Letter Health Consultation

CASWELL, STRAUSS AND CO.

EDISON TOWNSHIP, MIDDLESEX COUNTY, NEW JERSEY

Prepared by
New Jersey Department of Health

AUGUST 13, 2014

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

CASWELL, STRAUSS AND CO.

EDISON TOWNSHIP, MIDDLESEX COUNTY, NEW JERSEY

Prepared By:

New Jersey Department of Health
Environmental and Occupational Health Surveillance Program
Under cooperative agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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August 12, 2014

Kimberly Staiger
On-Scene Coordinator, Removal Action
USEPA Region II
2890 Woodbridge Ave.
Edison, NJ 08837-3679

Dear Ms. Staiger:

This Letter Health Consultation (LHC) has been completed by the New Jersey Department of Health (NJDOH), through a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR), for the former lead smelter site known as Caswell, Strauss and Co. The site is located in Edison Township, Middlesex County, New Jersey.

NJDOH was requested by the EPA to evaluate their February 2012 soil sampling results and determine the following:

- Do the lead levels present in the surface soils at the residential properties pose a health hazard to the residents, especially young children?
- Do the lead levels present in the surface soils at the commercial property pose a health hazard to workers or to adjacent residents?

Nine of the ten residential properties sampled are located on land owned by the former lead smelter. The LHC also evaluated results from soil sampling conducted at a commercial facility constructed on the former site, which is now a self-storage facility.

The former Caswell, Strauss & Co., Inc. site likely was used for smelting operations from approximately the mid-1940s until the late 1950s. The property has since been sold and sub-divided and is now located in a mixed use commercial/residential community. Based upon historical photos and chain of title records, the original footprint of the former lead smelter once included the land that is now occupied by a self-storage facility on Oak Tree Road and approximately ten residential properties located on Hilltop Road. Residential housing on Hilltop Road appears to have been constructed from 1970 to 1971. The self-storage facility was constructed in 1983.

Soil sampling conducted by the New Jersey Department of Environmental Protection (NJDEP) in October and November 2011 determined that lead contaminated soils may be present at homes constructed on the site.

In early February 2012, EPA collected soil samples from the yards of nine homes located along Hilltop Road within the historic footprint of the former lead smelter and one yard on Libby Court, adjacent to the historic footprint of the site. Additionally soils samples were also collected from the self-storage facility.

Since 2012, the EPA has implemented remedial measures at the contaminated properties which include excavation of soil, backfilling with clean soil and grading activities.

Site Visit and Community Meeting

A site visit was conducted on April 19, 2012 for the Caswell Strauss site located in Edison Township, Middlesex County, New Jersey. Present were representatives from NJDOH, ATSDR, EPA, and the Edison Health Department. The residences were inspected for bare soil, gardens, play areas, and other pertinent information which could help determine exposure scenarios. There are no children below the age of six residing in any of the homes with elevated lead levels. At the time of the site visit, one residence had a large garden that appeared to include root vegetables. All residences inspected had many areas of bare soil. The self-storage facility located on the main portion of the former Caswell site was observed to be well kept, and paved. An employee of the storage facility lives on-site.

EPA hosted a public availability session on May 2, 2012, to provide information about the residential soil sampling, future cleanup actions planned for the community, and future sampling events. NJDOH attended this session and discussed community concerns regarding the Caswell Strauss Site with several residents.

Soil Investigation Results – February 2012

Soil samples were collected using the protocol as set forth in the EPA Superfund Lead-Contaminated Residential Sites Handbook dated August 2003 (OSWER 9285.7-50). Each property was divided into four quadrants. If there was a play area or a garden plot present at a property, additional quadrants were added. Five soil borings were completed in each quadrant (to a depth of two feet) and within the drip zone. Five soil samples were collected from each boring as follows: 0 to 2 inches, 2 to 6 inches, 6 to 12 inches, 12 to 18 inches and 18 to 24 inches. Samples collected from the same horizon in the same quadrant or drip zone were composited. Sample results are presented in Table 1. The results do not include the samples collected within the drip zone.

