

Letter Health Consultation

BIANCHI-WEISS GREENHOUSE STATE SUPERFUND SITE

EAST PATCHOGUE, SUFFOLK COUNTY, NEW YORK

**Prepared by
New York State Department of Health**

OCTOBER 9, 2012

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

Health Consultation: A Note of Explanation

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

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

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LETTER HEALTH CONSULTATION

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EAST PATCHOGUE, SUFFOLK COUNTY, NEW YORK

Prepared By:

New York State Department of Health
Under a cooperative agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

NEW YORK
state department of
HEALTH

Nirav R. Shah, M.D., M.P.H.
Commissioner

Sue Kelly
Executive Deputy Commissioner

October 2, 2012

Mr. Peter Ross
573 South Country Road
East Patchogue, NY 11772

Dear Mr. Ross:

As the New York State Department of Health's (DOH) project manager, I am providing you with a Letter Health Consultation summarizing our evaluation of potential exposures associated with the Bianchi-Weiss Greenhouse State Superfund site in East Patchogue, Suffolk County. This site (Registry #152209) is currently under investigation by the New York State Department of Environmental Conservation (DEC).

In September 2006, you contacted the Agency for Toxic Substances and Disease Registry (ATSDR) about potential health effects of exposures to site-related contaminants in the community around the site. The DOH acts as the lead agency in responding to health-based concerns that arise on environmental sites in New York State, through a cooperative agreement with the ATSDR. In September 2009, the DOH provided you with a Letter Health Consultation (LHC) that summarized the sampling data and exposure pathway information available at that time and concluded that the data were insufficient to address your concerns about exposures to the community at that time. The September 2009 LHC determined there were three main data gaps for evaluating your health concerns: off-site surface soil data were incomplete, shallow groundwater results were not available and private well use information was incomplete. This LHC, as well as the prior correspondence, responds to the September 2006 ATSDR petition and is being performed under the cooperative agreement between ATSDR and DOH.

Between 2008 and 2010, the DEC collected soil, sediment, surface water and groundwater samples from both on-site and off-site as part of a State Superfund remedial investigation. The DOH evaluated both the data collected under the State Superfund program and data collected by the Suffolk County Department of Health Services (SCDHS).

Your Property:

In May 2010, the DOH provided you with an update letter explaining that additional data were being collected as part of the site investigation. These additional data included soil and groundwater samples collected on your property in March 2010. In January 2011, the DOH provided you with a letter evaluating the potential for exposure based on the results of the soil and water tests. The soil data collected on

your property did not contain the site-related pesticide chlordane, although the water sample collected from groundwater that infiltrated the basement did, but below the two micrograms per liter public drinking water standard for chlordane. Based on these data, exposures to site-related contamination at levels of health concern were not likely.

All Properties:

Of ten residential properties sampled, only one property had pesticides detected above residential soil cleanup objectives (SCOs, which are contaminant-specific remedial action objectives for soil based on a site's current, intended or anticipated future use; they are further defined in the attached report). This property is immediately adjacent to the Bianchi-Weiss Greenhouses site's southern property boundary. As the residential SCOs are based on vegetable consumption (among other pathways), if residents on this property choose to grow vegetables before the property is remediated, by following healthy gardening practices such as peeling any vegetables that grow in or on the ground or washing outer surfaces where dirt particles can adhere, they can reduce the potential for residual contaminant ingestion. A copy of the Healthy Gardening brochure was provided to the homeowner with the DOH's results evaluation letter. Currently, grass covers the impacted soil, serving to limit direct contact soil exposures.

DOH and ATSDR conclude that incidental ingestion of, and/or direct contact with soil containing site-related pesticides in residential yards near the Bianchi-Weiss Greenhouses site is not expected to harm people's health. We recommend the one residential property with surface soil contamination above residential SCOs be remediated to the unrestricted SCO for chlordane, which would significantly reduce this potential exposure and also allow for such things as raising chickens for food. The estimated risks for adverse health effects for the one yard are minimal to low.

Groundwater monitoring wells were installed and sampled to determine the extent of the site-related groundwater plume. Since groundwater is shallow in this area of East Patchogue, the water table can rise into basements during periods of inclement weather. Concern for exposure from flooded basements and/or temporary ponds is limited to where the shallow groundwater is impacted. In addition, this is a temporary condition, further limiting potential for exposure. As chlordane was detected in the groundwater above drinking water standards, soil vapor intrusion (SVI) was evaluated as a potential exposure concern. Groundwater samples were filtered and analyzed, and did not contain any detectable chlordane. Therefore, as the chlordane was found to be primarily adhered onto microscopic clay particles (colloids) and not dissolved in the groundwater where it could potentially volatilize, SVI is not considered to present an exposure route for site-related chlordane.

DOH and ATSDR conclude that contact with chlordane-contaminated groundwater, which occasionally infiltrates into area basements or creates a temporary surface pond, is not expected to harm people's health. This is because levels of chlordane in this water are below levels of concern for incidental ingestion/direct contact exposures, which are expected to be limited. The approved Record of Decision (ROD) remedial plan is to offer basement foundation sealing and/or

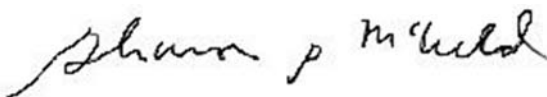
sewer upgrades (with filters) to property owners of impacted properties along the shallow groundwater plume. This action is intended to reduce the occurrence of groundwater rising into basements and to eliminate the discharge of chlordane above groundwater standards and reduce any potential exposures to chlordane-contaminated groundwater.

