Health Consultation

PCB Contamination in Residential Soil

GENERAL ELECTRIC COMPANY/GENERAL ELECTRIC ROME

ROME, FLOYD COUNTY, GEORGIA

EPA FACILITY ID: GAD003308145

OCTOBER 5, 2004

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
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 document has previously been released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The health consultation has now been reissued. 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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Prepared by:

Exposure Investigation and Consultation Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

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Background and Statement of Issues

In April 2001 former Congressman Bob Barr petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) to perform a public health assessment of contamination by polychlorinated biphenyls (PCB) occurring outside the site boundaries of the General Electric (GE) facility [1]. In August 2001, ATSDR conducted a scoping visit to view the site area and to collect available environmental data related to the site. This health consultation focuses on exposure to residential soil contaminated with PCBs that occurred through the application of waste PCB oil, called "Pyranol." ATSDR is focusing on soil contamination because of the concern for high levels of PCBs found in residential soils during sampling.

The public comment version of this health consultation was released in August 2002. ATSDR received several comments from EPA and GE, but no comments from community members. This final health consultation addresses all comments received during the public comment period. The comments and ATSDR responses can be found in Appendix D.

The GE facility in Rome, Georgia, is a former transformer manufacturing facility that closed its manufacturing operations in 1997. GE used PCBs in its manufacturing process from the time the plant opened in 1953, until PCBs were banned in 1977. Prior to 1953, the area was the site of the Rome Municipal Airport. The former GE facility encompasses 236 acres and is bounded by Redmond Circle and Lavendar Drive. The area surrounding the plant is a mix of residential and light industrial use.

In the past, some GE workers took home waste PCB oil, or Pyranol, from the facility. The workers allegedly used the oil at their homes for several purposes. It was applied as an insecticide for termite control in soils around the foundations of houses and in crawlspaces, on driveways as a dust suppressant, and on fences as a wood preservative. In addition, sludge containing waste PCBs was obtained from the local wastewater treatment plant and used as a fertilizer in yards and gardens.

PCBs are mixtures of up to 209 individual polychlorinated biphenyls compounds (called *congeners*). No natural sources of PCBs are known to exist. PCBs are either oily liquids or solids, colorless to light yellow in color, with no known smell or taste. Some PCBs can be present in the air as a vapor. Many commercial PCB mixtures are known in the United States by the trade name Aroclor. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they do not burn easily, and they are good insulators. Because of these properties, PCBs were used widely in the electrical transformer manufacturing industry until they were banned in 1977.

Use of PCBs and disposal of PCB wastes lead to uncontrolled releases into the environment, mostly to land (soils) and waterways. The fate of PCBs in the environment depends on the environmental medium (e.g., air, soil, or water) that is contaminated. PCBs usually bind to soil and persist in the soil for many years. This is true for most PCB congeners that contain high amounts of chlorine. PCBs with lower amounts of chlorine can volatilize from contaminated soil into the air [2].

The Georgia Environmental Protection Division (GA EPD), the U.S. Environmental Protection Agency (EPA), Emory University, the Floyd County Health Department, and General Electric (GE) have been involved with PCB contamination related to the GE facility before ATSDR was

petitioned to perform a public health assessment. The Public Health Action Plan at the end of this document lists past, current, and future public health activities at this site by these agencies.

Residential Soil Sampling Results

The residential soil sampling being conducted by GE is an ongoing effort. The public comment draft of this health consultation that was released in August 2002 evaluated residential soil data collected through October 29, 2001. This final health consultation evaluates all residential soil sampling available and reviews the status of remediation as of May 2004.

Most of the sampling of residential soil associated with use of Pyranol and/or PCB contaminated sludge has been conducted by GE. General Electric has collected soil samples at 42 residential properties where owners could provide some proof of use of Pyranol or PCB-contaminated sludge at their property. GA EPD performed sampling at 12 properties that GE chose not to sample. PCBs were detected at 27 of the 54 (total) residences sampled at levels ranging from below detection limits up to 320,000 parts per million (ppm) [3, 4,5].

ppm - parts per million, which correlates with milligrams per kilogram (mg/kg)

Laboratory results on PCBs indicate that Aroclor 1260 is the predominant PCB mixture found on the residential properties (data not included). In some samples, Aroclor 1254 was also detected. Because Pyranol is composed of approximately 50% PCBs and 50% combination of trichlorobenzene and tetrachlorobenzene [6], the soil at all residences was analyzed for these chlorobenzene compounds. Neither chlorobenzene compound was detected in any surface or subsurface soil sample; therefore, these compounds will not be considered further in this report [3].

Table 1 shows a breakdown and the status of the 54 properties that GE and GA EPD sampled.

Table 1. Status of sampled properties

PCB Level	No. of Houses (out of 54)	Status
Not detected	27	No further action
< 1 ppm	8	No further action
>1 ppm and < 10 ppm	4	All remediated to levels less than 1 ppm
> 10 ppm and < 100 ppm	9	8 - remediated to levels less than 1 ppm
		1 - not remediated
> 100 ppm	6	All remediated to levels less than 1 ppm

This document will evaluate the 27 properties where PCBs were detected. The other 27 properties, that have no detectable levels of PCBs, require no further action, and will not be considered further in this document.

Exposure Pathway Analysis

Methods

In preparing this analysis, ATSDR used established methodologies for determining how people might be exposed to PCBs and what harmful effects, if any, might result from such exposure. See Appendix A for a detailed discussion of quality assurance considerations, human exposure pathways analyses, ATSDR's health comparison values, and the methods used to select contaminants of concern.

Exposure Pathways

Primary pathway

In this document, ATSDR has limited its evaluation to the pathway of PCBs in residential soils, which has been determined to be the most immediate exposure of concern. Incidental ingestion of contaminated surface soil is the predominant PCB exposure pathway at contaminated residences in Rome, GA.

PCBs were detected in the yards, gardens, and crawlspaces of homes. The exposure pathway which might include incidental ingestion of surface soil could take place during several different activities. For adults, these include gardening, yard work, or accessing crawlspace areas. For children, these include playing in the dirt or ingesting outdoor dust tracked into the house.

Children and adults are not expected to come into contact with subsurface soil as often as surface soil. In addition, concentrations of PCBs were generally lower in subsurface soil than surface soil. Therefore, using surface soil concentrations of PCBs for the exposure assessment and exposure doses is conservative and protective of public health.

