Draft
Public Health Response Plan to Prioritize and Evaluate the Public Health Impact of Environmental Contamination in the Village of Endicott, Broome County, New York

January 24, 2006

Prepared by:

The New York State Department of Health,
the Agency for Toxic Substances and Disease Registry, and
the Broome County Health Department

PHRP Release History

January 24, 2006 (current)
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1. The Public Health Response Plan (PHRP)

A Public Health Response Plan (PHRP) is a written plan designed to document historic, on-going, and planned public health actions being undertaken to address specific human exposure(s) to environmental contaminants. Health agencies, regulatory agencies (such as the New York State Department of Environmental Conservation (NYSDEC)), and community stakeholders will use the PHRP to help prioritize and evaluate the public health affect of environmental contamination. The PHRP helps to facilitate increased communication and understanding between the involved agencies and community stakeholders.

This PHRP is being developed by the New York State Department of Health (NYSDOH), the Agency for Toxic Substances and Disease Registry (ATSDR) and the Broome County Health Department (BCHD) in response to community concerns about health issues associated with environmental contamination in the Village of Endicott. It is a "living" document. That is, it will be updated and shared with the public as progress warrants.

The PHRP will do the following:

- identify community concerns;
- provide an overview of environmental contamination and human exposures;
- provide descriptions of actions that are being proposed to address community concerns;
- assist stakeholders in prioritizing health agency and community activities;
- describe opportunities for input from the community;
- provide updates as new issues and concerns arise;
- provide an overview of completed health studies in the Endicott area (Appendix C);
- give background on what proposed health studies can and cannot tell us, as well as describe how proposed studies will be conducted; and
- provide an overview of the stakeholder planning group (SPG).

2. Community Concerns

The community has expressed the following concerns about health issues associated with environmental contamination in the Village of Endicott:

- possible excesses of childhood and adult cancers;
- relationship of cancers to environmental factors;
- relationship of adverse birth outcomes to environmental factors;
- potential health effects from inhalation exposures as a result of soil vapor intrusion of volatile organic compounds (VOCs) into overlying structures;
- potential health effects from inhalation of historic outdoor (ambient) air;
- potential health effects from inhalation of current outdoor (ambient) air;
- potential health effects from ingestion of vegetables grown in the soil vapor plume area;
- potential exposures associated with contamination at the Old Village Dump;
- potential health effects from historic occupational exposures to chemicals;
- potential health effects from current occupational exposures to chemicals; and
- potential health effects associated with exposure to low concentrations of VOCs in the public water supply.

These concerns will be addressed based on their potential public health importance, community stakeholders' assessment of priority and the availability of resources.

3. Overview of Environmental Contamination and Human Exposures

The Village of Endicott is a mixed residential, commercial and industrial community in the Susquehanna River Valley. Soil in the area is mainly sand and gravel. Shallow groundwater is generally found at 18 to 24 feet below ground surface and represents the top of the shallow aquifer. A second, deep aquifer, is present below the shallow aquifer. In most areas of Endicott, the shallow and deep aquifers are separated by a layer of dense silt, which acts as a confining layer, effectively isolating the two aquifers from each other. In a few locations, this confining layer is absent.

Endicott has a rich industrial heritage that included large manufacturing operations at the Endicott Johnson Tannery and International Business Machines (IBM) facility. Many historic and current businesses within the Village of Endicott used or use solvents that contain VOCs. Such businesses include, but are not limited to, IBM, automotive repair facilities and dry-cleaners. As a result of leaks and spills associated with these operations, groundwater, soil and soil vapor in the Endicott area are contaminated with VOCs. This section provides a brief evaluation of human health exposure pathways to VOCs in Endicott.

3.1 Soil

Some areas of soil at the former IBM facility may be contaminated with VOCs. Access to the former IBM facility is restricted and most of the site is paved, therefore direct contact to VOC-contaminated soil is unlikely. Direct contact, although unlikely, remains a potential exposure pathway. Potential exposure to contaminated soil at other sites, such as those on Robinson Hill Road, will be evaluated as they are identified and investigated.

3.2 Groundwater

Although both shallow and deep aquifers are contaminated with several VOCs, the contamination is mostly contained in the shallow aquifer. The area is served with public water from wells installed in the deep aquifer. In the past, routine monitoring of the main public water supply well for this area, the Ranney Well, has detected VOCs at levels above New York State drinking water standards. Historic ingestion of water from the Ranney Well is a completed exposure pathway. To reduce exposures and remove VOCs, an air stripper was installed on this well in 1991.

The South Street Well Field, which is intermittently used to supply the public water system, has had low level detections of VOCs. Detections of VOCs have not exceeded drinking water standards. Therefore, exposure to VOCs above New York State drinking water standards from this well is not expected. In January 2004, the Village of Endicott received funding from IBM to install a treatment system on the South Street Well Field. In July 2005 the Village of Endicott completed construction of a packed tower aeration treatment system for well #5 and well #28 designed to reduce VOC levels in water produced from those wells. The system began treatment of water from well #5 during July 2005. The pump in well #28 will be upgraded so that it too can provide treated water. That well has been off line since September 2005.

3.3 Outdoor (Ambient) Air

There are many sources of contaminants to the outdoor air including motor vehicle emissions, operation of sub-slab mitigation systems, and emissions from industrial/commercial facilities. Inhalation exposure of contaminants in outdoor air is a potential exposure pathway.

Historic and current industrial/commercial operations, including the former IBM facility, emitted or emit contaminants to the outdoor air. The former IBM facility is still an active process facility

known as Endicott InterConnect Technologies Incorporated. The facility currently has emissions that are regulated by an air emissions permit issued by the NYSDEC.

Current inhalation exposure of VOCs as a result of the operation of the sub-slab mitigation systems is being evaluated by IBM in consultation with the NYSDEC and NYSDOH (see Section 4.4).

ATSDR is planning on collecting historic data from agencies to help evaluate the feasibility and usefulness of conducting exposure modeling for historic ambient emissions, consistent with Section 4.5.

3.4 Soil Vapor and Indoor Air

Soil vapor is the air that occupies the spaces between soil particles in the ground. In some areas of Endicott, VOC contamination is present in the soil vapor. Soil vapor intrusion is the process by which VOCs migrate from the subsurface into the indoor air of overlying structures.

In the IBM study area the primary VOC of concern in soil vapor is trichloroethene (TCE). TCE and its degradation by-products were found in indoor air as a result of soil vapor intrusion. Therefore, exposure to VOCs in indoor air is a completed exposure pathway. Mitigation systems have been offered to owners of those structures known to be affected and to most of those potentially affected by contaminated soil vapor. If a structure has a mitigation system, then inhalation exposure to VOCs in indoor air as a result of contaminated soil vapor is minimized. In those structures where an affect was identified and a mitigation system has not been installed, inhalation of VOCs in indoor air remains a completed exposure pathway.

