ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Public Health Assessment for

L & B RECYCLING, INC.
COVINGTON, NEWTON COUNTY, GEORGIA
EPA FACILITY ID: GAD984295410
NOVEMBER 2, 2005

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.

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PUBLIC HEALTH ASSESSMENT

L & B RECYCLING, INC.

COVINGTON, NEWTON COUNTY, GEORGIA

EPA FACILITY ID: GAD984295410

Prepared by:

Georgia Department of Human Resources
Division of Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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SUMMARY

A resident living near L&B Recycling, Inc. in Newton County, Georgia, submitted a request for a public health assessment to the Agency for Toxic Substances and Disease Registry (ATSDR) to determine whether exposures to site contaminants pose a health hazard. The Georgia Department of Human Resources, Division of Public Health (GDPH) has prepared this public health assessment under a cooperative agreement with the Agency for Toxic Substances and Disease Registry to respond to this request.

L&B Recycling processes mixed source scrap metal wastes in order to reclaim useable metals for resale. Large amounts of scrap metal are stored on site for later transport to smelters or users. The petitioner states that the community suffers from smoke, foul odors, contaminated storm water run off, mosquitoes, rats, and surface water and soil contamination. In addition, the adjacent residents report that storm water, silts, and debris and other scrap components have migrated from the L&B facility onto their property.

This document contains information about the environmental transport and extent of human exposure to hazardous chemicals, conclusions about the health risks posed to residents, and recommendations intended to protect public health. A public health assessment is designed to provide the community with information about the public health implications from exposure to hazardous substances at a specific site, and to identify populations for which further health actions are needed. It is not intended to serve the purpose of addressing liability, zoning, or other non-health issues.

GDPH has determined that this site poses **no apparent public health hazard**. Human exposure to contaminated media occurred in the past, but the exposure was below a level of health hazard.

There are no recommendations at this time. GDPH will provide health education to the petitioner and the general public. GDPH will review additional data if it becomes available and provide documents, including a follow-up health consultation, if appropriate.

STATEMENT OF ISSUES AND BACKGROUND

A citizen living near L&B Recycling, Inc. in Newton County, Georgia, submitted a request for a public health assessment to the Agency for Toxic Substances and Disease Registry (ATSDR) to determine whether exposures to contaminants from the facility and from nearby Newton Recycling pose a health hazard. Under a cooperative agreement with ATSDR, the Georgia Division of Public Health (GDPH) conducted this investigation to address the citizen's concerns. The citizen states that the community suffers from smoke, foul odors, contaminated storm water run off, mosquitoes, rats, and surface water and soil contamination as a result of facility operations.

Newton Recycling is located several hundred feet southeast of L&B Recycling, and considered a similar type of facility. The facility has continued to operate within all of its legal parameters except for occasional visible smoke. Residents report illegal open burning conducted at the site, and have complained to the company and the state regulatory authority resulting in little to no open burning. No air samples were collected during these events, and there is no way to determine if contaminants were released to air that may cause human health effects. However, based on the historical operations at the facility, the infrequency of open burning, the reported size of the emission plumes, and the distance to nearby residences, it is not considered to be a source of exposure that would result in long term health effects or chronic disease. There are no other known or suspected releases from the facility. Consequently, Newton Recycling is currently and in the future considered to be **no apparent public health hazard**. This public health assessment will address environmental issues associated with L&B Recycling only.

Site Description

L&B Recycling is located at 8194 Washington Street (Highway 81) in Covington, approximately 30 miles east of Atlanta, Georgia. The population within 1 mile of L&B Recycling is approximately 2,800 people. Using 2000 Census data, the Agency for Toxic Substances and Disease Registry (ATSDR) calculated population information for individuals residing within a 1-mile radius of the site using an area-proportion special analysis technique (Figure 1).

It began current operations in 1990, and has historically been used for various commercial and light industrial operations including auto salvage, gas distribution and welding [1,2]. From five to eight workers are employed by the facility at any given time. L&B Recycling processes mixed source scrap metal wastes in order to reclaim useable metals for recycling and sale. Scrap stock includes former underground storage tanks, 55-gallon steel drums, electrical components, batteries, etc. Currently, the facility does not accept any containers unless they are empty [3]. Two buildings are located on-site that are used for storage and office space. The remaining four-plus acres consist almost entirely of recyclable debris. Operations consist of storing large amounts of scrap metal on site for later transport to smelters or users. The only chemical stored on site is fuel for the equipment [3]. L&B Recycling is restricted from accepting, storing, handling, or disposing of hazardous waste at the site. The site has limited access: a barrier and/or fence surrounds approximately 75% of the facility, excluding the western boundary of the property along the creek (Figure 2). Access to the site from along the Creek is extremely difficult and considered trespassing. There is no indication or reports of individuals accessing the site or creek in this area.

The site is approximately five acres in an area of mixed light industrial, commercial, and residential use. There are approximately ten similar facilities in the immediate area, including Newton Recycling, across Washington Street and to the south. The site is bordered to the north by several businesses, to the west by a small creek that is an unnamed tributary of the Yellow River, and to the south and east by Washington Street and residences (Figures1, 2 and 3). The nearest residence is adjacent to the site to the south (Figure 2).

A new retaining wall separates the L&B Recycling facility from the nearest residence.