Other exposure pathways

Several other possible exposure pathways are present at the site, including dermal contact with contaminated soil and inhalation of PCB vapors. Exposure via inhalation of PCB vapors is not discussed in this document because no air data are available to evaluate the inhalation pathway. Exposure via the dermal contact pathway is a major route of exposure in factory workers that have direct contact with PCB oils; however, when PCBs are bound to the soil, less than 2% is absorbed [7]. Because exposure to soil in a residential area from dermal contact is considered to be such a small contributor of *total* exposure to PCBs, such exposure will not be evaluated in this document.

Another potential exposure pathway is ingestion of home-grown vegetables contaminated with PCBs. Vegetables grown in gardens with PCB-contaminated soil can be contaminated with PCBs from uptake through the roots, or from PCBs that have been volatilized into the air from the soil and then deposited on the leaves [2]. However, the main concern for PCBs and vegetables is the dirt found on the vegetables that may be PCB-contaminated. The route of incidental ingestion of soil, examined in this document, may account for some of this exposure.

Crawlspace soil

In addition to the general exposure activities mentioned above, site-specific exposures for the Rome area are also important. For instance, some homes in the Rome area have crawlspaces underneath their houses. Sampling by GE has shown that PCBs are present in the soil in crawlspaces of some homes. People do not access crawlspaces as often as they do yards or gardens; therefore, such exposure would occur less frequently. ATSDR assumes in this document that only adults will have access to the crawlspace soil; therefore, children's exposure to crawlspace soil is not evaluated.

Pica

Pica is a behavior in young children, usually ages 1 to 3 years, in which they intentionally consume large amounts of soil at one time. The amount of soil a pica child consumes can be on the level of 5 to 10 grams per day. However, pica behavior is not common, and it is usually intermittent and a transient or short-term activity in young children. Nevertheless, to be protective of children, ATSDR evaluated pica exposure scenarios as part of the exposure assessment.

Comparison Values

Comparison Values (CVs) are concentrations of contaminants set by ATSDR that are considered to be levels of exposure likely to be without an increased risk of adverse health effects. CVs are used for screening purposes only to determine if the contaminant needs further evaluation. The maximum concentrations of PCBs at all properties where PCBs were detected exceeded at least one ATSDR CV (see Table 2); therefore, all 27 properties were evaluated further. See Appendix A for more details on comparison values.

Table 2. ATSDR Comparison Values (CVs)

Comparison Value	Type of Comparison Value
0.06 ppm	EMEG - pica child
0.40 ppm	oral CREG
1.0 ppm	EMEG - chronic child
10.0 ppm	EMEG - chronic adult

EMEG - Environmental Media Evaluation Guideline
CREG - Cancer Risk Evaluation Guideline

Exposure Doses

Incidental ingestion of soil may occur from hand-to-mouth transfer, direct mouth contact, ingestion of soil on home-grown fruits and vegetables, and ingestion of dust from soil. Exposure activities and the concentration of the contaminant both play an important role in determining the amount of PCBs to which a person is exposed. However, a variety of other factors are involved in using exposure to estimate an exposure dose and to evaluate what adverse health effects, if any, might occur from that dose. These factors include

- **duration of exposure:** when the contamination occurred and how long residents have lived there,
- **frequency of exposure:** how often the person has contact with the soil,
- **body weight:** the amount the person weighs, and
- **area of contamination:** does the person come into contact with the highest level of PCBs all the time?

The earliest reports of the usage of Pyranol on private properties date back to the 1960s [8]. Because the Pyranol was deposited some time ago, and in areas that are used frequently (i.e., yards, gardens), exposures are likely to be frequent and are likely to have occurred over a long period of time. These factors all have a part in determining an exposure dose, or the estimated average amount of PCBs ingested by a person on a daily basis. For more information on exposure doses and examples of calculations, see Appendix B.

Total Exposure

The evaluations in this document are subject to limitations because of the complex PCB exposure pathways that arise from site-specific conditions. ATSDR's evaluation, limited to incidental ingestion of PCB-contaminated soil, is unable to account for *total exposure* to PCBs. With the exception of dermal contact exposures, it is unknown how other potential exposures not evaluated in this document might contribute to total exposure; however, if the exposure exists, the exposure doses calculated in this document are likely to result in underestimation of true dose from total exposure. The factors contributing to total exposure include

- *Other exposure pathways.* The exposure doses which were calculated only account for ingestion of PCB-contaminated soil. These exposure doses do not account for other possible

exposure pathways (e.g., dermal (skin) contact with PCBs in soil or inhalation of PCB-vapors), nor do these doses account for possible exposure to PCBs from other sources (e.g., eating contaminated fish or occupational exposures). Exposures from any or all of these exposure routes will increase the exposure dose estimates provided in this document.

- *PCB vapors*. Whether vapors from PCBs in crawlspace soil would migrate into the living areas of the house is uncertain. If PCB vapors do migrate into the house, this pathway also will increase the estimated daily dose.
- *Past PCB levels.* The levels of PCBs examined in this document might not represent past contamination levels. Past levels of PCBs are unknown. Because PCBs are persistent in the environment, the current levels are used in this document to represent past exposures. However, some degradation (including vaporization, migration with underground water or with eroded soil) is expected to have occurred; therefore, it is possible that PCB levels might have been higher in the past. This would increase the exposure dose estimates provided in this document.

Discussion

Residential properties with <1ppm PCBs in soil

There were eight properties where the highest levels of PCBs detected were less than 1 ppm [3,5]. These highest (maximum) PCB levels exceed ATSDR's soil comparison value for a pica child, but not for children with normal exposure scenarios or adults (see table 2). Because the concentrations exceed the pica child CV, exposure doses were calculated for pica children and compared to ATSDR's MRL of 0.03 µg/kg/day for intermediate exposure. An intermediate MRL was used instead of the chronic MRL, because pica exposure is not expected to occur for any long periods of time.

The estimated dose for a pica child exposed to approximately 1 ppm of PCBs in soil is 0.2 µg/kg/day. This exceeds ATSDR's Minimal Risk Level (MRL) of 0.03 µg/kg/day. The estimated exposure dose uses conservative assumptions in the calculations — it assumes a fairly consistent exposure. However, pica behavior is typically transient, intermittent, and short-term in nature. In addition, the doses are 10 to 100 times lower than the level at which there is an observable adverse health effect in animals for intermediate exposure (7.5 µg/kg/day).

Minimal Risk Level (MRL) - Estimates of daily human exposure to a chemical that are unlikely to be associated with any appreciable risk of adverse non-cancerous effects. MRLs are used to compare estimated daily exposure doses to doses in the toxicological literature.