Outside of the IBM study area, the main contaminant of concern, in addition to TCE, is tetrachloroethene (PCE or PERC). PCE and its degradation products were found in the soil vapor and indoor air of some structures outside of IBM's study area during IBM's Groundwater Vapor Project investigation. IBM offered mitigation systems to those structures in this area affected by soil vapor intrusion of primarily TCE. The NYSDEC conducted further investigations into this area in March 2004 to identify the remaining affected structures. Based on the results appropriate actions were taken to reduce exposures to TCE and PCE. The NYSDEC is continuing to investigate this area (see Section 4.2). Inhalation exposure to TCE and PCE in indoor air was a completed exposure pathway in the past and in some cases may remain to be one today.

4. Status of On-Going Actions

This section describes the various activities being conducted to identify environmental contamination and corresponding human exposures, to mitigate human exposures, to determine the feasibility of evaluating potential past exposures, and to evaluate potential health effects associated with human exposures.

4.1 IBM Endicott Site — Groundwater Corrective Action Program

Being Performed by:

IBM Corporation with NYSDEC, NYSDOH and BCHD oversight

Project Overview:

The goal of the Groundwater Corrective Action Program is to identify and address source areas and to reduce the overall extent of contamination through the use of interim remedial measures (IRMs) both on and off-site. The program consists of 8 operable units, each of which is designed to address a different component of the overall remediation, ranging from on-site source area remediation to bedrock plume control to addressing the Ideal Cleaners source area.

Status:

IBM continues to operate and maintain a series of extraction wells and treatment facilities in an effort to reduce contaminant levels in groundwater. Included in these activities is the monitoring of the overall effectiveness of the existing extraction wells and the installation of new extraction wells where necessary.

IBM has conducted supplemental remedial investigation (SRI) activities at the Ideal Cleaners site and is currently preparing an SRI report. Investigation activities included groundwater, soil and soil vapor sampling.

IBM has submitted a Draft Pre-Characterization Technical Memorandum for the Railroad Corridor Source Area and the North Street Area. This document includes a detailed Source Area Evaluation (SAE) for the main site, presents Remedial Actions Objectives (RAOs) and offers candidate remedial technologies.

IBM was offered an opportunity to conduct an on-site soil vapor intrusion investigation. However, they declined, and the NYSDEC, in conjunction with the NYSDOH, conducted an on-site soil vapor intrusion investigation that was completed in September 2005 (see Appendix D). Overall, no immediate health concerns were identified as a result of the investigation. However, the soil vapor data generated by this investigation support the necessity of continuing IBM's on-going on-site investigation.

Timeline:

Analytical Summary Reports are prepared for many of the operable units on a regular basis. These reports are available for review at the document repository (see Page 16).

IBM is due to submit the SRI Report for Ideal Cleaners in early 2006.

4.2 Area-wide Investigation

Being Performed by:

NYSDEC, in consultation with the NYSDOH and BCHD

Project Overview:

One goal of this investigation is to further define the extent of soil vapor and groundwater contamination outside of the IBM study area.

A second goal of this investigation is to identify the potential sources of VOC contamination of the soil vapor and groundwater in Endicott. Investigations have been completed at the Old Village Dump, Jenny F. Snapp Middle School, and Creative Printing among others. An ongoing investigation is being conducted in the Badger Avenue area, the results of which will be available in late 2006.

When warranted, samples will be collected to evaluate potential human exposures associated with soil vapor intrusion and appropriate actions will be taken to address exposures where necessary.

Status:

The NYSDEC and NYSDOH have investigated soil vapor intrusion at more than 100 structures. Soil vapor and indoor air results from the 2004-2005 heating season have been evaluated and based on those results measures have been taken to reduce exposures to VOCs where appropriate. In general, actions taken to date have been driven primarily by the potential for exposures rather than current exposures.

The final report for sampling conducted through May 2005 was submitted in November 2005 and is available in the document repository.

The investigation at Creative Printing was conducted in 2004 and the Preliminary investigation Report was submitted in March 2005. Additional investigation is being conducted. The Preliminary Investigation Report is available in the document repository.

Timeline:

Additional investigation will be conducted throughout the 2005-2006 heating season.

4.3 Other Identified Site Investigations

Being Performed by:

Varies depending on the site or remedial program

Project Overview:

These investigations are focused on potentially contaminated sites currently being handled under the Brownfield Cleanup Program, the Voluntary Cleanup Program, Environmental Remediation Program or Environmental Protection Agency Emergency Removal Actions. These sites include, but are not limited to the following:

- Schapiro's Fine Dry-Cleaning
- Endicott Forging
- IBM Gun Club
- IBM Gun Club Burn Pit
- 312 Maple Street

The goal at each of the above sites is to determine the nature and extent of environmental contamination and to take appropriate actions to mitigate exposures and remediate the environment where necessary.

Status:

Schapiro's Fine Dry-Cleaning has entered the Voluntary Cleanup Program and additional investigative work according to the June 2005 work plan will be conducted in early 2006. The proposed work includes installation of additional monitoring wells and limited soil vapor intrusion sampling.

The USEPA completed an emergency removal action of drums stored on the Endicott Forging site. The NYSDEC regional spills unit is conducting and investigation in addition to removing NAPL from monitoring wells.

IBM has submitted Brownfields Cleanup Program (BCP) applications for the former IBM Gun Club and the Former IBM Gun Club Burn Pit. The applications were deemed complete by the NYSDEC and workplans have been submitted and approved. Investigation work should begin in early 2006.

Broome County has submitted an Environmental Investigation Program (ERP) application for the 312 Maple Street. The application was deemed complete by the NYSDEC and a workplan has been submitted and approved. Investigation work should begin in early 2006.

Approved work plans and final reports for each of the above sites are available at the document repository.

Timeline:

Varies depending upon the specific site; see above. For additional, site specific questions please contact Mr. Justin Deming at 1-800-458-1158 (extension 2-7880), by faxing at (518) 402–7859, or by emailing to BEEI@health.state.ny.us.

4.4 Current Outdoor (Ambient) Air Investigations

Being Performed by:

IBM Corporation, in consultation with NYSDEC and NYSDOH

Project Overview:

The goal of this project is to develop and implement an action plan to address community concerns that pertain to current exposures to contaminants in the outdoor air from the operation of sub-slab mitigation systems.