The site is covered with bare soil and piles of scrap metal. The yard of the nearest residence, and other residences near L&B Recycling are covered with grass, shrubs, and other vegetation. There is very little bare soil in off-site properties.

The topography of the site is generally flat with an approximate 10-15% slope from the middle of the site to the northeast and an approximate 60% slope from the western boundary of the site to the creek [1].

Natural Resource Use

Residents living near L&B Recycling get their water from a municipal or other public source, supplied by surface water [3]. The nearest public drinking water intake is approximately three miles from L&B Recycling on the Yellow River. Municipal water has been available and used by residents for several decades. The nearest individual water well is at the adjacent property, but has not been used for consumption for at least two years. There are no sampling data for this well or other groundwater wells. There are a few private wells identified within or approximately 1 mile northwest of L&B Recycling. The creek and Yellow River are not popular for fishing, although some residents report that fish are returning to it and fishing does occur. Swimming has never been popular in the creek or this part of the Yellow River, until it reaches the other side of Porterdale over a mile away [4].

Some residents living near the facility cultivate fruits, vegetables and herbs for consumption [4].

Site History

During a site inspection by the EPA in June 1991, approximately 600 55-gallon drums, and approximately 25 excavated underground storage tanks ranging in size from 5,000 to 50,000

gallons, were observed on site [1]. Most of the drums were not labeled nor had labels that were illegible. Many of the drums were crushed, bulging, and/or leaking [1]. Several drums were observed with discolored soil at the base. In response to the number of drums found at the facility, EPA conducted multi-media sampling at the site to characterize waste streams and document releases, and oversaw the removal of the drums. Some of the drums were empty and others were taken to appropriate facilities [5]. Sample results indicated low levels of contaminants in surface soil and air near suspect drums. A surface water sample from the creek also revealed low levels of contaminants that may have originated from the site.

L&B Recycling is located between Covington and Porterdale, Georgia. Files from the city of Porterdale municipal water supplier indicate that numerous complaints from city residents were received by the Georgia Environmental Protection Division (GEPD), Drinking Water Program, concerning the quality of their drinking water [1]. The nearest municipal drinking water intake is from the Yellow River, approximately 1.3 miles downstream of L&B Recycling. In September 1992, GEPD staff conducted an inspection of the municipal water plant in response to these complaints, and several violations were found [1]. These violations included lack of proper process controls and laboratory equipment. The violations made the water system vulnerable to potential contamination and presented a potential health hazard. There is no indication that any water samples were taken. The city was advised to take immediate steps to either correct the problems at the water plant or make arrangements to connect into the city of Covington's water system. No records were available as to follow-up measures; however, in 2000, it is reported that most residents now receive drinking water from the city of Covington [3]. Residents in the area who use private well water for consumption are encouraged to routinely test their well water, and connect to the municipal water supply where available.

In January 1993, representatives of the GEPD conducted a site visit. Site conditions were reported to be generally the same as documented by EPA in 1991; however, it did appear that fewer drums were present [1]. There is community concern about the fate of the drums; specifically, speculation about whether they have been properly removed and disposed of or whether they were buried on site or at other locations in the area, including the former municipal landfill. Because of the high potential for other buried hazardous waste at the landfill and in other light industrial areas in the community, it would not be possible to determine the source if contaminants were detected in groundwater or surface water. There is no indication to date that groundwater or surface water are contaminated.

Piles of debris stacked near an incline with evidence of stressed vegetation below.

In January 1994, a site visit was conducted by EPA. Additional soil samples were collected by EPA contractors from suspected source areas on site and within 200 feet of the nearest residence. Sediment samples were also collected from the creek and the Yellow River, as well as background samples for each media. Elevated levels of several contaminants were found in some soil and sediment samples [6].

In August 2000, a site reassessment was conducted by GEPD. Multiple media samples were taken, and results indicated slightly elevated levels of polychlorinated biphenyl (PCB) in one on-site soil sample, and arsenic and copper in off site soil (see Evaluation Process section below) [2]. Because of the low levels of contaminants found, GEPD concluded that the site should not be evaluated further under the Hazard Ranking System[1] [3].

In June 2001, L&B Recycling was declined for EPA Remedial Site Assessment because "drums had been removed from the site in 1994, and subsequent sampling found no pathways of concern" [7].

Runoff of surface water, silts, and debris and other scrap components from the L&B facility onto the adjacent residence has been reported by these residents. The exact dates of the release(s) are unknown. In August 2001, an investigation was conducted by the adjacent property owner to evaluate whether operations conducted by L&B Recycling may have had an environmental impact on the property. Analyses of surface soil samples collected from the property indicate that lead and one PCB (Aroclor 1242) exceed regulatory and health-related values [8]. However, it cannot be determined if these contaminants originated from the site. The adjacent residence is currently vacant.

Delineation and remediation of off-site soil contaminated with PCB and lead is planned [9]. As a conservative measure, L&B Recycling has been ordered by GEPD to ensure that groundwater has not been impacted by observed soil contamination [9].

Community Involvement Activities

In early 2003, GDPH and ATSDR staff conducted a site visit and spoke with the petitioner about his concerns regarding L&B Recycling. GEPD staff visited the site and surrounding neighborhoods in response to complaints about open burning, which was indeed witnessed. Local authorities were called and responded, and no complaints of open burning have since been received.

