

# Health Consultation

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Evaluation of Environmental Concerns at the Chicopee Registry of  
Motor Vehicles Related to a State-Regulated Release Site in  
Chicopee, Hampden County, Massachusetts

EPA FACILITY ID: MA5000000620

AUGUST 27, 2008

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Agency for Toxic Substances and Disease Registry  
Division of Health Assessment and Consultation  
Atlanta, Georgia 30333

## **Health Consultation: A Note of Explanation**

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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## HEALTH CONSULTATION

Evaluation of Environmental Concerns at the Chicopee Registry of Motor Vehicles Related to a  
State-Regulated Release Site in Chicopee, Hampden County, Massachusetts

EPA FACILITY ID: MA5000000620

Prepared By:

Massachusetts Department of Public Health  
Bureau of Environmental Health  
Community Assessment Program  
Under Cooperative Agreement with the  
U.S. Department of Health and Human Services  
Agency for Toxic Substances and Disease Registry

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## **I. Background and statement of issues**

At the request of a representative of the Massachusetts Executive Office of Transportation (EOT)/Registry of Motor Vehicles (RMV), the Community Assessment Program (CAP) at the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH), conducted an evaluation of current and historical analytical results of groundwater samples collected from the RMV property located at 1011 Chicopee Street in Chicopee, Massachusetts, in order to evaluate the potential for RMV employees and customers to be exposed to contaminants in groundwater.

The RMV property is located adjacent to a Sunoco service station. EOT/RMV officials received data on groundwater samples taken from the RMV property in connection with a site investigation following a release of petroleum at the Sunoco station (LaPointe 2007). According to the Massachusetts Department of Environmental Protection (MassDEP), the release was reported in 1994 (MassDEP 2007a). Sunoco hired a contractor, Kleinfelder, Inc. (Kleinfelder) that conducted remedial activities at the site. Kleinfelder reported that both the initial phase (e.g., soil remediation) and the final phase (groundwater monitoring) of remediation have been completed and that monitoring wells on the RMV property have been decommissioned. On December 4, 2007, the site was closed in accordance with MassDEP regulations (Kleinfelder 2007e-h).

## **II. Groundwater sampling at the RMV property**

Kleinfelder personnel forwarded all available groundwater monitoring data for the RMV property to MDPH. Beginning in 2002 and continuing through 2007, Kleinfelder conducted 18 rounds of groundwater sampling at the RMV property. Groundwater samples were analyzed for the following contaminants: volatile organic compounds (VOCs), including benzene, ethylbenzene, methyl tert butyl ether (MTBE), naphthalene, toluene, total xylenes; and volatile petroleum hydrocarbon (VPH) fractions, including C5-C8 aliphatics, C9-C12 aliphatics, and C9-C10 aromatics (Kleinfelder 2007a-d).

Petroleum products are mixtures of hundreds of hydrocarbon compounds. Instead of analyzing environmental samples for hundreds of compounds, environmental samples can be analyzed for groups of hydrocarbon compounds with similar characteristics to simplify the process of evaluating petroleum contamination. VPH fractions are a group of petroleum hydrocarbons that can be analyzed in the laboratory by a single analytical method. The VPH group is broken down into ranges or fractions of petroleum hydrocarbons as follows: C5-C8 aliphatic hydrocarbons, C9-C10 aromatic hydrocarbons, and C9-C12 aliphatic hydrocarbons (MassDEP 2002a).