Status:

IBM submitted and NYSDEC approved a work plan that was designed to assess what, if any, affects the operation of mitigation systems are having on ambient air quality. The work plan requires IBM to complete several tasks, including mitigation system sampling and outdoor air sampling. Outdoor air sampling began in May 2005 in accordance with the ambient air monitoring plan approved by DEC. The first set of sampling results for the monitoring period from May 2005 - September 2005 were submitted to the NYSDEC and NYSDOH in November 2005 and are under review.

Timeline:

Outdoor air sampling will continue until May 2006. At that time, the monitoring results will be evaluated and a determination will be made as to the need for further monitoring.

4.5 Data Review: Historic Outdoor Air Emissions in Endicott

Being Performed By:

ATSDR in consultation with the NYSDOH

Project Overview:

The purpose of this project is to collect available data and information to determine the feasibility of reconstructing past exposures to VOCs in the outdoor air in the Village of Endicott. Depending on the data and information that are available, air modeling may be performed to assist in reconstructing past exposures.

Status:

ATSDR met with the WBESC on July 26, 2005 to discuss the preliminary findings of the IBM air modeling for the timeframe 1987-1993 (Phase I) and to inform the stakeholders that it is feasible to conduct air modeling for this time period. Phase II of the modeling effort will determine air exposures from IBM before 1987. ATSDR and our contractors at Eastern Research Group (ERG) have reviewed data and information at the IBM Somers, New York, facility on two occasions (July and October 2005) to assist in completing Phase II of the project. ATSDR and ERG believe that all available data and information have been collected to complete Phase II of the project. A health consultation will be conducted by ATSDR and ERG to provide the public with a health interpretation of past air exposures from IBM.

Timeline:

ATSDR expects that Phase I and II will be completed by ERG by winter 2006 and that the health consultation will be available for public comment in spring 2006.

4.6 Health Statistics Review: Cancer and Birth Outcome Analyses

Being Performed by:

NYSDOH and ATSDR, in consultation with BCHD

Project Overview:

This project compiled information on the incidence of different types of childhood and adult cancers, as well as birth defects, low birth weight and prematurity, in two areas of Endicott with potential exposure to VOCs in soil vapors. The goal of this review was to determine if these adverse health outcomes were higher, lower, or about what we would expect to see in a community of this type. Among the 22 specific types of cancer investigated, rates of testicular and kidney cancer were found to be significantly higher than expected. In addition, rates of cardiovascular birth defects and term low birth weight births were also significantly higher than expected. Because of certain limitations in this type of study, it can not directly link adverse health outcomes with specific causes. Rather, it can generate hypotheses which may require further investigation.

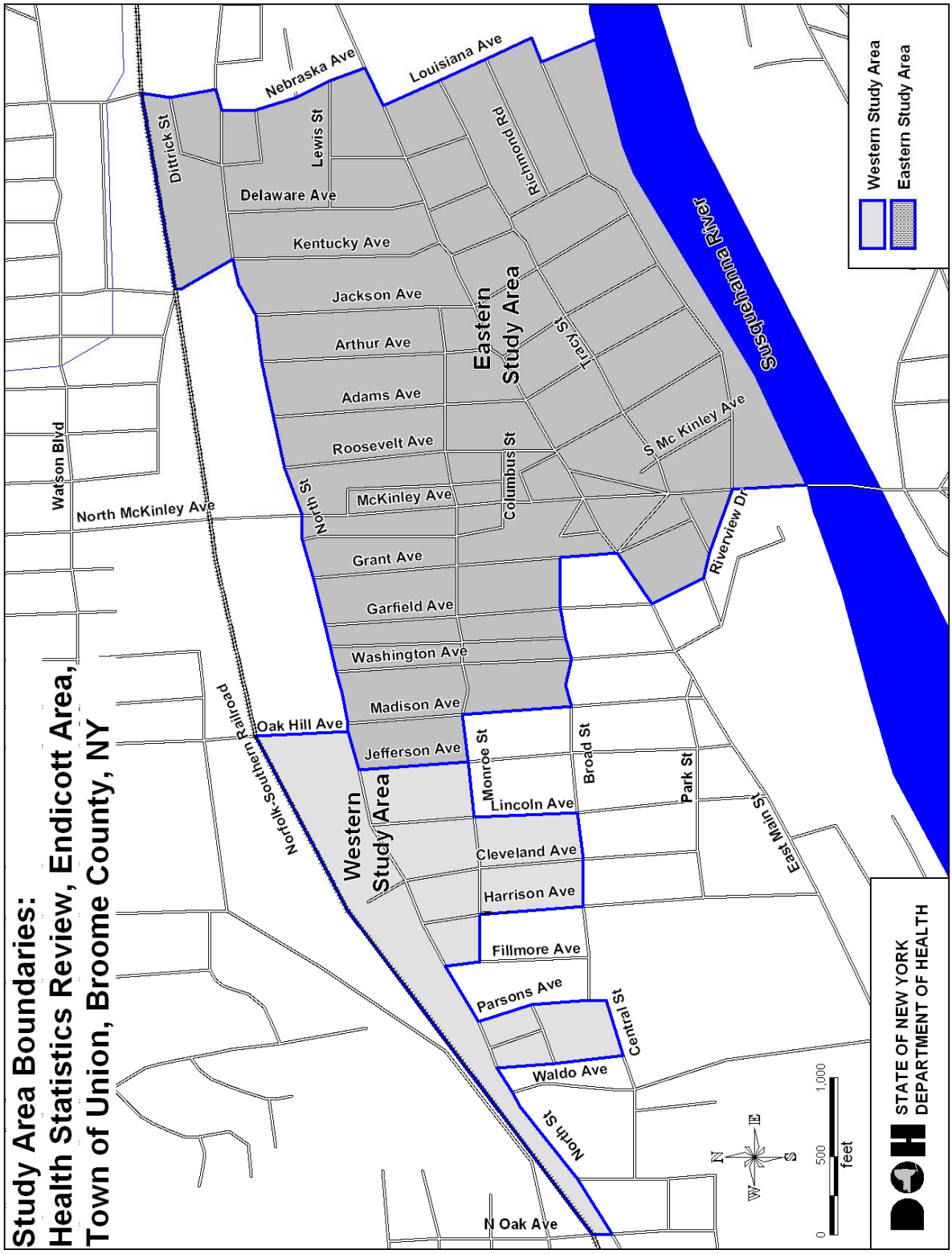
Status:

A draft of the public health consultation entitled "Health Statistics Review, Cancer and Birth Outcome Analysis, Endicott Area, Town of Union, Broome County, New York" was released on August 23, 2005 for public comment. A fact sheet summarizing the consultation findings, along with educational materials about cancer and birth outcomes, was sent to over 7,000 Endicott residents in September 2005. The public comment period for the draft consultation ended November 23, 2005 and currently NYSDOH staff are responding to public comments to finalize the health statistics review.