In 2004, GDPH staff spoke with the petitioner on several occasions, and was provided with several referrals to other residents who were reported to have concerns, knowledge, and/or be affected by the site. GDPH contacted each individual on the list, and no additional information was received. Several referrals did not return the calls, another had moved, and two had no comments. The petitioner traveled from North Carolina to the GDPH office and brought several files with additional site-related information, which were copied and reviewed by staff.

1 The Hazard Ranking System (HRS) uses federal guidelines to evaluate the groundwater migration, surface water migration, soil, exposure and air migration pathways. The overall score for L&B Recycling was 6.4. Detailed information about the HRS can be found at *www.epa.gov/superfund/programs/npl_hrs/hrsint.htm*.

Health Outcome Data

In August 2004, the petitioner requested that GDPH include in its investigation analyses of cancer and other health outcome data available for communities near L&B Recycling. The GDPH Cancer Control Section analyzed current (1999 – 2001) cancer incidence data available for the 30014 zip code. Zip codes are the smallest geographic units for which data are available. Analyses of a distribution of cancer cases in the 30014 zip code show that no cancer clusters and/or no statistically significant numbers of cancer cases have been reported (Appendix A). No other health outcome data such as mortality or birth defects were evaluated for this health consultation because the number of people exposed (fewer than 30) is too small to be evaluated. No site-specific health outcome data related to this site exist. According to the local health department, no health studies pertaining to this facility have been performed in the community.

DISCUSSION

Exposure Pathways

GDPH determines exposure to environmental contamination by examining exposure pathways. An exposure pathway is generally classified by environmental medium (e.g., water, soil, air, food). A completed exposure pathway exists when people are actually exposed through ingestion or inhalation of, or by skin contact with a contaminated medium. An exposure pathway consists of five elements: a source of contamination; transport through an environmental medium; a point of exposure; a route of exposure; and a receptor population.

In completed exposure pathways, all five elements exist, and exposure to a contaminant has occurred in the past, is occurring, or will occur in the future. In potential pathways, at least one of the five elements is not definitely documented to be present, but could exist. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present.

GDPH reviewed the site's history, community concerns, and available environmental sampling data. Based on this review, GDPH identified exposure pathways that warranted consideration. Each of the completed and potential exposure pathways identified for the L&B Recycling site are discussed in the following sections. The completed exposure pathways identified at the site are summarized in Table 1.

Table 1. Potential Exposure Pathways

Pathway	Exposure Pathway Elements					Time
	Sources	Medium	Point of Exposure	Route of Exposure	Exposed Population	
Soil	Various	Surface soil	Surface soil and dust	Ingestion, Inhalation, and Dermal absorption	Residents, Workers, Trespassers, and Visitors	Past
Sediment	Movement of contaminants from site run-off to surface water	Surface water and sediment	Yellow River and creek	Ingestion, Inhalation, and Dermal absorption	Recreationists and Fishers	Past, Present, and Future

Evaluation Process

In preparing this document, GDPH used the Agency for Toxic Substances and Disease Registry's (see Appendix B for more information about this Agency) established comparison values to screen contaminant levels and select chemicals of concern--a chemical that exceeds one or more comparison value--that warrant further evaluation. **Comparison values (CVs)** are concentrations of chemicals that can reasonably (and conservatively) be regarded as harmless, assuming the most likely conditions of exposure. The CVs generally include ample safety factors to ensure protection of sensitive populations. Because CVs do not represent thresholds of toxicity, exposure to contaminant concentrations above CVs will not necessarily lead to adverse health effects. CVs used in this document are discussed further in Appendix C.

Because the levels of some contaminants exceeded CVs, the potential health risks from exposure to these contaminants were examined.

Environmental Sampling Results

<u>On-site Soil</u>

In 1991, EPA sampled on-site soil from three locations with visibly stained soil for various organics (volatile organic compounds [VOCs]) and inorganics (metals) [1]. The chemicals sampled for and the sample collection and analyses methods used are not clearly defined; however, it is believed that they were consistent with EPA guidelines for 1991. No off-site samples were collected. Table 2 summarizes the maximum levels of contaminants found on site.

Only arsenic was found in on-site soil at levels that exceed a CV for children or adults [1].

In January 1994, a total of five surface (2 – 4 inches) and five subsurface (3 – 4 feet) soil samples were collected by EPA contractors, and sampled for semi-volatile organic compounds, VOCs, and metals [4]. Two surface and two subsurface samples were collected to characterize the on-site source areas, and two surface and two subsurface soil samples were collected on site within 200 feet of the adjacent property south of the site. Background samples for surface and subsurface soil were also collected northeast of the facility. All samples were collected, preserved, and analyzed for all chemicals listed in, and in accordance with, EPA guidelines at the time of the sampling. (All detection limits were well below current CVs.)

Analytical results of the soil samples taken in 1994 indicate that for children and adults [6]:

- arsenic exceeded a CV in all surface soil samples and one subsurface soil sample
- benzo(a)pyrene exceeded a CV in one surface and one subsurface soil sample
- PCB 1254 exceeded a CV in two surface soil samples

In the two background samples, arsenic and benzo(a)pyrene were found above the CVs for children and adults, but below the highest levels detected in surface or subsurface soil. Table 2 summarizes the maximum levels of contaminants found on site.