Kleinfelder installed three groundwater monitoring wells (OMW-1, OMW-2, and OMW-3) on the RMV property to delineate the extent of groundwater contamination. Monitoring well OMW-1 is located on the west side of the RMV property, approximately 32 feet southwest of the RMV building; OMW-2 is located on the south side of the RMV property, approximately 12 feet south-southeast of the RMV building; and OMW-3 is located on the street side (north side) of the RMV property, approximately 15 feet north-northwest of the RMV building (Kleinfelder 2007a). The locations of monitoring wells on the RMV property and approximate extent of groundwater contamination are illustrated in the Site Boundary Plan for RTN-1-100355 (Appendix A). Based

on topography and the measured depth to groundwater in the three monitoring wells, groundwater is anticipated to flow toward the northwest beneath the RMV property. The depths of the three monitoring wells on the RMV property, as measured from the ground surface, were as follows: OMW-1 (28.65 feet), OMW-2 (31.20 feet), and OMW-3 (28.95 feet) (Kleinfelder 2007h).

The groundwater at the RMV property is not used for drinking water. The RMV building and surrounding neighborhoods are supplied with municipal drinking water (MassGIS 2007a-c; MWRA 2007).

### **III. Groundwater sampling results**

Table 1 summarizes groundwater data on the RMV property for each of the three monitoring wells. Because the groundwater is not used for drinking water, the most likely route of exposure, if any, is via volatilization of chemicals, from groundwater, up through the soil and into indoor air of the building located above the groundwater. To evaluate this potential exposure, MDPH used a screening method recommended by the U.S. Agency for Toxic Substance and Disease Registry (ATSDR) for vapor intrusion into indoor air. The guidance recommended by ATSDR provides concentrations for contaminants of concern [called U.S. Environmental Protection Agency (EPA) target concentrations] in groundwater by which this potential exposure pathway should be evaluated (ATSDR 2007; ITRC 2007; EPA 2002). Table 1 also shows the EPA target concentrations for constituents in groundwater.

EPA does not have target concentrations for groups of compounds such as hydrocarbon groups. Thus, for VPH fraction results reported by Kleinfelder, concentrations were compared to MassDEP groundwater standards (MassDEP Method 1 GW-2) designed to evaluate the potential for contaminants, including hydrocarbons, to be sources of vapors to indoor air (see Table 1).

As can be seen in Table 1, monitoring well OMW-1 did not have any exceedances and monitoring well OMW-2 had one exceedance for benzene. A review of all the sampling data for monitoring well OMW-2 indicates that benzene was detected in one of the 18 samples collected between 2002 and 2007. The detection (5.5 ppb detected versus 5 ppb EPA target concentration) occurred in 2002. The fifteen samples taken since 2002 showed no detection of benzene (detection limit ranged from 1 to 5 ppb). Thus, based on the infrequency of benzene detection and the consistency of the non-detects since 2002, as well as no other constituents exceeding comparison concentrations, it is not expected that any constituents detected in these two wells impacted the indoor air quality in the RMV. The third monitoring well, OMW-3, did have some exceedances, and hence, results from this well will be further evaluated in the following section.

Maximum concentrations of the following VOCs and VPH fractions detected in OMW-3 exceeded EPA target concentrations or MassDEP Method 1 GW-2 standards (Table 1): benzene, ethylbenzene, naphthalene, C5-C8 aliphatic hydrocarbons, C9-C12 aliphatic hydrocarbons, and C9-C10 aromatic hydrocarbons. The number of samples from 2002-2007 in which these constituents exceeded target concentrations or MassDEP Method 1 GW-2 standards were as follows:

- Benzene: 2 of 18 samples (exceedances in 2003)
- Ethylbenzene: 5 of 18 samples (exceedances in 2002 - 2004)

- Naphthalene: 10 of 18 samples (exceedances in 2002 – 2006)
- C5-C8 aliphatic hydrocarbons: 14 of 18 samples (exceedances in 2002 – 2006)
- C9-C12 aliphatic hydrocarbons: 8 of 18 samples (exceedances in 2002 – 2006)
- C9-C10 aromatic hydrocarbons: 5 of 18 samples (exceedances in 2003 – 2006)

