

APPENDIX A

Figures

Figure 1. Site Location Map with Landfill Property Line

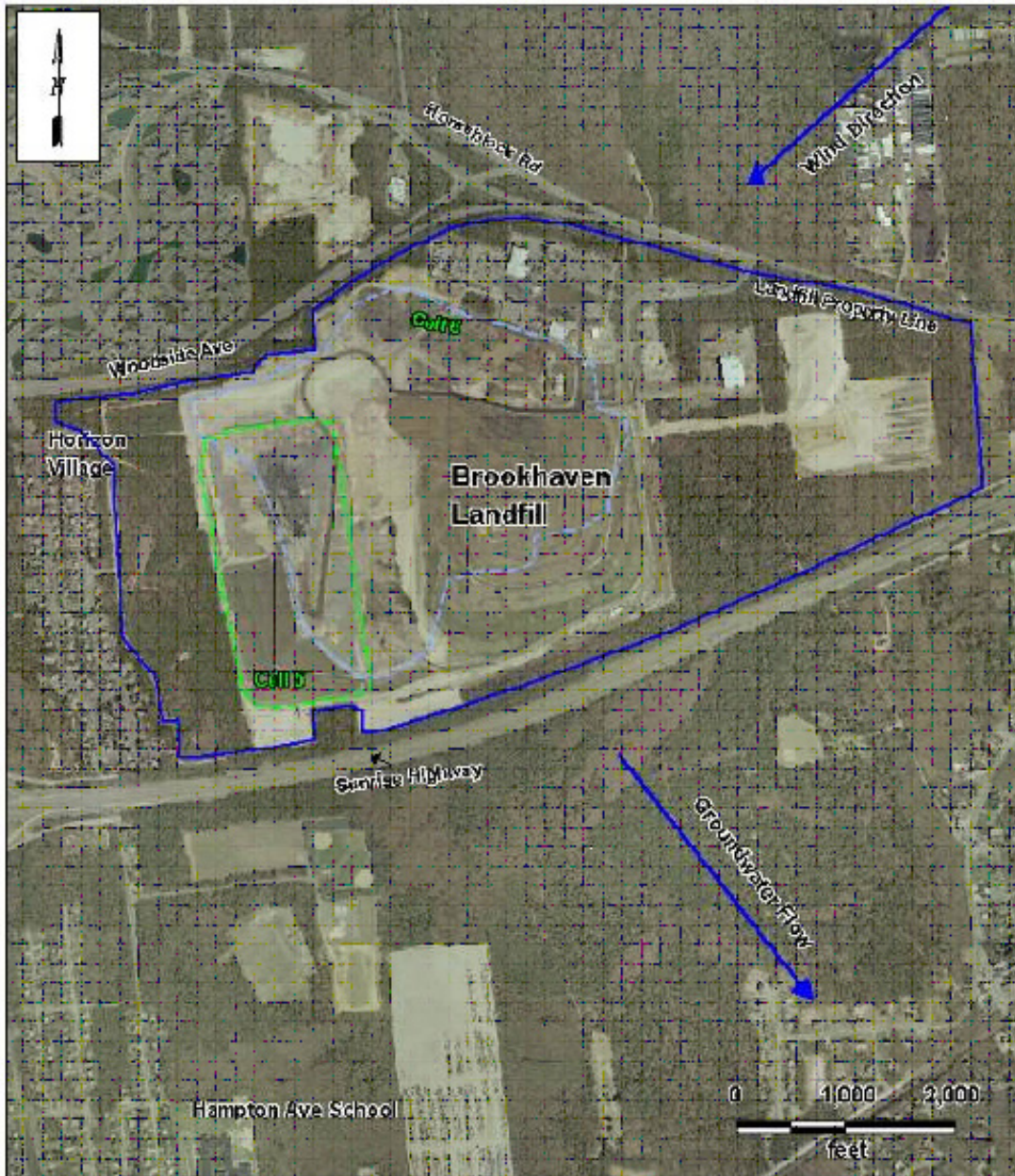
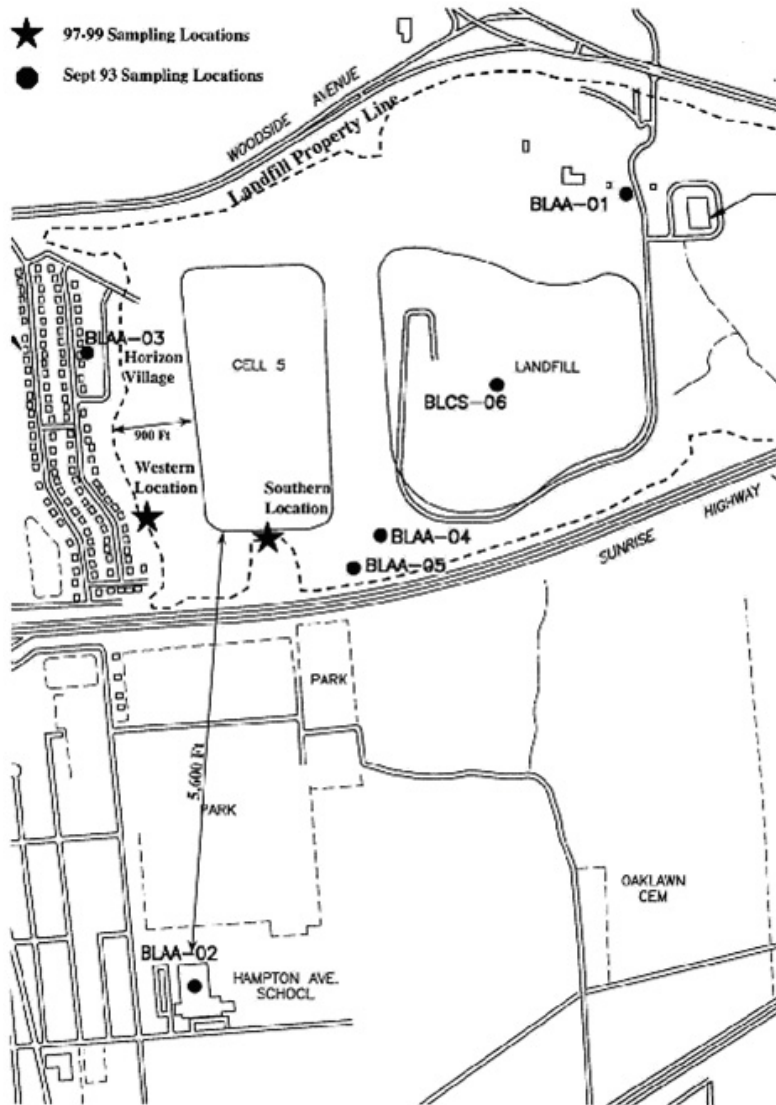


Figure 2. Air Monitoring Locations (September 93, 97-99)



APPENDIX B

Tables

Table 1
Water Quality Standards/Guidelines and /or Public Health Assessment Comparison Values
Exceeded by Contaminants Found in Private Wells Near the Brookhaven Landfill Site
[All values in micrograms per liter (mcg/L)]

Contaminant	Water Quality Standards/Guidelines				Comparison Values*			
	New York State			US EPA	Cancer	Basis**	Noncancer	Basis**
	Ground Water	Surface Water	Drinking Water	Drinking Water				
1,1-dichloroethane	5	5	5	---	6.1	CA EPA CPF	---	--
<i>cis</i> -1,2-dichloroethene	5	5	5	70	---	---	70	EPA OSRTI RfD
dichlorodifluoromethane	5	5	5	---	---	---	1400	EPA IRIS RfD
1,1,1-trichloroethane	5	5	5	200	---	---	1960	EPA Region 3 RfD
Trichloroethene	5	5	5	5 ^b	6.1	NYS CPF	10	Health Canada RfD
vinyl chloride	2	0.3 ^a	2	2	0.023	EPA IRIS CPF	21	EPA IRIS RfD

* Comparison values determined for a 70 kilogram adult who drinks 2 liters of water per day. The cancer comparison value is the water concentration that provides an intake corresponding to an increased lifetime cancer risk of one-in-one million. The noncancer comparison value is the water concentration that provides an intake equivalent to the reference dose assuming a relative source contribution of 20%.