DOH and ATSDR conclude that drinking water from private wells downgradient of the site is not expected to harm people's health. This is because private well sampling did not find levels of chlordane above drinking water standards and the approved ROD remedial action plan proposes to monitor private wells and offer public water supply connections to homeowners near and/or within the plume if chlordane is detected at one microgram per liter (half the public drinking water standard). A private water well survey was conducted by the DEC and SCDHS to determine if the groundwater was being used by area residents as a source of potable water. Identified potable water wells were sampled and results evaluated. The DOH and SCDHS recommend that homeowners connect to public water systems wherever public water mains are available and disconnect their private wells from their household system to eliminate potential exposures from using well water. Public water systems are routinely monitored for a variety of compounds, thus if contamination is present in the groundwater, it is treated prior to consumption.

The attached report - **Evaluating Public Health Exposures Associated With The Bianchi-Weiss Greenhouse State Superfund Site** - provides you with more details on activities conducted to evaluate if site conditions present an exposure concern for the surrounding community.

The DOH will continue to coordinate with ATSDR, SCDHS and the appropriate environmental agencies in implementing the recommendations in this health consultation. If you have any questions regarding this health assessment, please contact the DOH's principal investigator for ATSDR, Mr. Don Miles at (518) 402-7880. Site-related health questions can be directed to me at the same number. If you wish to stay informed of the ongoing State Superfund process, please refer to the DEC website at <http://www.dec.ny.gov/chemical/34189.html>. The DOH website at www.nyhealth.gov may also serve as a source of additional information for health-related concerns.

Sincerely,



Sharon P. McLelland
Public Health Specialist
Bureau of Environmental Exposure Investigation

ec: D. Miles – DOH
G. Ulirsch, Ph.D./L. Graziano - ATSDR
D. Feldman/R. Paulsen/ A. Juchatz - SCDHS
W. Parish – DEC, Region 1
cc: Town of Brookhaven

Evaluating Public Health Exposures Associated With The Bianchi-Weiss Greenhouse State Superfund Site

As requested by an adjacent property owner to the Bianchi-Weiss Greenhouses State Superfund site, the New York State Department of Health (DOH), in conjunction with the Agency for Toxic Substances and Disease Registry (ATSDR), evaluated the potential for community residents to be exposed to contamination associated with the Bianchi-Weiss Greenhouses site. The DOH evaluated the site data and presents this assessment.

Site Background

The Bianchi/Weiss Greenhouses site is located at 25 Orchard Road in East Patchogue, Suffolk County. The site is fenced along the perimeter, separating the site from the adjacent residential properties. Woods are located in the northern portion of the site. The site covers approximately 14 acres and is presently zoned for residential use.

The property was used as a nursery for commercial growing purposes from 1929 to 2005. Site operations were initially performed by the Bianchi family and Bianchi Orchards until 1992 when the property was purchased by several members of the Weiss family and Kirk Weiss Greenhouses. The current owner demolished the buildings on the site as part of the redevelopment of the property. During the site demolition, concerned neighbors contacted local officials about potential health concerns. In March 2005, the current owner conducted initial soil sampling activities at the site and in April 2006, the Suffolk County Department of Health Services (SCDHS) collected groundwater samples in the vicinity of the site. In December 2006, the site was included on the Registry of Inactive Hazardous Waste Disposal Sites. Remedial investigation and feasibility study activities have been performed under the State Superfund Program.

In July 2011, a final Remedial Investigation (RI) report that provided a summary of the remedial data collected was submitted to the state agencies. The RI provided the data needed by the Department to evaluate the potential for exposures to the community and complete the Letter Health Consultation that you requested in 2006. A Feasibility Study (FS) was submitted in August 2011. A Proposed Remedial Action Plan (PRAP) was prepared and a Fact Sheet was mailed in October 2011 that identified the preferred remedy to be discussed at the upcoming public meeting and notified the community about the public comment period. The public comment period extended from November 1, 2011 to December 16, 2011. A public meeting was held on November 14, 2011 at the South Country Library in Bellport. Based on community requests, the South Country Library was added as a document repository in November 2011. All final reports were provided to the new document repository so that the community had access to site reports in both local repository locations. A public availability session was held on December 8, 2011 to allow the community an additional

Soil Cleanup Objectives

New York State (NYS) soil cleanup objectives (SCOs) are contaminant-specific remedial action objectives for soil based on a site's current, intended or reasonably anticipated future use. In developing the SCOs, DEC and DOH considered many factors including multiple human exposure pathways (soil ingestion, dermal contact, inhalation, home-produced animal product consumption, homegrown vegetable consumption). Also considered are short-term and long-term exposures, protection of ecological resources, ground-water protection and the typical background levels of chemicals present in rural soils. Soil clean-up objectives have been developed for several land use categories, including industrial, commercial, residential and unrestricted. Only residential and unrestricted SCOs were considered for this site. Residential SCOs include soil ingestion, dermal contact, inhalation and homegrown vegetable consumption. Unrestricted SCOs also are based upon these exposures and also include exposures from consumption of home-produced animal products. The SCOs represent soil concentrations of soil contaminants that are un-likely to cause health effects based on the exposure assumptions for a particular land use.

