

Letter Health Consultation

NORTHAMPTON SANITARY LANDFILL

NORTHAMPTON, MASSACHUSETTS

**Prepared by the
Massachusetts Department of Public Health**

APRIL 8, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

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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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

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MEMORANDUM

TO: James Laurila, P.E.
City of Northampton, Department of Public Works

FROM: Suzanne K. Condon, Associate Commissioner
Director, Bureau of Environmental Health

CC: Mayor Mary Clare Higgins, The Honorable
Ben Wood, Director, Northampton Health Department
Edward Huntley, Director, Northampton DPW
Daniel Hall, Section Chief, Solid Waste Management, MassDEP
William Sweet, ATSDR Region 1 (New England)

RE: Review of Screening-Level Air Risk Assessment for Northampton Landfill,
Northampton, Massachusetts

DATE: March 11, 2010

The City of Northampton requested the Massachusetts Department of Public Health's Bureau of Environmental Health (MDPH/BEH) input on Brown and Caldwell's *Screening-Level Air Risk Assessment, Northampton Landfill* (Brown and Caldwell [BC] 2009d). The Northampton Landfill is a site for which MDPH/BEH has conducted numerous public health assessment activities in the recent past. This memorandum documents MDPH/BEH's review and comments on the risk assessment that is part of the City of Northampton's current efforts to address health concerns of residents in the vicinity of the landfill due to potential exposure to landfill air emissions.

Background and Statement of Issues

The Northampton Sanitary Landfill, located at 170 Glendale Road in Northampton, Massachusetts, is owned and operated by the City of Northampton as a municipal solid waste landfill that accepts waste from approximately 44 municipalities. The landfill began operating as

a municipal solid waste landfill in 1969. Prior to 1969, the landfill property was operated as a gravel pit. The 40-acre landfill is located on a 52-acre parcel consisting of upland and wetland areas (Figure 1). The landfill consists of the original 22-acre unlined landfill cell and four additional lined landfill cells (Phase 1 through Phase 4). Waste is currently deposited in the Phase 4 cell and the other landfill cells are closed and capped (Dufresne-Henry 2005; MassDEP 2008). Capped portions of the landfill utilize an active landfill gas collection system that applies a vacuum to a system of landfill gas extraction wells and directs landfill gas to an enclosed flare for destruction (Tech Environmental 2007). Currently, the City of Northampton is proposing the construction of an additional 20.5-acre cell, Phase 5/5B, to be constructed north of and overlapping onto the existing landfill areas (Dufresne-Henry 2005).

Residents in the vicinity of the landfill have expressed concern about the possible health effects of exposure to landfill air emissions. In order to obtain the data necessary to evaluate these concerns, MDPH/BEH recommended ambient air monitoring to determine the concentrations of landfill gas in the air in the vicinity of the Northampton Landfill (MDPH 2009a). In addition, the Massachusetts Department of Environment Protection (MassDEP) specifically requested the completion of a Human Health Risk Characterization (BC 2009d) to determine whether landfill emissions could result in health concerns for nearby residents. In an effort to address these concerns, the City of Northampton hired Brown and Caldwell to produce a scope of work (SOW) for ambient air monitoring on and around the landfill and to complete a risk assessment evaluating residential exposures to site-related contaminants in ambient air.

The MDPH/BEH reviewed and provided comments on three draft scopes of work for the ambient air testing and interpretation, each of which had been revised based on previous comments (MPDH 2009a, MDPH 2009b, MDPH 2009c). The drafts were prepared in January 2009 (BC 2009a), February 2009 (BC 2009b), and October 2009 (BC 2009c). This memo provides comments on the results and interpretation of the first of two rounds of air testing to be conducted under the final SOW (one in October 2009; a second in Spring 2010) (BC 2009d).

Summary of Air Sampling and Risk Assessment

During October 2009, two air sampling events were conducted at the Northampton Landfill. Sampling locations were selected to characterize air quality at each of the four sides of the landfill. Four perimeter samples and one duplicate sample were collected during each sampling event. At each sampling location, 24-hour SUMMA canisters and Tedlar bags were used to collect air samples and subsequently analyzed for volatile organic compounds in accordance with USEPA Method TO-15 and reduced sulfur compounds using a modified USEPA Method TO-15, respectively.

Meteorological conditions were recorded at an on-site meteorological station during the sampling events. Conditions during the first sampling event, October 21st, were relatively calm with no rain, an average wind speed of 2.1 mph, winds from the west, 63% calm wind conditions, and temperatures ranging from 38-63°F. Conditions during the second sampling event, October 27th, were also relatively calm with 0.25 inches of rain, an average wind speed of 1.5 mph, winds from the north, 67% calm wind conditions, and temperatures ranging from 37-47°F. During both sampling events, odor complaints were received from one home located 300 feet west in Northampton and from one home located 2,000 feet south in Easthampton.