**CA EPA CPF: California Environmental Protection Agency Cancer Potency Factor
EPA IRIS Reference Dose: U.S. Environmental Protection Agency Integrated Risk Information System Reference Dose
EPA IRIS Cancer Potency Factor: U.S. Environmental Protection Agency Integrated Risk Information System Cancer Potency Factor
EPA OSRTI Reference Dose: U.S. Environmental Protection Agency Office of Superfund Remediation Technology Innovation Reference Dose
EPA Region 3 Reference Dose: U.S. Environmental Protection Agency Region 3 Reference Dose
Health Canada RfD: Health Canada Reference Dose
NYS CPF: New York State Department of Environmental Conservation Cancer Potency Factor

^aGuidance value

^bUnder review

Table 2.
Brookhaven Landfill Air Sampling Data of Metals and
Total Particulates from the 1993 24-Hour Ambient Air Study
(All values in micrograms per cubic meter [mcg/m³])

Compound	BLAA-01 (Landfill Office)	BLAA-02 (Hampton Ave School)	BLAA-03 (Horizon Village)	BLAA-04 (450 ft downwind)	BLAA-05 (800 ft downwind)
arsenic	0.0012	ND	ND	0.00058	ND
cadmium	0.00046	0.001	ND	0.00041	ND
chromium, total	0.0055	0.007	0.0019	0.0033	0.0035
lead	0.031	0.012	0.012	0.02	0.021
mercury	0.0003	0.0001	ND	0.000041	ND
nickel	0.0041	0.01	0.0029	0.0035	0.0029
vanadium	0.0058	0.0045	0.002	0.0023	0.0035
particulates, total	129	45	56	27	35

ND – Not detected

Table 3. Brookhaven Landfill Air Sampling Data for Volatile Organic Compounds (VOCs) from the 1993 24-Hour Ambient Air Study (All values in micrograms per cubic meter [$\mu\text{g}/\text{m}^3$])

Compound	BLAA-01 (Landfill Office)	BLAA-02 Hampton Ave School)	BLAA-03 (Horizon Village)	BLAA-04 (450 ft downwind)	BLAA-05 (800 ft downwind)	BLCS-06 (Flare)
acetone	240	68	120	24	46	4,500
benzene	1.5	1.2	0.7	2.8	ND	2,800
bromodichloromethane	ND	ND	ND	ND	ND	ND
bromomethane	ND	ND	ND	ND	ND	ND
bromoform	ND	ND	ND	ND	ND	ND
1,3-butadiene	ND	ND	ND	ND	ND	ND
2-butanone (MEK)	17	17	17	ND	ND	4,600
carbon disulfide	ND	ND	ND	ND	ND	ND
carbon tetrachloride	ND	ND	ND	ND	ND	ND
chlorobenzene	ND	ND	ND	ND	ND	720
chloroethane	ND	ND	ND	ND	ND	2,800
2-chloroethyl vinyl ether	ND	ND	ND	ND	ND	ND
chloroform	ND	ND	ND	ND	ND	ND
chloromethane	ND	ND	ND	ND	ND	ND
dibromochloromethane	ND	ND	ND	ND	ND	ND
1,2-dibromoethane	ND	ND	ND	ND	ND	ND
1,2-dichlorobenzene	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene	ND	ND	ND	ND	ND	950
1,1-dichloroethane	ND	ND	ND	ND	ND	770
1,2-dichloroethane	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	ND	ND	ND	ND	ND	2,300
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND
dichloromethane	ND	ND	ND	13	ND	ND
1,2-dichloropropane	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene	ND	ND	ND	ND	ND	ND
ethylbenzene	ND	ND	ND	ND	ND	22,000
2-hexanone	ND	ND	ND	ND	ND	ND
4-methyl-2-pentanone	ND	ND	ND	ND	ND	3,100
styrene	ND	ND	ND	ND	ND	1,500
1,1,2,2-tetrachloroethane	ND	ND	ND	ND	ND	ND
tetrachloroethene	ND	ND	ND	ND	ND	1,900
toluene	6.6	3.5	3.8	69	3.2	41,000
1,1,1-trichloroethane	ND	ND	ND	10	ND	520
1,1,2-trichloroethane	ND	ND	ND	ND	ND	ND
trichloroethene	ND	ND	ND	ND	ND	610
trichlorofluoromethane	ND	ND	ND	ND	ND	ND
trichlorotrifluoroethane	ND	ND	ND	5.6	ND	210
vinyl acetate	ND	ND	ND	ND	ND	ND
vinyl chloride	ND	ND	ND	ND	ND	3,500
xylenes, total	ND	ND	ND	18	ND	54,000

APPENDIX C

NYS DOH Procedures for Evaluating Potential
Health Risks For Contaminants of Concern

NYS DOH PROCEDURE FOR EVALUATING POTENTIAL HEALTH RISKS FOR CONTAMINANTS OF CONCERN

To evaluate the potential health risks from contaminants of concern associated with the Brookhaven Landfill site, the New York State Department of Health assessed the risks for cancer and noncancer health effects.

Increased cancer risks were estimated by using site-specific information on exposure levels for the contaminant of concern and interpreting them using cancer potency estimates derived for that contaminant by the US EPA or, in some cases, by the NYS DOH. The following qualitative ranking of cancer risk estimates, developed by the NYS DOH, was then used to rank the risk from very low to very high. For example, if the qualitative descriptor was "low", then the excess lifetime cancer risk from that exposure is in the range of greater than one per million to less than one per ten thousand. Other qualitative descriptors are listed below:

Excess Lifetime Cancer Risk

<u>Risk Ratio</u>	<u>Qualitative Descriptor</u>
equal to or less than one per million	very low
greater than one per million to less than one per ten thousand	low
one per ten thousand to less than one per thousand	moderate
one per thousand to less than one per ten	high
equal to or greater than one per ten	very high

An estimated increased excess lifetime cancer risk is not a specific estimate of expected cancers. Rather, it is a plausible upper bound estimate of the probability that a person may develop cancer sometime in his or her lifetime following exposure to that contaminant.

There is insufficient knowledge of cancer mechanisms to decide if there exists a level of exposure to a cancer-causing agent below which there is no risk of getting cancer, namely, a threshold level. Therefore, every exposure, no matter how low, to a cancer-causing compound is assumed to be associated with some increased risk. As the dose of a carcinogen decreases, the chance of developing cancer decreases, but each exposure is accompanied by some increased risk.

There is general consensus among the scientific and regulatory communities on what level of estimated excess cancer risk is acceptable. An increased lifetime cancer risk of one in one million or less is generally not considered a significant public health concern.

For noncarcinogenic health risks, the contaminant intake was estimated using exposure assumptions for the site conditions. This dose was then compared to a risk reference dose (estimated daily intake of a chemical that is likely to be without an appreciable risk of health effects) developed by the US EPA, ATSDR, and/or NYS DOH. The resulting ratio was then compared to the following qualitative scale of health risk:

Qualitative Descriptions for
Noncarcinogenic Health Risks

<u>Ratio of Estimated Contaminant Intake to Risk Reference Dose</u>	<u>Qualitative Descriptor</u>
equal to or less than the risk reference dose	minimal
greater than one to five times the risk reference dose	low
greater than five to ten times the risk reference dose	moderate
greater than ten times the risk reference dose	high

Noncarcinogenic effects unlike carcinogenic effects are believed to have a threshold, that is, a dose below which adverse effects will not occur. As a result, the current practice is to identify, usually from animal toxicology experiments, a no-observed-effect-level (NOEL). This is the experimental exposure level in animals at which no adverse toxic effect is observed. The NOEL is then divided by an uncertainty factor to yield the risk reference dose. The uncertainty factor is a number that reflects the degree of uncertainty that exists when experimental animal data are extrapolated to the general human population. The magnitude of the uncertainty factor takes into consideration various factors such as sensitive subpopulations (e.g., children or the elderly), extrapolation from animals to humans, and the incompleteness of available data. Thus, the risk reference dose is not expected to cause health effects because it is selected to be much lower than dosages that do not cause adverse health effects in laboratory animals.