Considering all of these factors, PCB levels at these properties where detections have been less than 1 ppm are generally not expected to cause an increased risk of adverse health effects in pica children. If, however, parents believe a child exhibits pica behavior, steps can be taken to reduce the behavior as part of good public health practice; see the section entitled "Best Public Health Practice" in Appendix C.

Although the maximum concentrations at most of these properties exceeded ATSDR's cancer screening value of 0.40 ppm (see Table 2), an evaluation of the duration of exposure and other

exposure and toxicological studies shows that there is no increased risk of cancer from exposure to PCBs less than 1 ppm.

Residential properties with >1ppm PCBs in soil

Nineteen properties had detections of PCBs at levels above 1 ppm. The maximum concentrations in either the crawlspace or the yard area of these properties ranged anywhere from about 2 ppm – 320,000 ppm [3,5].

GE has completed remedial activities at all properties except for one where permission has not been granted for cleanup. Remediation of soils includes post-cleanup sampling to confirm that PCB levels have been reduced to 1 ppm or less [3,5]. Since the contaminated soils have been removed, exposures at these properties reflect only past exposure. Still, past exposure could have been significant because the duration of exposure is estimated to be up to 40 years, depending on how long property owners occupied their homes. One property which had a maximum PCB level of 85 ppm has not been cleaned up, but the PCB contamination was found mainly underneath a barn on the property. The owner does not want the property remediated because the barn will have to be removed. Because of the location of PCBs, exposure at this property is most likely infrequent and limited.

Most of these properties had maximum PCB concentrations that exceeded ATSDR's CVs for adults and children. Exposure doses were calculated using maximum concentrations and compared to ATSDR's MRL of 0.02 μg/kg/day for chronic exposure. (Appendix C provides detail on exposure doses and how they are calculated). Almost all properties exceeded ATSDR's MRL; exceedances occurred at a level from about 2 to 1,000 times higher than the MRL. The doses calculated for pica children exceed ATSDR's MRL by about 60 to 28,000 times. Considering the exposure and toxicity data, there is a potential for increased risk of adverse health effects for residents on these properties from past exposure. The estimated dose for the one property that has not been remediated is expected to be much lower, given that soil underneath the barn is most likely not accessed frequently.

All of the maximum concentrations detected at these properties exceeds ATSDR's cancer screening value of 0.40 ppm (see Table 2). Cancer risk was estimated based on average soil concentrations and lifetime exposure. Properties range from no increased risk of cancer to a moderate increased risk of cancer, depending largely on the concentrations detected. A lifetime exposure to these levels of PCBs, however, is unrealistic. The maximum number of years exposed is about 40 years, with many residents exposed for less than 40 years. ATSDR has determined that exposure to PCBs posed an increased risk of cancer for residents, depending largely on the concentration detected on the property, and the number of years the residents lived on that property before it was remediated.

Residential properties contaminated in the past with PCBs do not pose a current public health hazard because the affected soils have been removed to levels less than 1 ppm. These properties might have posed a public health hazard in the past, including an increased risk of cancer. These determinations are made on the basis of exposure and toxicity data that indicate a potential for increased risk of adverse health effects. A general discussion on potential health effects of PCB exposure is provided in the following section.

Potential Health Effects

Noncancerous health effects

PCBs have been associated with several adverse noncancerous health effects in humans and animals, including liver, thyroid, dermal and ocular changes, immunological alterations, neurodevelopmental changes, reduced birth weight, and reproductive effects. Some of the exposure doses estimated in this document are in the range of doses that have caused adverse health effects in animals [1,9–17].

Studies attempting to show the same health effects in humans that have been observed in animals have generally been inconclusive [2]. In general, some human studies have found associations between PCBs and

- neurobehavioral effects in children, particularly from pre-natal exposure or exposure during breast-feeding,
- hepatic (liver) effects in occupationally exposed adults,
- dermal and ocular effects in occupationally exposed adults and in a population that consumed PCB-contaminated rice oil,
- immunological susceptibility, particularly in infants exposed during gestation or breast-feeding, and
- reproductive effects, particularly in infants born to mothers who ate contaminated fish [2].

However, one study showed that humans potentially exposed to a dose of 70 – 140 μg/kg/day of PCBs for months to years showed no evidence of impaired health [18].

Cancer

PCBs are known to cause cancer in animals [2]; however, the evidence that PCBs cause cancer in humans is not as clear. The potential for PCBs to cause cancer has been investigated through human studies that have examined both occupational exposures and environmental exposures. Most of the studies that examined environmental exposures used biological levels of PCBs rather than environmental levels (i.e., blood samples instead of soil samples). Therefore, it is difficult to evaluate the PCB levels discussed in this document for its potential to cause cancer. However, *occupational* exposures to PCBs (usually at much higher levels than what is found in the environment) have been associated with liver, biliary tract, and intestinal and skin cancers [19-26].

In contrast to human studies, stronger evidence supports PCBs causing liver and thyroid cancer in animals [27–30], particularly from exposure to PCBs with 60% chlorine (e.g., Aroclor 1260) [31]. In addition, a more recent study showed that all 4 mixtures of Aroclors (Aroclors 1016, 1242, 1254, and 1260) induced liver tumors [32,33]. Using sufficient evidence of carcinogenicity in animals, PCBs have been classified as a probable human carcinogen by the U.S. Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC), and reasonably anticipated to be a human carcinogen by the National Toxicology Program (NTP).

Cancer risks were calculated using maximum and average PCB concentrations. Average concentrations may represent a more likely scenario for long-term cancer risk exposure,

especially when concentrations vary spatially [34], which was the case for most of the properties evaluated in this document.

Short-term exposure to carcinogens is an area of considerable debate and research; however, it is generally believed that any exposure factors less than what was used for the calculations will significantly decrease the calculated risk (e.g., exposed for a shorter time period; exposed to lower concentrations; exposed less frequently during the time period).

Cancer risk estimates (and their calculations) from exposure to PCBs can be found in Appendix C. However, several important limitations of using cancer risks should be kept in mind:

- Cancer risks do not determine or predict if you will develop cancer. They only determine if you may be at a higher risk.
- Cancer risks are population risks, not individual risks.
- The cancer risks calculated assume a worst-case exposure scenario for incidental ingestion.