In the most recent groundwater sample collected from OMW-3 on March 14, 2007, concentrations of C5-C8 aliphatic hydrocarbons (1,500 ppb detected versus 1,000 ppb MassDEP standard) and C9-C12 aliphatic hydrocarbons (1,900 ppb detected versus 1,000 ppb MassDEP standard) exceeded MassDEP Method 1 GW-2 standards. No VOCs were detected above EPA target concentrations (Kleinfelder 2007d). Historically, concentrations of VOCs and VPH fractions were detected in monitoring well OMW-3 at concentrations exceeding EPA target concentrations or MassDEP Method 1 GW-2 standards; however, VOC and VPH fraction concentrations have been trending downward since 2003 and benzene has not been detected in groundwater samples since 2003 (Kleinfelder 2007d).

#### **IV. Evaluation of Indoor Air Impacts**

Because some VOCs detected in monitoring well OMW-3 at the RMV property exceeded EPA target groundwater concentrations, MDPH conducted modeling to evaluate whether those contaminants at this well are likely to migrate via vapor intrusion into the indoor air of the RMV building. Although VPH fractions exceeded MassDEP Method 1 GW-2 standards, those standards apply to groundwater located within 30 feet of an occupied building where the average depth to groundwater is 15 feet or less below the ground surface (MassDEP 2007b). Based on measurements taken since 2002, depth to groundwater beneath the RMV property has fluctuated between 22 and 30 feet below the ground surface (Kleinfelder 2007d). As a result, MassDEP Method 1 GW-2 standards do not apply to groundwater at the RMV property because the standards were designed for more shallow groundwater

MDPH modeled indoor air concentrations from annual average VOC concentrations in groundwater using EPA's Screening Level Implementation of the Johnson and Ettinger Vapor Intrusion Model (Johnson and Ettinger Model) (EPA 2007a). This model estimates indoor air concentrations based on several user-entered parameters including contaminant concentration, depth to contaminated media, soil type, soil temperature, and building construction. MDPH selected conservative, worst-case parameters for soil type and soil temperature and evaluated the average yearly concentrations of VOCs detected in groundwater at OMW-3 above EPA target concentrations. It is important to note that modeling was conducted for screening purposes to represent worst-case conditions and determine whether further evaluation may be necessary.

Table 2 shows the results of predicted concentrations of the modeled compounds (benzene, ethylbenzene, and naphthalene) in indoor air. These values were then compared to ATSDR health-based comparison values for air for screening purposes. The ATSDR comparison values are specific concentrations of a chemical in a media (in this case, air) that are used by health assessors to identify environmental contaminants that require further evaluation. These comparison values are developed based on health guidelines and assumed exposure situations that represent conservative (worst case) estimates of human exposure. Chemical concentrations detected in environmental media that are less than a comparison value are not likely to pose a health threat. However, chemical concentrations detected in environmental media above a

comparison value do not necessarily indicate that a health effect will occur. In order for a compound to impact one's health, it must not only be present in the environmental media, but one must also come in contact with the compound. Therefore, if a concentration of a chemical is greater than the appropriate comparison value, the potential for exposure to the chemical should be further evaluated to determine whether exposure is occurring and whether health effects might be possible as a result of that exposure.

In addition to comparison values, MDPH evaluated the modeled chemical concentration versus typical urban background concentrations of these compounds. Background concentrations are typical concentrations of chemicals found in indoor or outdoor air from sources such as household products, building materials, industry, and traffic. The background concentrations used for comparison in this report are based on EPA's Building Assessment and Survey Evaluation (BASE) database, which comprises indoor and outdoor air sampling data from 100 randomly selected public and commercial office buildings across the United States (EPA 2007b; NYDOH 2006).

Table 2 summarizes the modeled indoor air concentrations of benzene, ethylbenzene, and naphthalene and compares them to ATSDR comparison values and BASE background values. The predicted indoor air concentrations for ethylbenzene and naphthalene were less than their respective comparison values. Benzene was predicted to be present at a maximum concentration of 0.36 ppb versus the 0.03 ppb Cancer Risk Evaluation Guide (CREG) (0.16 ppb averaged over the 6 modeled years); however, the predicted concentrations were within typical background concentrations for benzene as reported by the EPA (2.9 and 2.1 ppb for indoor or outdoor air, respectively).

