



Public Health Assessment for

Evaluation of Off-Site Surface Soil Data from
Adjacent Residential Properties

SONFORD PRODUCTS SITE
FLOWOOD, RANKIN COUNTY, MISSISSIPPI
EPA FACILITY ID: MSD086556388
DECEMBER 8, 2008

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE**

Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was 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 public health assessment has now been reissued. This concludes the public health assessment 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.

Agency for Toxic Substances & Disease Registry Julie L. Gerberding, M.D., M.P.H., Administrator
Howard Frumkin, M.D., Dr.P.H., Director

Division of Health Assessment and Consultation..... William Cibulas, Jr., Ph.D., Director
Sharon Williams-Fleetwood, Ph.D., Deputy Director

Health Promotion and Community Involvement Branch.....Hilda Shepeard, Ph.D., M.B.A., Chief

Exposure Investigations and Consultation Branch..... Susan M. Moore, M.S., Chief

Federal Facilities Assessment Branch..... Sandra G. Isaacs, B.S., Chief

Superfund and Program Assessment Branch Richard E. Gillig, M.C.P., Chief

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Prepared by:

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

STATEMENT OF ISSUES AND BACKGROUND

Statement of Issues

The Agency for Toxic Substances and Disease Registry (ATSDR) prepared this public health assessment to evaluate, based on the information currently available, any known or potential adverse human health hazards related to exposures to chemicals in off-site surface soil collected from properties adjacent to the Sonford Products Site. The majority of the properties sampled are residential parcels located to the west of the Sonford Products Site. In addition, surface soil was also collected from a parcel of land containing the Town of Flowood municipal drinking water well. The town-owned land is located adjacent to the other residential properties to the west of the site.

The U.S. Environmental Protection Agency (EPA) has listed the Sonford Products Site on its National Priorities List of hazardous waste sites. ATSDR is mandated by Congress to conduct public health activities at sites that EPA lists on its National Priorities List.

Background

The Sonford Products Site is located on approximately six acres at 3506 Payne Drive in Flowood, Rankin County, Mississippi. From 1972 to 1985, two separate chemical processing plants operated on the property: Sonford International and Sonford Products. Both businesses were involved with processing solid pentachlorophenol (PCP) into liquid formations. Sonford International, operating from 1972 to 1980, produced a water-soluble product used for short-term mildew protection of wood. Sonford Products, operating from 1972 to 1985, produced an oil-based product for long-term mildew protection of wood. In addition, Sonford Products also produced several pest control products. Both Sonford plants are no longer in operation. Currently, a septic tank business leases the property (1).

Currently, the site contains a multi-unit apartment house and mobile trailer that have been used for residential purposes in the recent past. The entire site, including property utilized by both Sonford International and Sonford Products is referred to as the Sonford Products Site in this public health assessment (1).

There is a residential community to the west of the site. These homes receive their drinking water from the municipal water supply for the City of Flowood. EPA is continuing its evaluation of the groundwater in the area at this time (1).

Summary of ATSDR's Previous Evaluation of Surface Soil on the Sonford Products Site (On-Site Surface Soil)

In April 2007, EPA requested technical assistance from ATSDR regarding the evaluation of dioxins in surface soil on the Sonford Products Site. Specifically, EPA requested (1) an assessment of whether dioxins in surface soil pose a public health concern for residents living on the site and whether soil cleanup activities are warranted to protect public health and (2) preparation of health education materials aimed at providing people living within the site boundary at the time with information on ways that they could reduce and/or mitigate their exposures to chemicals prior to EPA's planned remediation of the site soils.

To provide technical assistance to EPA, ATSDR evaluated eight on-site surface soil samples collected by EPA in August 2006. The samples were analyzed for semi-volatile organic compounds, dioxins, pesticides, and inorganic compounds.

According to EPA, several individuals lived on the site at the time. Two male workers of the septic tank business lived in a trailer near the former PCP process area. Additionally, a woman (also employed by the septic tank business) and her young daughter lived in a multi-dwelling apartment house on the site. Based on information provided by EPA, there may have been as many as three children and two adults residing in the building or visiting the building on occasion.

Based on the evaluation of site data and site-specific information provided by EPA, ATSDR concluded that residents living on the site property (within the site boundary) may be at risk for adverse health impacts due to the presence of dioxins in surface soil. ATSDR concurred with EPA's position that action is necessary to prevent exposures to harmful levels of dioxins in on-site surface soil and protect public health (2). ATSDR also met with owners, workers, and residents to provide them with information on ways to reduce their exposure to chemicals in soil prior to EPA clean-up measures being taken. During EPA's remedial investigation, residents of the apartment building vacated the home. The Town of Flowood also declared the building as condemned and unlivable. The workers who were living on the facility property inside the trailer had also moved off the site. However, EPA re-visited the site in June 2008 to collect additional samples and observed the workers living on the site property.

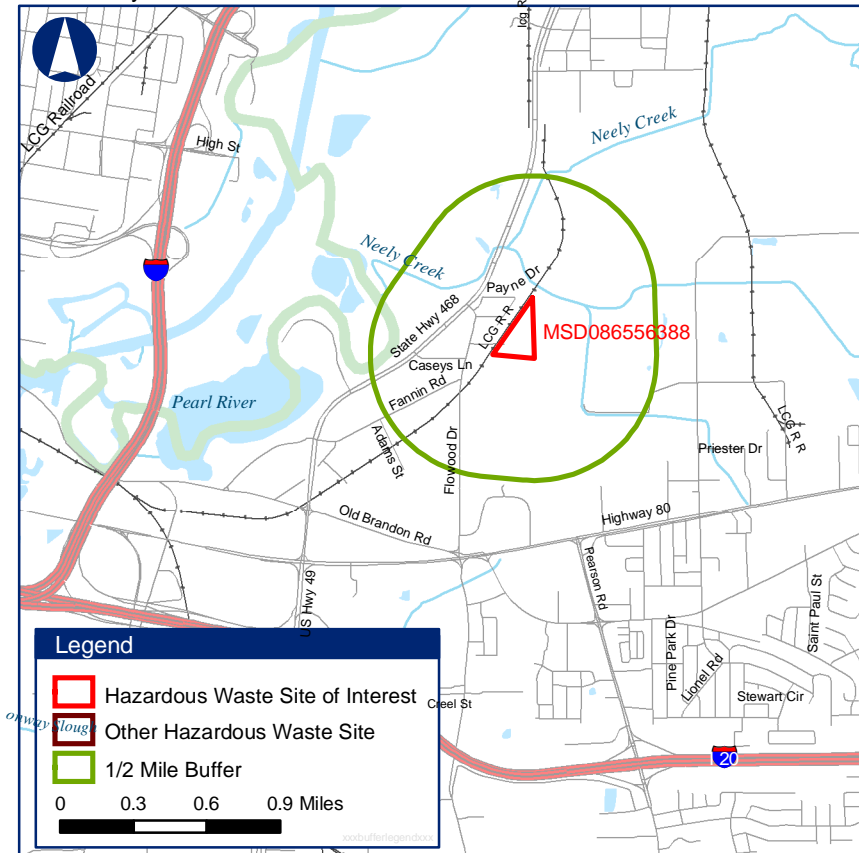
Additional details about ATSDR's efforts at this site are presented in the "Community Concerns" section of this public health assessment.

