ID	Tank #	Size (gals)	Contents	Status
7040	001	328	Diesel	Permanently Out of Use
7040	002	639	Not Listed	Permanently Out of Use
7040	003	517	Other	Permanently Out of Use
7040	004	664	Diesel	Permanently Out of Use
7040	005	639	Diesel	Permanently Out of Use
7040	006	263	Diesel	Permanently Out of Use
4418	007	4,000	Diesel	Permanently Out of Use

There is no information regarding the age of the UST and whether there have been any releases. There is no Leaking Underground Storage Tank listing for this site. Based on the available information, it is believed that all of the underground storage tanks have been removed.



**AB-GR, Berlin Electric Power  
317 Williams Street  
1/4 - 1/2 mile South-Southeast of the Subject Site**

The OCP case is from 1993. The only information available for this case is that the case has been closed. A listing of this type indicates that the site had an incident that caused an MDE response.

**Worcester County Senior Center  
107 Williams Street  
1/2 - 1 mile South of the Subject Site**

The OCP case is from 2001. The case information indicates that the site had a tank removal/abandonment action performed in 2001. The tank contained heating oil and there was no release or cleanup. The case has been closed. A listing of this type indicates that the site had an incident that caused an MDE response.

**Kathleen Timpler Property  
400 Broad Street  
1/2 - 1 mile South of the Subject Site**

The OCP case is from 1994. The case information indicates that the site had a leak from an aboveground storage tank. No cleanup was reported and that the case has been closed.

**Taylor Bank  
12 Commerce Street  
1/2 - 1 mile South of the Subject Site**

There is an OCP case listing for this site from 2003. This listing states that there was a release and cleanup. The case was closed. It does not list what type of fuel was released or what type of cleanup was performed.

**Calvin B. Taylor Bank  
24 North Main Street  
1/2 - 1 mile South of the Subject Site**

There is an OCP case listing for this site from 1998 and relates to a tank removal and/or abandonment which contained heating oil. This listing states that there was a release and cleanup. The case was closed. It does not list what type of cleanup was performed.



**Berlin Florist**  
**3 Pitts Street**  
**1/2 - 1 mile South of the Subject Site**

There are three listings for this site. Two of the listings for the site are the UST registrations with MDE. The following is a listing of the tanks registered at this site:

Facility ID	Tank #	Size (gals)	Contents	Status
6013069	001	500	Heating Oil	Currently in Use
10639	001	500	Heating Oil	Permanently out of Use

There is also one OCP case listing for this site from 2000 and relates to a tank removal and/or abandonment which contained heating oil. This listing states that there was a release and cleanup. The case was closed. It does not list what type of cleanup was performed.

**Berlin Farm Supply, Inc.**  
**115 Broad Street**  
**1/2 - 1 mile Southwest of the Subject Site**

There are three listings for this site. Two of the listings for the site are the UST registrations with MDE. The following is a listing of the tanks registered at this site:

Facility ID	Tank #	Size (gals)	Contents	Status
3012801	001	1,000	Gasoline	Removed
3012801	002	2,000	Gasoline	Removed

There is also one OCP case listing for this site from 1991. This listing states that no release or cleanup was reported. The case was closed. It does not list the cause of the case filing. Listings of this type typically indicate that the site has an incident that caused an MDE response.

## **7.0 Site Specific Water Level Information**

In order to better evaluate how these off-site sources relate to and affect the Tyson property, information relating to local and regional geology and hydrogeology is detailed in the Sections 7-11 of this report. Based on information gathered from the installation of the twenty (20) monitoring wells, F&R was able to establish a reasonably accurate site specific direction of groundwater flow. After the installation of the twenty (20) monitoring wells, the wells were properly developed, water levels were allowed to equalize and depth to water level measurements were obtained. Using MW-1 as a benchmark with an assumed elevation of 100' on the casing, the relative elevation on the casing of each well was surveyed to establish a relative elevation to the benchmark. Using this information the



relative elevation of groundwater in each monitoring well was calculated. The resulting groundwater elevations are detailed in Table 3 – Groundwater Elevation Chart and graphically represented on the Monitoring Well Location Drawing in Appendix B.