The elevated rates of several cancers and birth outcomes observed will be evaluated further to try to identify additional risk factors which may have contributed to these adverse health outcomes. Initial follow-up will consist of additional review of the cancer and birth outcome data already collected. This will include additional analysis of birth outcomes further adjusted for socioeconomic status and a review of small for gestational age, a slightly different low birth weight outcome than in the draft study. The results of these additional birth outcome analyses will be included in the final version of the Health Statistics Review. Other efforts underway or beginning include collecting individual case records for kidney and testicular cancer, heart defects, Down syndrome, and term low birth weight; obtaining historical exposure information; analyzing fetal deaths and calculating power for study options. The information gained, along with the results of this Health Statistics Review, will be used to assess if a follow-up epidemiologic study is warranted and feasible.

Timeline:

The final version of the Health Statistics Review is expected to be released in spring 2006. Initial follow-up steps are expected to be completed by fall 2006, at which time a summary describing these activities and suggesting other warranted study will be issued.


Study Area Boundaries:
Health Statistics Review, Endicott Area,
Town of Union, Broome County, NY
Western Study Area
Eastern Study Area
Nebraska Ave
Louisiana Ave
Dittrick St
Lewis St
Delaware Ave
Kentucky Ave
Jackson Ave
Arthur Ave
Adams Ave
Roosevelt Ave
McKinley Ave
Grant Ave
Garfield Ave
Washington Ave
Madison Ave
Jefferson Ave
Lincoln Ave
Cleveland Ave
Harrison Ave
Fillmore Ave
Parsons Ave
Waldo Ave
North St
N Oak Ave
Oak Hill Ave
Watson Blvd
North McKinley Ave
Norfolk-Southern Railroad
Richmond Rd
Track St
Columbus St
S Mc Kinley Ave
Riverview Dr
Susquehanna River
Monroe St
Broad St
Park St
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Central St
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DEPARTMENT OF HEALTH

4.7 Health Consultation: Exposures to Low-level VOCs in Public Drinking Water

Being Performed by:

ATSDR and NYSDOH with data collection by BCHD

Project Overview:

This project evaluates the public health implications of exposure of Village and Town residents to the combination of several different VOCs detected at low concentrations over the past 20 to 30 years. Throughout this time, the water met applicable drinking water standards for a public water supply. In addition, the risk posed by the combination of VOCs and trihalomethanes (a by-product of the disinfection of water) is evaluated.

Status:

ATSDR and NYSDOH released a draft health consultation on October 12, 2004. The draft health consultation evaluated the risk of non-cancerous and cancerous health effects from individual chemicals and the mixture of chemicals in the Endicott Municipal Water Supply. The water is not expected to cause any non-cancerous effects. ATSDR and NYSDOH conclude that the cancer risk from using water from the Endicott Municipal Water Supply is very low to low. Based on these data, ATSDR and NYSDOH conclude that drinking, bathing, and showering in water from the Endicott Municipal Water Supply is not an apparent public health hazard. ATSDR and NYSDOH concluded that Endicott's public water is of high quality and if suitable for both drinking and bathing. ATSDR and NYSDOH received public comments on the draft and met with members of the WBESC on May 24, 2005 to address these concerns. Even after taking into consideration these concerns and performing new calculations to create a worst-case scenario, the health consultation conclusions did not change.

Timeline:

The NYSDOH and ATSDR expect to release the final health consultation with response to public comments during the winter of 2006.

4.8 Western Broome Environmental Stakeholders Coalition (WBESC)

Being Performed By:

Stakeholders in the community

Project Overview:

The Western Broome Environmental Stakeholders Coalition, formerly referred to as the Stakeholders Planning Group (SPG), is made up of stakeholders representing varying constituencies within the Endicott area community. The group provides a way for stakeholders, individuals or groups from the community affected by decisions or actions taken by the health and environmental agencies, to present and discuss concerns related to the environmental contamination in the Endicott community. This helps the agencies more effectively understand community concerns. The group serves as the key vehicle for information exchange between members of the community and government agencies. Please see Appendix B for additional details on the WBESC.

Status:

The WBESC continues to meet monthly to discuss relevant issues. The WBESC generates an agenda prior to each meeting.

Timeline:

The actions of the WBESC will be on-going.

4.9 Data Review: Evaluating Cancer and Historic Occupational Exposures at the Former IBM Facility in Endicott

Being Performed By:

The National Institute for Occupational Safety and Health (NIOSH)

Project Overview:

NIOSH is assessing the feasibility of a study to evaluate associations between health effects and worker exposures at the former IBM facility. The primary focus of this effort is to determine the feasibility of a study of cancer.

Status:

NIOSH representatives requested, received, and evaluated electronic personnel and work history data for former IBM employees at Endicott. NIOSH contracted with industrial hygiene experts through Battelle to 1) identify the main exposures of concern at the plant given the primary health outcome of concern is cancer, 2) evaluate industrial hygiene and other data on potential exposures at the facility, 3) provide an expert opinion on whether or not exposures could be estimated for a study of former employees, and 4) provide recommendations for assessing exposures if a study among former employees was conducted. Selected industrial hygiene and other data were reviewed at IBM. The Battelle investigators completed their evaluation of these records and provided NIOSH with their findings, conclusions, and recommendations. NIOSH is currently completing their assessment of the feasibility of a study based on an evaluation of available records and Battelle's findings, conclusions, and recommendations.

Timeline:

NIOSH anticipates releasing the findings of their assessment of the feasibility of a study in the summer of 2006.

4.10 Community Outreach and Education

Being Performed By:
NYSDOH, ATSDR and BCHD

Project Overview:
This project will provide the community an integrated outreach and education program that focuses on issues related to the work being performed by ATSDR, NYSDOH and BCHD.

Status:
NYSDOH, ATSDR and BCHD supports the activities of the WBESC (see Section 4.8);

NYSDOH, ATSDR and BCHD will continue to participate in regular meetings with the stakeholder planning group and other community groups as appropriate. ATSDR and NYSDOH will request review and feedback from these groups on work in progress. ATSDR and NYSDOH will also attend and sponsor other public meetings and availability sessions related to the work being performed by the health and environmental agencies;

NYSDOH, ATSDR and BCHD will develop informational materials and update existing materials that provide health messages, such as in the previous NYSDOH fact sheet on soil vapor ventilation systems (released in April 2003);

To accomplish the above items, NYSDOH staff are available in the Endicott area as need arises and resources allow;

ATSDR will provide assistance to the to the NYSDOH in preparing and developing materials for the public and medical community; and

BCHD serves as the local contact for residents and a link to other agencies.

Timeline:
These activities are on-going.

5. Proposed Actions

There are no proposed actions at this time.