Land Use and Demographics

According to U.S. 2000 Census data, 510 people live within a half-mile radius of the site. Approximately 68% of this population, or 345, are white. Also, 59 are children age 6 and under, and 24 are adults over age 65. A total of 267 housing units are within a half-mile of the site area. Additional demographic information for the community in the vicinity of the site is presented in the following figure.

Sonford Products Site Flowood, MS

EPA Facility ID: MSD086556388



Site Location: Rankin County, MS



Demographic Statistics

Within Area of Concern*

1/2mi

Total Population	510
White Alone	345
Black Alone	143
Am. Indian & Alaska Native Alone	1
Asian Alone	8
Native Hawaiian & Other Pacific Islander Alone	0
Some Other Race Alone	6
Two or More Races	6
Hispanic or Latino**	18
Children Aged 6 and Younger	59
Adults Aged 65 and Older	24
Females Aged 15 to 44	156
Total Housing Units	267

Base Map Source: Geographic Data Technology, May 2005.

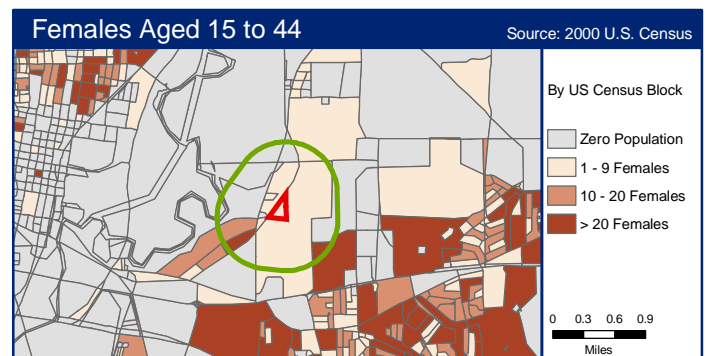
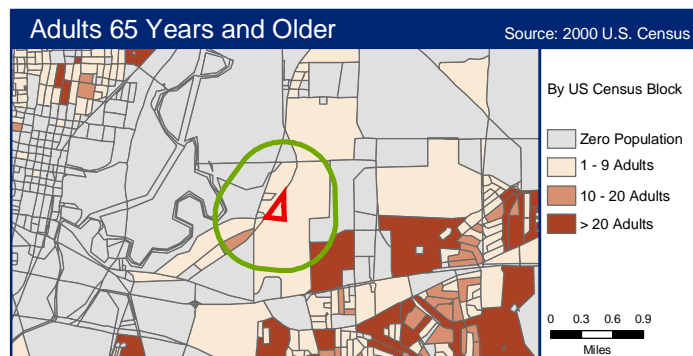
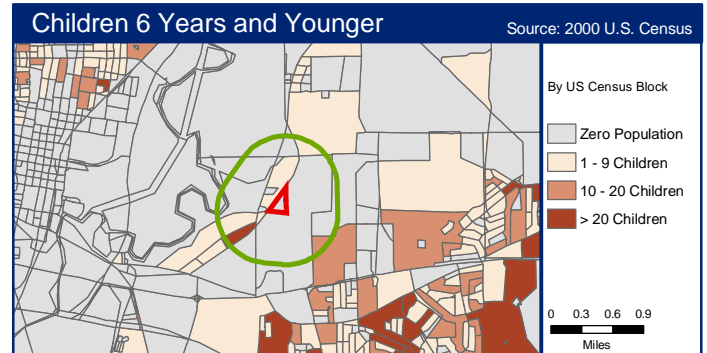
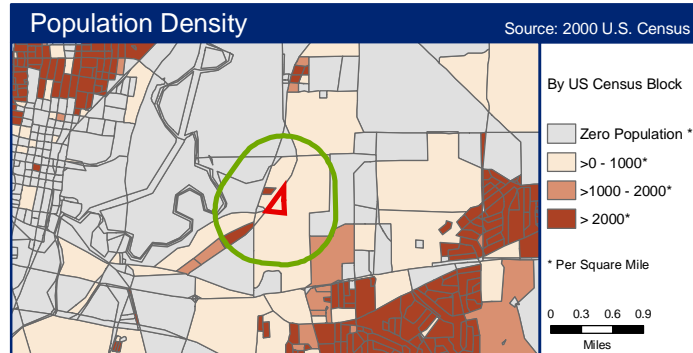
Site Boundary Data Source: ATSDR Geospatial Research, Analysis, and Services Program,
Current as of Generate Date (bottom left-hand corner).

Coordinate System (All Panels): NAD 1983 StatePlane Mississippi West FIPS 2302 Feet

Demographics Statistics Source: 2000 U.S. Census

* Calculated using an area-proportion spatial analysis technique

** People who identify their origin as Hispanic or Latino may be of any race.



<project=03240><userid=JXA0><geo=Rankin County, MS><keywords=MSD086556388, Sonford>

ENVIRONMENTAL DATA

As part of this public health assessment, ATSDR evaluated primarily residential (off-site) surface soil samples collected by EPA in May 2007. These samples were collected to determine whether surface soil, located on residential parcels west of the site and one town-owned parcel, have been impacted by chemicals associated with the former operations at the Sonford Products Site.

Samples were collected from 22 residential parcels during EPA's May 2007 sampling event. In addition, surface soil from property containing the Town of Flowood municipal water well was also sampled at the time. A total of 23 composite surface soil samples were collected from a 0 to 0.5 foot below land surface. The composite soil sample consisted of six aliquots (or individual samples) collected from each property. Typically, two aliquots were collected from the front yard, two from the backyard, and one from each of the side yards. In some situations because of the parcel size and shape, the number of aliquots varied. Samples were analyzed for semi-volatile organic compounds, pesticides, as well as classes of chemicals known as dioxins and furans (3).

PATHWAY ANALYSIS

ATSDR's pathway analysis determines whether people have come into contact with chemicals from a site and whether these contacts were substantial enough to cause harm. To make this determination, ATSDR identifies exposure pathways or ways in which chemicals in the environment could enter a person's body.

As outlined in ATSDR's Public Health Assessment Guidance Manual, an exposure pathway contains five major elements:

1. a source of contamination,
2. transport through an environmental medium,
3. a point of exposure,
4. a route of exposure, and
5. an exposed population.

If an exposure pathway contains all five elements and exists now or did exist in the past, the pathway is considered complete. Completed exposure pathways are evaluated further by ATSDR to determine whether health effects could occur. An exposure pathway is considered incomplete and is eliminated from further evaluation when exposure is highly unlikely to occur (4). ATSDR has identified the residential surface soil exposure pathway as a completed pathway for the Sonford Products Site. Therefore, this pathway has been considered further in this public health assessment.