PCB Blood Sampling

ATSDR funded GA EPD (in conjunction with Emory University and Floyd County Health Department) to collect blood samples for residents living on properties with PCB levels greater than 10 ppm. The purpose of the blood sampling was to analyze the level of PCBs in blood to characterize further any exposure to PCBs and the risk for adverse health effects. Samples were collected in October of 2001, and results of the blood testing were available in September 2002. A total of 29 persons were tested from five households. Seven samples were above 3 ppb – the detection limit for these samples [35, 36, and Dr. Wade Sellers, GA EPD and Dr. Howard Frumkin, Emory University, personal communication, 2002]. Four samples were within general background levels. That background levels of PCBs can range up to about 8 or 9 ppb in blood, although some new recent information shows background PCB levels declining with a mean (geometric) as low as 1.5 ppb, has been traditionally accepted in the scientific literature [2]. The other three samples were above background levels, 16.5 ppb, 35.1 ppb and 60.8 ppb; all three were from the same household and the highest result was from a former GE worker. GA EPD, Floyd County Health Department and Emory University determined that consumption of PCB-contaminated fish (from a unique residential exposure scenario) was most likely a significant factor relating to the elevated blood levels, rather than exposure to PCB-contaminated soil. Those persons with elevated blood PCBs were encouraged to discuss the results and any health concerns with a physician [35, 36, and Dr. Wade Sellers, GA EPD and Dr. Howard Frumkin, Emory University, personal communication, 2002]. The PCB-contaminated soils have been removed from the property; therefore, the soils no longer pose a health hazard.

GE also conducted a blood-sampling effort for PCBs among former workers in fall 2001. Although the purpose of this testing was to characterize occupational exposure, the results are summarized here to give an overview of worker exposure in comparison with the blood sampling effort for residential exposure summarized in the previous paragraph. A total of 447 former workers were tested. PCB results ranged from non-detect up to 240.3 ppb, with an average of 7.8 ppb. There were 173 (39%) samples where PCBs were not detected, and 236 (53%) samples were between 3 ppb (the detection limit) and 20 ppb. Thirty-eight (9%) samples were over 20 ppb, with an average among these workers of 38 ppb. These workers with elevated levels worked

directly with PCB oil. None of the office workers or factory workers had elevated PCB levels. About 4000 letters were mailed to former GE workers offering blood sampling; 447 were tested to give a response rate of about 11 % [37,38].

Child Health Considerations

During the evaluation of PCBs in residential soil, ATSDR used health guidelines specifically for children. Without evidence of the contrary, children's exposures were considered in past situations for all properties. ATSDR also considered a pica scenario for children, which is considered to be a conservative assumption.

PCB levels less than 1 ppm in soil pose no apparent public health hazard to children. However, if a child exhibits pica behavior, parents should take steps to reduce the behavior as a part of good public health practice. In the past, PCB levels greater than 1 ppm in soil might have been a public health hazard to children and to pica children.

Conclusions

- All properties with PCB levels greater than 1 ppm have been remediated to levels less than 1 ppm except for one property where cleanup permission has not been granted. These properties are not a current public health hazard. The properties might have been a public health hazard in the past. Future exposure is not expected to be a public health hazard given that properties have been remediated to less than 1 ppm of PCBs in soil.
- PCB blood sampling for residents who lived on properties with PCB levels greater than 10 ppm did not show elevated levels of PCBs in blood above background except for one home, where fish consumption was a likely contributor to exposure. PCB exposure is no longer occurring from residential soil at this home because the PCB-contaminated soils have been removed from the property.

Recommendations

- GE and GA EPD should continue to sample properties where residents provide information that PCBs may be present on their property. GE should continue to remediate properties with PCB levels above 1 ppm to be protective of public health.
- Residents should continue to request sampling if they believe that Pyranol or PCB-contaminated sludge is present on their property (call GA EPD's tollfree line: 1-888-869-1191).

Public Health Action Plan

Former Congressman Bob Barr petitioned ATSDR to perform a public health assessment of the PCB contamination at the General Electric site and surrounding areas in Rome, Georgia. Several agencies or entities are involved in public health activities at this site and interagency meetings are periodically held to coordinate these activities. ATSDR is working with the Georgia Environmental Protection Division (GA EPD), the lead agency for the site, to ensure that in response to the petition, the public health needs in Rome are met. Therefore, ATSDR has prepared this Public Health Action Plan to outline the completed and planned public health activities by ATSDR and other agencies.

Completed Activities

- ATSDR evaluated the hazard associated with the residential soil data collected by GE and GA EPD and reported the findings of the evaluation in this health consultation.
- In October 2001, ATSDR funded GA EPD (in conjunction with Emory University and Floyd County Health Department) to collect blood samples for residents living on properties with PCB levels greater than 10 ppm.
- In November 2002, GA EPD, Floyd County Health Department, and Emory University held a meeting in the community to discuss the blood results.
- ATSDR reviewed the PCB blood data and concurred with GA EPD and Emory University that the overall results were not atypical of background levels.
- GE sampled the soil at residences that had credible evidence of Pyranol (PCB waste oil) contamination. As of May 2004, GE had interviewed residents of 94 houses to determine suitability for soil sampling, and 42 residences had been sampled; the remaining 38 houses will not be sampled by GE. PCB levels from this sampling event ranged from non-detectable to 320,000 ppm.
- GA EPD sampled the soil at residences that had credible evidence of Pyranol contamination; however, less stringent criteria were applied. By May 2004, GA EPD had sampled 12 residences. During this sampling event PCBs were not detected at levels >1ppm at any residence.

Regulatory Investigations

- GE completed a RCRA Phase II investigation for GA EPD in February 2001.
- EPA completed sampling for a Superfund Expanded Site Investigation on GE in June and September, 2000, for surface water, soil, and sediment. The report was completed in December 2001. This investigation concluded that further evaluation under Superfund was warranted.
- EPA completed an Emergency Response and Removal Evaluation in November 2000 for soil and sediment in Tolbert Park, the creek behind West Central Elementary School, certain flood-prone residential properties on Horseleg and Little Dry Creeks, as well as other residential properties around and including the Anna K. Davie Elementary School. This evaluation found that emergency removal of soils in the areas investigated was not necessary, although there were concentrations of PCBs in Tolbert Park and the creek behind West

Central Elementary that were above long-term remedial goals. This evaluation did not include properties located along the Redmond Circle Corridor.

Off-site Sampling

- The City of Rome completed a surface-water investigation in 1999.
- GA EPD conducted sampling of sediment and soil in the Rome area in 1996/1997.
- GE conducted soil sampling at West End Elementary, West Central Elementary, and Tolbert Park between 1997 and 2001.
- GE conducted isolated sampling events of sediment and surface water in 1976 and 1994.

Community involvement and health education

- GA EPD has a community involvement specialist that has been working with members of the community and their concerns.
- EPA contracted Dr. Howard Frumkin of Emory University, in a joint effort with GA EPD, to provide physician and community health education.