6. Next Steps

As needed, the NYSDOH, BCHD and ATSDR will perform evaluations of emerging exposure issues as they arise.

The NYSDOH, ATSDR and BCHD are currently seeking the community's input on the following:

- proposed actions described in this document;
- prioritization of on-going and proposed activities; and
- additional concerns not identified in this document.

7. Contact Information

Comments about this document can be made by calling Mr. Justin Deming at 1-800-458-1158 (extension 2-7880), by faxing at (518) 402–7859, or by emailing to BEEI@health.state.ny.us. Where appropriate, updated versions of the PHRP will incorporate comments received from the public.

8. Document Repository

Documents relating to the on-going projects in Endicott may be reviewed, as they become available, at the George F. Johnson Memorial Library, Village of Endicott, 1001 Park Street, Endicott, NY 13760.

Appendix A
Glossary

Adverse health effect
A change in body function or cell structure that might lead to disease or health problems.

Ambient
Surrounding (for example, ambient air).

Aquifer
An underground source of water. This water may be contained in a layer of rock, sand or gravel.

Background level
An average or expected amount of a substance or radioactive material in a specific environment, or typical amounts of substances that occur naturally in an environment.

Cancer
Any one of a group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.

Case control study
A study in which people with a disease (cases) are compared to people without the disease (controls) to see if past exposure to chemicals or other risk factors were different.

Cluster investigation
A review of an unusual number, real or perceived, of health events (for example, reports of cancer) grouped together in time and location. Cluster investigations are designed to confirm case reports; determine whether they represent an unusual disease occurrence; and, if possible, explore possible causes and contributing environmental factors.

Completed exposure pathway
[See "exposure pathway."]

Contaminant
A substance that is either present in an environment where it does not belong or is present at levels that are unusual.

Dermal
Referring to the skin. For example, dermal absorption means passing through the skin.

Dermal contact
Contact with (touching) the skin. [See "route of exposure."]

Descriptive epidemiologic study
A study of the distribution of disease frequency in human populations, often based on routinely available data and case reports.

Environmental media
Soil, water, air, biota (plants and animals), or any other parts of the environment.

Environmental media and transport mechanism
Environmental media include water, air, soil, and biota (plants and animals). Transport mechanisms move contaminants from the source to points where exposure can occur. The environmental media and transport mechanism is the second part of an exposure pathway.

EPA
United States Environmental Protection Agency.

Epidemiology
The study of the occurrence and causes of health effects in human populations. An epidemiological study often compares two groups of people who are alike except for one factor, such as exposure to a chemical or the presence of a health effect. The investigators try to determine if the factor is associated with the health effect.

Exposure
Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term (acute), of intermediate duration, or long-term (chronic).

Exposure assessment
A process that estimates the amount of a chemical that enters or comes into contact with people or animals. An exposure assessment also describes how often and for how long an exposure occurred, and the nature and size of a population exposed to a chemical.

Exposure investigation
The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to substances.

Exposure pathway
The route a substance takes from its source (where it began) to its end point (where it ends), and how people or other organisms can come into contact with (or get exposed to) it. An exposure pathway has five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating, drinking, breathing, or touching), and a receptor population (people or other organisms potentially or actually exposed). When all five parts are present, the exposure pathway is termed a "completed exposure pathway." In a "potential exposure pathway," one or more pathway elements are missing and/or are uncertain indicating that exposure to a contaminant could have occurred in the past, could be occurring, or could occur in the future.

Groundwater
Water beneath the earth's surface in the spaces between soil particles and between rock surfaces. [See “aquifer."]

Health consultation
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. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical. [Compare with "public health assessment."]

Health education
Programs designed with a community to help it know about health risks and how to reduce those risks.

Health investigation
The collection and evaluation of information about the health of community residents. This information is used to describe or count the occurrence of a disease, symptom, or clinical measure and to evaluate the possible association between the occurrence and exposure to hazardous substances.

Health statistics review
The analysis of existing health information (i.e., from death certificates, birth defects registries, and cancer registries) to determine whether there is excess disease in a specific population, geographic area, and time period. A health statistics review is a descriptive epidemiologic study.

Incidence
The number of new cases of disease in a defined population over a specific time period. [Contrast with "prevalence."]

Ingestion
Swallowing (such as eating or drinking). Chemicals in or on food, soil, drink, utensils, cigarettes, hands, etc. can be ingested. After ingestion, chemicals may be absorbed into the blood and distributed throughout the body.

Inhalation
Breathing. People or organisms can take in chemicals by breathing contaminated air.

Migration
Moving from one location to another.

Mitigation
An action intended to break a completed or potentially complete human or other organism exposure pathway.

Organic
Generally considered as originating from plants or animals, and made primarily of carbon and hydrogen. Scientists use the term organic to mean those chemical compounds which are based on carbon.

Plume
An area of chemicals moving away from its source in a long band or column. A plume, for example, can be a column of smoke from a chimney or chemicals moving with groundwater.

Point of exposure
The place where someone or an organism can come into contact with a substance present in the environment. [See "exposure pathway."]

Potential Exposure Pathway
[See "exposure pathway."]

Population
A group or number of people living within a specified area or sharing similar characteristics, such as occupation or age.

Prevalence
The number of existing disease cases in a defined population during a specific time period. [Contrast with "incidence."]

Public availability session
An informal, drop-by meeting at which community members can meet one-on-one with Agency staff members to discuss health- and site-related concerns.

Public comment period
An opportunity for the public to comment on agency findings or proposed activities contained in draft reports or documents. The public comment period is a limited time period during which comments will be accepted.

Public health action
A list of steps to protect public health.

Public health assessment (PHA)
A document that examines hazardous substances, health outcomes, and community concerns at a hazardous waste site to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health. [Compare with "health consultation."]

Public Health Response Plan
A Public Health Response Plan (PHRP) is a written plan designed to document historic, on-going, and planned public health actions being undertaken to address specific human exposure(s) to environmental contaminants.

Public health surveillance
The ongoing, systematic collection, analysis, and interpretation of health data. This activity also involves timely dissemination of the data and use for public health programs.

Public meeting
A public forum with community members for communication about a site.

Receptor population
People or an organism who could come into contact with hazardous substances. [See "exposure pathway."]

Registry
A systematic collection of information on persons exposed to a specific substance or having specific diseases. [See "exposure registry" and "disease registry."]

Route of exposure
The way in which a person or an organism may contact a substance. For example, drinking (ingestion) and bathing (skin contact) are two different routes of exposure to contaminants that may be found in water. [See “Exposure."]

Soil vapor
The air that occupies the spaces between soil particles in the ground. Also referred to as "soil gas."