The measure used to describe the potential for noncancer health effects to occur in an individual is expressed as a ratio of estimated contaminant intake to the risk reference dose. A ratio equal to or less than one is generally not considered a significant public health concern. If exposure to the contaminant exceeds the risk reference dose, there may be concern for potential noncancer health effects because the margin of protection is less than that afforded by the reference dose. As a rule, the greater the ratio of the estimated contaminant intake to the risk reference dose, the greater the level of concern. This level of concern depends upon an evaluation of a number of factors such as the actual potential for exposure, background exposure, and the strength of the toxicologic data.

APPENDIX D

Public Health Hazard Categories

CATEGORY / DEFINITION	DATA SUFFICIENCY	CRITERIA
<p>A. Urgent Public Health Hazard</p> <p>This category is used for sites where short-term exposures (< 1 yr) to hazardous substances or conditions could result in adverse health effects that require rapid intervention.</p>	<p>This determination represents a professional judgement based on critical data, which ATSDR has judged sufficient to support a decision. This does not necessarily imply that the available data are complete, but in some cases additional data may be required to confirm or further support the decision made.</p>	<p>Evaluation of available relevant information* indicates that site-specific conditions or likely exposures have had, are having, or are likely to have in the future an adverse impact on human health that requires immediate action or intervention. Such site-specific conditions or exposures may include the presence of serious physical or safety hazards.</p>
<p>B. Public Health Hazard</p> <p>This category is used for sites that pose a public health hazard due to the existence of long-term exposures (> 1 yr) to hazardous substance or conditions that could result in adverse health effects.</p>	<p>This determination represents a professional judgement based on critical data, which ATSDR has judged sufficient to support a decision. This does not necessarily imply that the available data are complete, but in some cases additional data may be required to confirm or further support the decision made.</p>	<p>Evaluation of available relevant information* suggests that, under site-specific conditions of exposure, long-term exposures to site-specific contaminants (including radionuclides) have had, are having, or are likely to have in the future an adverse impact on human health that requires one or more public health interventions. Such site-specific exposures may include the presence of serious physical or safety hazards.</p>
<p>C. Indeterminate Public Health Hazard</p> <p>This category is used for sites in which “critical” data are <i>insufficient</i> with regard to extent of exposure and/or toxicologic properties at estimated exposure levels.</p>	<p>This determination represents a professional judgement that critical data are missing and ATSDR has judged the data are insufficient to support a decision. This does not necessarily imply all data are incomplete, but that some additional data are required to support a decision.</p>	<p>The health assessor must determine, using professional judgement, the “criticality” of such data and the likelihood that the data can be obtained and will be obtained in a timely manner. Where some data are available, even limited data, the health assessor is encouraged to the extent possible to select other hazard categories and to support their decision with clear narrative that explains the limits of the data and the rationale for the decision.</p>
<p>D. No Apparent Public Health Hazard</p> <p>This category is used for sites where human exposure to contaminated media may be occurring, may have occurred in the past, and/or may occur in the future, but the exposure is not expected to cause any adverse health effects.</p>	<p>This determination represents a professional judgement based on critical data, which ATSDR considers sufficient to support a decision. This does not necessarily imply that the available data are complete, but in some cases additional data may be required to confirm or further support the decision made.</p>	<p>Evaluation of available relevant information* indicates that, under site-specific conditions of exposure, exposures to site-specific contaminants in the past, present, or future are not likely to result in any adverse impact on human health.</p>
<p>E: No Public Health Hazard</p> <p>This category is used for sites that, because of the absence of exposure, do NOT pose a public health hazard.</p>	<p>Sufficient evidence indicates that no human exposures to contaminated media have occurred, none are now occurring, and none are likely to occur in the future.</p>	

INTERIM PUBLIC HEALTH HAZARD CATEGORIES

*Such as environmental and demographic data; health outcome data; exposure data; community health concerns information; toxicologic, medical, and epidemiologic data; monitoring and management plans.

APPENDIX E

Response to Public Comments

RESPONSE TO PUBLIC COMMENTS

This response to public comments was prepared to answer area residents' questions on the draft Brookhaven Landfill Health Consultation (NYS DOH, 1996a). The public was invited to comment during the public comment period which ran from April 1, 1996 to May 15, 1996. Some comments were consolidated or grouped together to incorporate similar concerns raised by more than one person. If you have any questions, please contact the New York State Department of Health (NYS DOH) at the toll-free number 1-800-458-1158 extension 27850.

Comment #1: A request was made to use the term "area resident" instead of "citizen".

Response #1: "Citizen" has been replaced with "area resident" or "resident" throughout the document.

Comment #2: If "evaluating the potential for human exposure to contaminants from the landfill" is the health consultation's statement of purpose, it should be set apart from the text and identified as such, not buried in the paragraph. A more rigorous definition of the term "health consultation" should be given.

Response #2: A paragraph has been added to the introduction which more clearly defines the purpose of any health consultation and this one in particular.

Comment #3: One comment stated that the Site Description and History subsection of the document inadequately provides specific information about the history of the landfill.

Response #3: The Site Description and History subsection is meant to be a brief summary of information about the site and the surrounding area. Additional information about the site is included in other sections of the document.

Comment #4: One set of comments expressed disagreement with the discussion of the completed exposure pathways in the Environmental Contamination and Exposure Pathways subsection. One person believes that elimination of an exposure pathway is impossible on Long Island given the topography, weather, and population density. This person also asked why a receptor population is needed for an exposure pathway to exist and whether this implies that if no one is there - there is no pollution.

Response #4: An exposure pathway is the process by which an individual is exposed to contaminants that originate from some source of contamination. Situations can occur where one of the five elements is missing and there is no expectation that the element would exist in the future. A receptor population is a person(s) who is exposed or potentially exposed to the contaminants of concern. The elements of an exposure pathway may occur in the past, present, or future. If no individuals are exposed or potentially exposed to a contaminant or contaminated media, there is no exposure. This is not meant to imply that there is no pollution.

Comment #5: "The landfill is a known past source of groundwater and air contamination." We

suggest that this background information be discussed and be incorporated as part of the record. Data, sources, remediation, solutions, and hazards should and must be discussed. Are they ongoing?

Response #5: Background information, data, remediation, solutions, and hazards are all discussed in various sections of the document. Please refer to the Table of Contents to determine which sections contain these details. Some supplemental information has been added to the final health consultation in response to questions submitted during the public comment period following the release of the draft health consultation. For example, the following information from a U.S. Geological Survey (USGS) report has been added to the final health consultation to clarify why the landfill is a known past source of groundwater contamination. The USGS reports that, "although elevated specific conductance and chloride concentrations might be attributed to sources other than the landfill, the presence of ammonium in groundwater on Long Island is unusual and is considered to be a reliable indicator of contamination by landfill leachate" (Wexler, 1988a).

Comment #6: People asked questions about various details of the NYS DOH site visit(s) including the following: agencies represented, observations about the site, truck traffic, and surrounding properties/buffer zones. A comment was made that one site visit is not sufficient to draw conclusions regarding the landfill or the migration of contaminants.

Response #6: The information requested is included for each site visit discussed in the draft health consultation. We agree that one site visit is not sufficient to draw conclusions regarding the landfill or the migration of contaminants. The ATSDR requires that the authors of the health consultation include information about the most recent site visit by the NYS DOH. At the time that the authors started writing the draft health consultation, the August 1994 visit was the most recent site visit made by NYS DOH. Subsequent site visits are included in the final public health consultation.