None of the levels of arsenic found in soil in 1994 exceeded the maximum level found during the 1991 sampling event. PCBs were not sampled for during the 1991 sampling event. PCBs were

not sampled for in the subsurface samples taken in 1994.

As part of the EPA reassessment of the site, three on-site soil samples were taken in April 2000. In view of the 1994 finding that only the surface portion of the soil was contaminated, all samples were taken from a depth of 2 – 4 inches [3]. The site was again sampled in the source area, in the middle of the scrap metal storage area of visibly stained soil. Soil was also sampled at the western edge of the site where soil is most susceptible to surface transportation offsite, and in a low area of the site's western edge which was wet with seepage water from the site interior. One soil sample was taken from the nearest residence. An off-site background soil sample was also taken (see Off-site Soil section below).

One chemical, PCB 1248 exceeding the applicable CV, was found in a sample taken from a source area [3].

Table 2 compares the highest concentration of each contaminant found in on-site soil during the 1991, 1994, and 2000 sampling events that exceeded a CV for children and adults, and the CVs for that contaminant that were exceeded. (Although the value for aluminum, copper, and PCB 1254 exceeded applicable CVs for a pica child[2], they are not listed because it is extremely unlikely that children with pica accessed the source areas.)

Table 2. Comparison of On-site Soil Sample Results
to Applicable Comparison Values For Ingestion

Contaminant	Maximum Level (ppm)	Sample Date	Soil Comparison Value*	
			Concentration (ppm)	Reference
Arsenic	3.3	1991	0.5	CREG
Benzo(a)pyrene	0.4Js	1994	0.1	CREG
PCB (Aroclor 1248)	2.25	2000	1.0**	EMEGc

ppm: parts per million
CREG: Cancer Risk Evaluation Guide
J: Estimated value
s: subsurface soil
** CV for Aroclor 1254[3]
EMEGc: Environmental Media Evaluation Guide (child) based on chronic oral exposure
* Source: ATSDR, soil comparison values (expires 12/31/04)

[2] *Pica* is defined as a craving to eat nonfood items, such as dirt, paint chips, and clay. Sometimes children exhibit pica-related behavior, and dirt is the most commonly eaten non-food item. Pica is very rare, and usually does not occur for an extended period of time. Children with pica should be given special consideration at hazardous waste sites, and are potentially at greater risk for adverse health effects from exposure to contaminated soil. It should be noted that the incidence rate of deliberate soil ingestion behavior in the general population is low.

[3] Polychlorinated biphenyls)PCBs) are mixtures of up to 209 individual chlorinated compounds (known as congeners; e.g., PCB 1248, 1242) and by the trade name Aroclor. No CVs have been established for Aroclor 1248 or 1242; however, the CV for Aroclor 1254 (1.0 ppm) was used because Aroclor 1254 is considered the most toxic congener in the PCB class of chemicals, and the application of this CV is considered the most protective for evaluating health risks from exposure to total PCBs in soil.

Note: lead was found in on-site soil (range 50 – 150 parts per million) at slightly elevated levels (above normal background levels), but no CVs currently exist for lead. The levels found for lead do not exceed state or federal regulatory clean up levels (400 parts per million), but are mentioned because repeated exposure to lead at low levels may result in adverse health effects in children. In addition to contaminated soil, there are many potential sources of lead in the environment. See Appendix D for best practices to reduce exposure to lead.

Off-site Soil

No off-site soil samples were collected until the 2000 sampling event. One surface soil sample was taken from the nearest residence on the property adjacent to the south edge of the site; and, one background sample from the parking lot outside of the site fence. Arsenic was found exceeding a CV in the sample from the adjacent residential property and in the background sample taken in 2000 [3]. Lead was found at 200 parts per million (ppm) (see *Note* above). Table 3 summarizes the maximum levels of contaminants found off site.

In August 2001, the owners of the adjacent residential property hired a private company to conduct limited sampling and analyses of soil in areas where they reported visible runoff from the site had migrated onto their property. The investigation did not identify the source areas, nor did it include surface water or groundwater testing. Five surface soil samples (0 – 6 inches) were collected and analyzed for metals and PCBs [8].

Results for five limited surface soil (0 – 6 inches) samples collected from the nearest residence in 2001 indicate that PCB (Aroclor 1242) and lead are present in surface soils above levels of health concern [8]. One sample had lead at 2,200 ppm and PCB 1242 at 9 ppm. One other sample had an elevated level of PCB 1242 at 8.8 ppm. None of the remaining samples had concentrations of the chemicals tested for (metals and PCBs) above levels of health concern.

Because of these elevated levels of lead in one location and PCB 1242 found in two samples from the nearest residence, in May 2003, delineation and remediation of off-site soil contaminated with PCB and lead is planned as outlined in a Consent Order issued by GEPD [9]. The property will likely be cleaned up to Type 2 Soil Criteria for residential properties because there is no indication that the contamination is widespread or the “hot spots” are repeatedly accessed by young children. Also, as a conservative measure, L&B Recycling has been ordered by GEPD to ensure that groundwater has not been impacted by observed soil contamination [9].

Because Aroclor 1242 has not been found on site, and lead is commonly found in soil from many sources, the presence of these contaminants cannot be fully attributed to site-related activities. There are many other sources for PCB and lead including old vehicles, painted building debris, and transformers, and there is no information about the historical use of the land where they were detected.