Adults and children living in the vicinity of the Sonford Products Site may come in contact with chemicals in their residential soil during typical daily activities. Adults may come in contact with soil as a result of gardening and children may be exposed while playing. These individuals may incidentally ingest soil particles, inhale fugitive dust, or come in direct skin contact with chemicals in soil from their yards. Therefore, the ingestion, inhalation, and direct skin contact routes of exposure have been considered by ATSDR as part of this evaluation.

DISCUSSION

The first step in ATSDR's evaluation process is to select the chemicals of concern, also described as the chemicals that require further evaluation. ATSDR selects chemicals of concern on the basis of whether the maximum detected concentrations of the chemical are found to exceed applicable, health-based comparison values. A chemical found to exceed a comparison value indicates that a more detailed analysis is necessary for that chemical. Levels of chemicals greater than comparison values do not necessarily mean that adverse health effects will occur. The amount of the chemical, the duration of exposure, the route of exposure (i.e., ingestion, inhalation, and direct skin contact), and the health status of exposed individuals are also important factors in determining the potential for adverse health effects. Instead, when concentrations of a chemical exceed comparison values, a more detailed assessment of the site-specific exposure factors is necessary. A complete discussion of ATSDR's evaluation process for chemicals that exceed health-based comparison values is presented in Appendix A of this public health assessment.

ATSDR evaluated surface soil samples collected from 23 parcels. These samples were analyzed for semi-volatile organic compounds, pesticides, as well as classes of chemicals known as dioxins and furans. Chemicals that exceed health-based comparison values are presented in Table 1.

Table 1. Off-site (primarily residential) surface soil – Chemicals detected above health-based Comparison Values

CONTAMINANT	Milligrams per kilogram (µg/kg)		Comparison Value & Source	FREQUENCY of DETECTION ³	FREQUENCY DETECTED ABOVE CV ⁴
	Minimum	Maximum			
Dieldrin	ND	130	40 (CREG ¹)	3/23	1/23
Heptachlor epoxide	ND	89	80 (CREG ¹)	6/23	1/23
Dioxin TEQs	0.012	0.20	0.050 (Chronic EMEG Child ²)	23/23	9/23

Notes:

¹Cancer Risk Evaluation Guide (or CREG) is a comparison concentration that is based on the risk of cancerous effects and is derived from EPA's cancer slope factors.

²Chronic Environmental Media Evaluation Guide Child (or Chronic EMEG Child) is a comparison concentration below which adverse non-cancer health effects are not expected from long-term exposure. These values are derived by ATSDR from its toxicological profiles.

³Frequency of Detection = Number of samples in which the chemical was detected / Total number of samples collected

⁴Frequency Detected Above Comparison Value = Number of samples in which the chemical was detected above an applicable comparison value / Total number of samples collected

A more detailed discussion of the types of chemicals detected above comparison values and their presence in residential surface soil samples collected in the vicinity of the Sonford Products Site is presented in the following sections.

Dieldrin is a pesticide used widely from the 1950s until the 1970s on crops such as corn and cotton, as well as for termite control. Because of environmental and human health concerns, its use was completely banned in 1987. Dieldrin binds very tightly to soil and breaks down very slowly over time. Studies have shown impacts on the nervous system and liver impacts from prolonged exposures. Liver cancer has been observed among mice exposed to dieldrin.

Of the 23 properties sampled, dieldrin was only detected in three samples. Only one sample was found to have dieldrin concentrations above the selected comparison value. The environmental data does not indicate that dieldrin contamination is a widespread concern. However, ATSDR further evaluated exposure to dieldrin using the maximum detected concentration of 130 micrograms per kilogram (µg/kg) for health protectiveness (5).

Heptachlor epoxide was extensively used as an insecticide for homes, buildings, and crops. Its use was discontinued in 1988. Like dieldrin, it can remain in the soil for many years because it does not easily dissolve or break down. Although human effects are less known, animal studies have reported impacts to the liver and reproductive system. Liver cancer has also been associated with long-term exposure to animal subjects.

Of the 23 properties sampled, heptachlor epoxide was only detected in six samples. Only one sample was found to have heptachlor epoxide concentrations slightly above the selected health-based comparison value of 80 µg/kg. Based on the available residential data for properties adjacent to the Sonford Products Site, heptachlor epoxide does not appear to be a widespread concern. However, a more thorough evaluation of heptachlor epoxide was conducted by ATSDR using the maximum detected concentration of 89 µg/kg to be health protective (6)

Dioxins are chemicals that are not intentionally produced, but are rather the byproducts of the chlorine bleaching process at pulp and paper mills. They are released to the air from municipal and industrial incinerators and travel long distances before being deposited. Dioxins may also be present as a result of hazardous waste site practices and have been found to be associated with the chemical production of pentachlorophenol. The most common health effects observed among individuals exposed to high levels of dioxins is chloracne, a severe skin condition with acne-like lesions on the face and upper body. Animal studies indicate reproductive, endocrine, and immune system impacts. Several human studies have suggested that exposure to dioxins increases individuals' risks for several different types of cancer, including a possible association with the production of soft-tissue (muscles, fat, fibrous tissue, and blood vessels) sarcoma, non-Hodgkin's lymphoma (immune system), and respiratory cancer.

Surface soil data from the 23 parcels in proximity to the Sonford Properties Site indicates that low levels of dioxins were detected in all of the samples ranging from 0.012 to 0.2 µg/kg. Nine of the samples contained dioxins greater than the health-based comparison value of 0.05 µg/kg. A more complete evaluation of dioxin concentrations in surface soil is therefore necessary and has been conducted as part of this public health assessment (7).

PUBLIC HEALTH IMPLICATIONS

For chemical concentrations found to exceed comparison values, ATSDR performed calculations referred to as exposure doses to assess non-cancer health impacts as well as cancer risk estimates. These calculations estimate the amount of the chemicals of concern that individuals may be exposed to and the likelihood of cancer and non-cancer health impacts. The calculations are based on the types of site-specific activities that individuals may be involved with that result in contact with chemicals in the surface soil. In the event that calculated exposure doses exceed established health guidelines (e.g., ATSDR Minimal Risk Levels or EPA Reference Doses), an in-depth toxicological evaluation is the next step necessary to estimate the likelihood of health effects.

Adults and children may be exposed to chemicals in residential surface soil through ingestion, inhalation, or direct skin contact. In order to evaluate these potential exposures, ATSDR considers the available site-specific information and makes assumptions about how much and how often people might be exposed to the chemicals of interest. Assumptions are also made regarding types of activities, body weight, and skin surface area.

Adult residents are assumed to incidentally ingest 100 milligrams per day (mg/day) of soil during gardening activities. Gardening activities are estimated to occur 3 days per week (or 156 days per year). Adults are assumed to weigh 70 kilograms (or 154 pounds). The surface area of skin exposed during gardening is estimated to be 2,479 square centimeters per day (cm²/day) which accounts for exposure of the face, hands, and arms.

Children residents are assumed to incidentally ingest twice as much soil as adults (or 200 mg/day) because of their hand-mouth activities (4). Based on professional judgment, children are assumed to play in their yards at their homes for 5 days per week (equal to 260 days per year). Children are estimated to weigh approximately 16 kilograms (or 35 pounds). The surface area of skin exposed during playing is estimated to be 4,785 cm²/day which accounts for exposure of the face, hands, arms, legs and feet.