**Table 3 – Groundwater Elevation Chart**

Monitoring Well	Casing Elevation	Groundwater Elevation
MW-1	100'	89.01''
MW-2	99.22'	91.20'
MW-3	99.75'	88.75'
MW-4	99.59'	91.59'
MW-5	99.09'	88.09'
MW-6	98.09'	90.07'
MW-7	98.05'	90.01'
MW-8	97.83'	89.85'
MW-9	97.84'	89.84'
MW-10	97.84'	89.82'
MW-11	97.67'	90.64'
MW-12	97.67'	90.65'
MW-13	97.59'	90.59'
MW-14	97.59'	90.57'
MW-15	97.17'	90.23'
MW-16	97.00'	89.98'
MW-17	97.00'	90.01'
MW-18	97.00'	90.00'
MW-19	94.59'	87.57'
MW-20	93.92'	86.88'

Note: All elevations are set relative to an assumed elevation of 100.00' on the casing of MW-1 and bear no relationship to elevations based on sea level.

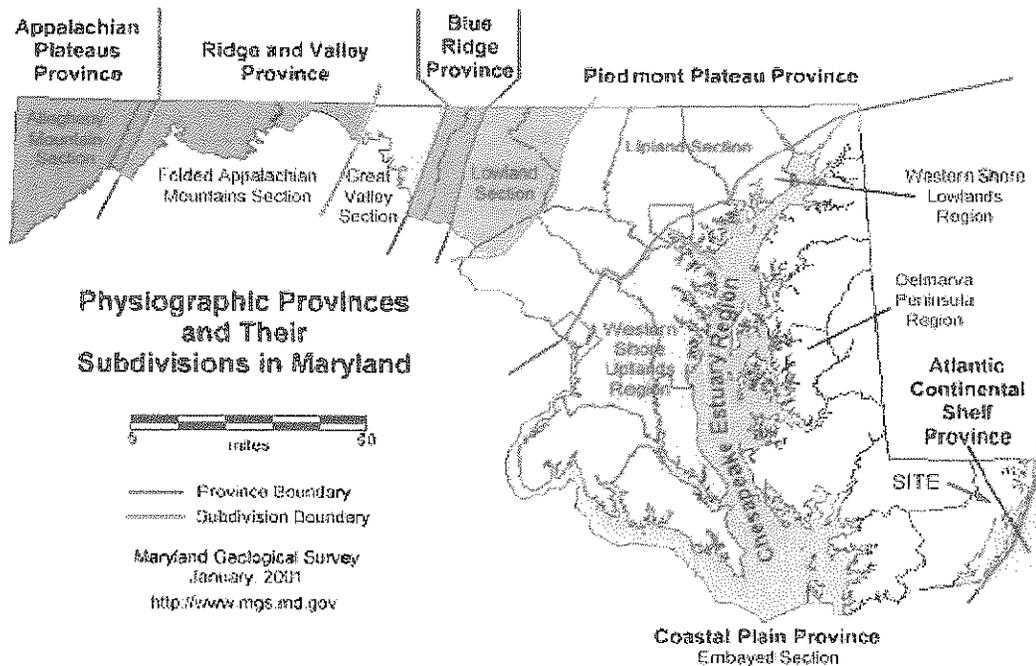
In two of the forty (40) foot wells, MW-2 and MW-4 the groundwater elevation appears to be slightly higher than would be expected given their location relative to the other wells in this area. As explained in Section 8 – Site Geology Hydrology and Soils there appears to be a clay confining layer at a depth of approximately 33 feet. These slightly higher groundwater elevations may be the result of the pressure exerted on the aquifer by the clay confining layer. The upward pressure is common in aquifers as discussed in Section 9 – Regional Hydrogeology. If we consider MW-2 and MW-4 anomalies, the groundwater elevations trend from highest to lowest in an east northeast direction.



## 8.0 Regional Geology

The project site and the surrounding area are located within the Coastal Plain Physiographic Province. The Coastal Plain Physiographic Province is underlain by unconsolidated sediments including gravel, sand, silt, and clay. This wedge of sediments thickens towards the east and reaches depths of more than 8,000 feet at the Atlantic coastline. The sediments of the Coastal Plain are inclined slightly eastward, and range in age from Triassic to Quaternary. Groundwater within the Coastal Plain is characterized by sand and gravel aquifers interlayered with silt and clay confining units. Diagram A – Physiographic Provinces shows the site's location in relation to the Physiographic Provinces of Maryland.