The highest level of each contaminant found exceeding CVs in off-site soil samples collected in 2000 and 2001, and the child and adult CVs that are exceeded, are presented in Table 3.

Table 3. Comparison Of Off-site Soil Sample Results to Applicable Comparison Values For Ingestion

Contaminant	Maximum Level (ppm)	Sample Date	Soil Comparison Value*	
			Concentration (ppm)	Reference
Arsenic	10	2000	0.5	CREG
Copper	90	2000	40	EMEGpc
Lead	2,200 (Average 92)	2001	400**	GEPD[4]
PCB (Aroclor 1242)	9	2001	1.0***	EMEGc

ppm: parts per million
CREG: Cancer Risk Evaluation Guide
EMEGpc: Environmental Media Evaluation Guide (*pica* child) based on intermediate oral exposure
** Soil Concentration that Trigger Notification/Type 2 Soil Criteria cleanup level for residential properties
*** CV for PCB 1254[3]
EMEGc: Environmental Media Evaluation Guide (child) based on chronic oral exposure
* Source: ATSDR, soil comparison values (expires 12/31/04)

Groundwater, Surface Water and Sediment

Groundwater is estimated to range from 15 to 40 feet below ground surface, and generally flows toward streams and rivers to the southwest [3]. The clayey soils observed at the site suggest a low permeability, and no release to groundwater have been observed or suspected at this site [1]. Most residents living near the site obtain their drinking water from municipal and other public surface water sources [3]. The nearest public drinking water intake is approximately 1.3 miles from L&B Recycling. The nearest individual water well is approximately one mile from L&B Recycling. Six other individual wells have been identified between one and four miles from the site [3]. Residents neither expressed concern nor requested environmental sampling of groundwater in the petition or during this site investigation.

Groundwater was not investigated during any of the sampling events [1,3, 6,8]. No contaminants were detected in subsurface soil samples taken from source areas; therefore, there is no evidence that site-related contaminants have migrated to groundwater [6]. The groundwater pathway is not considered to be of concern from contamination at this site.

Surface water runoff from the facility flows west approximately 50 feet overland before reaching a small creek, which is an unnamed tributary of the Yellow River. The creek flows for approximately 0.6 mile before reaching the Yellow River. Fishing does occur in the creek and the Yellow River near the site. There are no drinking water intakes within a mile of the site [3].

In 1991, EPA collected one sediment sample from the creek, which runs along the western boundary of the site. The chemicals sampled for and the sample and analyses methods used are not clearly defined; however, it is believed that they were consistent with EPA guidelines for 1991. No contaminants were found exceeding current CVs [1].

[4] Rules Of Georgia Department Of Natural Resources, Environmental Protection Division, Chapter 391-3-19, Hazardous Site Response.

In 1994, four sediment samples were collected and analyzed. One background sample was taken from upstream of the facility on the Yellow River. The other sediment samples were collected from the on-site creek, north and northwest of the site, and from the Yellow River. All samples were collected, preserved, and analyzed for all chemicals listed in, and in accordance with, EPA guidelines at the time of the sampling. (All detection limits were well below current CVs for soil.)

Sediment samples taken from upstream of the site in 1994 indicate that arsenic and benzo(a)pyrene at levels above CVs may be migrating from an unknown off-site source into the on-site creek. No contaminants were found exceeding CVs in samples taken from the Yellow River [6].

In sampling for the Reassessment in 2000, two sediment samples were taken: from the center of the western edge of the site that may contain sediment transported from the site, and a background sample from the northwest corner of the site in the most upstream accessible location. No contaminants exceeding CVs were found in sediment [3].

There is a small creek north/northwest of the site that has been sampled on several occasions.

People who walk, fish, or otherwise access the small creek may accidentally ingest some of the sediments from the creek or get them on their skin. No CVs exist for sediment; however, arsenic and benzo(a)pyrene exceeded CVs for soil. Using the CV for soil to compare sediment levels is customary, and considered a conservative and protective measure because individuals in this area are far less likely to be exposed to sediment than soil. (Although the value for aluminum in sediment exceeded the applicable CV for a *pica* child, aluminum is not listed because it is extremely unlikely that children with *pica* repeatedly accessed and consumed the contaminated sediment.)

Table 4: Comparison of Surface Water and Sediment Sample Results to Applicable Comparison Values For Ingestion

Contaminant	Maximum Level (ppm)	Sample Date	Soil Comparison Value*	
			Concentration (ppm)	Reference
Arsenic	13.0	1994	0.5	CREG
Benzo(a)pyrene	0.11J	1994	0.1	CREG

ppm: parts per million
CREG: Cancer Risk Evaluation Guide
J: estimated value
* Source: ATSDR, soil comparison values (expires 12/31/2004)

Health Guidelines

When a contaminant exceeds a CV, the toxicological evaluation presented in a public health assessment requires a comparison of the exposure dose (i.e., amount of the contaminant believed to enter the body at the person's body weight for an estimated duration of time) with an appropriate health guideline.

Appendix C contains an explanation of the CVs and health guidelines, and the equations used to estimate the exposure doses used in this public health assessment.