Future Activities

- ATSDR will review the other available environmental data (on fish, sediment, surface water, and soil not linked to Pyranol contamination) if requested.
- GA EPD and GE will continue to sample residences at which soils show credible evidence of Pyranol usage.

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Appendix A: Evaluation of Environmental Contamination and Potential Exposure Pathways Methodology

Quality Assurance

In preparing this report ATSDR staff relied on the information provided in the referenced documents. ATSDR reviewed the available quality assurance and control data and determined that it was adequate for the purpose of this document.

Human Exposure Pathway Evaluation and the Use of ATSDR Comparison Values

ATSDR assesses a site by evaluating the level of exposure in potential or completed exposure pathways. An exposure pathway is the way chemicals may enter a person's body to cause a health effect. An exposure pathway must include all the steps between the release of a chemical and the population exposed: (1) a chemical release source, (2) chemical movement, (3) a place at which people can come into contact with the chemical, (4) a route of human exposure, and (5) a population that could be exposed. In this consultation, ATSDR evaluates incidental ingestion of PCBs from contaminated soil.

Comparison values are used as screening tools to evaluate environmental data relevant to exposure pathways. Comparison values are concentrations of contaminants that are considered to be not likely to cause health effects. Comparison values used in this document include ATSDR's environmental media evaluation guide (EMEG), and ATSDR's cancer risk evaluation guide (CREG). Comparison values are derived from available health guidelines, such as ATSDR's Minimal Risk Levels (MRLs) and EPA's Reference Doses (RfDs).

The derivation of a comparison value uses conservative exposure assumptions, resulting in values that are much lower than exposure concentrations that have been observed to cause adverse health effects. These comparison values are therefore protective of public health in essentially all exposure situations. That is, if the concentrations in the exposure medium are less than the comparison values, the exposures are not of health concern and no further analysis of the pathway is required. While concentrations below the comparison value are not expected to lead to any observable health effect, it should not be inferred that a concentration greater than the comparison value will necessarily lead to adverse effects. Depending on site-specific environmental exposure factors (for example, duration of exposure) and human activities that result in exposure (time spent in area of contamination), exposure to levels above the comparison value may or may not lead to a health effect. ATSDR's comparison values, therefore, are not used to predict the occurrence of adverse health effects.

The CREG is a concentration at which excess cancer risk is not likely to exceed one case of cancer in a million persons exposed over a lifetime. The CREG is a very conservative comparison value that is used as a screening value for cancer. Exposure to a concentration equal to or less than the CREG is defined as an insignificant risk and is an acceptable level of exposure over a lifetime.

Aroclor 1260 was the predominant PCB mixture that was detected in the soil samples. However, there are no comparison values specific for Aroclor 1260. ATSDR's comparison values are derived from studies using Aroclor 1254. In the absence of other information, the comparison values for Aroclor 1254 are used for screening purposes in this document. ATSDR typically uses

Aroclor 1254 screening values for health documents that evaluate any type of PCBs or PCB mixtures.

Selecting Contaminants of Concern

Contaminants of concern (COCs) are the site-specific chemical substances that the health assessor selects for further evaluation of potential health effects. Identifying contaminants of concern is a process that requires the assessor to examine contaminant concentrations at the site, the quality of environmental sampling data, and the potential for human exposure. A thorough review of each of these issues is required to accurately select COCs in the site-specific human exposure pathway. The following text describes the selection process.

In the first step of the COC selection process, the maximum contaminant concentrations are compared directly to health comparison values. ATSDR considers site-specific exposure factors to ensure selection of appropriate health comparison values. If the maximum concentration for a chemical was less than the health comparison value, ATSDR would conclude that exposure to that chemical was not of public health concern; therefore, no further data review would be required for that chemical. However, if the maximum concentration was greater than the health comparison value, the chemical would be selected for additional data review, as a contaminant of concern (COC). In addition, any chemicals detected that did not have relevant health comparison values would also be selected as a COC.

ATSDR comparison values have not been developed for some contaminants, and, based on new scientific information, other comparison values may be used that are appropriate for the specific type of exposure (e.g., EPA's Maximum Contaminant Levels (MCLs) for drinking water).

The next step of the process requires a more in-depth review of data for each of the contaminants selected. Factors used in the selection of the COCs include the number of samples with levels above the minimum detection limit, the number of samples with detections above an acute or chronic health comparison value, and the potential for exposure at the sampling location.

Appendix B: Exposure Doses and Cancer Risk Estimates

Exposure Doses (for noncancerous health effects)

The levels of PCBs detected were above at least one of ATSDR's comparison values for non-cancerous health effects at all of the properties. These comparison values (CVs) are very conservative levels, at which ATSDR believes is safe for exposure. Evaluating the potential for health effects involves using a more realistic exposure scenario with site-specific conditions, if known. Doses were calculated to estimate the average daily dose for an adult, child, and pica child exposed to the maximum concentration of PCBs. Several examples of exposure doses can be found in Table B1 of this appendix. The following are the assumptions used in the calculations:

Concentration (C): Maximum concentrations at each property were used

Ingestion rate (IR): Adult - 50 mg/day (From EPA's Exposure Factors Handbook [2])

Child - 200 mg/day

Pica child - 5,000 mg/day

Body weight (BW): Adult - 70 kg (From EPA's Exposure Factors Handbook [2])

Child - 16 kg

Exposure frequency (EF):

Surface soil in yard = {(5 days/week) x (50 weeks/year) x (40 years)* / (365 days/year) x (40 years)*}= 0.68

Crawlspace soil = {(1 day/week) x (50 weeks/year) x (40 years)*/ (365 days/year) x (40 years)*}= 0.14

* 70 years is used if the property is not remediated

Equation:

$$ED\,(mg/kg/day) = \frac{C\,(mg/kg) \times IR\,(mg/day) \times EF \times CF\,(1E-6)}{BW\,(kg)} \times 1000\,(ug/kg)$$

Where: ED= exposure dose

C = contaminant concentration

IR = ingestion rate

EF = exposure frequency

CF = conversion factor (A conversion factor of 10-6 kg/mg is required to convert the soil contaminant concentration (C) from mg/kg soil to mg/mg soil.