It should be noted that the ATSDR CREG for benzene is based on a daily exposure to a concentration over a lifetime. In this case, a worker at the RMV would be expected to have less exposure (e.g., 5 days a week, 8 hours a day, 50 weeks a year, for less than a lifetime). Thus, given that the modeled benzene concentration is within typical background and reflects conservative assumptions, it is not expected that exposure opportunities to benzene in indoor air would present unusual cancer risks to the RMV population.

## **V. Discussion**

At the request of the Massachusetts Executive Office of Transportation/Registry of Motor Vehicles, the MDPH conducted an evaluation of groundwater samples collected from the RMV property in Chicopee. Because the groundwater is not used for drinking water, the most likely route of exposure, if any, would be via volatilization of chemicals from groundwater to indoor air. Based on a screening method for evaluating vapor intrusion into indoor air, benzene was the only constituent that exceeded applicable health-based screening values; however, benzene was predicted to be at indoor air concentrations within typical background concentrations for indoor or outdoor air (EPA 2007; NYDOH 2006). In addition, benzene was not detected in any of the 39 groundwater samples that have been taken from the RMV property since 2003; therefore, exposure to the maximum modeled concentration of benzene for 24 hours per day over a lifetime is a very conservative assumption. Also, remediation activities were completed, and the site was closed in accordance with MassDEP regulations on December 4, 2007. Concentrations of VOCs

and VPH fractions in groundwater are expected to continue to decrease as natural attenuation takes place.

## **VI. Conclusions**

Results of modeling for predicted indoor air concentrations based on groundwater sampling results did not reveal unusual health concerns for workers at the RMV property. Concentrations in groundwater have been decreasing since 2003 and are expected to continue to decline through natural attenuation.

ATSDR requires that one of five conclusion categories be used to summarize findings of a health consultation. These categories are as follows: (1) Urgent Public Health Hazard; (2) Public Health Hazard; (3) Indeterminate Public Health Hazard; (4) No Apparent Public Health Hazard; (5) No Public Health Hazard. A category is selected from site-specific conditions such as the degree of public health hazard based on the presence and duration of human exposure, contaminant concentration, the nature of toxic effects associated with site-related contaminants, presence of physical hazards, and community health concerns. Therefore, based on MDPH's evaluation of groundwater sampling data, ATSDR would classify groundwater beneath the RMV property as posing No Apparent Public Health Hazard in the present and future.

## **VII. Public Health Action Plan**

The purpose of the Public Health Action Plan is to ensure that this health consultation not only identifies potential public health hazards, but also provides a plan of action designed to mitigate and prevent adverse health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR/MDPH to follow up on this plan to ensure that it is implemented. The public health action to be implemented by ATSDR/MDPH is as follows: 1. Upon request, MDPH will review new environmental data related to the Sunoco or RMV property if it becomes available.

## **VIII. References**

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Public Health Assessment Guidance Manual. January 2005.

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Guidance for Public Health Assessments Involving Vapor Intrusion Pathways: A Supplement to the January 2005 Public Health Assessment Guidance Manual. November 2007.

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Air Comparison Values in ppbv. March 13, 2008.

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Kleinfelder, Inc. 2007d. Table 1, Groundwater Sample Analytical Results – Volatile Petroleum Hydrocarbons, EDB & Lead, Sunoco Service Station, SUN DUNS#0374-5650, 1031 Chicopee Street, Chicopee, Massachusetts, February 28, 2002 through March 14, 2007. May 15, 2007.

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[http://www.epa.gov/ATHENS/learn2model/part-two/onsite/JnE\\_lite.htm](http://www.epa.gov/ATHENS/learn2model/part-two/onsite/JnE_lite.htm). Accessed on August 17, 2007.