Fourteen volatile organic compounds and two sulfur compounds (carbonyl sulfide and carbon disulfide) were detected in ambient air at the landfill (Table 1). Brown and Caldwell compared the maximum detected concentration of all compounds with MassDEP guidance values (Threshold Effects Exposure Limits or Allowable Ambient Levels) and determined that six compounds (carbonyl sulfide, benzene, carbon tetrachloride, chloroform, tetrachloroethene [PCE], trichloroethene [TCE]) exceeded one or both of these guidelines. In addition, Brown and Caldwell compared the maximum concentrations with MassDEP risk-based concentration (RBC) values, and two of the six compounds listed above (carbon tetrachloride and TCE) exceeded their respective RBC. TCE was detected at 8.9 ug/m³ vs. the MassDEP RBC of 5.9 ug/m³, and it was detected in 2 of 8 samples taken during the two events. Carbon tetrachloride was detected at 0.748 ug/m³ vs. the MassDEP RBC of 0.7 ug/m³, and it was detected in 8 of 8 samples taken during the two events.

In addition, Brown and Caldwell contended that some of the sample locations were upwind, and that the upwind sample concentrations were similar to downwind concentrations. Thus, they concluded that based on the similarity between what they determined to be upwind vs. downwind concentrations, the detected concentrations were unlikely to be related to landfill emissions.

Finally, Brown and Caldwell compared the maximum concentrations of the compounds that exceeded MassDEP guidance values with USEPA's National Ambient Volatile Organic Compounds Database (USEPA 1988), which is a source of concentration data for organic compounds from across the United States. Brown and Caldwell determined this database to be the most appropriate for comparing to typical background concentrations of organic compounds in ambient air. Again, comparing maximum detected concentrations with data in the NAVOC database, Brown and Caldwell concluded that detected concentrations were similar to those measured in typical outdoor air in the US.

In conclusion, Brown and Caldwell determined that the results of the October 2009 sampling do not indicate that landfill-related emissions are contributing to unacceptable exposures at residential locations near the site. This conclusion was based on their comparison of upwind vs. downwind concentrations; comparison to national background data; and the low frequency of detections above MassDEP guidance levels. No quantitative risk assessment was conducted in the document.

Review of Air Risk Assessment

MDPH/BEH reviewed the risk assessment summarized above and provides the following comments:

- In our previous comment letters on the SOW (referenced above), MDPH/BEH has recommended characterizing background concentrations at some distance from the landfill. We continue to recommend that, as part of the next sampling round, a background sample be collected from a location sufficiently distant from the landfill to be outside of the influence of the landfill as well as other emission sources (such as major highways, busy roads, industrial pollution sources, and other landfills).

- Stagnant or calm wind conditions are expected to result in less dilution or movement of the chemical compounds in ambient air. MDPH/BEH believes that, due to the predominantly calm wind conditions present on the sampling dates, the measurements taken during these two sampling events are likely higher than would be measured during more windy days.
- Due to the variable nature of the wind direction, the on-site sample locations, and the predominantly calm conditions reported on the sampling days (>63% calm conditions), it is incorrect to characterize the samples as upwind or downwind. It is therefore inappropriate to conclude, as Brown and Caldwell do, that certain detected compounds are not related to the landfill. We strongly recommend a background location be chosen for the next sampling event that is sufficiently distant to not be influenced by the landfill (see first bullet).
- To supplement the collection of a true background sample in Northampton, as described above, MDPH/BEH recommends the use of the *most appropriate* background concentrations from the literature. While information on background concentrations is available from several sources, please review and identify the most appropriate up-to-date background concentrations that are region-specific. Consideration should be given to the USEPA's National-Scale Air Toxics Assessment (NATA) database (USEPA 2009), MDEP data, and the Agency for Toxic Substances and Disease Registry's (ATSDR) toxicity profile documents on specific compounds. USEPA's NATA, for example, is useful because it provides recent and region-specific background levels, which NAVOC database does not have.
- Brown and Caldwell did not conduct a quantitative risk assessment in this document. They also did not compare concentrations detected in ambient air to ATSDR comparison values, one of MDPH/BEH recommendations in comments provided on all draft SOWs (MDPH 2009a, b, c). Because of the fact that some compounds did exceed ATSDR comparison values; that we do not believe the rationale for upwind vs. downwind data supports the lack of landfill-related emissions; and that more appropriate regional background concentration data should be reviewed, we believe that Brown and Caldwell should be conducting a quantitative risk assessment based on the results of the October 2009 sampling event. This may also apply to the next sampling event this spring.