BW = body weight

Example equations:

Adult - crawlspace soil

$$ED(ug/kg/day) = \frac{48.0(mg/kg) \times 50(mg/day) \times 0.14 \times 1E-6(kg/mg)}{70(kg)} \times 1000(ug/kg) = 0.0048ug/kg/d$$

B. Adult - soil in yard

$$ED(ug/kg/day) = \frac{35.0(mg/kg) \times 50(mg/day) \times 0.68 \times 1E-6(kg/mg)}{70(kg)} \times 1000(ug/kg) = 0.017ug/kg/da$$

C. Child - soil in yard

$$ED(ug/kg/day) = \frac{35.0(mg/kg) \times 200(mg/day) \times 0.68 \times 1E-6(kg/mg)}{16(kg)} \times 1000(ug/kg) = 0.30ug/kg/da$$

D. Pica child - soil in yard

$$ED(ug/kg/day) = \frac{35.0(mg/kg) \times 5000(mg/day) \times 0.68 \times 1E-6(kg/mg)}{16(kg)} \times 1000(ug/kg) = 7.4ug/kg/da$$

Cancer Risk Estimate Examples (for cancerous health effects)

Most of the levels of PCBs detected were above ATSDR's comparison value for cancer (CREG) which is 0.4 mg/kg or ppm. This is a very conservative level at which ATSDR believes is safe for exposure. Initial screening with CREGs are based on continuous exposure for a lifetime (70 years). Evaluating cancer risk involves using a more realistic exposure scenario that considers site-specific conditions, if known. Several examples of Cancer Risk Estimates can be found in Table B1 of this appendix. The following assumptions were used:

Exposure duration – 40 years.

Ingestion rates, body weights, and frequency of exposure are the same for exposure doses.

The Cancer Slope Factor for ingestion determined to be the most applicable for this situation is 2.0 mg/k/day-1. Please see the following:

The upper reference point (2 per mg/kg-d) is appropriate for food chain exposure, sediment or soil ingestion, and dust or aerosol inhalation; these are exposure pathways for which environmental processes are likely to increase risk. Due to potential for higher sensitivity early in life, the upper reference point is also used for all early-life exposure. The middle reference point (0.4 per mg/kg-d) is appropriate for drinking water ingestion and vapor inhalation; these are exposure pathways for which environmental processes are likely to decrease risk. The lowest reference point (0.07 per mg/kg-d) should not be used without specific information on the congener composition of the mixture. The second tier is invoked when there are congener or isomer analyses for the mixture of interest. The lowest reference point (0.07 per mg/kg-d) can be used if these analyses verify that congeners with more than four chlorines comprise less than one-half percent of total PCBs, as well as the absence of dioxin-like, tumor-promoting, and persistent congeners. When congener

concentrations are available, the slope-factor approach can be supplemented by analysis of dioxin TEQs to evaluate dioxin-like toxicity. [2].

Equations:

$$\text{Lifetime Average Daily Dose (LADD)} = \frac{\text{Exposure Dose (µg/kg/day)} \times \text{Exposure Duration (years)}}{\text{70 years}}$$

$$\text{Cancer Risk Estimate (CRE)} = \text{LADD (µg/kg/day)} \times \text{Cancer Slope Factor (CSF) (mg/kg/day}^{-1}\text{)}$$

Example Equations:

Crawlspace Soil Lifetime Average Daily Dose (LADD)

$$\text{LADD} = \frac{0.0048\text{(µg/kg/day)} \times 40\text{ (years)}}{\text{70 years}} = 0.0027\ \text{µg/kg/day}$$

Yard Surface Soil Lifetime Average Daily Dose (LADD)

$$\text{LADD} = \frac{0.017\text{(µg/kg/day)} \times 40\text{ (years)}}{\text{70 years}} = 0.0097\ \text{µg/kg/day}$$

Add the Crawlspace LADD and the Yard Surface Soil LADD to get total LADD:

Total LADD = 0.0027 µg/kg/day + 0.0097 µg/kg/day = 0.0124 µg/kg/day =1.24E-5 mg/kg/day

Cancer Risk Estimate = 1.24E-5 mg/kg/day x 2.0 mg/kg/day-1 = 2.48E-5

A Cancer Risk Estimate of 2.48E-5 is rounded to 2.0E-5 and represents No apparent increased cancer risk. (See Table B2 for cancer risk categories).

Table B-1. Exposure doses and cancer risk estimate examples.

Property #	*Maximum concentration (ppm or mg/kg)*	*Estimated high-end exposure dose (µg/kg/day)* *MRL= 0.02 µg/kg/day*			*Cancer Risk Estimate (EPA's Cancer Slope factor = 2.0 mg/kg/day)*					
		Adult	**Child**	**Pica child**	**Maximum Concentrations (at left)**			**Average Concentrations**		
					LADD[1]	**Cancer Risk (of sum of LADDs)[2]**		**LADD[1]**	**Cancer Risk (of sum of LADDs) [2]**	
4	**48 (crawlspace)**	**0.0048**	**–**	**–**	**2.74E-6**	**2.0E-5**	**No apparent increased risk**	**1.20E-6**	**7.0E-6**	**No increased risk**
	35 (yard)	**0.017**	**0.30**	**7.4**	**9.71E-6**			**2.41E-6**		
13	**66 (garden area)**	**0.032**	**0.56**	**14.0**	**3.20E-5**	**6.0E-5**	**Low increased risk**	**6.02E-6**	**1.0E-5**	**No apparent increased risk**
16	**100 (garden area)**	**0.049**	**0.85**	**21.3**	**2.80E-5**	**6.0E-5**	**Low increased risk**	**8.47E-6**	**2.0E-5**	**No apparent increased risk**
18	**24000 (crawlspace)**	**2.4**	**–**	**--**	**2.40E-3**	**5.0E-3**	**Moderate/High increased risk**	**5.97E-4**	**2.0E-3**	**Moderate increased risk**
	390 (yard)	**0.2**	**3.3**	**82.9**	**2.00E-4**			**1.89E-4**		
21	**3000 (crawlspace)**	**0.3**	**--**	**--**	**1.71E-4**	**3.0E-4**	**Low increased risk**	**5.09E-5**	**1.0E-4**	**Low increased risk**
	5.5 (yard/garden)	**0.003**	**0.047**	**1.17**	**1.71E-6**			**3.33E-7**		
47	**1700 (crawlspace)**	**0.2**	**--**	**--**	**2.00E-4**	**3.0E-3**	**Moderate increased risk**	**9.72E-5**	**1.0E-3**	**Moderate increased risk**
	2600 (yard)	**1.3**	**22.1**	**552.5**	**1.30E-3**			**4.60E-4**		

[1]LADD = Lifetime Average Daily Dose. Based on adult exposure doses because it represents lifetime exposure more accurately than child doses.

[2] Cancer Risks are rounded to the nearest whole number in order to assign a risk category.