Table 1: Soil lead results from ten residences and one commercial property[*]

Property ID	Average Concentration at different depths (milligrams/kilogram)					Maximum Concentration (milligrams/kilogram)	
	0-2"	2-6"	6-12"	12-18"	18-24"	Max at 0-2"	Max at any depth
P001	121	57	34	26	13	184	184 (0-2")
P002[1]	73	27	20	29	24	138	138 (0-2")
P003[2]	78	62	32	17	13	151	151 (0-2")
P004[1]	85	43	25	13	14	125	125 (0-2")
P005[2]	782	797	455	504	592	1,820	2,710 (18-24")
P006	53	35	23	20	14	81	81 (0-2")
P007	229	149	74	47	356	671	1,260 (18-24")
P008	50	34	18	15	15	54	54 (0-2")
P009[3]	326	4,762	2,471	1,122	2,460	962	60,100 (2-6")
P010	564	15,12	174	240	113	1,210	3,840 (2-6")
P011	1,989	1,452	1,401	2,167	2,607	5,610	10,100 (18-24")

[*]EPA samples collected in February 2012; [1]Play area present in backyard; [2]Garden present in backyard;
[3]Commercial self-storage facility

Discussion

For this site, the following exposure pathways for individuals who live at these residences were identified.

Completed Pathways

Incidental Ingestion of and Dermal Contact with Surface Soil (past): There was a completed exposure pathway associated with ingestion of contaminated surface soil and dermal contact with lead contaminated surface soil. Exposed individuals include children and adults who used their backyards for recreational purposes. For the commercial property, this pathway is limited to adult exposures as there is no specific information that makes child exposures relevant for this commercial setting.

Potential Pathways

Ingestion of contaminated dust (past): Lead was detected in the yard soil (0 to 24 inches depth) of ten residential properties and one commercial property. Lead in the soil can be tracked indoors from the yard with shoes. Residents, including children, may have been potentially exposed to lead contaminated indoor dust. Since indoor dust sampling was not conducted, data are unavailable to assess this potential route of exposure.

Ingestion of contaminated vegetables from backyard gardens (past): Vegetables grown in the backyard gardens may have become contaminated with lead detected in the soil. Residents who consumed vegetables grown in backyard gardens may have been exposed to site-related

contaminants. It should be noted that studies have shown that in general plants do not absorb or accumulate lead. There is more concern about lead contamination from soil adhering to unwashed produce than from actual uptake by the plant itself. For this site, since vegetable sampling was not conducted, data are unavailable to assess this potential route of exposure.

Eliminated Pathways

For properties where soil remediation has taken place, all present and future exposure pathways from incidental ingestion of and dermal contact with surface soil are considered eliminated.

Public Health Implications of Completed Exposure Pathways

Once it has been determined that individuals have or are likely to come in contact with site-related contaminants (i.e., a completed exposure pathway), the next step in the assessment process is the calculation of site-specific exposure doses. This is called a health guideline comparison which involves looking more closely at site-specific exposure conditions, the estimation of exposure doses, and comparison to health guideline CVs. Health guideline CVs are based on data drawn from the epidemiologic and toxicologic literature and often include uncertainty or safety factors to ensure that they are amply protective of human health.

Regarding exposure to surface soil, the ATSDR considers the top two to three inches of soil the contact layer for incidental soil ingestion and dermal contact exposures. Soil samples collected from the top two inches of soil were used to assess incidental soil ingestion exposure.

EPA has developed a model to estimate the contribution of soil lead to children's blood lead level. The model is called the Integrated Exposure Uptake Biokinetic (IEUBK) model. The model estimates the percentage of children six months to seven years of age that exceed a specified blood lead level at certain soil lead concentrations. In using the IEUBK model, EPA recommends that the lead concentration in site soil does not result in a 5% probability of exceeding a specified blood lead concentration (USEPA 1994a; 1994b; 2002).