Solvent
A liquid capable of dissolving or dispersing another substance (for example, acetone or mineral spirits).

Source of contamination
The place where a hazardous substance comes from, such as a landfill, waste pond, incinerator, storage tank, or drum. A source of contamination is the first part of an exposure pathway.

Stakeholder
A person, group, or community who has an interest in activities at a hazardous waste site.

Stakeholder planning group (SPG)
A planning group consists of individuals and groups from the community who work to resolve issues and problems related to environmental contamination in the community. Members work to gather, review and prioritize community health concerns, provide information on how people might have been or might now be exposed to hazardous substances, and inform agencies on ways to involve the community in activities.

Statistics
A branch of mathematics that deals with collecting, reviewing, summarizing, and interpreting data or information. Statistics are used to help evaluate whether differences between study groups are meaningful.

Substance
A chemical.

Superfund (federal and state)
The federal and state programs to investigate and clean up inactive hazardous waste sites.

Toxic Release Inventory (TRI)
An EPA database of chemical release information provided by industries that are required to report contaminant releases annually. The earliest year that TRI data is available is 1988.

Volatile
Evaporating readily at normal temperatures and pressures. The air concentration of a highly volatile chemical can increase quickly in a closed room.

Volatile organic compounds (VOCs)
An organic chemical that evaporates readily. Petroleum products such as kerosene, gasoline and mineral spirits contain VOCs. Chlorinated solvents such as those used by dry cleaners or contained in paint strippers are also VOCs. [Also see “organic” and “volatile."]

Other Glossaries and Dictionaries

Environmental Protection Agency:
http://www.epa.gov/OCEPAterms/

National Center for Environmental Health:
http://www.cdc.gov/nceh/dls/report/glossary.htm

National Library of Medicine (NIH):
http://www.nlm.nih.gov/medlineplus/dictionaries.html

Appendix B
Stakeholder Planning Group (SPG)—The Western Broome Environmental Stakeholders Coalition (WBESC)

The purpose of a Stakeholder Planning Group (SPG) is to provide a way for stakeholders to present and discuss health concerns related to the environmental contamination in the Endicott community. Stakeholders are individuals or groups from the community that are affected by decisions or actions taken by the health and environmental agencies; they have a "stake" in the decisions or actions. Stakeholders can be neighborhood residents, property owners, community organizations, business owners/operators, or special interest groups.

B.1 How the Stakeholder Planning Group was formed

The goal was to form a group that was 1) balanced, 2) representative of the concerns and interests in the community, and 3) comprised of committed individuals willing to participate in an exchange of information with the community and the health agencies.

In public meetings starting in the fall 2003, health agencies (the State Health Department, the local Broome County Health Department, and the federal Agency for Toxic Substances and Disease Registry) began soliciting interest for the stakeholder planning group. During presentations and at other opportunities, participants were encouraged to submit their own names or nominate individuals who might be interested in the group. After months of recruitment, we had 20+ names. With the overall goal being to form a balanced, representative and committed group, we thought it would be helpful to learn more about all the nominees. The health agencies contacted everyone and said we were interested in hearing more about their ideas for the planning group and the community.

Everyone was very gracious and took the time to speak with us. We talked to 23 individuals and enjoyed the range of ideas shared as well as the enthusiasm to participate in the group. We listened to how people characterized their perspectives and were delighted to realize that the group, as a whole, was balanced and quite representative of community interests. The health agencies, therefore, invited all 23 people to become members of the group. Members listed their perspectives as current resident, former resident, members of the Resident Action Group of Endicott (RAGE), members of the Citizens Acting to Restore Endicott's Environment (CARE) group, clergy, retired IBM worker, current IBM worker, science/technology, university, environmentalist, human services, property owner, local official, local business, medical, and parent.

The initial set of community health concerns related to environmental contamination and the actions proposed by government were outlined in the January 5, 2004, draft of the Public Health Response Plan (PHRP). The document authors are the same agencies who participated in creating the SPG – the State Health Department, the Broome County Health Department and the federal Agency for Toxic Substances and Disease Registry. The agencies thought it was important to take the first steps to create a group to support the issues raised in the PHRP.

B.2 Evolution of the SPG into the Western Broome Environmental Stakeholders Coalition

As the SPG elected a permanent chair, the group also chose to evolve in focus. Changing their name to the Western Broome Environmental Stakeholders Coalition (WBESC), the group expanded their focus to include environmental sites of interest throughout Broome County.

The WBESC is the community's group, not the agencies' group. Although the agencies initiated the group, they are not members and they do not run the meetings. The agencies attend meetings at the request of the group.

B.3 The WBESC and the Public Health Response Plan

WBESC members provide input on PHRP-related issues such as the following:

- Current outdoor air conditions
- Historic outdoor air conditions
- Health statistics review – cancer and birth outcome analysis
- Health consultation – public health implications of exposures to low-level volatile organic compounds in public drinking water
- Community outreach and education

The WBESC helps the community and the agencies identify and prioritize concerns and the best ways to address those concerns. WBESC members, as representatives of the broader community, help identify ways to enhance community involvement.

The WBESC does not set policy or make decisions regarding the design and implementation of PHRP actions. The WBESC does guide the progress and content of the PHRP. The WBESC does help the agencies understand community concerns more effectively so that the agencies can make better decisions. The WBESC serves as the key vehicle for information exchange between members of the community and government agencies.

B.4 WBESC Members

Chair: Wanda Hudak, email: SPGWHUDAK@aol.com
Secretary: Frank Roma

- Blaine, Edward
- Davis, Susan
- Hudak, Wanda
- Jaros, Mark
- Lauffer, Scott
- Little, James
- Roma, Frank
- Sieczkov, Ann Marie
- White, Rick

Appendix C
Overview of Completed Health Studies

This section describes the health studies that have been completed in the Endicott area. Copies of these studies can be obtained by calling Karolina Schabses, of the NYSDOH, at 1-800-458-1158 (extension 2-7950). Documents are also available for public review at the George F. Johnson Memorial Library, Village of Endicott, 1001 Park Street, Endicott, NY 13760.

C.1 "Cancer Occurrence by Common Drinking Water Source, Broome County, New York, 1976 – 1980."

Performed by: NYSDOH and BCHD

Time Period Examined: 1976 – 1980

Study Area:
Multiple areas served by specific water supplies within Broome County, New York. The area served by Endicott drinking water wells was a specific sub-area.

Released: 1986

Purpose:
To evaluate cancer incidence in areas served by water supplies within Broome County where volatile organic compounds were detected at concentrations greater than historic NYSDOH drinking water standards. The municipal wells of these public drinking water supplies were tested for VOCs in 1979 as part of a statewide effort. Water supplies containing elevated concentrations of VOCs were either treated or taken out of service.