Table B2. Risk Categories Used by ATSDR [3]

Category	***Fraction***	***Exponential equivalent***
No increased risk	< 1/100,000	< 1E-05
No apparent increased risk	1/100,000	1E-05
Low increased risk	1/10,000	1E-04
Moderate increased risk	1/1,000	1E-03
High increased risk	1/100	1E-02
Very high increased risk	> 1/100	> 1E-02

References for Appendix B

[1] Environmental Protection Agency. Volume I - General factors. Exposure factors handbook. Washington, DC: National Center for Environmental Assessment, Office of Research and Development. EPA/600/P-95/002Fa; 1997.

[2] Environmental Protection Agency. PCBs: Cancer dose-response assessment and application to environmental mixtures. Washington DC: National Center for Environmental Assessment, Office of Research and Development. EPA/600/P-96/001F; 1996.

[3] ATSDR Decision Statement. Tox 14. Draft. QAA-27. Revised Oct. 21, 1991.

Appendix C: Best Public Health Practice

Any reduction in exposure to PCBs, no matter how small, will reduce the overall total exposure to PCBs and will be protective of public health. The following recommendations are made for residents interested in using good public health practices that will reduce human exposure to PCBs in soil:

1. Wear long sleeved shirts, long pants, gloves, socks, and shoes when gardening or doing yard work.
2. Change and launder clothes and wash hands following outdoor activities, such as gardening and yard work.
3. Wash children's hands and change and launder children's clothes immediately following outdoor activities, such as playing in the yard.
4. Discourage children from eating soil and putting their dirty hands or fingers in their mouths.
5. Rinse homegrown vegetables thoroughly with water or a 5% vinegar solution before eating or cooking.
6. Do not store food in crawlspaces where PCBs have been detected.
7. Do not use rainwater drained from the property for any domestic purpose.
8. Use the following pica guidelines for parents to reduce their child's pica behavior when possible, as well as the guidelines above:
    a. Supervise children closely to prevent ingestion of dirt and other materials when playing outdoors.
    b. Feed children a well-balanced diet.
    c. Have children with frequent pica behavior checked by a physician for nutritional deficiencies.
9. For more information on PCBs, see the following ATSDR resources:
    a. ToxFAQ on PCBs – http://www.atsdr.cdc.gov/tfacts17.html
    b. Public Health Statement on PCBs – http://www.atsdr.cdc.gov/toxprofiles/phs17.html

Appendix D: Responses to Public Comments

ATSDR issued a draft for the public comment petitioned public health consultation on April 8, 2002 for the General Electric site. Between April 8, 2002 and May 22, 2002, the public had the opportunity to provide comments on the draft public health consultation. ATSDR received written comments and questions from the General Electric Facility and the Environmental Protection Agency (EPA). Where possible, these comments and questions are presented unchanged below. However, for the sake of clarity and brevity, some comments or questions were paraphrased or summarized, and are marked as such at the beginning of the sentence. The full correspondence is available upon request. Each italicized comment or question is followed by a response from ATSDR.

Comments from EPA

Comment: Page 2, "Residential Soil Sampling Results": Additional data exist on this subject now that should be considered. There are additional properties that have been tested by GE, one in particular that was found to have soil concentrations up to 320,000 ppm PCBs. This data, along with all of the corresponding blood results for all of the residents tested in these homes, should be evaluated before the report is made final.

Response: ATSDR has added and evaluated all additional data in this final health consultation.

2. Comment: Page 13, "EPA Investigations", first bullet: "EPA" should be changed to "GE".

Response: Change completed.

3. Comment: Page 13, "EPA Investigations", third bullet: Please reword this paragraph to read the following: "EPA completed an Emergency Response and Removal Evaluation in November 2000 for soil and sediment in Tolbert Park, the creek behind West Central Elementary School, certain flood-prone residential properties on Horseleg and Little Dry Creeks, as well as other residential properties around and including the Anna K. Davie Elementary School. This evaluation found that emergency removal of soils in the areas investigated was not necessary, although there were concentrations of PCBs in Tolbert Park and the creek behind West Central Elementary that were above long-term remedial goals. This evaluation did not include properties located along the Redmond Circle Corridor."

Response: Change completed.

4. Comment: Page 13, "Other Off-site Sampling", first bullet: Please be more specific as to the areas included in the surface water investigation by the City of Rome in 1999.

Response: Since this document focuses on the soil exposure pathway, ATSDR does not have more detailed information regarding the surface water investigation. Please contact the City of Rome for more information about their surface water investigation.

5. Comment: Page 13, Last bullet: This bullet should read "EPA has contracted Dr. Howard Frumkin of Emory University, in a joint effort with EPD, to provide physician and community health education." (The contract was out of EPA, not EPD).

Response: Change completed.

Comments from General Electric Facility

6. Comment: ATSDR needs to be consistent with its own guidelines. And Comment: The ATSDR PHC does not recognize the body of data on other sites with PCB soil contamination that demonstrates that the potential for exposure is not significant.

Response: ATSDR conducts health assessments based on **site specific** exposure conditions, so assessments may vary from site to site. However, the PCB assessment in this document is consistent with other sites where ATSDR has evaluated PCB exposure. For example, levels of PCBs greater than 10 ppm in soil has triggered EPA emergency removal actions in Anniston, Alabama. EPA's value of 1ppm PCBs in soil (Recommended Soil Action Level) has been used as a cleanup value for PCBs in residential soil at other sites.

7. Comment: ATSDR fails to reflect the facts and current status of the residential sampling and cleanup program.

Response: The final version of this health consultation updates all residential soil sampling activities and clean-up efforts as of May 2004.

8. Comment: ATSDR's use of comparison values provides a distorted view of potential risk.

Response: Comparison values are only used as screening values to select contaminants for further evaluation. ATSDR health calls are based on a further evaluation of toxicological data and exposure information.

9. Comment: Pica soil ingestion is not a realistic surrogate for child exposure.

Response: ATSDR agrees that pica behavior is largely confined to young children and would not occur for a 40-yr period. Therefore, the estimated pica exposures were compared to an intermediate exposure MRL (14 days – 1 year). Also, ATSDR assumed that children would not have access to crawlspaces. When pica exposure dose estimates are compared to the intermediate MRL rather than the chronic MRL, there is not a change in our conclusions.

10. Comment: ATSDR's treatment of soil ingestion is not consistent with the most applicable data and current science.

Response: ATSDR used standard default values for soil ingestion as presented in ATSDR's Public Health Assessment Guidance Manual. The EPA uses similar values in their Risk Assessment Guidance for Superfund (RAGS). These are not meant to be average exposure values. Rather, they represent exposure to the most highly exposed segment of the population. ATSDR assessments are intentionally conservative to be protective of public health.