Lead causes or is associated with decreases in intelligent quotient (IQ); attention deficit hyperactivity disorder (ADHD); deficits in reaction time; problems with visual-motor integration and fine motor skills; withdrawn behavior; lack of concentration; issues with sociability; decreased height; and delays in puberty, such as breast and pubic hair development, and delays in menarche (CDC 2011; CDC 2012a; CDC 2012b). Until recently, the Centers for Disease Control and Prevention (CDC) had established a level of concern for case management of 10 micrograms lead per deciliter of lead blood (µg/dL). Recent scientific research, however, has shown that blood lead levels below 10 µg/dL can also result in harmful effects in children, such as neurological, behavioral, immunological, and developmental effects in young children.

On January 4, 2012, CDC's Advisory Committee on Childhood Lead Poisoning Prevention (ACCLPP) recommended that CDC adopt the 97.5 percentile for children one to five years old as the reference value for designating elevated blood lead levels in children. The 97.5 percentile currently is 5 µg/dL (CDC 2012a). On June 7, 2012, the CDC released a statement

indicating concurrence with the recommendations of the ACCLPP (CDC 2012b). A review of the sources of lead in the environments of the United States' children discusses the contributions of various lead-contaminated media to blood lead levels in children. Deteriorating lead paint and lead in house dust and soil are the primary, and often the most concentrated, sources of lead (Levin, et al. 2008). Evidence also suggests that for children with blood lead levels 5–9 µg/dL, no single source of exposure predominates. For these children, the contribution of multiple sources, including drinking water, seems likely, particularly for children who do not have well-established risk factors such as living in old housing or having a parent who is exposed to lead at work. CDC and ACCLPP concur that primary prevention of lead exposure is essential to reducing high blood lead levels in children (Bernard et al., 2003).

NJDOH has run the IEUBK model using EPA's default parameters for lead in air and water, dietary intake, mother's blood lead level and soil ingestion. The following default parameters were used in the current version of the IEUBK Model for Lead in Children, Windows® version (IEUBKwin v1.1 build 11):

- lead in air (0.1 µg/m^3),
- lead in drinking water (4 µg/L),
- soil/dust ingestion (ranges from 0.085 to 0.135 g/day),
- drinking water (ranges from 0.2 to 0.59 L/day),
- dietary lead intake (ranges from 1.95 to 2.26 µg/day),
- maternal blood lead concentration at childbirth (1 µg/dL),
- geometric standard deviation (1.6 µg/dL), and
- age interval (0-84 months).

The IEUBK model results are listed in the Appendix A.

Most of the properties near the former Caswell, Strauss & Co. site had relatively low levels of lead in surface soil. Three properties (P005, P010 and P011 in Table 2) had soil lead levels that are above EPA's current residential soil lead screening level of 400 mg/kg. There were two additional properties (P007 and P009) where the maximum surface soil level was above 400 mg/kg and where the average soil level resulted in higher than a five percent probability of blood lead levels being above 5 µg/dL (the current CDC reference value) as predicted by the IEUBK model. It should be noted that there were not any children under the age of six residing in any of the residences at the time of sampling.

EPA also has an adult pharmacokinetic lead model for assessing risks associated with non-residential adult exposures to lead in soil. The model is often used for women of child-bearing age to estimate blood lead levels in the developing fetus because the developing fetus is likely to be the more sensitive (EPA 2009). Calculated fetal blood lead levels at two residences (P005 and P011) indicate a health hazard at these two properties for past exposures.

The commercial property (P009) is being considered as a possible source area for area contamination based on soil sampling results. The highest lead concentrations were detected on-site (60,100 mg/kg; see Table 1). There is an occupant who resides on the property full-time. Based on the adult lead model results, this property did not show elevated blood lead levels in

the developing fetus when using average results in the 0-2 inch depth (see Table 3 in Appendix A). However, it is prudent to consider hazards posed by lead levels at other soil depths, in light of potential on-going soil contamination of surrounding residential properties. Children may be exposed to levels of health concern based on IEUBK results as shown in Table 2 in the Appendix A. Therefore, it can be concluded that lead levels present in surface soils at the commercial property posed a health hazard to workers and adjacent residents at the levels measured at the time of sampling.