Overall Findings:
No consistent patterns of elevated or decreased levels of cancer occurrence were found. Some types of cancer were statistically significantly elevated for only males or only females in some of the study areas.

Endicott-specific Findings:
Statistically significant excesses of all cancers combined for males, leukemia among males, and lung cancer among females were found in the Endicott study area.

Follow-up Study:
"Cancer Occurrence by Common Drinking Water Source, Broome County, New York, 1981 – 1990"

C.2 "Childhood Leukemia in the Town of Union, Broome County, New York 1993-1994."

Performed by: NYSDOH

Time Period Examined: 1993 – 1994

Study Area:
Town of Union, Broome County, New York

Released: 1995

Purpose:
To investigate reports of an unusual number of leukemia diagnoses among children residing in the study area.

Overall Findings:
The investigation confirmed that a total of seven cases of children under the age of 15 were diagnosed with leukemia in 1993 and 1994 in the Town of Union. This was a significantly greater number than the approximately one case expected in a town of this size in two years. Interviews with parents were conducted and possible contributing factors, both environmental and individual, were examined in depth.

No information was found that suggested a common exposure to an environmental or physical agent as a cause for the childhood leukemia elevation. All of the children who developed leukemia were born after the early 1980s, after the treatment or closure of municipal wells that exceeded drinking water standards. None of the children attended the same school, pre-school, or day care. The children's residences were not clustered in any one area of the Town of Union. None of the environmental factors reviewed increased in the late 1980s or early 1990s such that a sudden increase in childhood leukemia in 1993-1994 would occur.

Follow-up Study:
On-going Cancer Surveillance program

C.3 "Toxic Release Inventory (TRI) Evaluation, Endicott Village Wellfield (a.k.a. Ranney Well) site, Broome County, New York."

Performed By: NYSDOH, with funds from and oversight by ATSDR

Time Period Examined: 1988 – 1990

Study Area:

Two and a half-mile radius around the area served by the Endicott Village Municipal Water Service Area during the years 1988 through 1993.

Released: 1996

Purpose:

This health consultation evaluates the public health significance of air emissions from TRI reporting facilities within and near the Endicott public water supply service area. The NYSDOH evaluated these air emissions data for the years 1988 – 1993, using a refined screening model.

Overall Findings:

Estimated ambient air levels for methylene chloride and tetrachloroethene from the IBM Corporation (Systems Manufacturing Division) in 1988 were the only modeled results that exceeded the screening level and the public health comparison values. These estimated air levels exceeded the cancer risk comparison values at distance of up to 2.5 and .38 miles, respectively, from the center of this facility. TRI emissions data for methylene chloride and tetrachloroethene are not available for year prior to 1988 and, therefore, any increased cancer risk from past exposure to these chemicals can not be determined. Since 1988, the IBM Corporation (Systems Manufacturing Division) reported significant decreases in air emissions of methylene chloride and tetrachloroethene. Therefore, based on an evaluation of current TRI data, the NYSDOH estimates that neither methylene chloride nor tetrachloroethene are a source of significant increase health risk.

C.4 "Cancer Occurrence by Common Drinking Water Source, Broome County, New York, 1981-1990."

Performed by: NYSDOH, with funds from and oversight by ATDSR

Time Period Examined: 1981 – 1990

Study Area:

Multiple areas served by specific water supplies within Broome County, New York. The area served by Endicott drinking water wells was a specific sub-area.

Released: 1999

Purpose:

To evaluate cancer incidence in areas served by water supplies within Broome County for the period 1981-1990, where volatile organic compounds were detected at concentrations greater than historic NYSDOH drinking water standards. The municipal wells of these public drinking water supplies were tested for VOCs in 1979 as part of a statewide effort. Water supplies containing elevated concentrations of VOCs were either treated or taken out of service.

Overall Findings:

No consistent patterns of elevated or decreased levels of cancer occurrence were found. Some types of cancer were statistically significantly elevated for only males or only females in some of the study areas.

Endicott-specific Findings:

No significant excess or deficit of any type of cancer among males or females was found in the Endicott study area. The observed number of cases of leukemia in Endicott was somewhat higher than expected for males and females during 1981-1990, but not significantly so. The number of cases of leukemia occurring among children was examined separately in the Endicott study area and no excess was observed.

Follow-up Study:

Due to the suggestion of an elevation of leukemia in the Endicott study area, a follow-up study of leukemia among males 65 and older diagnosed with cancer from 1981 to 1990 and residing in the Town of Union at the time of diagnosis is being conducted by the NYSDOH.

C.5 Health Study: "Leukemia Incidence among Workers in the Boot and Shoe Manufacturing Industry in the Town of Union, Broome County."

Performed by: NYSDOH

Time Period Examined: 1981- 1990

Study Area:
Town of Union, Broome County, New York

Released: August 2004

Purpose:
This health study is a follow-up study of leukemia among males 65 and older diagnosed with cancer from 1981 to 1990 and residing in the Town of Union at the time of diagnosis. The focus of this study was to investigate whether men diagnosed with leukemia were more likely to have worked at the Endicott Johnson boot and shoe manufacturer.

Overall Findings:

The results suggest an association between leukemia and working at Endicott Johnson. Overall, the men whose death certificates indicated that they had worked at Endicott Johnson had a higher risk of developing leukemia than those who did not. In addition, the risk of acute myeloid leukemia was slightly higher among former Endicott Johnson workers. These suggested associations are consistent with other studies that investigated leukemia and employment in the boot and shoe manufacturing industry. However, this study does not provide enough evidence to rule out the possibility that the results were due to chance. One way to determine whether these higher risks are significant is to conduct statistical tests. When researchers performed these tests, the elevated risks were not statistically significant. However, this does not mean that there is not an association between leukemia and employment at Endicott Johnson; it means that the tests were unable to show a statistical association.

A fact sheet detailing the summary of findings is available on the NYSDOH website at: http://www.health.state.ny.us/nysdoh/environ/broome/ej_workers.htm. The full report is published online at the journal Environmental Health: http://www.ehjournal.net/content/3/1/7

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Appendix D
Overview of Completed Environmental Investigations

This section describes the environmental investigations that have been completed in the Endicott area. Information pertaining to many of these investigations is available for public review at the George F. Johnson Memorial Library, Village of Endicott, 1001 Park Street, Endicott, NY 13760.

D.1 IBM Endicott Site — Supplemental Groundwater Assessment (SGA) and Remediation

Performed by:
IBM Corporation, with NYSDEC, NYSDOH and BCHD oversight

Finalized:
October 2004, Report: Supplemental Groundwater Assessment (SGA) Final Report. Available in the document repository

Purpose:
The supplemental groundwater assessment was implemented to identify additional corrective actions that could be taken at this site to accelerate groundwater remediation.