Additional specific information on the exposure scenarios, assumptions and calculations used to estimate exposures to chemicals in residential surface soil are discussed in Appendix A of this public health assessment.

As previously discussed, the following chemicals were detected in off-site (primarily residential) surface soil samples collected from residential parcels adjacent to the Sonford Products Site at levels that exceed health-based comparison values: dieldrin, heptachlor epoxide, and dioxins. Therefore, further consideration of these chemicals has been conducted as part of this public health assessment to evaluate their potential for

non-cancer and cancer impacts based on the concentrations that they have been found in residential soil in the vicinity of the Sonford Products site.

Non-cancer Effects Evaluation: ATSDR calculated exposure doses for the chemicals detected in surface soil to determine the potential for non-cancer health effects. Exposure doses are expressed in units of milligrams per kilograms per day (mg/kg/day). The calculated exposure doses were compared with health-based guidelines, when available. These guidelines are described in more detail in Appendix A of this public health assessment.

Calculated exposure doses below health guidelines indicate that health effects are not expected. When calculated exposure doses for a particular chemical exceed the health-based guidelines (ATSDR Minimal Risk Levels or EPA Reference Doses), it does not necessarily indicate that health effects will occur. Instead, a more in-depth look at the toxicological data available for the chemical is needed to fully evaluate this exposure. ATSDR considered ingestion, direct skin contact, and inhalation of dust from surface soil in this evaluation. However, health guidelines for inhalation are not available for the chemicals of interest so calculations could not be completed. Therefore, the evaluation for heptachlor epoxide, dieldrin, and dioxins focuses on ingestion and direct skin contact with surface soil during gardening and playing. It should be noted that health effects resulting from inhalation exposure to the detected chemicals is considered in the cancer evaluation.

- ✓ **Dieldrin** – The calculated exposures dose for ingestion and direct skin contact with dieldrin in surface soil for ***adult residents*** is 0.000000058 mg/kg/day (or 5.8×10^{-8} mg/kg/day) which does not exceed the selected health guideline of ATSDR's Oral Chronic Minimal Risk Level of 0.000050 mg/kg/day (or 5.0×10^{-5} mg/kg/day). The calculated dose for ***children residents*** is 0.00000092 mg/kg/day (or 9.2×10^{-7} mg/kg/day) is also below the level of health concern. Therefore, residents are not at risk for non-cancer health effects from dieldrin exposure (5).
- ✓ **Heptachlor epoxide** – The calculated exposures dose for ingestion and direct skin contact with heptachlor epoxide in surface soil for ***adult residents*** is 0.000000085 mg/kg/day (or 8.5×10^{-8} mg/kg/day) which does not exceed the selected health guideline of the EPA Oral Reference Dose of 0.000013 mg/kg/day (or 1.3×10^{-5} mg/kg/day). The calculated dose for ***children residents*** is 0.0000013 mg/kg/day (or 1.3×10^{-6} mg/kg/day) is also below the level of health concern. Therefore, residents are not at risk for non-cancer health effects from heptachlor epoxide exposure (6).

- ✓ **Dioxins** – The calculated exposures dose for ingestion and direct skin contact with dioxins in surface soil for **adult residents** is 0.00000000012 mg/kg/day (or 1.2×10^{-10} mg/kg/day) which does not exceed the selected health guideline of ATSDR's Oral Chronic Minimal Risk Level of 0.0000000010 mg/kg/day (or 1.0×10^{-9} mg/kg/day). The calculated dose for **children residents** of 0.0000000018 mg/kg/day (or 1.8×10^{-9} mg/kg/day) very slightly exceeds the health guideline and warranted a more in-depth evaluation (7).

A more detailed review of the available toxicological information for dioxins indicates that health effects from exposure occurs at doses that are significantly greater than the doses calculated for children and adult residents living around the Sonford Products Site (7). The available scientific studies on dioxins and adverse health impacts, in particular reproductive and developmental effects, report these effects at much higher exposure doses than those associated with the Sonford Products Site.

In conclusion, ATSDR has determined that adverse non-cancer health effects are not expected to occur among adult and children residents who may come in contact with chemicals in surface soil at residential properties adjacent to the Sonford Products Site.

Cancer Evaluation: The available scientific literature indicates that heptachlor epoxide, dieldrin, and dioxins may be associated with cancerous effects in human or animal studies. Therefore, ATSDR evaluated the cancer risk associated with these exposures. ATSDR considers similar exposure assumptions as it did for calculating non-cancer exposure doses. However, EPA's cancer slope factors were applied to the calculated exposure doses to estimate the likelihood of an increased cancer risk (8). Cancer risk estimates calculated for exposures occurring during adulthood and childhood are combined and expressed as the risk of an individual developing cancer over his or her lifetime.

It should be noted that an increased cancer risk is not a specific estimate of expected cancers. Rather, it is an estimate of the increase in the probability that a person may develop cancer sometime during his or her lifetime following exposure to a particular chemical. The recommendations of many scientists, including ATSDR and EPA, has been that an increased lifetime cancer risk of one in one million (1×10^{-6}) or less is generally considered an insignificant increase in cancer risk. Cancer risk less than 1 in 10,000 (or 1×10^{-4}) is not typically considered a health concern. Cancer risk greater than 1 in 10,000 may pose a significant concern regarding cancerous effects.

ATSDR's evaluation of cancer risk indicates that exposure to heptachlor epoxide, dieldrin, and dioxins via ingestion, direct skin contact, and inhalation of dust, poses a low increased risk for cancer. Numerically, the calculated cancer risk was estimated to be 3

extra cancer cases per hundred thousand people exposed (or 3×10^{-5}), a low increased cancer risk.

ATSDR concludes that exposure to chemicals in surface soil at residential properties adjacent to the Sonford Products Site does not pose a significant increased risk of cancer.

The calculated exposure doses and cancer risk estimates for each of the chemicals are presented in Tables B-1 and B-2, respectively, in Appendix B of this public health assessment.

ATSDR's Community Health Concerns

At the completion of ATSDR's evaluation of on-site surface soil on the facility property in April 2007, an ATSDR representative visited the site to tour the property as well as meet with property owners, workers and those living on the site to report the findings. ATSDR provided information to these individuals on the conclusions of the evaluation that was requested by EPA. As part of EPA's request, ATSDR was asked to provide property occupants with health education materials focused on minimizing exposure to harmful on-site chemicals. A fact sheet entitled "Ways to Protect Your Health" was provided in both Spanish and English.

Other community-related activities conducted by ATSDR at Sonford Products include a mailing sent to approximately 200 residents and businesses in April 2008. The mailing included a letter, as well as a fact sheet to introduce ATSDR and let individuals know what they can expect from our efforts. The mailing was also intended to encourage individuals to contact the ATSDR Sonford Products site team with any questions or health concerns they have regarding the site. Community input helps ATSDR to create reports that accurately reflects how people in this community may have come into contact with chemicals from the site. Community feedback can also help ATSDR to understand individual health concerns as they relate to the site.