Diagram A - Physiographic Provinces



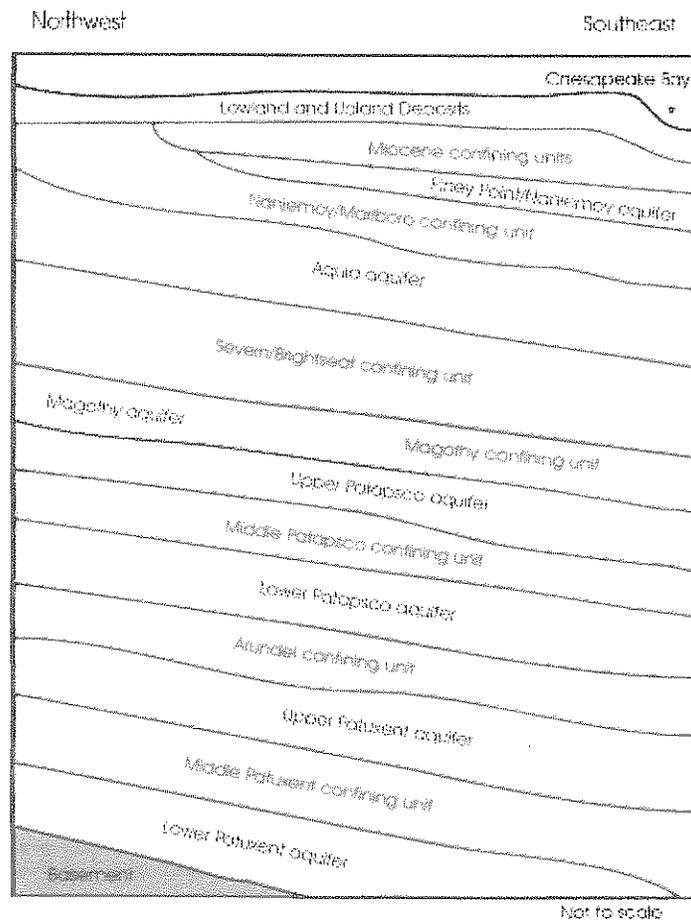
## 9.0 Regional Hydrology

The project site is located within the Chincoteague Watershed, identified by USGS Hydrologic Unit Code 02060010. Storm runoff from this watershed drains into Chincoteague Bay, located east of the site. The groundwater beneath the site is indicative of Coastal Plain geology. Aquifers in the Coastal Plain are located in high-permeability subsurface units such as gravel or sand. There are also less permeable subsurface units such as clay and silt form confining boundaries, creating a series of interlayered aquifers.



Please refer to Diagram B – Aquifer Cross Section, which graphically illustrates the general subsurface conditions prevalent in coastal area similar to those encountered at the Tyson site.

### Diagram B – Maryland Coastal Plain Aquifer Cross Section



Aquifers located beneath a confining layer may be under pressure relative to the surface and will flow naturally from a well when accessed. Unconfined aquifers are more common and do not have a low-permeability deposit above them. Water in unconfined aquifers may have arrived recently by percolating through the land surface. Water in unconfined aquifers is often considered very young, in geologic time. The top layer of an unconfined aquifer is the water table. It's affected by atmospheric pressure and changing hydrologic conditions, including local rainfall events. Discharge and recharge rates in unconfined aquifers depend on the hydrologic conditions above them. Unconfined aquifers located within Coastal Plain geology are particularly susceptible to ground surface releases of contaminants due to the



normally high transmissivity of groundwater within the sand and gravel deposits located in the upper subsurface.

## **10.0 Site Geology Hydrology and Soils**

The topography of the site and its surroundings is relatively flat. The site's grade inclines slightly to the east northeast. The nearest surface water body is a tributary of Kitts Branch, located approximately 100 feet west of the site. Kitts Branch together with Battle Branch flows east southeast into Trappe Creek and eventually Newport Bay. Regional groundwater flows towards the east and south.