Drinking Water Standard

Total chlordane has a public drinking water standard of 2.0 micrograms per liter ($\mu\text{g/L}$).

opportunity to discuss their concerns about the site with the State agencies. A Record of Decision (ROD) was issued in January 2012, following the end of the public comment period, which finalized the remedial plan and includes the state agencies' responses to comments submitted by the community regarding the PRAP. This Letter Health Consultation (LHC) has been prepared based upon information that was gathered during the RI phase and at the PRAP meetings.

Environmental Sampling and Contamination

The following environmental data were collected after the September 2009 LHC was issued. These data provide additional information in evaluating if human exposures exist from site-related contamination.

Off-site Soil Sampling:

Seventeen surface and two subsurface soil samples were collected on ten produce gardens on properties surrounding the site in March and August 2010. The surface soil samples were collected from areas where surface water run-off from the site could have deposited site-related contamination. When gardens were noted to border the site in areas that may have been affected by surficial run-off, soil samples were collected from these areas. The samples were analyzed for pesticides and metals. None of the soil samples contained metals above residential Soil Cleanup Objectives (SCOs; see sidebar). Pesticides were detected above residential SCOs in only one of the ten properties sampled (DEC 2006b, 2010). This property is immediately down-gradient and adjacent to the site's southern property boundary. Chlordane, a site-related contaminant, consists of many isomers and is reported as "total chlordane" or by the predominant isomers, *alpha*-chlordane or *gamma*-chlordane. SCOs have been established for *alpha*-chlordane and for *gamma*-chlordane. Please see the attached Table 1 for a summary of the sampling results for on-site and off-site surface (0-2 inch) soil.

Groundwater Sampling:

Near and on the site, the water table is very shallow and can rise above the ground surface during seasonally wet periods. Groundwater is reported to infiltrate into basements and/or create temporary surface water ponds. In March 2010, two properties immediately adjacent to the site were sampled to determine if the rising groundwater table presented a dermal contact/incidental ingestion exposure concern to residents.

Water samples were collected from two properties: one from a basement where groundwater had infiltrated, and another from a sump effluent pipe as it discharged into the yard. Water samples were also collected from two temporary ponds that formed where the rising water table breached low-lying areas. All water samples, including two on-site surface water temporary ponds, were analyzed for pesticides. One of the two surface water ponds and the basement water and sump water samples contained total chlordane, a site-related pesticide, at levels at or near the public drinking water standard of 2 micrograms per liter ($\mu\text{g/L}$) with a maximum concentration of 6.1 $\mu\text{g/L}$ in the sump effluent sample. Although the results were compared to drinking water standards, the water in the basement or sumps is not being used as a source of drinking water. Please see the attached Table 2 for a comparison of the on-site and off-site sampling data for site-related contaminants of concern in water samples taken from standing water.

Several groundwater samples were collected both on-site and off-site to evaluate the shallow groundwater plume at the upper water table. An on-site temporary monitoring well point was installed and sampled in June 2009. Three off-site hydropunch (a technique for collecting groundwater samples using temporary wells) samples were also collected. These temporary well points provided additional data on the upper groundwater table contamination: Two of the four well points contained total chlordane above public drinking water standards. The well point furthest to the south contained chlordane at low levels, below drinking water standards, and the well point furthest to the southeast did not contain chlordane at the method detection limit. These well points define the limited area where the upper water table is impacted. Please see the attached Table 3 for a comparison of the sampling data for on-site and off-site groundwater site-related contaminants of concern.

Private Wells:

Properties surrounding and downgradient of the site were evaluated for public water connections with the Suffolk County Water Authority. The November 2008 Remedial Investigation Fact Sheet for the site requested community input on private wells in the area. Up to 13 wells were identified in the general area (see attached Figure 1) that may or may not still exist as the property's potable water supply. Based on the Suffolk County Water Authority data, the owners of six properties with wells near the groundwater plume were contacted by the DEC to determine if they still used a potable well and if the State could collect a sample. The remaining seven properties were located beyond the area of contamination-from the contaminant plume; therefore, it was determined that sampling of the wells on these properties was not warranted at this time. A DEC employee discussed drinking water usage with the occupants of the six properties. Based on these discussions, the DEC determined that three properties were already connected to public water, one property no longer had an active well, and the two homeowners using private water wells would allow the DEC to collect samples as part of the remedial investigation of the site. The two properties with private wells are also sampled periodically by the Suffolk County Department of Health Services (SCDHS) and were verified as not having public water connections. To date, no site-related contaminants of concern have been detected in the private water wells above New York State public drinking water standards. The drinking water standards are used as guidelines for evaluating private well contamination.

Exposure Assessment (Exposure Pathways)

Soil:

DOH compared the levels of pesticides in 19 off-site soil samples, including 17 surface and two subsurface soil samples collected on ten properties surrounding the site, to SCOs (DEC 2006b, Table 375-6.8(a) and (b)) and Supplemental SCOs (DEC 2010, Table 1). Surface soils were collected from within produce gardens, when present, or from areas where site run-off may have affected the adjacent residential property. Soil samples were collected from the upper two inches of soil, and subsurface soils were collected from a depth of 6 to 8 inches below ground surface.

We used the SCOs for the “residential” land use category for our comparisons here because we believe the most likely uses of the property in the future are for single family homes. However, we also compared one of the off-site home’s soil results to the “unrestricted” SCOs because poultry are being raised on the property. The unrestricted use soil cleanup objectives represent the cleanup level that will allow the site to be used for any purpose without any use restrictions.