Overall Findings:
The final SGA report recommended additional corrective measures be implemented for the following components of the overall remediation: source control in the vicinity of the railroad, flux control at North Street, and plume reduction south of North Street. Maximizing the extraction rates and evaluating the use of vacuum assist were recommended as the preferred corrective measure for source control in the vicinity of the railroad. The same corrective measure was recommended for controlling contaminant flux at North Street, with the possible addition of a reactive barrier and the use of in-situ chemical oxidation. Groundwater extraction and treatment coupled with the injection of clean water was recommended for reducing the contaminant plume south of North Street. The corrective measures that were recommended in the SGA are being developed and implemented under the Groundwater Corrective Action Program (see Section 4.1).

D.2 IBM Endicott Site — Groundwater Vapor Project (GVP)

Being Performed by:

IBM Corporation, with NYSDEC, NYSDOH and BCHD oversight

Finalized:

December 2005, Report: Summary Report Groundwater Vapor Project. Available in the document repository

Purpose:

The purpose of the Groundwater Vapor Project (GVP), which began in December 2002, was to define the nature and extent of soil vapor contamination, design and install ventilation systems, and to implement a soil vapor monitoring program that would ensure that the mitigation systems remain protective of public health in the future.

Overall Findings:

The GVP investigated soil vapor intrusion resulting from the IBM plume in the Village of Endicott and the Town of Union. Based on that investigation, areas of ventilation were established and appropriate measures were taken to reduce exposures where necessary. In addition to mitigating exposures, the GVP established a monitoring system that will ensure that the boundaries of ventilation remain protective should conditions in the subsurface change over time.

D.3 IBM Endicott Site — On-site Soil Vapor Intrusion

Performed by:
NYSDEC, in consultation with the NYSDOH and BCHD

Finalized:
September 2005 Report: Preliminary Site Assessment Report. Available in document repository.

Purpose:
The purpose of this investigation was to evaluate the potential for exposures to volatile organic compounds (VOCs) via soil vapor intrusion into on-site structures. Indoor air, subslab and outdoor air samples were collected from across the Huron campus.

Overall Findings:
The results of the investigation were interpreted and transmitted to the owners and tenants of the Huron Campus in September 2005. Overall, no immediate health concerns were identified. However, the soil vapor data generated by this investigation support the necessity of continuing IBM's on-going on-site investigation. The purpose of IBM's investigation is to characterize the nature and extent of subsurface contamination on the Huron Campus and to evaluate the feasibility of expanding remedial actions.

The NYSDEC and NYSDOH will continue to work with IBM to identify source areas and enhance existing remedial measures to reduce potential exposures to soil vapor contamination (see Section 4.1).

D.4 Old Village Dump (OVD) Investigation

Performed by:

NYSDEC in consultation with NYSDOH and BCHD

Finalized:

June 2005, Report: Final Investigation Report Old Village Dump, Jennie Snapp School, and Tannery Sewer NYSDEC Area Wide Study. Available in the document repository

Purpose:

The goal of the Old Village Dump (OVD) Investigation was to assess the soil vapor, indoor air, soil and groundwater quality in and around the OVD, Tannery Sewer and Jennie F. Snapp school. The purpose of this investigation was to determine if materials within the OVD or the Tannery Sewer could represent contributory sources to low-level groundwater quality impacts observed in the Village Supply wells (South Street Well Field).

Overall Findings:

The OVD does not appear to be a continuing source of vapor phase contamination because adsorbed or dissolved impacts were not observed in soil or groundwater samples. Also, neither the OVD nor the Tannery Sewer appears to be the source of low-level groundwater quality impacts observed in the South Street Well Field. Additional sampling will be conducted in the future to ensure these are valid conclusions.

Appendix E
Overview of Completed Outreach Activities

This section describes the various outreach activities already completed in the Endicott area.

E.1 Health Care Provider Outreach

Performed by: NYSDOH, ATSDR and BCHD

Project Overview:

These actions provided the local medical community with information and solicited their input regarding the cancer investigation and other work being performed by the health agencies.

Completed Activities:

- NYSDOH met with Broome County Health Officials to solicit input regarding available listings of health maintenance organizations and targeted health care providers in November 2003. In addition, a mailing to 10 key area physicians was completed in January 2004, introducing them to the PHRP and soliciting their comments.

- NYSDOH and BCHD obtained a mailing list of selected medical specialists from the area surrounding and including Endicott in December 2003.

- NYSDOH mailed selected educational materials to around 400 local healthcare providers in May 2004. ATSDR supplied some of the materials for this mailing. As an incentive for providers to read the materials, a notice of the availability of free continuing education credits was included.

- NYSDOH and BCHD met with selected local physicians in May 2004 to demonstrate the available educational materials used for a large mailing to local area providers. The ATSDR Case Study in Environmental Medicine on TCE is one example of such materials. Physician input has been solicited regarding work being done by the health agencies.

- NYSDOH and BCHD attended local and countywide meetings of health care professionals to continue distributing educational materials throughout 2004. The first meeting was in the summer of 2004.

- NYSDOH and BCHD identified nursing groups, medical and nursing schools, residency programs and medical libraries and has provided them with the appropriate ATSDR Case Studies in Environmental Medicine and other selected materials during 2004.

- NYSDOH mailed information sheets on the Health Statistics Review: Cancer and Birth Outcome Analyses and a list of local resources for perinatal and cancer public health information to about 400 local health care providers in September 2005.

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Appendix F
Overview of Other Completed Activities

F.1 Occupational Exposure Investigation at the Endicott Interconnect Facility

Performed By: The National Institute for Occupational Safety and Health (NIOSH)

Project Overview:

In response to an employee request, the NIOSH Health Hazard Evaluation Program investigated current occupational exposures at Endicott Interconnect Technologies. The purpose of the investigation was to identify work areas and current manufacturing operations where employees could be exposed to hazardous substances; and, if indicated, conduct exposure monitoring to assess the extent of current occupational exposures. This investigation did not assess historical workplace exposures, specific health outcomes, or solvent exposures due to environmental contamination.

Findings:

An industrial hygienist from the Health Hazard Evaluation Program conducted a site visit on April 27-29, 2004, which determined that sufficient engineering and administrative controls were used for controlling occupational exposures in areas evaluated during the walk-through. Endicott Interconnect Technologies provided air sampling data, which indicates that employee exposures to airborne contaminants are well below all occupational exposure limits used by NIOSH. Although the investigation concluded that further evaluation by NIOSH was not needed, recommendations were made for increasing the extent of employee involvement in the occupational safety and health program. The final report was issued on May 20, 2004.