The Worcester County Soil Survey maps the site's soils as Roanoke fine sandy loam. This soil unit is defined as stratified silts, sands and clays with potential hydrologic conductivity rates from 0 to 20 inches per hour. Any mapped soil survey unit possesses a 51% chance of actually matching the soils at any specific location examined. Site investigation revealed that the site's soils do not patently match the Roanoke fine sandy loam profile, but generally do conform to the anticipated soil conditions of unconsolidated, layered gravel, sand, clay, silt and other fines.

Boring logs from the installation of the site's 20 monitoring wells indicate that the upper 9 to 11 feet of soil are a dark brown clay loam with some sand. Soils within this zone were moderately compacted and clayey based on the number of hammer blows required to advance the sampling rod a given distance. From approximately 11 to 15 feet the subsurface soils transition to sandy wet clay. Based on field observations, the subsurface soil from 11 to 15 feet appears to mark the transition zone into the site's water table. The logs indicate that the sampling rod advanced through this level using only the weight of the hammer. This is indicative of voids or loose, porous soils with low compaction ratings. Generally, the boring logs reveal that these low compaction soils persist across the site to a depth of approximately 33 feet. At 33 feet, each of the nine deep borings advanced to 40 feet encountered a layer of resistant sandy clay. F&R anticipates that the site soils are porous and have a rapid transport potential below 11 feet, but are resistant to surface spills due to higher clay content in the upper 11 feet. Boring Logs detailing observations made during installation of the site's monitoring wells are included in Appendix C.

## **11.0 Site Hydrology & Proximate Water Supply Wells**

F&R recorded relative groundwater depths after each well was properly developed. The water level data indicate that the site's groundwater flow is to the east-northeast, similar to expected regional groundwater flow of east-southeast. One factor influencing the anticipated local groundwater flow is the presence of sixteen water supply wells located within ½ mile of the site. Please refer to Diagram C – Berlin Well Location Map for a graphical representation of the locations of these sixteen (16) well relative to the Tyson site. Research indicates that the majority of these wells were installed between 1945 and 1966. F&R used USGS coordinates recorded with each of the wells to plot the well locations on a USGS topographic map. Three of the supply wells are known to be located on the



subject site. The majority of the remaining wells, including two Public Water System (PWS) supply wells plotted using Maryland state plane coordinates, are located south of the site. These wells range in depth from 98 feet to 161 feet below grade and are all screened within the unconfined aquifer that is located beneath the site. Any projected direction or velocity of groundwater movement within the described ½-mile radius will be influenced to an unknown degree by the depression cones formed on the surface of the water table when these supply wells are active.