Ten residences share property boundaries with the Bianchi-Weiss Greenhouse site, and all had surface soils sampled for site-related contamination during the remedial investigation. Nine of these properties adjacent to the site did not contain chlordane in surface soils at levels above residential SCOs. However, soils from one residential property contained chlordane and other non site-related pesticides (dieldrin, DDT and heptachlor epoxide). The maximum concentrations detected in these off-site surface soil samples from the one impacted property are presented in Table 1 and are compared to pesticide concentrations detected in on-site soils.

The pesticides dieldrin, DDT, DDD, DDE and heptachlor epoxide were not considered site-related because they were either not detected on-site or were detected at lower levels on-site than were found in off-site soils. The affected residential property had been owned by the family that also operated the greenhouse property. It is possible that site-related pesticide use may have occurred at this location, however chlordane was commonly used on residential properties as an insecticide before it was banned in the 1980s. The DOH provided the property owner with a letter evaluating the data results which stated that the soil levels were above Residential SCOs and recommended a vegetable garden not be planted using these soils, but to consider instead using a raised bed or container garden and to follow Healthy Gardening practices (a copy of the DOH brochure was also provided).

The surface soil could present a potential pathway for incidental ingestion and dermal exposure to soil until remediation occurs. Currently, vegetation covers the off-site residential soil areas sampled and mulch and/or vegetation covers the on-site surface soil. Fencing restricts access to the Bianchi-Weiss Greenhouse site. These barriers serve to limit adult and children’s direct contact and exposure to the contaminated soils. The one residential property where site-related contaminants were detected above SCOs is not currently used for gardening or for raising livestock for home-consumption of animal products (i.e. meat, milk, or eggs). Based on the levels of

pesticides detected in the soil at this one property, acute health effects are unlikely, even with soil eating (pica) behavior and assuming the pica child ingests 10 grams of soil per ingestion event, using DOH guidelines for pica behavior ingestion rates.

Since one of the ten properties sampled is used to raise poultry, the soil data collected at this property was also compared to unrestricted SCOs. The surface soil samples collected from this property included a sediment sample from the edge of a temporary pond. Pesticides could be higher in the soils at the temporary ponds where the groundwater rises above the land surface during wet periods, as the chlordane-bound colloidal particles in the groundwater plume may adsorb onto the organic matter in the surface soils. Surface soil samples did not exceed the applicable unrestricted levels at the property where the poultry are being raised. Recently, the poultry have been caged which prevents them from accessing adjacent properties where soil contamination exists. Access to the Bianchi-Weiss Greenhouses site has been restricted by the fence that surrounds the entire boundary.

Water:

Chlordane was detected in on-site and off-site groundwater monitoring wells above the 2 µg/L NYS public drinking water standard, which can be used as a guideline for private wells. None of the sampled private wells to the west and southwest of the site contained chlordane above public drinking water standards.

Currently, the groundwater contaminant plume extends 2,900 feet from the site boundary. Figure 1 shows the contaminated groundwater plume, with the outer line representing the extent of chlordane concentrations above the public drinking water standard of 2 µg/L. The plume is shallow (at the water table) near the site, and sinks to approximately 50 feet below grade near Abets Creek. One private water well southwest of the site contained chlordane above the groundwater standard, but below the drinking water standard. Groundwater monitoring wells between this location and the site have not contained chlordane.

Groundwater that occasionally rises and infiltrates into basements of properties located above the shallow portion of the groundwater plume could present a direct contact/incidental ingestion exposure pathway to area residents. A water sample collected from a basement sump discharge pipe contained chlordane at a concentration of 6.1 µg/l, which is above public drinking water standards. The sump effluent is discharged directly to the residential yard. A water sample was also collected from a flooded residential basement on another property, which detected chlordane just below the drinking water standard. This basement water is also discharged into the yard, creating a temporary pond during high water table periods. Chlordane is not believed to present a soil vapor intrusion exposure concern as the chlordane is bound to colloidal particles and is not in a dissolved state in the groundwater. Chlordane has not been detected in filtered water samples.

In light of the available data and the relative infrequency of the flooding events, any dermal or incidental ingestion exposures to chlordane in the standing water of basements or in yards is expected to be at low levels and of minimal duration and

frequency. Thus, this is not considered a significant exposure pathway, and is not further evaluated on a quantitative basis.

Public Health Implications

Surface soil samples were taken at ten properties adjacent to the Bianchi-Weiss Greenhouses site and only one had levels of pesticides (*alpha*-chlordane, *gamma*-chlordane, dieldrin, heptachlor epoxide and DDT) that exceed the residential SCOs. Of those pesticides detected, only *alpha*-, and *gamma*-chlordane are considered site-related chemicals. This one property was the only off-site residential property evaluated further.