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## **PREPARER**

This document was prepared by the Bureau of Environmental Health of the Massachusetts Department of Public Health. If you have any questions about this document, please contact Suzanne K. Condon, Director of BEH/MDPH at 250 Washington Street, 7<sup>th</sup> Floor, Boston, MA 02108.

## CERTIFICATION

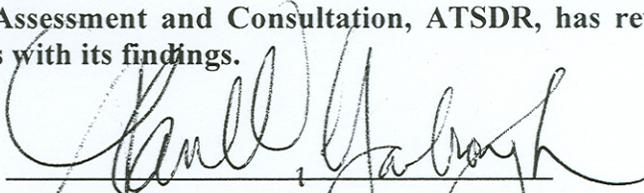
The Health Consultation, *Evaluation of Environmental Concerns at the Chicopee Registry of Motor Vehicles Related to a State-Regulated Release Site in Chicopee, Hampden County, Massachusetts*, was prepared by the Massachusetts Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated. Editorial review was completed by the cooperative agreement partner.



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Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Health Consultation and concurs with its findings.



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Team Lead, CAT, CAPEB, DHAC

## **Tables**

**Table 1**  
**Chicopee RMV**  
**Maximum groundwater sample results comparison table**

Monitoring Well ID	Maximum Concentrations Detected			Comparison Values	
	OMW-1	OMW-2	OMW-3	EPA Target Groundwater Concentrations (ppb)	MassDEP Method 1 GW-2
<i>VPH</i>					
C5-C8 Aliphatic Hydrocarbons	203	329	<b>3880</b>	NA	1,000
C9-C12 Aliphatic Hydrocarbons	96	165	<b>6750</b>	NA	1,000
C9-C10 Aromatic Hydrocarbons	283	419	<b>7900</b>	NA	5,000
<i>VOCs</i>					
Benzene	ND	<b>5.5</b>	<b>32.8</b>	5	2,000
Ethylbenzene	66.9	100	<b>1000</b>	700	30,000
Methyl tert-butyl ether	ND	ND	39	120,000	50,000
Naphthalene	12.6	19.5	<b>588</b>	150	1,000
Toluene	180	299	1220	1,500	8,000
Xylenes Total	430	640	5840	22,000*	9,000
<i>Miscellaneous</i>					
Iron	--	--	4,810	NA	
Manganese	--	--	1,020	NA	NA

**Notes:**

**Bolded** values exceed EPA Target Groundwater Concentrations or MassDEP Method 1 GW-2 standards.

MassDEP Method 1 GW-2 standards are presented for comparison purposes only. These standards apply to groundwater that has an average depth of 15 feet or less below the ground surface. The groundwater at the RMV property has been measured at depths between 22 and 30 feet below ground surface, and hence, these standards do not apply to groundwater at the RMV property.

\* The EPA Target Groundwater Concentration for p-xylene is presented.

-- = Not reported.

NA = Not available.

ND = Not detected

**Data sources:**

SPL Environmental Testing Laboratory. 2007. Laboratory Report, Project Name: Sunoco Duns#0374-5650, 1031 Chicopee St., Chicopee, MA. March 28, 2007.

Kleinfelder, Inc. 2007. Table 1 - Groundwater Sample Analytical Results - Volatile Petroleum Hydrocarbons, EDB & Lead, Sunoco Service Station, 1031 Chicopee Street, Chicopee, MA, February 28, 2002 through March 14, 2007

**Comparison values (source organization, reference):**

EPA Target Groundwater Concentrations - Table 2c generic target media-specific concentrations corresponding to indoor air concentrations associated with a lifetime cancer risk of 10<sup>-6</sup>. EPA OSWER. 2002. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance).

MassDEP Method 1 GW-2 - Massachusetts Department of Environmental Protection. 2007. Massachusetts Contingency Plan 310 CMR 40.0000.