In August 2008, ATSDR prepared community fact sheets to summarize the public health activities that ATSDR has been involved with at the Sonford Products Site. The fact sheets, as well as flyers announcing ATSDR's visit to meet with local community members in Flowood, Mississippi, were mailed to over 200 residents and businesses. On Tuesday August 19th, ATSDR held a public availability session at the Flowood Pavilion (also referred to as The Underwood Pavilion). Approximately 30 community members attended the meeting which took place from 6:00p.m. to 8:00p.m. ATSDR representatives met with community members, one-on-one, to discuss their individual health concerns about the site, as well as to announce the release of this public health assessment. At the meeting, community members were informed about the 60-day public comment period for the submittal of formal comments on the public health assessment. The public comment period began on August 15, 2008 and ended on October 15, 2008. The comments received and ATSDR's responses to the comments are presented in Appendix C of this document.

Child Health Considerations

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposures to hazardous substances. Children play outdoors and typically engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than adults; this means they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much

information as possible to make informed decisions regarding their children's health. On the basis of the site-specific evaluation conducted in this public health assessment, ATSDR has determined that children do not come in contact with levels of chemicals in the surface soil at their homes that are likely to be associated with health effects.

CONCLUSIONS

Based on site-specific information, ATSDR has evaluated exposures to adult and children residents who may come in contact with chemicals detected in residential surface soils during gardening or playing activities on their property. The evaluation considered exposures occurring through accidental ingestion and direct skin contact with surface soil, as well as inhalation of dust particles from surface soil. The potential for cancer and non-cancer health effects were considered.

Heptachlor epoxide, dieldrin, and dioxins were detected in residential soil at levels that required further evaluation by ATSDR. ATSDR's in-depth evaluation of these chemicals concludes that individuals residing adjacent to the Sonford Products Site are not likely to be exposed to chemicals in their residential surface soil that put them at risk for cancer or non-cancer health effects.

Additional site-specific information, including environmental data, may become available in the future. In the event new information becomes available, ATSDR may evaluate this information in supplemental public health documents, if this information changes the conclusions for the site.

RECOMMENDATION

ATSDR does not make any recommendations regarding surface soil at residential properties in the vicinity of the Sonford Products Site.

REFERENCES

1. U.S. Environmental Protection Agency. Preliminary Assessment/Site Inspection Report for Sonford Products Site. Flowood, Rankin County, Mississippi. August 2004.
2. Agency for Toxic Substances and Disease Registry. Letter to Keriema Williams from Annmarie DePasquale. RE: ATSDR's response to the technical assistance request from EPA regarding on-site concentrations of dioxins in surface soil at the Sonford Products Site, Flowood, Rankin County, Mississippi. April 2007.
3. Black and Veatch. Technical Memorandum to Keriema Newman from Reginald Dawkins, Jr. RE: Sampling protocol for the collection of surficial soil samples from 22, mostly residential parcels located west of the Sonford Products Site. March 9, 2007.
4. Agency for Toxic Substances and Disease Registry. Public health assessment guidance manual. Atlanta: US Department of Health and Human Services; 2005.
5. Agency for Toxic Substances and Disease Registry. Toxicological profile for aldrin/dieldrin. Atlanta: US Department of Health and Human Services; September 2002.
6. Agency for Toxic Substances and Disease registry. Toxicological profile for heptachlor and heptachlor epoxide. Atlanta: US Department of Health and Human Services; November 2007.
7. Agency for Toxic Substances and Disease registry. Toxicological profile for chlorinated dibenzo-p-dioxins. Atlanta: US Department of Health and Human Services; December 1998.
8. U.S. Environmental Protection Agency. Website: Integrated Risk Information System (IRIS). Accessed May 8, 2008 on-line at: <http://www.epa.gov/iris>.

ATSDR TEAM

Annmarie K. DePasquale, MPH

Environmental Health Scientist
Division of Health Assessment and Consultation
Superfund Site Assessment Branch.

Robert Safay, MS

Senior Regional Representative – Region 4
Division of Regional Operations

Paula Peters, MPH, CHES

Health Education Specialist
Division of Health Assessment and Consultation
Health Promotion and Community Involvement Branch

APPENDIX A - ATSDR's EVALUATION PROCESS

Step 1 – Comparison Values and the Screening Process

To evaluate the available data, ATSDR used comparison values (CVs) to determine which chemicals to examine more closely. CVs are the chemical concentrations found in a specific media (for example: air, soil, or water) and are used to select chemicals for further evaluation. CVs incorporate assumptions of daily exposure to the chemical and a standard amount of air, soil, or water that someone may take into their body each day. CVs are generated to be conservative and non-site specific. These values are used only to screen out chemicals that do not need further evaluation; CVs are not intended as environmental clean-up levels or to indicate that health effects occur at concentrations that exceed these values.

CVs can be based on either carcinogenic (cancer-causing) or non-carcinogenic effects. Cancer-based comparison values are calculated from the U.S. Environmental Protection Agency's (EPA) oral cancer slope factor (CSF) or inhalation risk unit. CVs based on cancerous effects account for a lifetime exposure (70 years) with a theoretical excess lifetime cancer risk of 1 extra case per 1 million exposed people. Non-cancer values are calculated from ATSDR's Minimal Risk Levels (MRLs), EPA's Reference Doses (RfDs), or EPA's Reference Concentrations (RfCs). When a cancer and non-cancer CV exists for the same chemical, the lower of these values is used in the comparison for health protectiveness. The chemical and media-specific CVs utilized during the preparation of this public health assessment are listed below:

An **Environmental Media Evaluation Guide (EMEG)** is an estimated comparison concentration for which exposure is unlikely to cause adverse health effects, as determined by ATSDR from its toxicological profiles for a specific chemical.

A **Reference Dose Media Evaluation Guide (RMEG)** is an estimated comparison concentration that represents concentrations of chemicals (in water, soil, and air) to which humans may be exposed without experiencing adverse health effects.

A **Cancer Risk Evaluation Guide (CREG)** is a comparison concentration that is based on an excess cancer rate of one in a million persons and is calculated using EPA's cancer slope factor (CSF).

A **Risk-Based Concentration (RBC)** is a comparison concentration derived by EPA by combining standard exposure scenarios and toxicological information corresponding to fixed levels of risk.

Step 2 – Evaluation of Public Health Implications

The next step in the evaluation process is to take those chemicals that are detected at concentrations above their respective CVs and further identify the site-specific exposure situations and the likelihood that these exposures could pose a health hazard. Therefore, calculations are performed to estimate the possibility of cancer and non-cancer health problems. The calculations consider the activities of people living in the community.

In this public health assessment, ATSDR has estimated potential exposure of adult and children residents to chemicals in residential surface soil by calculating exposure doses and cancer risk estimates. The same equations have been used for the non-cancer and cancer calculations with the indicated modifications. Note that cancer risk calculated for exposures occurring during adulthood and childhood are combined and expressed as the risk of an individual developing cancer over his or her lifetime. The equations and the assumptions are based on the EPA Risk Assessment Guidance for Superfund, Part A¹, EPA Risk Assessment Guidance for Superfund, Part E² and the EPA Exposure Factors Handbook³, unless otherwise specified. The assumptions and details on the non-cancer and cancer evaluations of exposure are presented in the following equations and text.