Chlordane, dieldrin, heptachlor epoxide, and DDT cause cancer in laboratory animals exposed to high levels for their lifetimes (ATSDR 1994; 2002a, b; 2007). Whether these chemicals cause cancer in humans is unknown. However, chemicals that cause cancer in laboratory animals may increase the risk of cancer in humans exposed to lower levels over long periods of time. Chlordane, dieldrin, heptachlor epoxide, and DDT can also cause noncancer health effects in animals or humans at high exposure levels, primarily to the nervous system and liver (ATSDR 1994; 2002a,b; 2007). The estimated cancer risks for long-term exposure to each of the pesticides at the one property where they were detected above their residential SCO are presented in the following table. The estimated noncancer risk for heptachlor epoxide is low, and is minimal for the remaining pesticides (see Appendix 1).¹

Table 4 - Estimated Theoretical Cancer Risks for Pesticides Detected in Surface Soil Above Residential SCOs at One Property Downgradient from the Bianchi-Weiss Greenhouses Site

Pesticide	Level Detected in Surface Soil (mg/kg)	Estimated Cancer Risk^a	Qualitative Descriptor for Cancer Risk^b
<i>alpha</i> -chlordane	3.3	3 in 1,000,000	low
<i>gamma</i> -chlordane	1.3	1 in 1,000,000	low
dieldrin	0.29	7 in 1,000,000	low
heptachlor epoxide	1.1	3 in 100,000	low
DDT	3.2	2 in 1,000,000	low

mg/kg = milligrams of contaminant per kilogram of soil.

^aThe cancer risk is theoretically-based and not specific to this community. The estimated risk was calculated by dividing the soil level by the residential SCO and multiplying by a factor of 10⁻⁶. The residential SCO represents the soil concentration associated with an increased lifetime cancer risk of one in one million. Sample calculation for dieldrin: [0.29 mg/kg/0.039 mg/kg] x 1E-6 = 0.0000074 or 7 in 1,000,000. The exposure parameters and development of the residential SCOs is discussed in detail in DEC/DOH (2006a).

^bAdditional information on the basis for qualitative descriptors is found in Appendix 1.

¹ Calculation of hazard quotient for heptachlor epoxide:

$$1.1 \text{ mg/kg} \times 74 \text{ mgs/day} \times 1/13.3 \text{ kg} \times 1 \text{ kgs}/1\text{E}+6 \text{ mgs} \times 5 = 3.1\text{E}-5 \text{ mg/kg/day}$$

$$3.1\text{E}-5 \text{ mg/kg/day} / 1.3\text{E}-5 \text{ mg/kg/day} = 2.4 \text{ (low)}$$

Child Health Considerations

The ATSDR Child Health Considerations emphasize examining child health issues in all of the agency activities, including evaluating child-focused concerns through its mandated public health assessment activities. ATSDR and DOH consider children when evaluating exposure pathways and potential health effects from environmental contaminants. We recognize that children are of special concern because of their greater potential for exposure from play and other behavior patterns. Children sometimes differ from adults in their sensitivity to the effects of hazardous chemicals, but whether there is a difference depends on the chemical. Children may be more or less sensitive than adults to health effects from a chemical exposure and the relationship may change with developmental age.

Dieldrin and DDT, two of the pesticides detected above residential SCOs in the surface soil near the site, are identified by the United States Environmental Protection Agency (US EPA) as chemicals for which there is evidence from animal studies that exposure during early life stages may pose a greater risk for cancer than the same exposure during adulthood (US EPA, 2005). In addition, some studies report that when pregnant animals are exposed by ingestion to large amounts of DDT, chlordane or dieldrin, adverse effects on the normal development of the offspring are observed (ATSDR 1994; 2002a,b). In some, but not all the studies, the high amounts of the chemicals to which animals were exposed also caused adverse health effects on the parent animal. Based on the available information from animal studies, the possibility exists that children may be more sensitive to the carcinogenic effects of some of the pesticides detected near the site, and therefore exposure to some of the pesticides may pose risks to the normal development of children. This information was considered when estimating risks for the site. The estimates of cancer and non-cancer risk for these and the other pesticides detected near the Bianchi-Weiss Greenhouses site took into account exposure to contaminants in soil during early life stages by using soil ingestion rates for children of several age groups. Furthermore, considering the possibility that children may have increased sensitivity to the health effects of some organochlorine pesticides detected in surface soil, we continue to recommend measures to reduce exposure to soil contaminants. These include the maintenance of a grass or mulch cover to help prevent direct contact with soil, avoiding unnecessary digging in the dirt, and washing hands after outdoor activities. These practices make sense for any yard since they can help reduce children's exposure to the chemicals and microorganisms that are present in all soils.

Conclusions

DOH and ATSDR conclude that incidental ingestion of, and/or direct contact with soil containing site-related pesticides in residential yards near the Bianchi-Weiss Greenhouses site is not expected to harm people's health (see Appendix 2). This is because the levels of chlordane in soil of all but one yard are below unrestricted SCOs and the estimated risks for adverse health effects for the one yard are minimal to low.

Soil samples from one yard contained chlordane and several non-site related pesticides at levels that are above residential SCOs. As the residential SCO is based on a lifetime risk of a subsistence type of gardening practice, if residents choose to grow vegetables before the property is remediated, they should follow healthy gardening practices (see attached guidance). The levels detected in this yard are associated with minimal to low risks for adverse health effects. Currently, grass covers the impacted soil which serves to limit direct contact soil exposures. In addition, the approved ROD remedial action plan for the site is to offer soil excavation on the impacted off-site property to the unrestricted SCO for chlordane, which would eliminate this potential exposure.