In addition to site visits, we had multiple sources of information such as the reports of site visits by ATSDR (ATSDR, 1994) and NYS DEC staff, information in the documents listed in the Documents Reviewed section of the health consultation, and area residents' complaints. The NYS DEC employs an on-site monitor who regularly visits the site to ensure that landfill operations are in compliance with state and federal regulations. The NYS DOH maintains contact with the NYS DEC on-site monitor to obtain updated information about the site.

Comment #7: The Site Description and History subsection in the draft health consultation improperly gave the impression that the landfill has a history of accepting hazardous waste. The site was not listed on the New York State Registry of Inactive Hazardous Waste sites because of the temporary storage of abandoned drums, but because all landfills on Long Island were listed in the Registry. The landfill was removed from the list because no known generator of hazardous waste has ever used the site for disposal.

Response #7: NYS DEC did initially list all major Long Island landfills on the New York State Registry of Inactive Hazardous Wastes Sites. The NYS DEC proceeded to review the records and remove landfills from the registry as appropriate. The Brookhaven Landfill was a temporary storage site for thirty-five barrels of hazardous waste. Due to the lack of documentation of any permanent storage of hazardous waste, as defined in Part - 371 of the NYS DEC Title 6 New York Codes, Rules and Regulations (NYCRR), the site was removed from the list in May 1992 (NYS DEC, 1991). The text has been reworded to clarify this information.

Comment #8: The landfill is not an "active municipal solid waste landfill" in the usual sense. What assurances are there that the Brookhaven Landfill does not accept hazardous waste or other carcinogenic material? (On June 10, 1994, 2,000 tons of contaminated soil from Operable Unit IV of the Brookhaven National Laboratory was transferred to this facility).

Response #8: The wastes the landfill is permitted to accept are restricted by statute and permit, and does not include raw municipal solid waste. Raw municipal solid waste is sent to the town of Hempstead Energy Recovery Facility for thermal processing and energy recovery. The resultant incinerator ash residue is then transferred to the town of Brookhaven Landfill. Unprocessable wastes are also filled at the Brookhaven Landfill.

The Hempstead Resource Recovery Facility conducts a Waste Control Plan, approved by NYS DEC, to check that the facility does not process hazardous waste or any other type of unacceptable waste. The Hempstead facility performs spot checks on incoming waste loads and submits the results to the NYS DEC as part of the facility's Quarterly Operating Report. The Hempstead facility periodically samples and analyzes the composition of the incinerator ash it produces in accordance with its operating permit.

The town of Brookhaven independently monitors the quality and composition of the incinerator ash disposed of at the existing landfill. As noted in the Final Environmental Impact Statement (Wehran-New York, Inc., 1993) for the Cell 5 expansion, the town tests incoming ash at the existing landfill on a more frequent basis than the bi-annual frequency required of energy recovery facility operators by NYS DEC regulations. Under the intermunicipal agreement with The town of Hempstead, the town of Brookhaven has the right to reject ash deliveries that contain hazardous waste or are otherwise considered unacceptable. The town will continue to monitor incoming incinerator ash at the new Cells to determine if its composition meets applicable state and federal standards.

NYS DEC staff have no records of the disposal of soils from Brookhaven National Laboratory in 1994.

Comment #9: The Community Health Concerns and Current Issues subsection (of the draft health consultation) regarding an alleged dumping incident fifteen years ago should be deleted because it is out-of-date, irrelevant, and unsupported.

Response #9: The dumping allegation has been removed from the text.

Comment #10: The report seems to indicate that 800 feet is an acceptable distance for a facility to operate from a residential area (Horizon Village). The expansion to the landfill, Cell 5, is also closer to the school than the original landfill. Were these facts considered when the expansion proposal was reviewed? Is there a set criterion for the State of New York as to a safe distance for an operation such as proposed?

Response #10: The distances between the proposed expansion and the residential area (Horizon Village) and the school (Hampton Avenue) are stated in the Site History and Description subsection of the health consultation. This information is included only to describe the area surrounding the landfill. This document does not evaluate the adequacy of the 800-foot area as a buffer zone between the residents and the landfill. However, the distances between these areas and Cell 5 were considered during the proposal. The locations of the four original cells and Cell 5 all meet the NYCRR Part-360-2.13 (a) Landfill Siting Restrictions, which notes that the minimum horizontal separation distance between a landfill and property line must be 100 feet.

Comment #11: The document should state that all capping activities at the landfill were undertaken at the request of the NYS DEC or in accordance with applicable permits or the consent order between the town and the NYS DEC. The document should also state that Cell 4 is now partially capped, and that the cited erosion problem has been corrected.

Response #11: Capping activities are done in compliance with NYS DEC regulations, unless otherwise stated. NYS DEC employs an on-site monitor to evaluate operations at the site to ensure compliance. Cell 4 is now capped.

Comment #12: Who will oversee the hydrogen sulfide release problem and continually monitor to insure the town does wet down and cover the ash? Problems with “gritty dust” have been a concern in the past. A suggestion was made that a water curtain be installed to continually wet the dumping area during delivery to reduce airborne particulates.

Response #12: The NYS DEC on-site monitor visits the landfill about four days per week. While at the site, the on-site monitor checks waste levels and other compliance-related issues. No air monitoring is done but the on-site monitor does go into the community to check for any off-site odors.

The town was required to conduct an Operational Air Monitoring Program after Cell 5 operations began in 1996. The town of Brookhaven hired a private consultant group, RTP Environmental Associates, to conduct the air monitoring. The monitoring results have been reviewed by NYS DOH and our analysis is included in the air monitoring subsection.

The water curtain suggestion has been forwarded to NYS DEC.

Comment #13: Consistency regarding the NYS DEC's monitoring practices at the landfill is important. Is there a standard procedure? Regarding the frequency of the visits, are they preceded by phone calls?

Response #13: The NYS DEC employs an on-site monitor who regularly visits the town of Brookhaven Landfill about four days per week. The on-site monitor is free to show up at any time and does not have to call ahead. However, once the on-site monitor is at the landfill, landfill staff is notified.

Comment #14: The statement that the landfill is not a "licensed" composting facility is misleading and implies the town is conducting unauthorized activities at the landfill. In fact the landfill is a registered composting facility, as required by state law.

Response #14: The authors contacted NYS DEC to check the accuracy of the statement "the landfill is not a licensed composting facility" that is included in the draft health consultation (see the Air Quality Issues subsection). At the time the draft health consultation was written, the landfill was a leaf transfer facility, not a composting facility. Since the draft health consultation was written, the town has stopped accepting grass and leaves and does not intend to conduct any future composting activities at the landfill site. Leaves are picked up on a specific day and transferred directly to a separate composting facility in Manorville. Currently, the landfill accepts some yard waste (e.g., branches) which they chip but do not compost.

Comment #15: The draft health consultation states leaf piles were over the limit. What is the magnitude and frequency of the stockpile overages? How is this 3,000 cubic yard number arrived at and justified? When stated that the 1993 leaf operation was completed without significant problems or complaints, was there a number provided to the residents to call in complaints? If so, was it given to surrounding communities at large?

Response #15: As stated in the health consultation, the NYS DOH found the documentation of the leaf transfer activities to be unclear. The 3,000 cubic yard limit was based on the size of the leaf transfer station the town was going to build and was justified by the volume of leaves already collected with normal municipal solid waste. Complaints can be made to the NYS DEC Region 1 office at 631-444-0375.

Comment #16: Does the flare contribute other contaminants to the environment? Does the flare mitigate any other concentrations of contaminants other than hydrogen sulfide?

Response #16: The landfill is to operate in accordance with the NYS DEC air regulation permit for the site. The flare removes methane, the primary constituent of landfill gas, by burning it; the combustion products are carbon dioxide and water. Trace concentrations of other chemicals can pass through the flare or can be created during burning, but these emissions are regulated under the permit. Flare emissions are monitored to determine if they are below the stationary source

emission standards.