Toxicological Evaluation

The target population for exposure to elevated levels of arsenic, benzo(a)pyrene, PCB 1248, and lead in on-site soil is workers who accessed the contaminated areas frequently. Because this is an operating facility, workers who may have been exposed to contaminated soil are advised to contact the U.S. Occupational Safety and Health Administration if they have health concerns. In addition, the potential for exposure does exist for family members and the public from workers transporting contaminant residues off-site on their bodies and clothing. No health outcome data exists for workers or their families. Therefore, the toxicological evaluation is limited to off-site exposures.

Based on soil and sediment sample results, exposures were evaluated to determine the likelihood of health effects. Adult, child, and children with *pica* exposure doses were calculated for each contaminants found in off-site soil and sediment, based on the highest detected concentration above a CV. Because the facility was in operation for 13 years, the worst-case scenario for exposure to contaminated soil and sediment resulting from facility operations, was established as 4 hours/day, 7days/week, 50 weeks/year, for 13 years, and is considered a conservative estimate and protective for potential maximum exposure. Children with *pica* were considered to receive potential maximum exposure in 1 year, 4 hours/day, 7 days/week, 50 weeks/year. Appendix C contains an explanation of the equations used to estimate the exposure doses in this health consultation.

Table 5. Calculated exposure doses from ingestion of contaminated soil compared to health guidelines

Contaminant	Total estimated dose (mg/kg/day)	Health guideline* (mg/kg/day)	Numeric cancer Risk[1]
Arsenic	Adult: 3.7×10^{-6} Child: 0.00002 Pica: 0.00004	MRL: 0.0003	1.0×10^{-6} 5.8×10^{-6} NA
Copper	Adult: 2.6×10^{-5} Child: 0.0001 Pica: 0.003	MRL: 0.02	NA
Lead	Adult: 0.0006 Child: 0.0035 Pica: 0.007	not established	NA
PCB (Aroclor 1242)	Adult: 2.6×10^{-6} Child: 0.00001 Pica: 2.8×10^{-5}	MRL: 00002**	NA
Benzo(a)pyrene	Adult: 3.1×10^{-8} Child: 1.8×10^{-7} Pica: 3.4×10^{-7}	not established	4.3×10^{-8} 2.4×10^{-7} NA

mg/kg/day: milligrams per kilogram per day
MRL: minimal risk level
NA: not applicable. No cancer slope factor has been established.
[1] Based on EPA's cancer slope factors [arsenic: 1.5 $(mg/kg/day)^{-1}$, benzo(a)pyrene: 7.3 $(mg/kg/day)^{-1}$]
** MRL for PCB 1254[3]
* Source: ATSDR, health guidelines (expires 12/31/04)

Estimated doses relative to health guidelines and numeric cancer risks (where applicable), are presented in Table 5. Based on the calculations conducted, the only chemicals that may result in increased risk for adverse health effects are arsenic and lead.

For soil and sediment pathways, ingestion is defined as *direct ingestion* or actively and passively eating soil particles; and, *indirect ingestion*, or inhalation of dust particles that are then expelled from the respiratory tract and swallowed (ingested). It is important to note that the other routes of exposure; inhalation of very small particles and vapors into the lungs, and direct skin contact (dermal absorption), may contribute additional exposure to specific contaminants but, because they are found at very low levels at this site, are considered to be minimal and not of health concern.

Contaminant Frequency

To summarize the frequency of these contaminants in samples, arsenic was found above the average background levels in:

- five of ten on-site surface soil samples
- none of the four on-site subsurface soil samples
- one of six off-site soil samples

- two of six sediment samples

The level of arsenic in soil that triggers a requirement to notify GEPD is 41 ppm[5]. Arsenic levels found in all soil and sediment samples from on and off-site of L&B Recycling are below all state regulatory standards.

Lead was found above average background levels in:

- eight of ten on-site surface soil samples
- one of the four on-site subsurface soil samples
- four of six off-site soil samples
- two of six sediment samples

The level of lead found in one off-site soil sample (2,200 ppm) exceeds the state and federal screening level of 400 ppm for residential property.

Contaminants of Concern

Arsenic

The highest level of arsenic found off-site was in a sediment sample (13 ppm) collected in 1994. The second highest level of arsenic found off-site was 10 ppm in a soil sample collected in 2000, and the remaining elevated levels was 9.3 ppm in sediment collected in 1994. The calculated exposure doses to 13 ppm of arsenic in soil for adults and children, and for children with *pica* (3.7×10^{-6}, 0.00002, 0.00004; respectively) are well below the established health guideline of 0.0003 mg/kg/day[6]. The health guideline used is ATSDR's chronic oral MRL, which is based on a study conducted in Taiwan where a large number of poor farmers who were exposed to high levels of naturally occurring arsenic in well water [10]. A control group used in the study showed no observed adverse health level (NOAEL) effects at 0.0008 mg/kg/day. GDPH concludes that non-cancer adverse health effects from arsenic exposure at L&B Recycling are not expected to result from past, current or future exposures. Estimated exposure doses based on the highest level detected are substantially below levels in which adverse health effects would likely occur.

The numeric risks of getting cancer from exposure to this level of arsenic in soil were estimated. The calculated risks are 1.0×10^{-6} (1 in 1 million) for adults and 5.8×10^{-6} (6 in 1 million) for children. The numeric cancer risks are based on a 70-year lifetime, with 13 years of exposure, assuming a "worse-case" exposure scenario (Appendix C). The numeric risk for a child developing cancer from exposure to arsenic in soil at this site is slightly elevated.