**Table 2**  
**Modeled concentrations of contaminants in indoor air at the**  
**1011 Chicopee Street, Chicopee property that exceeded EPA groundwater target concentrations at**  
**monitoring well OMW-3**

Contaminant	Modeled indoor air concentrations (ppb)		90th Percentile BASE Indoor Air Background (ppb)	90th Percentile BASE Outdoor Air Background (ppb)	Air comparison value (ppb)
	Year(s)	Concentration			
Benzene	2002	0.03	2.9	2.1	Chronic EMEG/MRL = 3 CREG = 0.03
	2003	0.36			
	2004	0.22			
	2005	0.02			
	2006	0.33			
	2007	0.01			
Ethylbenzene	2002	5.85	1.3	0.8	Chronic EMEG/MRL = 300
	2003	9.83			
	2004	7.03			
	2005	5.33			
	2006	5.12			
	2007	2.94			
Naphthalene	2002	0.08	0.97	0.93	Chronic EMEG/MRL = 0.7
	2003	0.14			
	2004	0.09			
	2005	0.10			
	2006	0.08			
	2007	0.05			

**Notes:**

1.) On 10/1/07, the above indoor air concentrations were calculated using the Screening Level Implementation of the Johnson and Ettinger Vapor Intrusion Model available at: [http://www.epa.gov/ATHENS/learn2model/part-two/onsite/JnE\\_lite.htm](http://www.epa.gov/ATHENS/learn2model/part-two/onsite/JnE_lite.htm).

## **Table 2 (Continued)**

### **Notes (Continued):**

- 2.) Annual average concentrations of contaminants detected in groundwater were used to model indoor air concentrations. Benzene was not detected in groundwater between 2004 and 2007. For these years, annual average benzene concentrations in groundwater were estimated using half the sample detection limit.
- 3.) Actual soil type at the RMV property is unknown, as a result, the most conservative soil type (Sand) was selected for use in the model.
- 4.) Input values, including Henry's Law Constant, for the Johnson and Ettinger Model were not available for hydrocarbon fractions. As a result, indoor air concentrations of hydrocarbon fractions were not estimated.
- 5.) The BASE Indoor and Outdoor Air Background concentrations are the 90th percentile concentrations calculated from the U.S. Environmental Protection Agency database *Building Assessment Survey and Evaluation (BASE) Study* as presented in the New York Department of Health's guidance document *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*.

### **Data sources:**

Burkhamer, J. (Massachusetts Department of Public Health). 2007. Memorandum to file RE: Chicopee Registry of Motor Vehicles, Indoor Air Simulation Results, Screening-Level Johnson and Ettinger Model. October 2.

New York Department of Public Health (NYDOH). 2006. Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October.  
U.S. Environmental Protection Agency (EPA). 2007b. Building Assessment Survey and Evaluation (BASE) Study . Available at [http://www.epa.gov/iaq/base/study\\_overview.html](http://www.epa.gov/iaq/base/study_overview.html). Accessed on December 2007.

### **Comparison values (source organization, reference):**

CREG = Cancer Risk Evaluation Guide for  $1 \times 10^{-6}$  excess cancer risk (ATSDR, ATSDR 2005a)

Chronic EMEG/MRL (adult/child) = Environmental Media Evaluation Guide/Minimal Risk Level (i.e., for adult or childhood exposures greater than 1 year) (ATSDR 2005a)