Four residences (P002 through P005) have backyard areas that feature either a garden or play areas. Residences P003 and P005 have vegetable gardens. Guidance was provided to residents in P005 during the site visit and fact sheets were made available during the EPA public availability session to all residents with respect to minimizing lead exposure when consuming the produce (see Appendix B).

Summarizing results from both the IEUBK and adult lead models, there was potential for health concerns for past exposures, specifically for children, for the following residences: P005, P007, P009, P010 and P011.

Since 2012, EPA has conducted the following remediation at the following properties: excavation, backfill and topsoil operations were completed at P010 on May 31st, 2013; at P011 on July 19th, 2013 and at P005 and P007 on August 27th, 2013. Remediation at the commercial facility (P009) was completed on July 3, 2013 and included excavation of soil from three areas of concern, installation of new perimeter fencing, improvements to site drainage to limit runoff to adjacent residential properties and installation of trees and turf along the northern property line.

The Edison Department of Health and Human Services has indicated that there are no records of elevated child blood lead cases in residences on Hilltop Road or Libby Court adjacent to the former lead smelter site (J. Elliot, Edison Department of Health and Human Services, personal communication, May 2012). This was confirmed by the New Jersey Childhood Lead Poisoning Prevention Program who reported the same (J. Nanavaty, NJDOH, Family Health Services, personal communication, June 2012).

Conclusions

The NJDOH and ATSDR have concluded that past exposures to soil lead detected at some sampled properties may have harmed people's health, especially children who may have lived in the properties. Since the time of sampling in 2012, the EPA has implemented remedial measures at the contaminated properties which include excavation of soil, backfilling with clean soil and grading activities. As such, all present and future exposure pathways from incidental ingestion of and dermal contact with surface soil are considered eliminated for these residences.

The NJDOH and ATSDR have concluded that soil lead detected at the remaining sampled properties is not likely to harm people's health. It should be noted that there is

currently no known safe level of exposure to lead; the one means to reduce lead exposure is to take steps to reduce contact with lead contaminated sources.

Recommendations

Parents of young children should continue to follow guidelines for routine lead exposure testing. All children by law (N.J.A.C. §8:51A) are required to be screened for lead poisoning. All children should be screened at 12 and 24 months of age. Any child between three and six years of age who has never previously been screened should get screened for lead poisoning. Additional information is available at: http://www.nj.gov/health/fhs/newborn/lead.shtml

Public Health Action Plan

The purpose of a Public Health Action Plan is to ensure that this health consultation not only identifies public health hazards, but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of the ATSDR and the NJDOH to follow-up on this plan to ensure that it is implemented. The public health actions to be implemented by the NJDOH are as follows:

Public Health Actions Taken

1. The NJDOH has reviewed information and relevant data supplied by the EPA to produce this LHC which evaluates the potential health implications for past exposures to contaminants detected in surface soil at the residential properties near the former lead smelter site.

2. Fact sheets about lead contamination (including reducing lead exposure from gardening) were given to residents at the EPA Public Availability Meeting on May 2, 2012.

3. Since 2012, the EPA has implemented remedial measures at the some contaminated properties which include excavation of soil, backfilling with clean soil and grading activities.

Public Health Actions Planned

The NJDOH will be available to discuss the findings of this LHC to concerned citizens.

If you have any questions, please contact me at 609-826-4986, or by e-mail at Somia.Aluwalia@doh.state.nj.us.

Sincerely,

Somia Aluwalia, PhD
Environmental and Occupational Health Surveillance Program

c: Gregory Ulirsch, MS, PhD, Technical Project Officer, ATSDR
Jerald Fagliano, MPH, PhD, Program Manager, NJDOH

References

Bernard SM, McGeehin MA. Prevalence of blood lead levels ≥5 µg/dL among U.S. children 1 to 5 years of age and socioeconomic and demographic factors associated with blood of lead levels 5 to 10 µg/dL, Third National Health and Nutrition Examination Survey, 1988–1994. Pediatrics 2003;112:1308–13.