Conclusion and Recommendations

- Based on the shortcomings in the Brown and Caldwell SOW, MDPH/BEH cannot conclude whether air emissions from the Northampton Landfill could harm people's health.
- MDPH/BEH recommends that future sampling events include an off-site sample location to characterize background concentrations. Due to variable wind directions, samples collected from on-site locations cannot reliably be used to represent background conditions. In addition to the use of the most appropriate background concentrations from the literature, please include an off-site sample at a location farther from the landfill that is not likely to be influenced by known sources of contamination.

- Based on MDPH/BEH's review of the risk assessment and Brown and Caldwell's evaluation of the data, it would be helpful if the final report included detailed information on the type of weather station, the weather station calibration history, and the methods used by the weather station for calculating and recording wind speed (i.e. a snapshot every 5 minutes or measurements every 10 seconds with an average over every 5 minutes). This information will allow for an assessment of the accuracy and sensitivity of the weather station as well as the quality and reliability of the weather station data.

References

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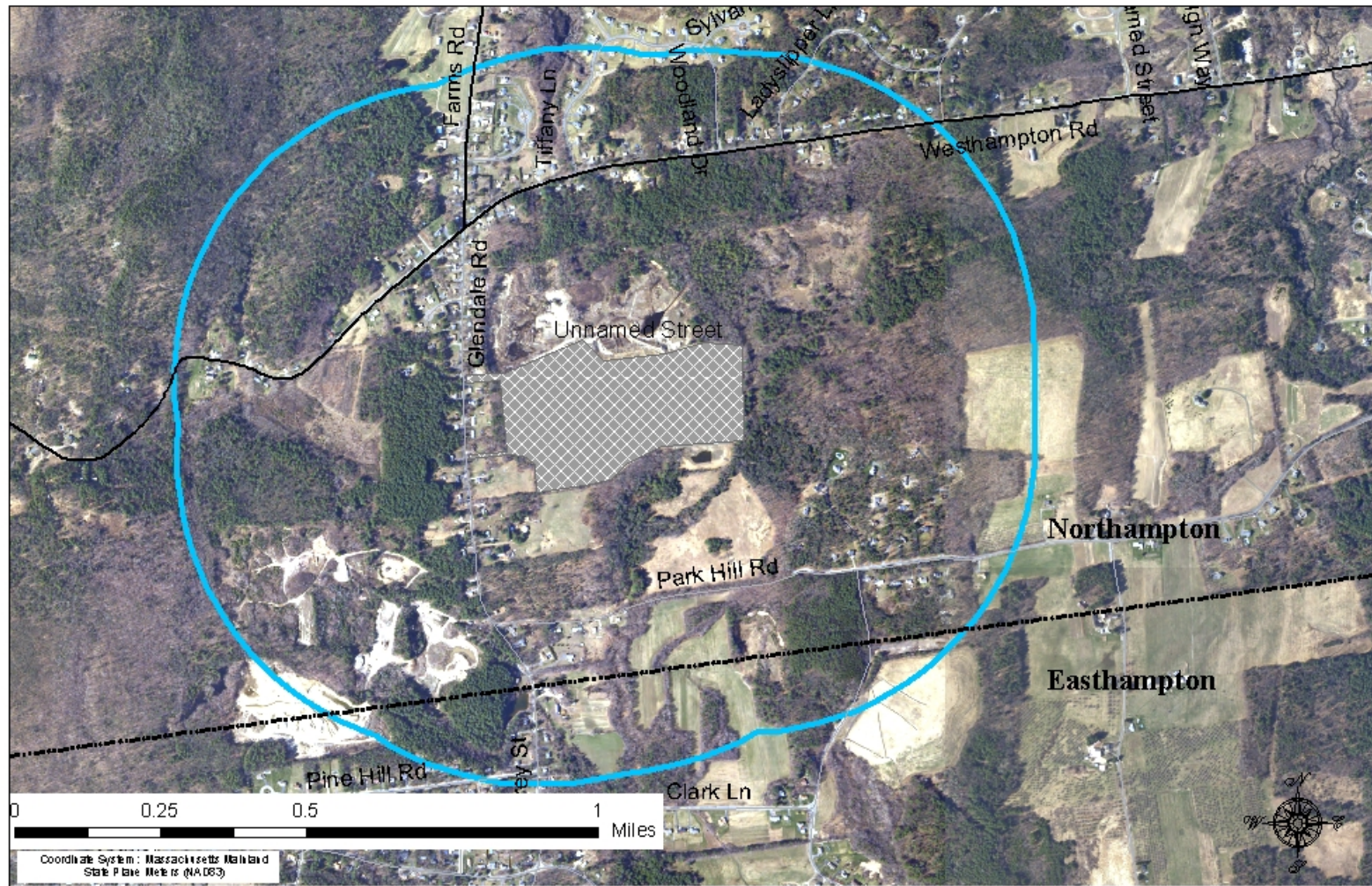
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<http://www.epa.gov/ttn/atw/natamain/>

Figure 1 - Location of the Northampton Sanitary Landfill, Northampton



Geographic data supplied by: Massachusetts Executive Office of Environmental Affairs, MassGIS; Geographic Data Technology, Inc.