## **Appendices**

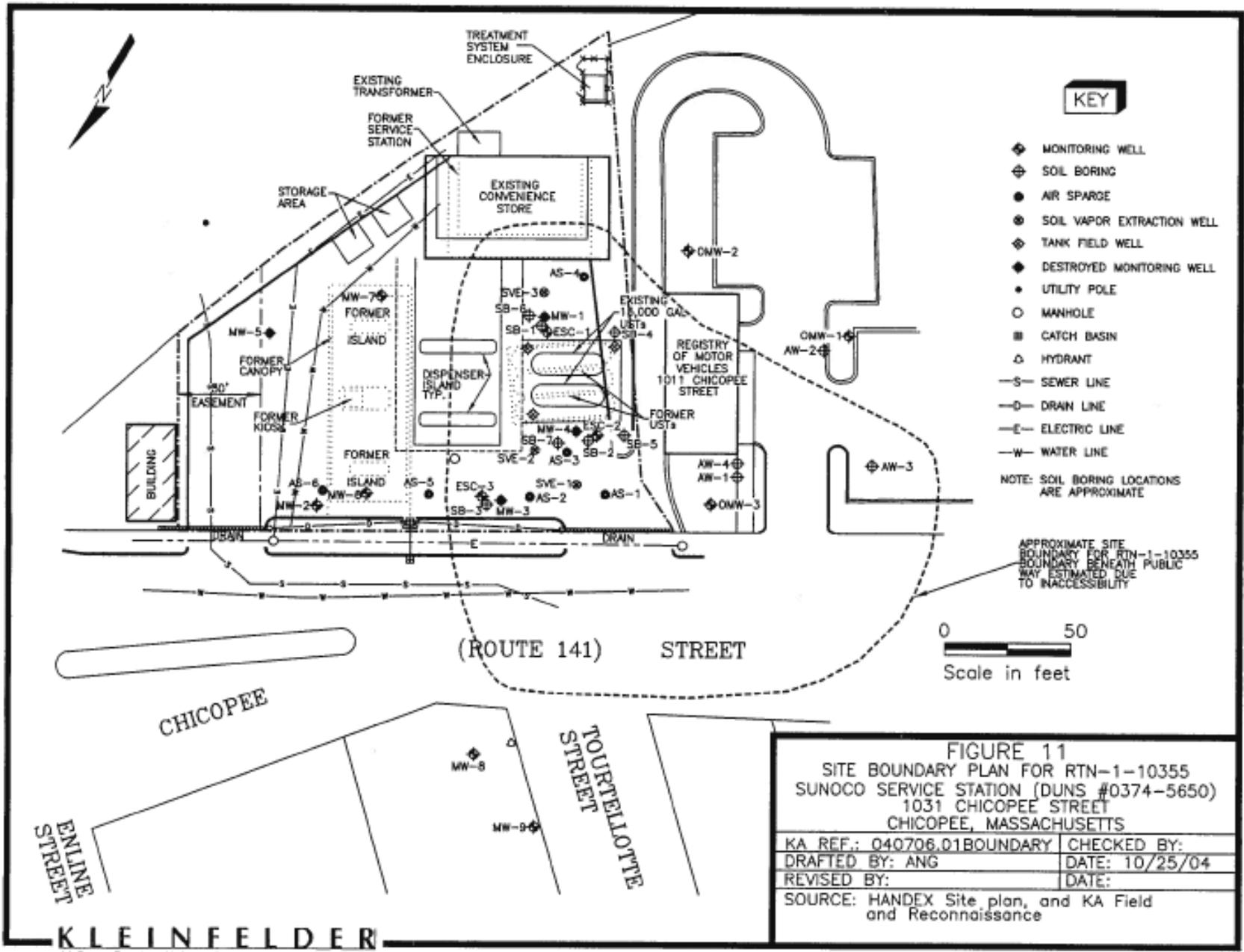
**APPENDIX A**

**Site Boundary Plan for RTN-1-10355**

**Sunoco Service Station (DUNS #0374-5650)**

**1031 Chicopee Street, Chicopee, Massachusetts**

**Dated October 25, 2004**



**Appendix B**

**Letter to the Massachusetts Executive Office of Transportation from Kleinfelder  
RE: Submittal of Analytical Data, Registry of Motor Vehicles – Chicopee Branch, 1011  
Chicopee Street, Chicopee, Massachusetts, MADEP RTN 1-10355.**

**Dated: April 9, 2007.**