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APPENDIX A

IEUBK Child Lead Model Results

Based on site-specific results from surface soil sampling in the residences and the commercial property, Table 2 details the calculated blood lead levels using the IEUBK model.

Table 2: Calculated child Blood Lead Levels (BLL) using average soil lead concentration detected in 0-2 inches

Property ID	Geometric Mean BLL (µg/dL)	IEUBK Probability Estimate (P_5)
		5 µg/dL cut-off
P001	1.9	1.7%
P002[1]	1.6	0.65%
P003[2]	1.5	0.56%
P004[1]	1.6	0.86%
P005[2]	8.2	**85%**
P006	1.4	0.30%
P007	2.8	**11%**
P008	1.4	0.35%
P009[3]	3.8	**29%**
P010	5.1	**51%**
P011	13	**98%**

Bolded values indicate exceeded of P_5 over 5%
[1]Play area present in backyard; [2]Garden present in backyard;
[3]Commercial self-storage facility

Using default assumptions, the IEUBK model estimates that a soil lead concentration of 154 mg/kg will result in no more than 5% of children exceeding a blood lead level of 5 µg/dL. Stated another way, to obtain a risk that 5% of children might be expected to exceed 5 µg/dL, the average soil lead level should not exceed 154 mg/kg. This soil lead level is not a clean-up number; it is a level that has been derived using default assumptions and a blood lead cut-off level of 5 µg/dL in the IEUBK model. It should be noted that any changes in the future to these default parameters may result in changes to this soil concentration to some extent.

Adult Lead Model Results

The default ingestion rate of 50 mg soil per day is intended for occupational exposures that occur predominantly indoors (EPA 2009). Using this and other default assumptions, the adult lead model estimates a 5% risk that fetal blood lead levels will exceed 5 µg/dL when average soil lead levels are 773 mg/kg. The blood lead levels as calculated by the adult lead model are shown below in Table 3.

Table 3: Calculated Fetal Blood Lead Levels using average soil lead concentration (0-2 inches)

Property ID	Adult Lead Model Probability Estimate (P_5)
	5 µg/dL cut-off
P001	0.37%
P002[1]	0.30%
P003[2]	0.29%
P004[1]	0.32%
P005[2]	**6.4%**
P006	0.27%
P007	0.66%
P008	0.27%
P009[3]	1.2%
P010	2.1%
P011	**19%**

Bolded values indicate exceeded of P_5 over 5%
[1]Play area present in backyard; [2]Garden present in backyard;
[3]Commercial self-storage facility

APPENDIX B

Reducing Exposure to Lead From Gardening

For more information on lead, contact:

New Jersey Department of Health and Senior Services (NJDHSS)
Somia Aluwalia, Health Assessor;
Christa Fontecchio, Health Education Coordinator
1-609-826-4984

Edison Health Department
Jay Elliot, Director
1-732-248-7476

Agency for Toxic Substances and Disease Registry (ATSDR)
Leah Graziano, Regional Director (Region 2)
1-732-906-6932

Environmental Protection Agency (EPA)
Wanda Ayala, Community Involvement Coordinator
1-212-637-3676

If you eat vegetables grown in soil that contains lead, lead can get into your body. This may cause health problems. To lower the amount of lead that gets into your body when you eat vegetables grown in your garden, follow these simple steps:

✔ Clean vegetables well before cooking or eating.

- Throw away old and outer leaves of vegetables.
- Wash all vegetables with cold water. Scrub vegetables with a brush to help remove dirt. Rinse vegetables well before eating.
- Scrub and peel root crops such as carrots, potatoes, turnips, and onions before eating them.

✔ Avoid planting root crops in contaminated soils or grow vegetables in raised beds or containers.