Comment #17: The Air Quality Issues subsection (of the draft health consultation) is out of date in regards to the flare and generators; the permanent flare has been installed for over two years and the town has installed higher capacity generators. This is done as part of its landfill gas-to-energy project that combusts greater quantities of methane, an improvement that also improves air quality. Several questions were asked about these generators.

Response #17: The document has been updated. More specific comments about the methane-powered generators at the site have been forwarded to NYS DEC. Additional questions should be addressed to:

New York State Department of Environmental Conservation
Building 40 - SUNY
Stony Brook, New York 11790-2356

Comment #18: The leachate collection system (content, volume, and disposal) in place for Cells 1, 2, 3, and 4 should be discussed more. Since leachate was found to be overflowing the liner in 1975 and 1978, was the problem corrected? Can NYS DOH evaluate whether the events affected groundwater? Why was this operation not discussed during other parts of the draft health consultation concerning the plume of leachate affecting drinking water? Is the collection program catching all the leachate produced at the site?

Response #18: Additional information about leachate has been provided in the Water Quality Issues section.

Both NYS DEC and USGS reported that leachate was ponding above the landfill liner early in the landfill's history (around 1976). The town has taken measures to prevent leachate contamination and monitors the leachate collection system. The town monitors leachate collected in the secondary liner to evaluate the effectiveness of the primary liner.

Leachate quality is analyzed quarterly in accordance with NYS DEC 6 NYCRR Part 360-2.11. The NYS DEC reviews the data to ensure compliance with appropriate regulations. Discussions between NYS DOH staff and NYS DEC staff indicate that about 20 gallons/acre/day are collected from the secondary liner. This is a small volume when compared to the total volume of leachate (1,500 gallons/acre/day) produced by the landfill (Dvirka and Bartilucci, 1990a). The third liner then acts as a back up for any possible leakage from the second liner. These facts suggest that the leachate collection program is functioning effectively.

The reports by the USGS (Wexler, 1988a) and Dvirka and Bartilucci (1990a) contain information about the volume of leachate generated by the landfill. Yearly groundwater assessment reports are submitted to the NYS DEC and are available if the reader needs more detailed information about the leachate generation rate every year or the content by Cell.

Comment #19: What are the composition, location, direction, and depth of the plume? What are the height of the water table and the position of the plume in relation to it?

Response #19: The USGS reported that leachate samples and leachate-contaminated groundwater (plume) samples contained elevated concentrations of sodium, potassium, calcium, magnesium, ammonium, bicarbonate (measured as total alkalinity), chloride, iron, and manganese ions (Wexler, 1988a). Elevated chloride concentrations indicate the location of the plume, most recently (1990) depicted in figures produced by Dvirka and Bartilucci. Groundwater near the landfill (and the plume) moves southeastward at a rate of about 1 foot per day (Dvirka and Bartilucci, 1990a). They also report that the water table depth, which varies due to differences in land surface elevation, ranges from 0 to 60 feet near the landfill.

The Upper Glacial aquifer is located directly below the landfill. The plume has penetrated most of the Upper Glacial aquifer (100 feet below the water table), but has not affected the underlying Magothy aquifer. The plume is 90 feet deep and is further described in the Groundwater Contamination subsection of the health consultation.

Comment #20: Is the contamination plume advancing/growing? Will the plume be tracked/sampled/halted? Can you project the plume's location over the next 10-15 years? The plume and its effects on the aquifer (and public health) should be addressed in detail. Is the plume being remediated?

Response #20: Whether the plume is advancing/growing is not clear. In 1982, the USGS reported that the contaminated plume extended about 3,700 feet. Dvirka and Bartilucci (1990a) compared chloride concentrations found in the groundwater in 1990 to the chloride data that the USGS reported in 1982. They concluded, "the plume has advanced approximately 3,000 feet since 1982 in the direction of ground water movement at a usual, predictable rate (about 1 foot/day), and has reached at least Montauk Highway, approximately 5,500 feet from the landfill." Tonjes and Black (1994) disagree with the conclusions drawn by Dvirka and Bartilucci (1990a). In their 1993 "Landfill Groundwater Assessment" update, Tonjes and Black conclude the "plume of leachate contamination extends at most 3000 feet southeast from the edge of the landfill downgradient towards Montauk Highway." Although the authors of these reports are in disagreement about the extent of the plume, all the reports agree that:

- 1) Contamination from landfill leachate has penetrated the Upper Glacial Aquifer;
- 2) A layer of Gardiner's Clay impedes the vertical migration of the leachate below Upper Glacial Aquifer;
- 3) Landfill leachate has not affected the Magothy Aquifer (in other words, the contamination appears to be contained in the Upper Glacial Aquifer);
- 4) Contamination levels will decrease as the plume contaminants continue to mix with more of the native water in the Upper Glacial Aquifer.

Groundwater monitoring, on- and off-site, is conducted quarterly and the results are published in yearly Groundwater Assessment Reports. Copies of these reports are available upon request from the town of Brookhaven.

We are not aware of any plans for more modeling efforts to predict the migration/location of the plume over the next 10-15 years.

The contaminant concentration in Upper Glacial Aquifer will decrease over time. Various processes determine the distribution or dilution of contaminants in the plume downgradient of the landfill. Physical processes tend to spread the contaminants in the aquifer thereby reducing the concentration of contaminants. The contaminants can spread by moving through the aquifer in the direction of, and at the average rate of, groundwater flow in the area. The contaminants will mix in the direction of flow and perpendicular to flow, depending on variations in local groundwater velocities. Finally, the contaminants can spread in the aquifer by molecular diffusion driving solutes from areas of high concentration to areas of low concentration. Chemical and biological processes alter the concentration of certain contaminants by changing the chemical structure of the contaminants or by causing certain chemicals to sorb onto or into aquifer sediments.

Many measures have been taken to minimize any potential for public health problems due to the contaminant plume. Private wells were tested in the past and residents in the affected areas have been supplied with public water.

Comment #21: The data obtained in the 1981-83 survey, the 1990 report, and the 1986, 1987, and 1991 groundwater sampling are by now too old to serve as a basis for reliable conclusions. Much has changed at the landfill since that time including the methods by which the town collects and treats the leachate. The document assumes that all sampling wells are within the plume and that all wells are household wells, but provides no maps or other means to determine whether such assumptions are correct. The document also fails to rule out or even discuss other potential sources of contamination, an especially serious oversight in light of the observation that many of the VOCs listed do not occur in leachate.

Response #21: The health consultation describes the history of the contamination for the purpose of trying to understand the potential for past exposure. Likewise, the health consultation describes the current conditions to understand the potential for current and future exposure. A health consultation is a summary document focusing on public health issues, by design we try to limit the number of graphs and tables. However, we have added tables and figures to help describe the public health information, but we do not include specific addresses in the document to protect the confidentiality of businesses and homeowners. The landfill is known to have contaminated groundwater and it is also known that some private potable wells downgradient of the site were contaminated. It is reasonable to conclude that the two are related, however, it is still possible other sources have also contributed.

Comment #22: One comment states that the area resident would like the groundwater

contamination eliminated. The area resident feels the remedial measures to prevent further contamination are not enough.

Response #22: The remedial measures implemented at the landfill are discussed in the Water Quality subsection. We have evaluated the groundwater contamination as it relates to the potential for human exposure and mitigated exposures, where needed. We feel that remedial measures are in place to minimize further contamination and that the provision of potable water to residents is one of our primary public health concerns. The issue of eliminating existing contamination will be shared with the NYS DEC and the town of Brookhaven.

Comment #23: In the Groundwater Related Exposure Pathways subsection, the document speculates about the "probable" ingestion of VOCs, the "probable" inhalation of vaporized VOCs, and the "probable" dermal absorption of VOCs that were "likely" to have come from the landfill. It also implies that such inhalation and absorption continue to be a problem. The data, referred to in the health consultation, does not support these conclusions. Moreover, there is evidence to the contrary. The conclusion of a report prepared by the town is that a localized spill, rather than the plume, is responsible for the detection of certain organic compounds downgradient of the landfill.