Subsequent sampling conducted by the homeowner's contractor in 2001 did not reveal any elevated levels of arsenic in any of the five off-site soil samples. If arsenic is present on the property adjacent to L&B Recycling, it is apparently in one or more isolated "hot spots" only. Therefore, it is highly improbable that a child would be exposed to contaminated soil at this site

[5] *Rules Of Georgia Department Of Natural Resources, Environmental Protection Division, Chapter 391-3-19, Hazardous Site Response.*

[6] Data used to develop the health guideline and assess carcinogenic effects of arsenic exposure are based on the ingestion of drinking water, not the ingestion of soil or food containing arsenic.

using the worst-case exposure scenario used in these calculations.

Arsenic is a naturally occurring, substance widely distributed in the earth's crust. Inorganic arsenic is usually found in the environment combined with oxygen, chlorine, and sulfur. In animals and plants, arsenic combines with carbon and hydrogen to form organic arsenic. Inorganic and organic arsenic compounds usually have no smell or taste. Inorganic arsenic is mainly used as a preservative for wood to make it resistant to decay. Organic arsenic compounds are used to make pesticides, primarily for cotton plants.

Several studies have determined that exposure to inorganic arsenic is more harmful than to organic arsenic. Repeated ingestion of low levels of arsenic in soil and dust may cause small corns or warts to develop on the palms, soles and torso and affect the kidneys, liver, and bladder. The EPA classifies inorganic arsenic as a human carcinogen based on sufficient evidence from human data. Increased mortality from multiple internal organ cancers (liver, kidney, lung, and bladder) and an increased incidence of skin cancer were observed in populations consuming drinking water high in inorganic arsenic [10]

The development of cancer is most often related to one's lifestyle: such as sunlight exposure, cigarette smoking, heavy drinking, and diet (for example, excess calories, high fat, and low fiber) [11]. A family history of cancer may also increase a person's chances of developing cancer. It is usually very difficult to confirm whether cancer that develops later in life is attributable to past environmental exposures.

Lead

The highest level of lead found off-site was 2,200 ppm in soil. All other lead levels in soil and sediment are well below the applicable state and federal cleanup level of 400 ppm. No blood lead levels were collected from residents near L&B Recycling. An evaluation of the available lead soil data indicates that the calculated exposure dose is 0.0006 mg/kg/day for adults, 0.0035 mg/kg/day for children, and if a child exhibited *pica* characteristics, the estimated dose is 0.0069 mg/kg/day.

No MRL has been established for lead. EPA's residential soil lead screening value is 400 mg/kg. This value is derived from a model and is considered to be protective of health and the environment [12]. The Centers for Disease Control and Prevention (CDC) considers children to have an elevated blood lead level if the amount of lead in blood is 10 micrograms of lead per deciliter (µg/dL) of whole blood-or greater but, given our increasing scientific knowledge, the levels of lead thought to be associated with negative health effects have been dropping in recent years [13]. Because of the varied nature of lead-containing compounds, ATSDR has not developed a health-based comparison value for lead; however, ATSDR has developed a mathematical model designed to estimate blood lead levels in the body based upon the actual concentrations of lead in soil (Appendix E) [14]. The estimated blood lead levels from exposure to environmental and dietary lead for persons exposed to contaminated off-site soil at L&B Recycling are 4.8 µg/dL (low) and 5.9 µg/dL (high), well below CDCs level of concern.

A person's blood lead level is a good indicator of recent exposure to lead and correlates well with health effects. However, lead concentrations in soil do not directly predict adverse health effects. It is estimated that blood lead levels generally raise three to seven µg/dL for every l000

mg/kg increase in soil lead concentration [14]. Based on the results of applying the highest soil lead concentration found in off-site to the ATSDR lead model (Appendix E), we can conclude that elevated blood lead levels among persons exposed to contaminated off-site soil at L&B Recycling are not expected.

Because this sampling event did not reveal elevated levels of lead in any of the other off-site soil samples, lead is apparently in one or more isolated "hot spots" only. Therefore, it is highly improbable that a child would be exposed to lead in soil at this site at levels of health concern.

The International Agency for Research on Cancer classifies lead as possibly carcinogenic to humans (limited human evidence; less than sufficient evidence in animals), and the EPA classifies lead as a probable human carcinogen (inadequate human, sufficient animal studies). In 2004, the National Toxicology Program (NTP) classified lead as reasonably anticipated to be a human carcinogen because lead exposure has been associated with increased risk of lung, stomach and bladder in diverse human populations [14]. However, EPA has not determined a slope factor for lead from which any kind of numeric cancer risk can be assessed.

Air

During the EPA inspection in June 1991, ambient (outside) air monitoring was conducted in the vicinity of 150 550-gallon drums and eight excavated underground storage tanks (UST) stored on-site and no contaminants were detected in ambient air. No other air sampling has been conducted.

There is insufficient environmental data to determine conclusively whether emissions to air from facility operations could pose a health threat to neighboring residents. However, based on facility operations, professional knowledge about similar facilities, and the data available from inspection reports conducted regularly at the facility since it began operations, it is not suspected of releasing emissions that could cause or contribute to chronic health problems.