- Grow crops such as tomatoes, peppers, squash, cucumbers, peas, beans, or corn. They are less likely to absorb lead.
- Grow leafy vegetables such as lettuce and root crops (carrots, potatoes) in containers or raised beds filled with lead-free soil. You can purchase lead-free soil from nurseries or garden stores.

✔ Do…

- add peat moss, compost, or manure to your soil. These bind the lead in soil so that vegetables absorb less lead.
- keep soil pH at 6.5 or higher so that plants will absorb less lead.
- cover all bare soil in the garden with 2 to 4 inches of lead-free mulch such as wood chips, grass clippings, lead-free soil, or compost.

✘ Do not...

- grow vegetables in the drip zone and around the foundation of older buildings.
- grow root crops and low-growing leafy vegetables in soil that contains more than 1,000 parts per million of lead.
- garden in soil that contains more than 1,500 parts per million of lead.

Get your child tested for lead poisoning today!

Most lead poisoned children do not act or look sick.
The only way to know if your child has lead poisoning is to have a blood lead test.
Children 6 years and younger are more likely to have lead poisoning.
Call your doctor or clinic today to get your child tested.

Protect Your Family

Eating or swallowing soil that contains lead is a common way of getting lead into your body. Children get lead in their bodies when they put their hands, toys or other items covered with lead dust in their mouths. When lead gets into your body, it may cause health problems.

To lower the amount of lead that gets into your body from soil, follow these simple steps:

Do not let children play in dirt that contains high amounts of lead.

- Have children play on grass or in areas covered with lead-free mulch, wood chips or sand.
- Keep children from playing in bare dirt.
- Cover bare dirt with grass, bushes or 4 to 6 inches of lead-free wood chips, mulch, soil or sand.

Protect your family from lead-based paint in the yard.

- Keep your family, especially young children, away from areas in the yard where paint is peeling or chipping, such as from old porches, fences, or houses.
- Do not try to remove lead paint yourself unless you have been trained to follow lead-safe work practices. Hire a professional lead specialist who follows lead-safe work practices.
- If you paint over lead-based paint, use special paint that will seal in the old paint.

Keep children's hands and toys clean.

- Wash children's hands before they eat any food if they have been playing outside.
- When eating outdoors, always eat in an area where there is no bare soil.
- Do not let your children put toys, dirty hands, paint chips, or other things that might have lead dust on them into their mouths

For more information on lead, contact:

New Jersey Department of Health and Senior Services (NJDHSS)
Somia Aluwalia, Health Assessor; Christa Fontecchio, Health Education Coordinator
1-609-826-4984

Edison Health Department
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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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Lead Poisoning in Children

Children can be exposed to lead in soil by putting their hands or toys in their mouths. Other ways children can get lead poisoning are by eating or drinking from imported lead-glazed pottery or from putting jewelry made from lead in their mouths. Many houses built before 1978 have lead-based paint. The paint may chip and flake and be ground into tiny bits. These bits of lead become part of the dust and soil in and around our homes. Children can get dust and soil into their bodies because they are likely to put their hands or toys in their mouths. When too much lead builds up in the children's bodies, they can get sick even though they may not look or act sick.

Most children show no symptoms of lead poisoning. Signs of lead poisoning can often be mistaken for other illnesses.

Symptoms of lead poisoning, if they occur, are

- Tiredness or restlessness
- Headache
- Stomach ache or vomiting
- Constipation
- Irritability

Lead poisoning can lead to

- Learning problems
- Behavioral problems
- Hearing problems
- Lower IQ
- Kidney damage

Children who do not have lead poisoning may also show some of these symptoms from time to time. Many of the symptoms of lead poisoning may also be caused by other health conditions or by learning and behavior problems.

Questions about lead?

Call your doctor or health care provider, or the Edison Health Department at 1-732-248-7476

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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REPORT PREPARATION

This Letter Health Consultation for the Caswell, Strauss and Co., located in Edison Township within Middlesex County, New Jersey was prepared by the New Jersey 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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