DOH and ATSDR conclude that contact with chlordane-contaminated groundwater which occasionally infiltrates into area basements or creates a temporary surface pond is not expected to harm people's health. This is because levels of chlordane in this water are below levels of concern for incidental ingestion/direct contact exposures, which are expected to be limited. The rising groundwater table is a temporary condition associated with inclement weather events and flooded basements and/or temporary ponds are only of concern where the shallow groundwater is impacted. Chlordane is not considered to present a soil vapor intrusion concern for this site as the chlordane is bound to colloidal particles in the groundwater. The approved ROD remedial plan is to offer basement foundation sealing and/or sump upgrades (with filters) to property owners of impacted properties along the shallow groundwater plume, which are intended to reduce the occurrence of groundwater rising into basements and to eliminate the discharge of chlordane above groundwater standards. These actions are intended to reduce exposures to chlordane-contaminated groundwater.

DOH and ATSDR conclude that drinking water from private wells downgradient of the site is not expected to harm people's health. This is because private wells sampling did not detect levels of chlordane above drinking water standards. However, the remedial action plan proposes to monitor private wells and offer public water supply connections to homeowners near and/or within the plume if chlordane is detected at 1 µg/L (half the Maximum Contaminant Level) to eliminate potential exposures from using well water.

Recommendations

- 1) Anytime there are public water supply lines available, DOH and SCDHS recommend that property owners connect to the public water supply and disconnect their private wells from their household system. As public water systems are routinely monitored for a variety of compounds, connecting to a public water supply ensures that if contamination is present in the groundwater, it is treated prior to consumption. This recommendation is consistent with the standard recommendation offered by the SCDHS when providing private homeowners with data results in areas where public water supply lines are available.

- 2) Property owners with private water supply wells downgradient of the site who have not had their wells tested for pesticides should contact the SCDHS to arrange to have the potable well(s) sampled to determine if the well water meets drinking water standards for chlordane.
- 3) Residents at the property where soils contained pesticides above residential SCOs are encouraged to apply healthy gardening practices until the soils are remediated. Practices could include gardening in raised beds and/or container gardens using non-impacted soils for growing plants intended for human consumption.
- 4) Measures should be taken to address contaminated soils in the residential yard that contained chlordane above residential SCOs. This could include removal of impacted soils from the yard. We recommend minimizing any disruption to the current vegetative cover that acts as a barrier to the impacted soils.

Public Health Action Plan

Actions Taken Since September 2009 LHC issued:

- A private well survey was conducted to confirm public water connections and evaluate where potential private well users may be, relative to the groundwater contaminant plume.
- Private water wells have been sampled to assess for site-related contamination.
- Surface soil samples were collected at adjacent off-site properties to assess if contaminated surface run-off and subsequent deposition of site soils had impacted off-site surficial soils.
- Water samples were collected from a residential basement where groundwater had infiltrated and from a sump water effluent pipe in a residential yard to evaluate groundwater plume impacts.

Actions Pending, Continuing or In Process:

1. SCDHS or DEC will collect water samples from any private wells identified downgradient of the site that have not been previously sampled to assess for exposures to site-related contamination.
2. DEC will monitor potentially impacted private wells and offer public water supply connections if site-related chlordane is detected at 1 µg/L.
3. DEC will offer to conduct remedial actions to mitigate exposures to site-related contaminated groundwater that infiltrates into basements or from basement sump effluent.
4. DEC will offer to conduct remedial actions to mitigate exposures to site-related contaminated surficial soil samples on an adjacent residential property.

AGENCY INFORMATION

New York State Department of Health Authors

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REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry). 1994. Toxicological Profile for Chlordane. United States Department of Health and Human Services. Public Health Service. Available on-line at <http://www.atsdr.cdc.gov/toxprofiles/index.asp>.

ATSDR (Agency for Toxic Substances and Disease Registry). 2002a. Toxicological Profile for Aldrin/Dieldrin. United States Department of Health and Human Services. Public Health Service. Available on-line at <http://www.atsdr.cdc.gov/toxprofiles/index.asp>.

ATSDR (Agency for Toxic Substances and Disease Registry). 2002b. Toxicological Profile for DDT, DDE, and DDD. United States Department of Health and Human Services. Public Health Service. Available on-line at <http://www.atsdr.cdc.gov/toxprofiles/index.asp>.

ATSDR (Agency for Toxic Substances and Disease Registry). 2007. Toxicological Profile for Heptachlor and Heptachlor Epoxide. United States Department of Health and Human Services. Public Health Service. Available on-line at <http://www.atsdr.cdc.gov/toxprofiles/index.asp>.

DEC (New York State Department of Environmental Conservation). 2006a. New York State Brownfield Cleanup Program. Development of Soil Cleanup Objectives. Technical Support Document. September 2006. Available on-line at <http://www.dec.ny.gov/chemical/34189.html>.

DEC (New York State Department of Environmental Conservation). 2006b. Superfund/Brownfield Regulation, 6NYCRR, Part 375 – Environmental Remediation Program. Available at: <http://www.dec.ny.gov/chemical/34189.html>.

DEC (New York State Department of Environmental Conservation). 2008. Remedial Investigation Fact Sheet, Bianchi-Weiss Greenhouses, DEC Site #152209.

DEC (New York State Department of Environmental Conservation). 2010. Soil Cleanup Guidance, Final Commissioner Policy CP-51. Available at: <http://www.dec.ny.gov/chemical/34189.html>

DEC (New York State Department of Environmental Conservation). 2011. Remedial Investigation Report, Bianchi-Weiss Greenhouses, DEC Site #152209.

DEC (New York State Department of Environmental Conservation). 2011. Feasibility Study, Bianchi-Weiss Greenhouses, DEC Site #152209.