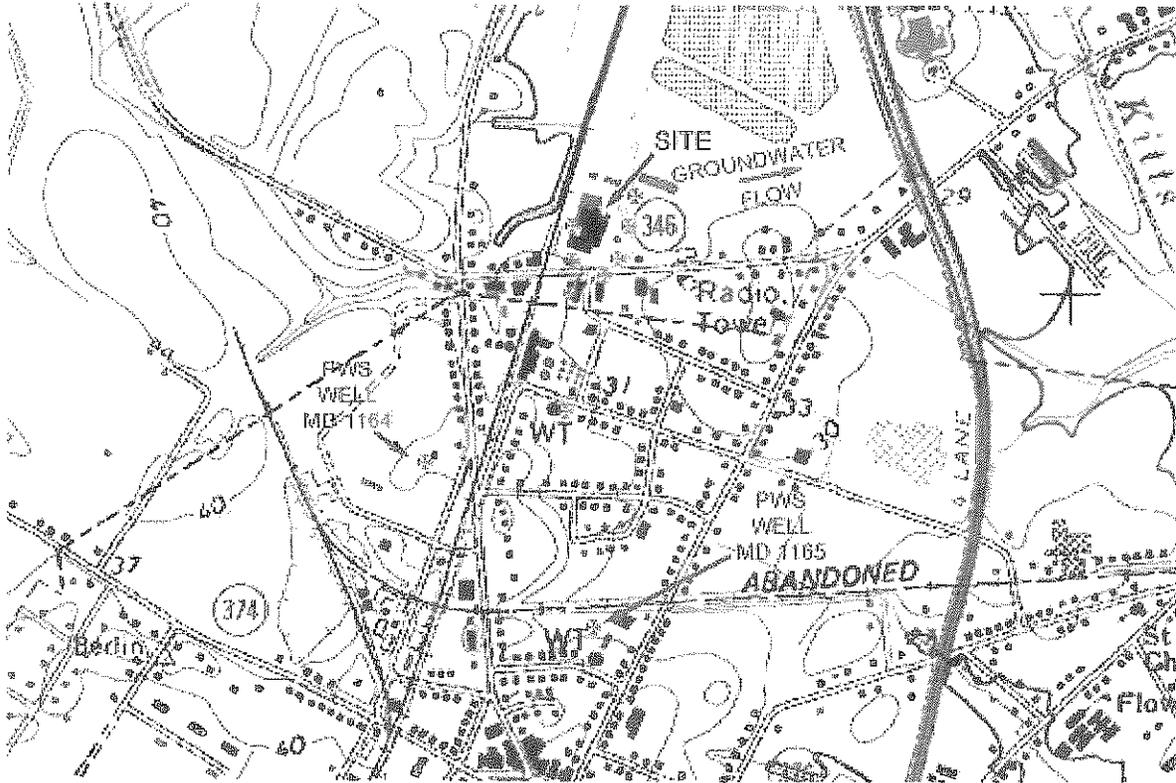
F&R accessed Open File Report No. 2001-02-14, *Estimation of areas contributing recharge to selected public supply wells in designated metro core areas of Upper Wicomico River and Rockwalking Creek basins, Maryland* on the World Wide Web at <http://www.mgs.md.gov/hydro/rockindex.html> to qualify the extent to which water supply wells might impact groundwater movement in a aquifer similar to the site's. The aquifer used for the cited report is also an unconfined, shallow water table aquifer located within the Coastal Plain Physiographic Province of Maryland. The report found that within this aquifer 50-year contributing areas related to two supply wells pumping at 0.36 million gallons per day formed an elongated depression pattern on the water table that extended approximately 4 miles from the wells.

Based on the Maryland PWS hydrological study, F&R anticipates that the direction of groundwater movement at the Tyson Berlin Plant has been subject to varying degrees of influence from the 16 water supply wells located within ½-mile of the site. Notably, two Public Water System wells identified as MD WELL 1164 and MD WELL 1165 are located south of the site. MD WELL 1164 (Geocheck Map Ref. No. 10) is situated 0.28-mile south-southwest of the site. This well is reported to have a total depth of 140 feet. MD WELL 1165 (Geocheck Map Ref. No. C-14) is located 0.42-mile south of the site and is reported to have a total depth of 134 feet. These two PWS wells are situated cross-gradient to the anticipated regional groundwater flow direction of east-southeast and the apparent east-northeast groundwater flow direction observed on the site. Additionally, there are three known supply wells located on the subject site and four supply wells are mapped immediately south of the site, between the site and the PWS wells.

Considering the site's apparent groundwater flow direction, the presence of a relatively impermeable clay layer in the upper 11 feet, and the influence of seven potentially intercepting supply wells, F&R anticipates a low probability that surface release contaminants from the site would travel over ¼-mile at 90 degrees cross gradient to groundwater flow to arrive at either PWS well. Based on the Wicomico River supply well report cited above, F&R proposes that the sources for any contaminants detected in those wells is possibly located miles up gradient from the wells. Supply well locations and details are located on pages A-6 through A-24 in the EDR Geocheck Report included in Appendix D.



Diagram C – Berlin Well Location Map



\* WELL LOCATION

## 12.0 Conclusions

The results of this Assessment are consistent with the finding and conclusions from all previous cases brought before the MDE OCP regarding petroleum issue on the Berlin Tyson Plant site. In each of the previous cases the MDE OCP concluded no further action was required and closed the case files. The closure of each case was based on the requirements set forth in the *Tank Removal/Abandonment – October 14, 2003* document having been satisfied.