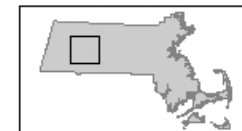
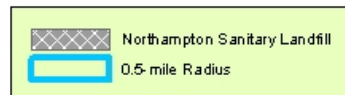


Table 1
Comparison of Constituents Measured in Ambient Air at Northampton Landfill with Comparison Values
Northampton Landfill
Northampton, Massachusetts

Location Sampling Date	USEPA NATA Background Concentration ^a (ug/m ³)	Comparison Values ^b (ug/m ³) <i>Non- Carcinogenic Carcinogenic</i>		1st Sampling Event				2nd Sampling Event			
				AM-1/T-1 10/21/2009	AM-2/T-2 10/21/2009	AM-3/T-3 10/21/2009	AM-4/T-4 10/21/2009	AM-5/T-5 10/28/2009	AM-6/T-6 10/28/2009	AM-7/T-7 10/28/2009	AM-8/T-8 10/28/2009
Compound (ug/m ³)											
Acetone	NA	30,000	NA	7.75	7.81	7.43	12.8	5.59	<4.75	<4.75	5.82
Benzene	1.2	10	0.1	0.661	0.508	0.571	0.619	0.44	0.412	0.45	0.463
Carbon disulfide	0.0026	900	NA	<1.56	<1.56	<1.56	2.15	3.23	3.19	4.58	3.35
Carbon tetrachloride	0.61	200	0.07	0.723	0.748	0.729	0.723	0.522	0.497	0.528	0.509
Carbonyl sulfide	0.00020	12 ^c	NA	5.98	5.18	7.34	8.03	10.6	12.2	11.2	12
Chloroform	0.086	100	0.04	0.107	<0.098	0.102	0.112	<0.098	<0.098	<0.098	<0.098
1,3-Dichlorobenzene	NA	200 ^c	NA	<0.12	<0.12	<0.12	1.57	<0.12	<0.12	<0.12	0.24
Ethylbenzene	0.31	1,000	NA	0.438	0.121	0.169	0.273	0.134	0.108	0.117	0.317
Styrene	0.047	900	NA	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	<0.085	0.094
Tetrachloroethene	0.10	300	NA	0.176	<0.136	0.142	0.481	<0.136	<0.136	<0.136	<0.136
Toluene	3.1	300	NA	1.68	0.663	1.09	1.7	0.704	0.61	0.689	1.74
1,1,1-Trichloroethane	0.27	4,000	NA	0.191	<0.109	0.114	0.169	<0.109	<0.109	<0.109	<0.109
Trichloroethene	0.091	40 ^d	NA	<0.107	<0.107	<0.107	8.34	<0.107	<0.107	<0.107	0.607
Vinyl chloride	0.0031	80	0.1	0.153	<0.051	<0.051	0.112	<0.051	<0.051	<0.051	0.095
Xylene (p-/m-)	1.5 ^e	200 ^e	NA	0.716	0.23	0.373	0.599	0.321	0.269	0.291	0.698
Xylene (o-)	1.5 ^e	200 ^e	NA	0.239	<0.087	0.13	0.226	0.113	0.095	0.104	0.243

Notes:

^a USEPA 2002 NATA Background Concentrations for Hampshire County, Massachusetts

^b Unless otherwise noted, the source of comparison values: ATSDR. 2009. Air Comparison Values in µg/m³. June 30, 2009.

^c Comparison values were not available from ATSDR for carbonyl sulfide and 1,3-Dichlorobenzene. These two compounds were screened using the toxicity information from USEPA's Risk-Screening Environmental Indicators (RSEI) (USEPA 2009).

^d Proposed RfC 40 ug/m³ (EPA toxicological summary draft 11/28/01)

^e Xylene (total) used as a surrogate

Shading indicates that the concentration detected in ambient air is greater than both the respective comparison value and the typical background concentrations present in ambient air.

Certification

The Massachusetts Department of Public Health prepared this Letter Health Consultation, Review of Screening-Level Air Risk Assessment for Northampton Landfill, Northampton, Massachusetts, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). At the time this Health Consultation was written, it was in accordance with the approved methodologies and procedures. Editorial review was completed by the Cooperative Agreement partner.



Technical Project Officer, Cooperative Agreement Team, CAPEB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.



Team Leader, Cooperative Agreement Team, CAPEB, DHAC, ATSDR