Adult Residents: Incidental Ingestion of Chemicals Present in Surface Soil

These individuals may unintentionally ingest chemicals in surface soil while gardening at their homes.

$$Dose (mg/kg/day) = \frac{C \times IR \times EF \times ED \times CF}{BW \times AT}$$

where

C = maximum detected concentration of a chemical; See Table 1; milligrams per kilogram (mg/kg)

IR = ingestion rate; 100 milligrams per day (mg/day)

EF = exposure frequency; 156 days per year (days/year) equal to exposure 3 days per week

ED = exposure duration; 30 years

CF = conversion factor; 0.000001 kilograms per milligrams (kg/mg)

BW = body weight; 70 kilograms (kg) equal to approximately 154 pounds

AT = averaging time; 10,950 days for non-cancer and 25,550 days for cancer evaluation

¹ U.S. Environmental Protection Agency. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part A. December 1989.

² U.S. Environmental Protection Agency. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part E, Supplemental Guidance for Dermal Exposure. July 2004.

³ U.S. Environmental Protection Agency. Exposure Factors Handbook. August 1997.

Children Residents: Incidental Ingestion of Chemicals Present in Surface Soil

These individuals may unintentionally ingest chemicals in surface soil while playing at their homes.

$$Dose(mg/kg/day) = \frac{C \times IR \times EF \times ED \times CF}{BW \times AT}$$

where

C = maximum detected concentration of a chemical; See Table 1; milligrams per kilogram (mg/kg)

IR = ingestion rate; 200 milligrams per day (mg/day)

EF = exposure frequency; 260 days per year (days/year) equal to exposure 5 days per week

ED = exposure duration; 6 years

CF = conversion factor; 0.000001 kilograms per milligrams (kg/mg)

BW = body weight; 16 kilograms (kg) equal to approximately 35 pounds

AT = averaging time; 2,190 days for non-cancer and 25,550 days for cancer evaluation

Adult Residents: Inhalation of Chemicals Present in Fugitive Dust from Surface Soil

Individuals may generate dust that can be inhaled from surface soil while gardening.

$$Dose(mg/kg/day) = \frac{C \times IR \times ET \times EF \times ED}{PEF \times BW \times AT}$$

where

C = chemical concentration; See Table 1; mg/kg

IR = inhalation rate; 0.80 cubic meter per hour (m³/hour)

ET = exposure time; 4 hours/day

EF = exposure frequency; 156 days/year equal to exposure 3 days per week

ED = exposure duration; 30 years

PEF = particulate emissions factor; default value of 1.32E+09 cubic meter per hour (m³/kg)

BW = body weight; 70 kg equal to approximately 154 pounds

AT = averaging time; 10,950 days for non-cancer and 25,550 days for cancer evaluation

Children Residents: Inhalation of Chemicals Present in Fugitive Dust from Surface Soil

Individuals may generate dust that can be inhaled from surface soil and dry sediment while gardening.

$$Dose (mg/kg/day) = \frac{C \times IR \times ET \times EF \times ED}{PEF \times BW \times AT}$$

where

C = chemical concentration; See Table 1; mg/kg

IR = inhalation rate; 0.42 cubic meter per hour (m³/hour)

ET = exposure time; 4 hours/day

EF = exposure frequency; 260 days/year equal to exposure 5 days per week

ED = exposure duration; 6 years

PEF = particulate emissions factor; default value of 1.32E+09 cubic meter per hour (m³/kg)

BW = body weight; 16 kg equal to approximately 35 pounds

AT = averaging time; 2,190 days for non-cancer and 25,550 days for cancer evaluation

Adult Resident: Direct Skin (Dermal) Contact with Chemicals Present in Surface Soil

Dermal absorption depends on numerous factors, including the area of exposed skin, anatomical location of the exposed skin, length of contact, concentration of the chemical in contact with the skin, and other factors.

$$Dose (mg/kg/day) = \frac{C \times SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT}$$

where

C = chemical concentration; See Table 1; mg/kg

SA = surface area exposed; 2,479 square centimeters/day (cm²/day) to account for exposure to the face, hands, and arms.

AF = adherence factor; 0.07 milligrams per square centimeters (mg/cm²)

ABS = absorption factor; chemical-specific; 0.001 for dioxins, 0.04 for dieldrin and heptachlor epoxide

EF = exposure frequency; 156 days/year equal to exposure 3 days per week

ED = exposure duration; 30 years

CF = conversion factor; 1 x 10⁻⁶ kg/mg

BW = body weight; 70 kg equal to approximately 154 pounds

AT = averaging time; 10,950 days for non-cancer and 25,550 days for cancer evaluation

Children Resident: Direct Skin (Dermal) Contact with Chemicals Present in Surface Soil

Dermal absorption depends on numerous factors, including the area of exposed skin, anatomical location of the exposed skin, length of contact, concentration of the chemical in contact with the skin, and other factors.

$$Dose (mg/kg/day) = \frac{C \times SA \times AF \times ABS \times EF \times ED \times CF}{BW \times AT}$$

where

C = chemical concentration; See Table 1; mg/kg

SA = surface area exposed; 4,785 square centimeters/day (cm²/day) to account for exposure to the face, hands, arms, legs, and feet during the summer; 1,880 cm²/day to account for face, arms, and hands during the winter.

AF = adherence factor; 0.20 milligrams per square centimeters (mg/cm²)

ABS = absorption factor; chemical-specific; 0.001 for dioxins, 0.04 for dieldrin and heptachlor epoxide

EF = exposure frequency; 195 days/year equal to exposure for 5 days/week for 9 months of the year (summer); 65 days/year equal to exposure for 5 days/week for 3 months of the year (winter)

ED = exposure duration; 6 years

CF = conversion factor; 1 x 10⁻⁶ kg/mg

BW = body weight; 16 kg equal to approximately 35 pounds

AT = averaging time; 2,190 days for non-cancer and 25,550 days for cancer evaluation

Non-Cancer Health Effects

The doses calculated for exposure to each individual chemical are then compared to established health guidelines, such as ATSDR's Minimal Risk Levels (MRLs) or EPA's Reference Doses (RfDs), in order to assess whether adverse non-cancer health impacts from exposure are expected. These health guidelines, described in more detail in the following text, are chemical-specific values that are based on the available scientific literature and are considered protective of human health.

Minimal Risk Levels (MRLs)

ATSDR has developed MRLs for contaminants commonly found at hazardous waste sites. The MRL is an estimate of daily exposure to a contaminant below which non-cancer, adverse health effects are unlikely to occur. MRLs are developed for different routes of exposure, such as inhalation and ingestion, and for lengths of exposure, such as acute (less than 14 days), intermediate

(15-364 days), and chronic (365 days or greater). At this time, ATSDR has not developed MRLs for dermal exposure. A complete list of the available MRLs can be found at <http://www.atsdr.cdc.gov/mrls.html>.