Just as in each of the previous cases there is little risk associated with this site. If you compare the results of this assessment to the Seven Risk Factors used by the OCP none are exhibited. These Seven Risk Factors are as follows: 1) Liquid Phase Hydrocarbon – no liquid phase hydrocarbons were encountered during this assessment; 2) Current and Future Use of Impacted Groundwater – currently the groundwater at this site is not being



used for consumption or even industrial processes. The impacted groundwater is in the uppermost aquifer with a significant clay confining layer between it and the deeper groundwater. Also, only one constituent, benzene in MW-16, is above the MCL for drinking water; historically the level of benzene contamination have been below the drinking water MCL; 3) Migration of Contamination – given the fact that no on-site source for any of the contamination found in the groundwater has been identified and the low levels of contamination detected, it is unlikely migration of contamination is occurring from the Tyson site.

The site soils are high in clay content in the upper ten (10) feet and appear to control migration. This can be clearly seen in the lack of migration of the heating oil spillage from Tanks #004 and #005; 4) Human Exposure – the chance of human exposure is very low due to the inaccessibility of the isolated pockets of residual contamination; 5) Environmental Ecological Exposure – for the same reasons human exposure is unlikely environmental ecological exposure is also unlikely; 6) Impact to Utilities and Other Buried Services – there are no utilities in the areas of residual contamination encountered during this assessment. Given the low mobility of the isolated pockets of on-site contamination the likelihood of an impact to any nearby utilities is remote; 7) Other Sensitive Receptors – there are no other sensitive receptors identified in the proximity of the Tyson site.

The impetus for this assessment was the detection of low level benzene and MTBE in Tyson's on-site production wells and the Town of Berlin Water Supply Well. Based on this situation the MDE OCP re-opened numerous previously closed cases including a case against the Tyson site. These cases were re-opened in an effort to locate the potential source of the benzene and MTBE. Based on the information gathered during this assessment, the results of the previous assessments and the site history it is unlikely the Tyson property is the source of the contamination. This conclusion is based on the following:

- 1) The only known source of benzene and MTBE ever on the Tyson site, Tank #002, was emptied and taken out of service in 1983, over twenty (20) years ago.
- 2) Given the mobility of MTBE and the rate of natural attenuation of benzene, it would be expected that any residual contamination from Tank #002 has dissipated.
- 3) There were twenty (20) composite soil samples submitted for analysis as part of this assessment. None contained detectable concentrations of benzene or MTBE.
- 4) There were twenty (20) groundwater samples submitted for analysis as part of this assessment. Only two (2) had any detectable concentrations of benzene and there was no MTBE detected.
- 5) Of the forty samples analyzed, only one sample, benzene in MW-16 was above the MCL.



- 6) Given the site's hydrogeology and proximity to the Tyson Wells on-site production wells and the Town of Berlin PWS well in question there is a low probability that surface release contaminants from the site would travel over ¼-mile at 90 degrees cross gradient to groundwater flow to arrive at the PWS well.
- 7) There are at least a dozen more likely off-site sources of the benzene and MTBE contamination than the Tyson Site, including the Seitz Automotive site. Based on the known usages of the site, including a gas station and automobile repair location, there is the potential for underground storage tanks at this site as well as uncontrolled petroleum and oil releases. Due to the fact that there are no known records regarding the removal of any UST's from this site, the possibility exists that the site contains unknown underground storage tanks.
- 8) The site does not exhibit any of the Seven Risk Factors used by the MDE OCP to determine risk.

### **13.0 Recommendations**

Based on the eight (8) conclusions listed above, the site history and the MDE OCP's own risk evaluation criteria, F&R recommends Tyson respectfully request that the MDE OCP close all open cases against the site at 9943 Old Ocean City Boulevard in Berlin, Maryland and a Notice of Compliance be issued stating no further action is required.

### **14.0 Limitations**

This report has been prepared for the exclusive use of Tyson Foods and its subsidiaries for specific application to the Former Tyson Foods - Berlin processing plant. No other warranty, expressed or implied, is made.

The evaluation and recommendations presented in this report were developed from a consideration of the project characteristics and an interpretation of observations made during completion of the test borings and of data recorded in the field using normally accepted environmental sampling protocol and reasonable professional judgment. Although individual test borings are considered to be representative of the subsurface conditions at the precise boring locations on the date shown, they are not necessarily indicative of the subsurface conditions at other locations or at other times of the year. Actual soil variations can be best evaluated during disturbance of subsurface conditions, and if necessary, minor changes can be made at that time. If such variations become apparent during any construction/soil disturbance, then it will be necessary to re-evaluate our recommendations based on these variations.