Response #23: Although there is some uncertainty in the exact source of the VOCs in the private wells monitored, based on the town's (Tonjes and Heil, 1996) and USGS reports, it is reasonable to state that some of the VOCs may have originated from the landfill. For this reason the health consultation did not definitively state that the VOCs were from the landfill. This does not contradict the conclusion drawn in the health consultation that leachate from the landfill has impacted groundwater and is consistent with the conclusion that area residents were likely exposed.

Comment #24: Several residents requested private well testing and extending public water. The Public Health Action Plan (PHAP) in the draft health consultation recommended identifying private wells that may be affected by contamination from the landfill.

Response #24: The draft health consultation included a recommendation to survey private wells near the landfill to determine the number of private wells in use for drinking water and to decide which of these wells, if any, should be sampled. Since the draft health consultation was written, the private well survey was completed and the results are included in the Groundwater Contamination section.

A community group provided additional completed private well survey forms and asked to have them included in the survey. The additional locations were included in the NYS DOH private well survey of the area. One survey response indicated that a neighboring private well on Burnett Lane was possibly used for drinking water. The Suffolk County Department of Health Services investigated this possibility in 1996 and found that the Suffolk County Water Authority served all the homes on that road for drinking water.

Comment #25: Who provided public water to the residents in the area and is it available to all residents?

Response #25: The town of Brookhaven, in cooperation with the Suffolk County Water Authority, provided public water to the residents in the area. See Groundwater Contamination Section. Public water is available to all residents affected, or potentially affected, by the contaminant plume.

Comment #26: The Groundwater Contamination subsection discusses a USGS survey. The draft health consultation fails to inform the reader that the plume denoted by the survey did not affect any wells. The town's installation of public water mains was at all times in advance of the plume's affect on private wells.

Response #26: In 1986 and 1987, the Suffolk County Department of Health Services tested private wells downgradient from the landfill and found VOC contamination above NYS DOH drinking water standards. The 1986 and 1987 sampling event occurred before the installation of public water mains in the area. If these VOCs were related to the landfill, it would be incorrect to say that the installation of the public water mains was in advance of the plume.

Comment #27: With respect to citizen claims (reported in the Groundwater Related Exposure Pathways subsection of the draft HC), the town is not aware of any contaminated private wells in use in the subject area. The health consultation should describe the reports in greater detail. Were they from area residents? Did they refer to wells located within the plume? On what dates were they made? Who were the reports filed with or made to?

Response #27: The health consultation is a summary document and does not include all of the details of area residents' complaints. During a scoping visit of the landfill in November 1993 after the petition for a health consultation, citizens reported to ATSDR that there were some private wells in use within the plume, downgradient of the landfill. A survey (1996) was conducted to identify these wells. In the survey, residents still indicated that private wells were being used. Our investigation into these reports located one contaminated well; however, public water was available, but not being utilized, by this resident. The text in the Groundwater Contamination and Groundwater Related Exposure Pathways sections have been amended to reflect this information. Sentences have also been added to the document stating that the source of the VOC contamination has not been determined.

Comment # 28: Measuring sample data against the National Ambient Air Quality Standards (NAAQS) does not adequately address the effects on the children in the area. NAAQS relates to the adult male population.

Response #28: NAAQS are proposed and promulgated under the mandate that they be protective of public health. In its evaluation of available scientific information to support a standard, The

U.S. Environmental Protection Agency (US EPA) considers along with other factors, the severity of health effects and sensitive populations at risk (e.g., children). For example, the 1997 revisions to the NAAQS for particulate matter were in part based on a review of more recent community-based epidemiology studies that suggested there was a need for greater protection of sensitive subpopulations (e.g., the elderly, individuals with cardiopulmonary disease, and children) against the potential health effects of fine particulate matter. In addition to comparisons to the NAAQS, long-term exposures to hydrogen sulfide were evaluated by using the US EPA reference concentration, which is derived with the intent of protecting members of the population who may be especially sensitive to the effects of this contaminant. Thus, the overall evaluations of health risks were aimed at ensuring that the potential risks to children would not be underestimated.

Comment #29: Many factors and variables affect sampling of air and none of the relevant details were included in this consultation. No topographical or weather conditions are listed in detail for the sampling undertaken. Location of the monitors, other than distance, was not discussed. The discussion on the concentration gradient would be directly affected by the aforementioned facts. The document inappropriately looks at two samples, one at the flare and one downwind, and concludes that these samples "could" indicate that the landfill "may" be the source of air contamination. A computerized graph should be created taking all variables into consideration. Data could then be reevaluated and discussed. The last sentence in the third paragraph of the Air Contamination subsection should be expanded upon ("Finally, other factors such as limited data, other potential nearby sources and the error associated with sample analysis, make it difficult to make definitive conclusions about these samples.")

The town recommends that the authors review the report of Phase II of the recently completed in-depth air study at the landfill.

Response #29: The health consultation is a summary document that includes our evaluation of data related to the site. Our evaluation examined many monitoring programs and we cannot include all details of the relevant studies in this document. Additional air monitoring has been done since the draft health consultation was released and we have included analysis of that air monitoring in the Air Monitoring subsection of this final health consultation. Three sentences on concentration gradients have also been removed.

For more detailed information about the September 30, 1993 24-hour ambient air study, please refer to the original report. For more details about the monitoring (discussed in the Air monitoring subsection) please refer to the Phase I report released by RTP Environmental Associates in March 1996, the additional Phase I information released in April 1996, and the Phase II report released in August 1996 (RTP Env., 1996a,b).

Comment # 30: The document should state up front that the September 30, 1993 study was adequate for its intended purposes (draft environmental impact study) but is not adequate for purposes of drawing any conclusions in the document. Notwithstanding the limitations of a 24-

hour study, the health consultation discusses it at great length, at times stating that the figures "suggest" certain implied conclusions. Even then, the document fails to address the conclusions of the study, all of which were favorable. The document is speculative and the data inadequate.

Response #30: The draft health consultation did note that the data from the September 1993 study were too limited to draw definite conclusions. The document now states that the September 1993 study was conducted as part of the preparation of a draft environmental impact study (Wehran-NY, 1992a). Also, additional air sampling events (see Air Monitoring subsection) have been included for a more comprehensive evaluation of air contamination issues.

Comment #31: Who was given the task of additional air monitoring? The public should be included in the development of the air-monitoring plan. One person recommended continuous short-term, 24-hour monitoring for respirable particulate, stating that modeling is not adequate. Tipping fees from the current landfill should be used as a funding source.

Response #31: NYS DEC and NYS DOH consider public concerns in the development and implementation of air monitoring plans. For this reason, comments from the public have been encouraged.

The town is not required to conduct 24-hour monitoring at the landfill, but was required to conduct additional air monitoring before NYS DEC issued an operating permit for Cell 5. The consultants' air-monitoring plans were reviewed by NYS DEC and NYS DOH to ensure the plans included adequate sampling to evaluate the potential for human exposures to contamination. Air monitoring for total suspended particulates (TSP) and particulate matter less than 10 microns (PM₁₀) was part of the consultants' plan and required by the NYS DEC permit to construct and operate Cell 5. The results of the air monitoring conducted from 1996 to 1999 for issuance of the permit are now included in this health consultation in the Air monitoring subsection.

Comment #32: The Air Contamination subsection discussed the analysis of total particulate matter. Comparing the upwind sample to the downwind sample suggests there are sources of particulate matter in the area other than the landfill. These sources should have been identified and discussed. We feel these conclusions are ambiguous.

Response #32: Other sources of particulate matter are not investigated as part of the health consultation, because the health consultation is a summary document dealing specifically with the town of Brookhaven Landfill. The 24-hour sampling event was not designed to identify or draw conclusions about other sources of particulate matter. We agree that we did not come to any definite conclusions about total particulate matter, based on the September 1993 sampling, because the data were so limited. Air monitoring performed since the release of the draft health consultation indicates that TSP and PM₁₀ are not at levels associated with adverse health effects at the Brookhaven landfill site (see Air Contamination section).