References Doses (RfDs)

An estimate of the daily, lifetime exposure of human populations to a possible hazard that is not likely to cause non-cancerous health effects. RfDs consider exposures to sensitive sub-populations, such as the elderly, children, and the developing fetus. EPA's RfDs have been developed using information from the available scientific literature and have been calculated for oral and inhalation exposures. A complete list of the available RfDs can be found at <http://www.epa.gov/iris>.

Non-carcinogenic effects, unlike carcinogenic effects, are believed to have a threshold, that is, a dose below which adverse health effects will not occur. As a result, the current practice for deriving health guidelines is to identify, usually from animal toxicology experiments, a No Observed Adverse Effect Level (or NOAEL), which indicates that no effects are observed at a particular exposure level. This is the experimental exposure level in animals (and sometimes humans) at which no adverse toxic effect is observed. The NOAEL is then modified with an uncertainty (or safety) factor, which reflects the degree of uncertainty that exists when experimental animal data are extrapolated (or applied) to the general human population. The magnitude of the uncertainty factor considers various factors such as sensitive subpopulations (for example; children, pregnant women, and the elderly), extrapolation from animals to humans, and the completeness of available data. Thus, exposure doses at or below the established health guideline are not expected to result in adverse non-cancer health effects.

When site-specific exposure doses exceed health guidelines, it does not necessarily indicate that health effects will occur. Rather, it indicates that a more thorough look at the known toxicological values for the chemical and the site-related exposures are needed. The known toxicological values are doses derived from human and animal studies that are presented in the ATSDR Toxicological Profiles and EPA's Integrated Risk Information System (IRIS). A direct comparison of site-specific exposure doses to study-derived exposures and doses found to cause adverse health effects is the basis for deciding whether health effects are likely to occur. This in-depth evaluation is performed by comparing calculated exposure doses with known toxicological values, such as the no-observed adverse-effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL) from studies used to derive the MRL or RfD for a chemical.

Health guidelines are available for ingestion and inhalation exposures to chemicals. However, specific health guidelines do not exist for exposures occurring as a result of dermal contact. As part of this public health assessment, non-cancer health effects from

dermal exposure were evaluated using oral health guidelines. This health-protective approach assumed 100% absorption to adjust from administered dose (oral) to absorbed dose (dermal). This approach is likely to overestimate exposure, but is considered health protective.

It is important to consider that the methodology used to develop these health guidelines does not provide any information on the presence, absence, or level of cancer risk. Therefore, a separate cancer evaluation is necessary for potentially cancer-causing chemicals detected in samples at this site. A more detailed discussion of the evaluation of cancer risks is presented in the following section.

Cancer Risks

Exposure to a cancer-causing compound, even at low concentrations, is assumed to be associated with some increased risk for evaluation purposes. The estimated excess risk of developing cancer from exposure to chemicals associated with the site was calculated by multiplying the site-specific adult exposure doses, with a slight modification, by EPA's chemical-specific Cancer Slope Factors (CSFs or cancer potency estimates), which are available at <http://www.epa.gov/iris>, with the exception of dioxins. The CSF for dioxins used in this public health assessment is referenced in EPA's Health Effects Assessment Summary Tables, dated July 1997.

CSFs are only available for ingestion and inhalation exposures and no specific CSFs exist for exposures occurring as a result of dermal contact. As part of this public health assessment, cancer health effects from dermal exposure were evaluated using oral CSFs. This approach conservatively assumed 100% absorption to adjust from administered dose (oral) to absorbed dose (dermal). This approach is likely to overestimate exposure.

Note that cancer risk calculated for exposures occurring during adulthood and childhood are combined and expressed as the risk of an individual developing cancer over his or her lifetime. An increased excess lifetime cancer risk is not a specific estimate of expected cancers. Rather, it is an estimate of the increase in the probability that a person may develop cancer sometime during his or her lifetime following exposure to a particular chemical. Therefore, the cancer risk calculation incorporates the equations and parameters (including the exposure duration and frequency) used to calculate the dose estimates, but the estimated value is divided by 25,550 days (or the averaging time), which is equal to a lifetime of exposure (70 years) for 365 days/year.

There are varying suggestions among the scientific community regarding an acceptable excess lifetime cancer risk, due to the uncertainties regarding the mechanism of cancer. The recommendations of many scientists, as well as ATSDR and EPA, have been in the risk range of 1 in 1 million to 1 in 10,000 (as referred to as 1×10^{-6} to 1×10^{-4}) excess

cancer cases. An increased lifetime cancer risk of one in one million or less is generally considered an insignificant increase in cancer risk. Cancer risk less than 1 in 10,000 (or 1×10^{-4}) is not typically considered a health concern. An important consideration when determining cancer risk estimates is that the risk calculations incorporate several very conservative assumptions that are expected to overestimate actual exposure scenarios. For example, the method used to calculate EPA's CSFs assumes that high-dose animal data can be used to estimate the risk for low dose exposures in humans. As previously stated, the method also assumes that there is no safe level for exposure. Lastly, the method computes the 95% upper bound for the risk, rather than the average risk, suggesting that the cancer risk is actually lower, perhaps by several orders of magnitude.

Because of the uncertainties involved with estimating cancer risk, ATSDR also employs a qualitative approach in evaluating all relevant data. The actual environmental exposures have been given careful and thorough consideration in evaluating the assumptions and variables relating to both toxicity and exposure. A complete review of the toxicological data regarding the doses associated with the production of cancer and the site-specific doses is an important element in determining the likelihood of exposed individuals being at a greater risk for cancer.

**Appendix B, Table B-1 - Summary of Calculated Exposure Doses
Off-Site (Residential) Soil Exposure Pathway
Sonford Products Site**

	Ingestion & Direct Contact Dose (mg/kg/day)	Oral Health Guideline (mg/kg/day)	Exceeds Health Guideline?	Health Guideline Source	Inhalation Dose (mg/kg/day)	Inhalation Health Guideline (mg/kg/day) ^(a)	Exceeds Health Guideline?
<u>Adult Resident</u>							
Heptachlor epoxide	8.50E-08	1.30E-05	No	EPA Oral RfD	NA	NA	NA
Dieldrin	5.80E-08	5.00E-05	No	ATSDR Chronic Oral MRL	NA	NA	NA
Dioxins	1.20E-10	1.00E-09	No	ATSDR Chronic Oral MRL	NA	NA	NA
<u>Child Resident</u>							
Heptachlor epoxide	1.30E-06	1.30E-05	No	EPA Oral RfD	NA	NA	NA
Dieldrin	9.20E-07	5.00E-05	No	ATSDR Chronic Oral MRL	NA	NA	NA
Dioxins	1.80E-09	1.00E-09	Yes	ATSDR Chronic Oral MRL	NA	NA	NA

NOTES:

Doses were only calculated for chemicals with available health guidelines.

MRL = Minimal Risk Level

RfD = Reference Dose

NA = Not available; inhalation health guidelines have not been derived for the above chemicals.