11. Comment: ATSDR's exposure duration of 70 years is extreme and contradicted by EPA.

Response: As indicated in Appendix C of this health consultation, ATSDR assumed a residential exposure of 40 years, not 70 years. Using 40 years for an exposure duration is conservative and protective of public health, and in the case of these exposure scenarios, not unrealistic. Exposure to PCBs in Pyranol applied at residences may have occurred as early as the 1960s. If residents still live in the same house, the exposure duration can be up to about 40 years.

12. Comment: The health consultation overstates the exposure point concentrations – ATSDR should follow US EPA example on spatial averaging in order to calculate potential exposure.

Response: ATSDR uses maximum concentrations to be protective of public health. If the maximum concentration was found in a garden, it is more accurate to use the maximum to estimate an exposure dose than it would be to take an average (averaging areas the resident is not exposed to).

13. Comment: ATSDR overstates the toxicity values for PCBs. Toxicity of PCBS is not nearly as high as that indicated by the cancer slope factor and MRL used in the health consultation.

Response: ATSDR relied on the MRL values for PCBs that were derived in ATSDR's Toxicological Profile. This document, including the MRLs, underwent extensive external peer review.

14. Comment: Page 2, first paragraph: GE should be listed as one of the participants (along with GA EPD, EPA, Emory University, and the Floyd County Health Department) in the collection of site sampling data prior to ATSDR's involvement.

Response: The paragraph was changed to: "The Georgia Environmental Protection Division (GA EPD), the U.S. Environmental Protection Agency (EPA), Emory University, the Floyd County Health Department, and General Electric (GE) have been involved with PCB contamination related to the GE facility before ATSDR was petitioned to perform a public health assessment."

15. Comment: Page 2, third paragraph, third sentence: For accuracy, sample concentrations ranged from below detection limit (BDL) up to 24,000 ppm. Therefore, the words **"from below detection limits"** should be inserted between "ranging" and "up" in this sentence.

Response: The sentenced was changed to: "Between September 2000 and October 2001, PCBs were detected at 14 of the 24 residences sampled at levels ranging from below detection limits up to 24,000 parts per million (ppm)."

16. Comment: Page 6, last paragraph, end of the second sentence: A new third sentence should be added as follows: "The properties containing surface soil concentrations below 1 ppm are all below GA EPD's reporting threshold concentration for PCBs of 1.55 ppm, indicating that these properties are not viewed as a concern form GA EPD's perspective".

Response: This health consultation is an ATSDR evaluation of PCB soil data to determine the potential for public health hazards. The GA EPD reporting threshold does not assist ATSDR with this evaluation.

17. Comment: Page 7, fourth paragraph: GE has already commented on the inappropriateness of a 70-year exposure duration given the survey information provided by US EPA (in the 1997 Exposure Factors Handbook) that suggests exposure durations far lower (approximately 9 years for the average, and 40 years for an upper-percentile). The following sentence should be added to the end of the fourth paragraph on page 7: "It should be noted that a person living at a particular property for a duration less than the 40-year or 70-year duration used by ATSDR in its calculations would have a lower dose estimate than that provided by ATSDR's theoretical calculations".

Response: The number of years is only one part of the calculation for an exposure factor, and it is not the driver for the exposure doses that were calculated. Exposure factors for noncancerous health effects for surface soil, for example, were as follows:

EF = (5 days/week x 50 weeks/year x 40 years) / (365 days/yr x 40 years)

The 40 years cancel out, therefore the exposure factor would be the same no matter what number of years were used for the calculation. The purpose of an exposure factor is to determine the frequency of exposure and come up with a ratio to use in the exposure dose calculation that would be more specific to site and the exposure pathway. Different exposure factors were used for the surface soil exposure dose calculation than the crawlspace soil exposure dose calculation.

For cancer risk calculations, either 40 or 70 years were used as the exposure duration, averaged over a lifetime of 70 years. Therefore a ratio of either .57 (40 years/70 years) or 1 (70 years/70 years) were used based on whether there was potential for future exposure. Again, the exposure duration was not the driving factor in these calculations. Recalculating the cancer risk using .13 (9 years/70 years) would not change the conclusions on cancer risk.

18. Comment: Page 8, second paragraph (italicized) containing ATSDR's concluding remarks on "Properties with Maximum Levels of PCBs Greater than 10 ppm": GE finds these several statements unnecessarily alarming and inaccurate. As discussed earlier in this response, GE is involved with a substantially expanded list of properties that it has or is in the process of addressing and remediating. Moreover, the general location of the highest PCB surface soil concentrations has tended to be along dwelling foundation perimeters and in crawlspace areas. Such locations are unlikely to experience regular and sustained human contact. As discussed above, GE believes that the exposure analysis and toxicity values used by ATSDR are inappropriate. Accordingly, GE recommends that the second paragraph on page 8 be reconsidered in light of our comments.

Response: ATSDR used exposure factors based on EPA and ATSDR guidance, and toxicity information from ATSDR's toxicological profile – a peer reviewed clearinghouse of PCB scientific literature. ATSDR believes exposure to crawlspace would be infrequent; therefore an exposure frequency of 1 day per week was used for adults. No exposure to crawlspace soil was used in the calculations for children's exposure. The doses calculated were appropriate for a residential scenario.

19. Comment: Page 10, Conclusions 1 & 2. GE disagrees with both of these conclusions. We believe that ATSDR should reconsider the conclusions of this Health Consultation in light of our comments herein and our recommendations below.

Response: ATSDR has considered the information given to us by GE. New site information has been incorporated in this final health consultation and has changed our conclusion from a current public health hazard to a past public health hazard. No other conclusions or information used to form our conclusions has changed.

20. Comment: Recommendations for HC: GE urges ATSDR to revise the PHC as discussed in these comments. First and foremost, the PHC should be revised to take account of the residential sampling and remediation program that has been completed and that portion that is ongoing as described above. In addition, GE submits that, in discussing exposures and potential health effects under past and current site conditions the PHC should be revised to: (1) modify, clarify, and quantify the exposure estimates consistent with the comments provided herein; (2) reference and take account of the recent comprehensive weight-of-evidence assessments of potential PCB cancer and non-cancer effects described in the discussion on PCB toxicity herein and provided to

ATSDR on December 6, 2001; and (3) use the revised MRL for PCBs described in the *Non-Cancer Effects of PCBs* above.

Response: This is a summary of the previous comments made. Please see the ATSDR responses to the previous comments.