DEC (New York State Department of Environmental Conservation). 2011. Record of Decision, Bianchi-Weiss Greenhouses, DEC Site #152209.

DOH (New York State Department of Health) 2004. Public Health Law. Section 225: Part 5, Subpart 5-1 Public Water Systems.

US EPA (United States Environmental Protection Agency). 2005. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. Risk Assessment Forum. EPA/630/R-03/003F. Available on line at http://www.epa.gov/ttn/atw/childrens_supplement_final.pdf.

Figure 1 –Potential Private Water Wells Located Near Bianchi-Weiss Greenhouses' Groundwater Plume in East Patchogue, Suffolk County, NY

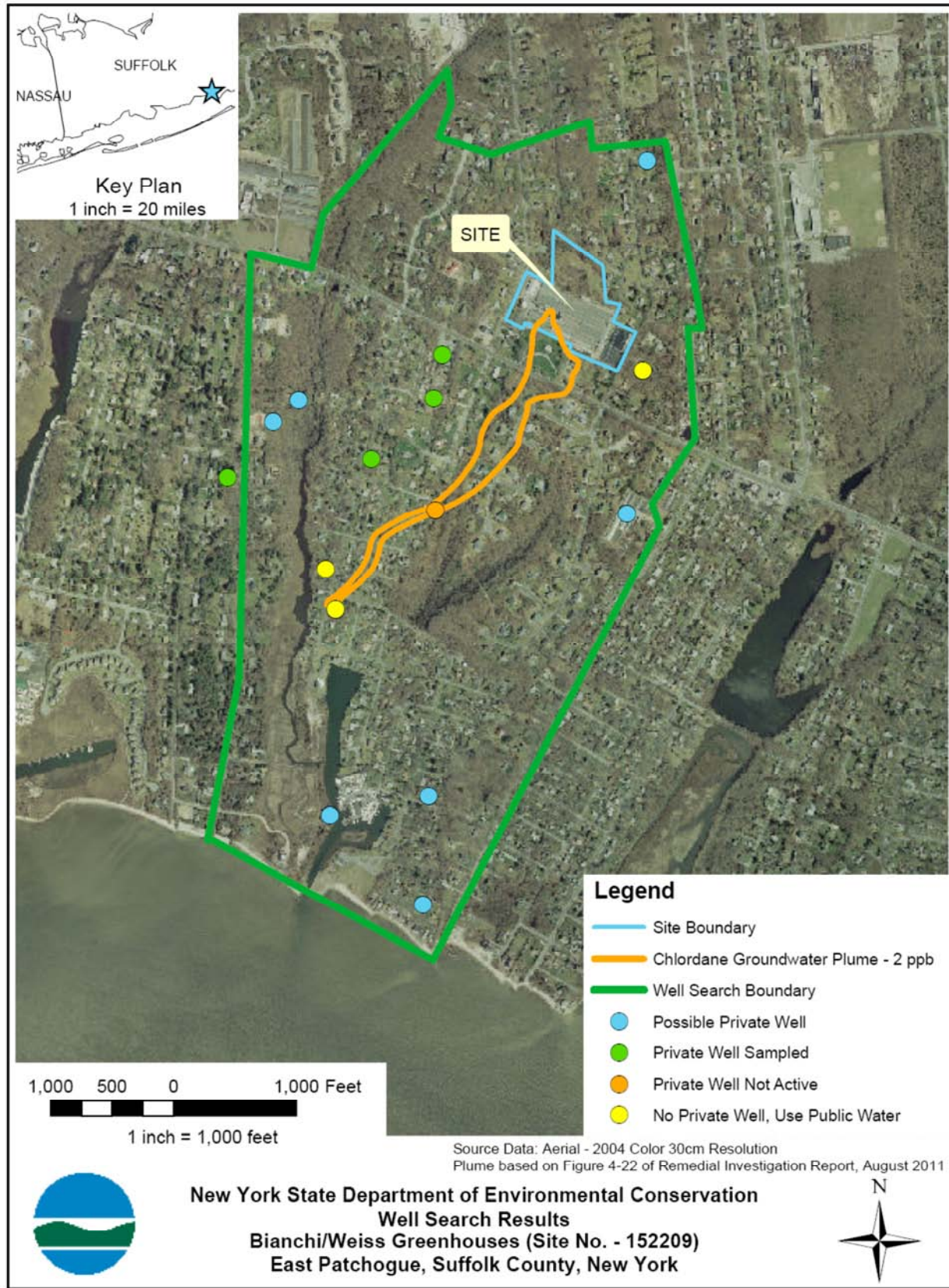


Table 1 – Pesticide Levels in Surface Soils above Soil Cleanup Objectives (SCOs) near the Bianchi-Weiss Greenhouse Site
All values in milligrams per kilogram (mg/kg)

Contaminant of Concern	On-site Maximum Concentration	Off-site Maximum Concentration ¹	Unrestricted SCO	Residential SCO
<i>Pesticides</i>				
Alpha-Chlordane ²	31	3.3	0.094 ^a	0.91 ^b
Gamma-Chlordane	26	1.3	NA	0.54 ^c
Dieldrin	ND	0.29	0.005	0.039 ^b
Heptachlor epoxide	ND	1.1	NA	0.077 ^c
DDT	ND (0.85)	3.2	0.0033	1.7
DDE	ND (1)	1.7	0.0033	1.8
DDD	ND	0.063	0.0033	2.6

NA = Not available; an SCO has not been developed for unrestricted use

ND = Not Detected or detected below applicable SCOs (detected concentrations in parentheses). DDT, DDE and DDD are not contaminants of concern for remedial action.