Comment #33: How were the forty-three VOCs analyzed in the September 30, 1993 air sampling selected? Do these correlate with the complaints placed by the residents? Were the VOCs discussed chosen based upon cancer incidence?

Response #33: The compounds were selected in part by cross-checking US EPA data on gaseous emissions from municipal solid waste landfills against NYS DEC lists of high and moderate toxicity air contaminants. Any substance from the US EPA database that was on either NYS DEC list was selected for sampling, provided that it was detected in at least four of the forty-six landfills in the database. (Environmental Health Associates, 1993). All seventeen VOCs identified by this procedure are detected by US EPA Method TO-14 analysis, which provides analyses for a total of forty-three VOCs.

Comment #34: The document should inform the reader of the town's efforts to control the odor problem; odor is reduced by capping activities, the placement of gas extraction wells, deodorizing efforts, improved daily cover methods, and the installation of a temporary flare and a permanent flare. The town also feels that the likelihood of detecting even the low levels of hydrogen sulfide found in 1993 is remote at best.

Response #34: The odor reduction efforts of the town are mentioned in the Air Monitoring subsection. In this section the health consultation also states that odor complaints have decreased since the town began the odor reduction plan in 1993 (NYS DEC, 1992).

Comment #35: The reference to a possible interruption in remedial measures shows a lack of understanding of the issue. The remedial measures that had the greatest effect, such as the completion of capping requirements and the end to landfilling unprocessed solid waste, cannot be "interrupted."

Response #35: A remedial measure that could be interrupted is the use of gas flares. This point is now noted in the revised health consultation.

Comment #36: Comments submitted criticize the Inhalation Exposures to Hydrogen Sulfide in Air subsection and question whether exposures were intermittent, acute (non-chronic) and/or chronic, if exposure occurred at all.

Response #36: The actual length of time people may have been exposed to hydrogen sulfide is difficult to ascertain through the air monitoring. As stated in the health consultation, monitoring for hydrogen sulfide indicates that residents near the Brookhaven Landfill site were exposed intermittently to hydrogen sulfide. Based on odor complaints, these exposures began in 1992 and were not continuous, but did occur repeatedly over a period of more than one year. In the health consultation, we evaluated exposures on both an acute and a chronic basis to account for the possibility that long-term exposures to hydrogen sulfide may have occurred.

Comment #37: ATSDR should evaluate the toxicological data related to hydrogen sulfide. The lack of reliable studies demonstrating any toxic effect of hydrogen sulfide at the low and intermittent levels evidenced here should be noted. The discussion of hydrogen sulfide inhalation exposure here is similar to the ones we have seen in other drafts and reports. The net result of a long-term, low-level exposure always seems to be the same; "studies have not been conducted to determine if exposure to hydrogen sulfide for long periods of time (i.e., for a lifetime) can cause any lasting effects on sensitive organ systems such as the respiratory tract or nervous system." We respectfully submit that the time has come to petition the federal government to conduct these studies. Hydrogen sulfide will always be a by-product of landfills and we should begin to address the problem in the long term for the low-level, constant exposures that will be produced.

Response #37: We agree that there are data gaps in the information available about the health effects associated with long-term, low-level exposure to hydrogen sulfide. ATSDR published a toxicological profile of hydrogen sulfide in July 1999 which evaluates the toxicological data up to that time (ATSDR, 1999d). Toxicological data from that publication were used to update the information contained in this health consultation. The available toxicological data, and the gaps in that data, are summarized in ATSDR's "Toxicological Profile for Hydrogen Sulfide."

Comment #38: The health consultation limits itself in the discussion on health risks to the exposure to hydrogen sulfide only. There is no mention of other chemicals or contaminants concerning health (example: benzene, cadmium, arsenic, etc.). We believe that chronic toxicity for this and all contaminants found in the samples thus far is a real possibility and threat to the residents, particularly the children.

Response #38: The Environmental Contamination and Exposure Pathways section discusses a number of contaminants detected in air and groundwater samples collected at and near the landfill. To decide whether these contaminants warrant further evaluation, NYS DOH compares the detected concentrations to typical background values and health comparison values. Only contaminants that exceed these values are discussed further in the document. Of the contaminants detected in air samples, hydrogen sulfide and acrolein were present at levels that called for further consideration and are discussed in depth in the Inhalation Exposures to Air Contaminants section. The Exposures to Volatile Organic Chemicals (VOCs) in Drinking Water section discusses six VOCs that were detected above drinking water standards.

Comment #39: The report being created for the cancer incidence study should include the carcinogenic effect of the VOCs.

Response #39: The data were evaluated as they relate to health comparison values and odor thresholds. Carcinogenic and noncarcinogenic effects of some VOCs are discussed in the health consultation. See the Discussion section in the health consultation.

Comment #40: How have these procedures for evaluating potential health risks been

formulated? What were sources used? Appendix C is incorrectly referred to as containing information regarding the landfill when in fact it is a procedural document. The first sentence of the Description of the Evaluation of Health Risks subsection implies that the NYS DOH has performed a health risk assessment of the contaminants associated with the landfill. If the reference is to the cancer study referred to in the Health Outcome Data subsection of the health consultation, the text should so state.

Response #40: ATSDR defines a health consultation as “a review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard”. They are focused on a specific exposure issue and are therefore more limited than a public health assessment. As part of the health consultation the NYS DOH evaluated the health risks associated with exposure to hydrogen sulfide and VOCs in drinking water. Therefore, the NYS DOH believes that the statement in the health consultation referring to the evaluation of the potential health risks from contaminants of concern associated with the Brookhaven Landfill site is appropriate.

Appendix C is a procedural document and does not include information specifically on the Brookhaven Landfill site. Accordingly, we have changed the last sentence in the Description of the Evaluation of Health Risks paragraph to now read: "For additional information on how the NYS DOH determines and qualifies health risks, refer to Appendix C." The procedures used to evaluate the potential health risks in the Brookhaven Landfill Health Consultation are documented in the ATSDR Public Health Assessment Guidance Manual. This manual is available through ATSDR (ATSDR, Division of Health Assessment and Consultation, 1600 Clifton Rd., E32, Atlanta, GA 30333; 404-639-0610).

Comment #41: There seems to be many informal surveys about this landfill. We believe it prudent for the NYS DOH to conduct a formal survey to evaluate the odor complaints and health concerns.

Response #41: The NYS DEC, the NYS DOH, and ATSDR have taken actions to evaluate odor complaints and health concerns. The NYS DEC recorded the odor complaints they received and, due to these complaints, started measuring hydrogen sulfide levels near the landfill. Hydrogen sulfide was measured because it has a strong odor and can cause the physical symptoms (e.g., eye irritation, headaches, respiratory problems, and nausea) reported by area residents at formal public meetings conducted by NYS DEC.

Both the hydrogen sulfide levels and odor complaints decreased after early 1993 when the odor reduction plan was put into effect at the landfill. Because the odors have decreased, further formal evaluation would not provide meaningful information at this time. According to the NYS DEC on-site monitor, complaints are generally infrequent and for general landfill odor, not hydrogen sulfide odors.

Comment #42: We find it quite alarming that the Health Activities Recommendations Panel

(HARP) found that no follow-up health actions are indicated at this time. Planning should be a priority of this panel to assure the residents that all health risk aspects have been considered.

Response #42: HARP was a panel of experts in the fields of toxicology, epidemiology, health education, and engineering. This panel no longer exists as HARP, but its tasks are conducted by experts at ATSDR and NYSDOH who contribute to this health consultation. The purpose of the HARP was to review the available data and objectively determine if health related activities were necessary. This purpose, as well as the general protection of public health, are addressed through this health consultation. Past remedial activities have reduced exposures and review of all available data indicates that the exposures to the levels of contaminants identified (see Discussion section) do not warrant any further formal health-related or epidemiologic activities. The PHAP now states that "NYS DOH will work with NYS DEC to respond to future community concerns if any are identified" and they will "re-evaluate and expand the PHAP as needed."