**Appendix B, Table B-2 - Summary of Theoretical Cancer Risk
Off-Site (Residential) Soil Exposure Pathway
Sonford Products Site**

Calculated Theoretical Lifetime Cancer Risk*					Cancer Risk Conclusion
	Ingestion	Direct Contact	Inhalation of Dust	Total Cancer Risk	
<u>Combined Adult & Children Residents</u>					Low Increased Cancer Risk
Heptachlor epoxide	1.21E-06	1.43E-07	1.90E-11	1.36E-06	
Dieldrin	1.46E-06	1.72E-07	2.31E-11	1.63E-06	
Dioxins	3.08E-05	9.03E-08	4.80E-10	3.08E-05	
Total Risk for Contaminants				3.38E-05	

NOTES:

*Cancer slope factors used to calculate cancer risk for heptachlor epoxide (9.1E+00) and dieldrin (1.6E+01) were available from EPA's Integrated Risk Information System website accessed on-line at: <http://www.epa.gov/iris>. Cancer slope factor for dioxins (1.5E+05) was referenced in EPA's Health Effects Assessment Summary Table, July 2007.

APPENDIX C

ATSDR RESPONSES TO PUBLIC COMMENTS RECEIVED

The Sonford Products Site public health assessment was available for a 60-day public comment period beginning on August 15, 2008 and ending on October 15, 2008. ATSDR received one set of formal public comments which were prepared by the U.S. Environmental Protection Agency. ATSDR's responses to the comments are presented below and indicated changes to the document have been made.

General Comments

1. It might be helpful to include a discussion about the different dioxin congeners and how the toxic equivalent value or TEQ value is calculated. Please see the discussion below. The section can be revised further to be included in the document.

"Toxic equivalents (TEQs) are a weighted quantity measure based on each dioxin congener's toxicity relative to the most toxic dioxin congeners, 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD. Because the most toxic dioxin congeners are given a weight of one, any mixture of congeners containing other than 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD will have a TEQ value that is less than the actual mass.

To calculate TEQs, a value is assigned describing how toxic each dioxin and dioxin-like compound is compared to 2,3,7,8-tetrachlorodibenzo-p-dioxin and 1,2,3,7,8-pentachlorodibenzo-p-dioxin. The two most toxic compounds are the comparison point. In order to calculate a TEQ, a toxic equivalent factor (TEF) is assigned to each member of the dioxin and dioxin-like compounds category. The TEF is the ratio of the toxicity of one of the compounds in this category to the toxicity of the two most toxic compounds in the category, which are each assigned a TEF of 1: 2,3,7,8-tetrachlorodibenzo-p-dioxin (commonly referred to as dioxin) and 1,2,3,7,8-pentachlorodibenzo-p-dioxin. TEFs that have been established through international agreements currently range from 1 to 0.0001.

A TEQ is calculated by multiplying the actual grams weight of each dioxin and dioxin-like compound by its corresponding TEF (e.g., 10 grams X 0.1 TEF = 1 gram TEQ) and then summing the results. The number that results from this calculation is referred to as grams TEQ."

Response: ATSDR appreciates the submitted comment. ATSDR has respectfully decided not to include the suggested information in the text in the interest of keeping the document easily understood. A more general discussion of dioxins is available for the reader on page 9 of this public health assessment.

Specific Comments

1. **Page 3, first paragraph:** Please change the forward slash in “and/or” to a backward slash.

Response: The requested change has been made.

2. **Page 3, fourth paragraph:** Please delete the last sentence in paragraph four. Please see comment #8 for further discussion.

Response: The requested change has been made.

3. **Page 6, second paragraph:** Please revise the section to read as the following “The *composite soil sample* consisted of six aliquots (or individual samples) collected from each property. Typically, two aliquots were collected from the front yard, two from *the* backyard, and one from each of the side yards. *In some situations because of parcel size and shape, the number of aliquots increased or decreased.* Samples were analyzed for semi-volatile organic compounds (also known as SVOCs), *pesticides*, as well as classes of chemicals known as dioxins and furans (3). The parts of the section that have been changed are shown in italics.

Response: The requested change has been made.

4. **Page 7, final paragraph:** Please revise the second sentence to read as the following, “These samples were analyzed for SVOCs, pesticides, as well as classes of chemicals known as dioxins and furans.”

Response: The requested change has been made.

5. **Page 8, first paragraph:** Please revise the sentence to define the acronym “CV” as Comparison Values in the sentence.

Response: The abbreviation for comparison values (“CV”) has been removed from the main text of the document. Instead, the term “comparison values” is spelled-out in the text.

6. **Page 9, second paragraph:** Please revise the third sentence to read as the following, “*Dioxins* may also be present as a result of hazardous waste site practices *and have been found to be associated with the chemical production of pentachlorophenol.*”

Response: The requested change has been made.

7. **Pages 10-11:** In an effort to be consistent, please bold and italicize the term “adult residents” in the dieldrin and dioxin sections.

Response: The requested change has been made.

8. **Page 13, first paragraph:** Please strike the final two sentences and replace with the following paragraph, “During the remedial investigation, residents of the apartment building vacated the home. The Town of Flowood also declared the building as condemned and not livable. The workers who were living onsite inside of the trailer had also moved off the site. Most recently (in June) during a field sampling event, the workers were observed living onsite over the weekend. The history of the land use at the site as both residential and industrial prompted the EPA to conduct a land use study at the site and it is planned to start this summer. Meetings will be conducted with the community, property owners, the current company that leases the property, and town officials/leaders. The purpose of the land use assessment is to engage the stakeholders in helping them to work together to develop a future reuse plan that is consistent with the overall plan for the town of Flowood and the selected remedy.”

Response: The suggested changes have been paraphrased and presented in the section entitled Summary of ATSDR’s Previous Evaluation of Surface Soil on the Sonford Products Site (On-Site Surface Soil) on page 3 of the public health assessment.

9. **Page 15, first paragraph:** Revise the first sentence to read as the following, “Based on site-specific information, ATSDR has evaluated exposures to adult and children residents who may *come in* contact with chemicals detected in residential surface soils during gardening or playing activities on their property.”

Response: The requested change has been made.

10. **Appendix B, Table B-2 Summary of Theoretical Cancer Risk:** The notes section state that the cancer slope factors (CSFs) were obtained from the EPA IRIS database. The only CSF on IRIS for a dioxin compound is for Hexachlorodibenzo-p-dioxin mixture. The IRIS file for this compound does not state that the CSF should be applied to other dioxin/furan congeners. If the CSF used was the old EPA HEAST value of 150,000 for 2378-TCDD, this value is *not* in IRIS. EPA does not currently have a verified CSF for TCDD while the EPA reassessment of dioxin is underway (hence EPA's use of the policy health based concentrations for dioxin in soil per the OSWER 1998 Directive). The CSF for dioxins should be corrected if needed, and the source of the CSF should be clarified in the health assessment. The CSF values should be listed on Table B-2 (as is done on Table B-1 for the RfDs and MRLs).

Response: The reference for the CSF for dioxins is the EPA HEAST value. The CSFs and references have been included in the table for each of the chemicals evaluated, as requested.