¹The maximum off-site concentrations all were found on one property; the remaining nine properties sampled did not detect pesticides above unrestricted SCOs.

² SCOs have been developed for alpha-chlordane and gamma-chlordane, but not for total chlordane which is a mixture of many compounds.

^a DEC 2006b, Table 375-6.8a

^b DEC 2006b, Table 375-6.8b

^c DEC 2010, Table 1

Table 2 – Pesticide Levels in Water Samples* Collected from Standing Water above New York State Drinking Water Standards
All values in micrograms per liter (µg/L)

Contaminant of Concern	On-site Maximum	Off-site Maximum	Standard
Total Chlordane	2.7	6.1	2

*Includes on-site and off-site temporary pond and/or basement water samples - it is not possible to duplicate these results due to the temporary nature of the ponded water, which results from a rise in the groundwater table associated with heavy precipitation weather events.

Table 3 – Pesticide Levels in Groundwater above New York State Drinking Water Standards
All values in micrograms per liter (µg/L)

Contaminant of Concern	On-site Maximum	Off-site Maximum	Standard
Total Chlordane	12.1	25.1	2

Results reflect data collected from on-site and off-site temporary and permanent groundwater monitoring wells.

Appendix 1

DOH PROCEDURE FOR EVALUATING POTENTIAL HEALTH RISKS FOR CONTAMINANTS OF CONCERN

To evaluate the potential health risks from contaminants of concern associated with the Bianchi-Weiss Greenhouses site, the DOH assessed the risks for cancer and non-cancer health effects.

Theoretical 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 EPA or, in some cases, by the DOH. The following qualitative ranking of cancer risk estimates, developed by the 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:

Qualitative Descriptors for Excess Lifetime Cancer Risk

Risk Ratio	Qualitative Descriptor
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 theoretical increased excess lifetime cancer risk is not a specific estimate of expected cancers. Rather, it is a conservative 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 may be judged acceptable. An increased lifetime cancer risk of one person out of one million exposed or less is generally considered negligible and not a public health concern. The level of risk is typically used as a "target

level," "screening level," or "goal", which when exceeded does not necessarily imply that risk reduction measures should be pursued but will trigger more careful evaluation of the situation. Cancer risks greater than one in ten thousand (10^{-4}), on the other hand, typically trigger actions to lower exposures. When cancer risk estimates are between one in one million (10^{-6}) and one in ten thousand (10^{-4}), a risk management decision must be made on a case-by case basis whether or not to pursue risk reduction measures. The one in one million (10^{-6}) risk level is used as a starting point for analysis of remedial alternatives which reflects a preference for managing risks at the more protective end of the risk range, all other things being equal. The ultimate risk management decision should consider judgments on not only the strength of the scientific evidence regarding carcinogenicity, but also the actual potential for chronic or lifetime exposure, other sources and levels of everyday exposure, our ability to detect the chemical, the availability and costs of risk reduction options, the societal benefits of the regulated activity, compliance with existing regulations, and, in many cases, the risks, benefits and costs of alternatives.

For non-carcinogenic 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 EPA, ATSDR and/or DOH. The resulting ratio was then compared to the following qualitative scale of health risk:

Qualitative Descriptors for Non-carcinogenic Health Risks

Ratio of Estimated Contaminant Intake to Risk Reference Dose	Qualitative Descriptor
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

Non-carcinogenic 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 sub-populations (for example, 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 non-cancer 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 non-cancer 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 toxicological data.

Appendix 2

Conclusion Categories and Hazard Statements

ATSDR has five distinct descriptive conclusion categories that convey the overall public health conclusion about a site or release, or some specific pathway by which the public may encounter site-related contamination. These defined categories help ensure a consistent approach in drawing conclusions across sites and assist the public health agencies in determining the type of follow-up actions that might be warranted. The conclusions are based on the information available to the author(s) at the time they are written.

1. Short-term Exposure, Acute Hazard “ATSDR concludes that...could harm people’s health.”

This category is used for sites where short-term exposures (e.g. < 1 yr) to hazardous substances or conditions could result in adverse health effects that require rapid public health intervention.

2. Long-term Exposure, Chronic Hazard “ATSDR concludes that...could harm people’s health.”

This category is used for sites that pose a public health hazard due to the existence of long-term exposures (e.g. > 1 yr) to hazardous substance or conditions that could result in adverse health effects.

3. Lack of Data or Information “ATSDR cannot currently conclude whether...could harm people’s health.”

This category is used for sites in which data are insufficient with regard to extent of exposure and/or toxicologic properties at estimated exposure levels to support a public health decision.

4. Exposure, No Harm Expected “ATSDR concludes that ... is not expected to harm people’s health.”

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.

5. No Exposure, No Harm Expected “ATSDR concludes that ...will not harm people’s health.”

This category is used for sites that, because of the absence of exposure, are not expected to cause any adverse health effects.

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REPORT PREPARATION

This Health Consultation for the Bianchi-Weiss Greenhouse Site was prepared by the New York State Department of Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication. Editorial review was completed by the cooperative agreement partner. ATSDR has reviewed this document and concurs with its findings based on the information presented. ATSDR's approval of this document has been captured in an electronic database, and the approving agency reviewers are listed below.

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