Comment #43: With the increased amounts of incinerator ash to be processed at the site, we find it premature to lower the classification of the site to an intermediate health hazard. Remedial efforts with the hydrogen sulfide and plume problems are occurring with some success. The draft health consultation itself states, however, that there has been limited and therefore insufficient testing of ambient air quality associated with this facility.

Response #43: The NYS DOH and ATSDR assigned the classification of indeterminate (not intermediate as written in the comment) public health hazard to the site conditions in the draft health consultation because of the insufficient air monitoring data at that time. The ATSDR criteria and action levels of public health hazard categories are included in the draft health consultation in Appendix D.

Since the release of the draft health consultation, additional on-site ambient air was sampled from 1997 through 1999 for hydrogen sulfide, VOCs, and methane. The results and their public health implications are examined in the final health consultation and the Brookhaven landfill is now classified as no apparent public health hazard.

Comment # 44: What is the connection between this health consultation and the "Small Area Analysis of Breast Cancer Incidence Rates in Nassau and Suffolk Counties, New York, 1978 - 1987", which is discussed in the Health Outcome Data subsection of the draft health consultation (NYS DOH, 1990).

Response #44: In general, the Health Outcome Data subsection of a health assessment or consultation includes reports of health outcome data that pertain to the geographic area under discussion. A discussion of the "Small Area Analysis of Breast Cancer Incidence Rates in Nassau and Suffolk Counties, New York, 1978 - 1987" was included in the prior draft because the Brookhaven area was included in the breast cancer study. The current document contains information about a cancer incidence study conducted specifically for the Brookhaven Landfill area and discussion of the "Small Area Analysis of Breast Cancer Incidence Rates" is no longer included.

Comment #45: Why was only one database used in the cancer incidence study conducted? Is there a reason an earlier time period was not studied? The report states that the study would be completed in May 1996. If completed, would a copy be available and how could it be obtained?

Response #45: By law, hospitals and physicians report cases of cancer among New York State residents to the New York State Department of Health Cancer Registry. Since it is the most complete database available for cancer in New York, it is commonly used to determine incidence of cancer in small geographic areas in the state.

The Brookhaven Landfill was opened in 1974. Epidemiological evidence suggests that the latency of cancer from time of exposure can be 10-20 years. Thus, we would not expect the landfill to have a potential impact on cancer incidence in the area prior to about 1983. The original study used New York State Department of Health Cancer Registry data for 1982 through 1991. Prior to the release of the report, additional years of cancer incidence data became available. An update was therefore undertaken that covers the years 1992 through 1996.

The review of cancer incidence for 1982 through 1996 for the area near the landfill is complete and a summary has been included with the final health consultation. Copies of the report will be placed in the document repository for this site. Requests for copies can also be sent to the New York State Department of Health, Bureau of Environmental and Occupational Epidemiology, Center for Environmental Health, Flanigan Square, 547 River Street, Rm 200, Troy, NY 12180-2216 or by calling the Center for Environmental Health's toll-free number 1-800-458-1158, extension 27950.

Comment #46: The nurse's logs discussed in the Health Outcome Data subsection, should have been condensed and included as an appendix to this report (we suggest in chart form). It is stated that the report was to be completed by the end of 1995 - was it? Is a copy obtainable? Was the nurse and school staff informed as to what to look for? Did the people collecting data or the health agencies make the children aware of potential hazards of participating in the study?

Response #46: NYS DOH has completed the report summarizing the evaluation of the nursing staff records. The results are discussed here in the final health consultation. Copies of the reports will also be available at the document repositories listed below:

Brookhaven Public Library
273 Beaver Dam Road
Brookhaven, NY 11719
(516) 286 - 1923

South Country Library
22 Station Road
Bellport, NY 11713
(516) 286 - 0818

A NYS DOH physician met with the school nurse when the logs were developed so that school personnel would have an objective record-keeping system. We are unaware of any hazard imposed on the children by the nurse's log study. It was a record-keeping project. The nurse

recorded the number of visits to the nurse's office, the students' health complaints that prompted the trips to the nurse's office, student absenteeism, staff health complaints and absenteeism, and odor complaints.

Comment #47: The Community Health Concerns subsection discusses two different public meetings during which area residents expressed their concerns. We would appreciate clarification as to which issues were discussed at which meeting. What was the geographical area(s) of concern?

Response #47: The community concerns contained in the health consultation, air and water quality, were discussed at both meetings. The geographical areas of the concerns are discussed in other sections of the health consultation. For example, water quality concerns are greatest in the area of the contaminant plume.

Comment #48: One person commented that he did not think there was widespread public concerns regarding the landfill. The person thought that one specific person, or group, petitioned the health consultation and they requested a description of the circumstances giving rise to the document. The person asked for the petitioner and a copy of the petition to be disclosed. Additionally, they commented, "Did the petitioner provide any health data to the DOH? Were the data factual?" Finally, they stated that the concerns expressed in November 1992 were not "recently" expressed.

Response #48: We do refer to a "petitioner" in the health consultation. In this case, we identified the primary author of the letter requesting the health consultation as the "petitioner." However, other area residents have expressed health concerns about the landfill through other mechanisms including public meetings.

Comment #49: Why are the Horizon Village and the school the only populations discussed?

Response #49: The Hampton Avenue School (southwest) and Horizon Village apartments (west-southwest) are close to the landfill. The prevailing westerly winds dominate general air movements in the area, except in summer months when the predominant wind direction becomes southwesterly. Therefore, these two areas are more likely to have air impacts than other areas. No other areas were discussed because we would expect the Hampton Avenue School and Horizon Village to be impacted the most highly, due to their proximity to the landfill.

Also, local residents have concerns and questions about the Hampton Avenue School and Horizon Village areas. They conducted their own informal surveys and gathered other information for this area, which they gave to ATSDR and the NYS DOH. We evaluated this information as part of the health consultation process and included this evaluation in the document.

Comment #50: Regarding the "informal survey of health complaints" done in a local

neighborhood, the report should have identified the area of the survey on the map. The draft does not suggest that testing was done for *Aspergillus fumigatus* to see if the complaint might have been caused by this. Apparently, it was not.

Response #50: As stated in the Community Health Concerns and Current Issues subsection, the informal survey of health complaints was conducted by an area resident, not the NYS DOH or ATSDR. We included a summary of the survey to enhance the reader's understanding of various community concerns.

The town of Brookhaven was temporarily storing leaves and chipping wood at the landfill. These were very small operations and are not likely to cause any health problems for residents in areas closest to the landfill. The town will not be composting materials at the site in the future. The NYS DOH conducted a comprehensive study of health symptoms and bioaerosol levels near a very large yard waste composting facility in Islip, Suffolk County, New York as part of a public health assessment for the Islip Municipal Sanitary Landfill (NYS DOH, 1996b). Based on the information gathered during the Islip study, testing for *Aspergillus fumigatus* in the area of the Brookhaven Landfill when leaves were stored there would not have been useful.

Comment # 51: A request was made for a copy of the registry of people exposed to VOCs in drinking water.

Response #51: The VOC registry collects both exposure and health information on individuals at locations where drinking water or indoor air was contaminated with chemicals from landfills, industrial sites, or spills. Individuals and communities are selected for inclusion in the Registry if exposures from the contamination of private wells, public water supplies, or indoor air have been verified by sampling results. Information collected by the NYS DOH for medical research purposes is protected by Section 206.1(j) of the New York State Public Health Law and must be kept confidential by NYS DOH. Only aggregate data will be available to the public. A fact sheet describing the VOC registry may be obtained by calling the Center for Environmental Health's toll-free number at 1-800-458-1158, extension 27950.