Food

Although residents in the area grow fruits, vegetables and herbs for consumption, there is no indication that contamination has migrated off-site and contaminated these foods. No garden sampling has been conducted.

Fish tissue composite samples were analyzed by GEPD in 1996 for metals, pesticides, and PCBs. Flat bullhead were collected from the Yellow River downstream of the facility near the Porterdale Dam. No contaminants were found and there are no restrictions on consumption for any fish species in the area [15].

Smoke, Foul Odors, Mosquitoes, And Rats

The state regulatory agency does not allow open burning. Residents have reported open burning at L&B Recycling and similar facilities in the area to city and county officials on several occasions (see Air section above).

Photograph showing smoke from alleged open burning at the Newton Recycling facility

They also require control of dust and odors from facilities such as L&B Recycling. As a recycling facility and a permit-by-rule solid waste transfer station, the site is regulated by the state in accordance with its solid waste permit and a general National Pollution Discharge Elimination System (NPDES) permit, and by local authorities in accordance with noise, erosion and sedimentation, and zoning laws. The facility has been inspected twice by the state regulatory agency in the last two years, and previously in response to complaints, and no violations were noted. No complaints of odor, mosquitoes, or rats have been received by local health department officials.

Odors are difficult to regulate. The influence of odors on the comfort and welfare of individuals is difficult to evaluate. Odors can result in social and behavioral changes in some people. However, odor perception is subjective, and different individuals may react differently to the same type and intensity of odor. People who live near a recycling facility may become sensitized to odors and report odors as much more intense than someone who only visits the site occasionally (or who is expecting a certain odor from the facility) [16]. GDPH cannot evaluate whether emissions that reportedly caused odors at L&B Recycling were present at levels of health concern because no data on the contaminants that might have caused the odors were collected. No health outcome data for residents living near L&B Recycling have been collected. However, based on facility operations, professional knowledge about similar facilities, and the data available from inspection reports conducted regularly at the facility since it began operations, it is not suspected of releasing emissions that could cause or contribute to chronic health problems.

The local health department will respond to complaints about mosquitoes and rats (and other vermin considered to be disease vectors). No complaints have been received by the local health department about this facility. However, the area has many recycling facilities, the nature of which may attract rodents and insects. It is strongly advised that residents with complaints about these issues contact the Newton County Health Department, Environmental Health Section at (770) 784-2121.

Physical and Other Hazards

There are many observed physical hazards on site. These include abandoned manufacturing and other debris common to a recycling facility.

CHILD HEALTH CONSIDERATIONS

The ATSDR Child Health Initiative recognizes the unique vulnerabilities of young children exposed to chemicals in the environment. Because of their size, body weight, frequent hand to mouth activity, and developing systems, children require special emphasis in communities faced with lead contamination. They may be more likely to come into contact with dust and soil on the ground because they play outdoors, and they often bring food and toys into contaminated areas. Also, they receive higher doses of exposure because children's growing bodies absorb more contamination and can sustain permanent damage if exposures occur during critical growth stages.

Residents with young children should exercise caution that children do not trespass onto the site or the adjacent residents to avoid physical danger and exposure to contaminated soil. This site does not pose a health threat to children because there is no evidence that children are being exposed to contaminants from the facility at levels that could cause chronic illness. Odors and smoke from the facility may cause temporary illness or exacerbate existing conditions in children, but these effects are not expected to continue after odors and smoke have ceased.

CONCLUSIONS

GDPH has determined that L&B Recycling poses **no apparent public health hazard**. Human exposure to contaminated media occurred in the past, but the exposure was below a level of health hazard.

Workers who may have been exposed to contaminated soil on site are advised to contact the U.S. Occupational Safety and Health Administration if they have health concerns.

For Newton Recycling, no air samples were collected during open burning events, and there is no way to determine if contaminants were released to air that may cause human health effects. There are no other known or suspected releases from the facility. Consequently, Newton Recycling is currently and in the future considered to be **no apparent public health hazard**.

RECOMMENDATIONS

Because of the elevated levels of lead found in one sample and PCB 1242 in two samples taken from the nearest residence, in May 2003, delineation and remediation of off-site soil contaminated with PCB and lead is planned as outlined in a Consent Order issued by GEPD [9]. The property will likely be cleaned up to Type 2 Soil Criteria for residential properties because there is no indication that the contamination is widespread or the “hot spots” are repeatedly accessed by young children.

PUBLIC HEALTH ACTION PLAN

Actions Completed

In late 2003, GDPH and ATSDR staff conducted a site visit and spoke with the petitioner about his concerns regarding L&B Recycling.

GEPD staff have repeatedly visited the site and surrounding neighborhoods in response to complaints about open burning, which was indeed witnessed. Local authorities were called and responded, and no complaints of open burning have since been received.

In 2004, GDPH staff spoke with the petitioner on several occasions and shared site-related information.

Actions Planned

GDPH will review additional data if it becomes available and provide documents, including a follow-up health consultation, if appropriate.

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CERTIFICATION

The Georgia Division of Public Health prepared this L & B Recycling, Covington, Newton County, Georgia, public health assessment under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodologies and procedures existing at the time the health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

Technical Project Officer, CAT, SPAB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

Team Lead, CAT, SPAB, DHAC, ATSDR

FIGURES

FIGURE 1: Site Map and Demographic Characteristics

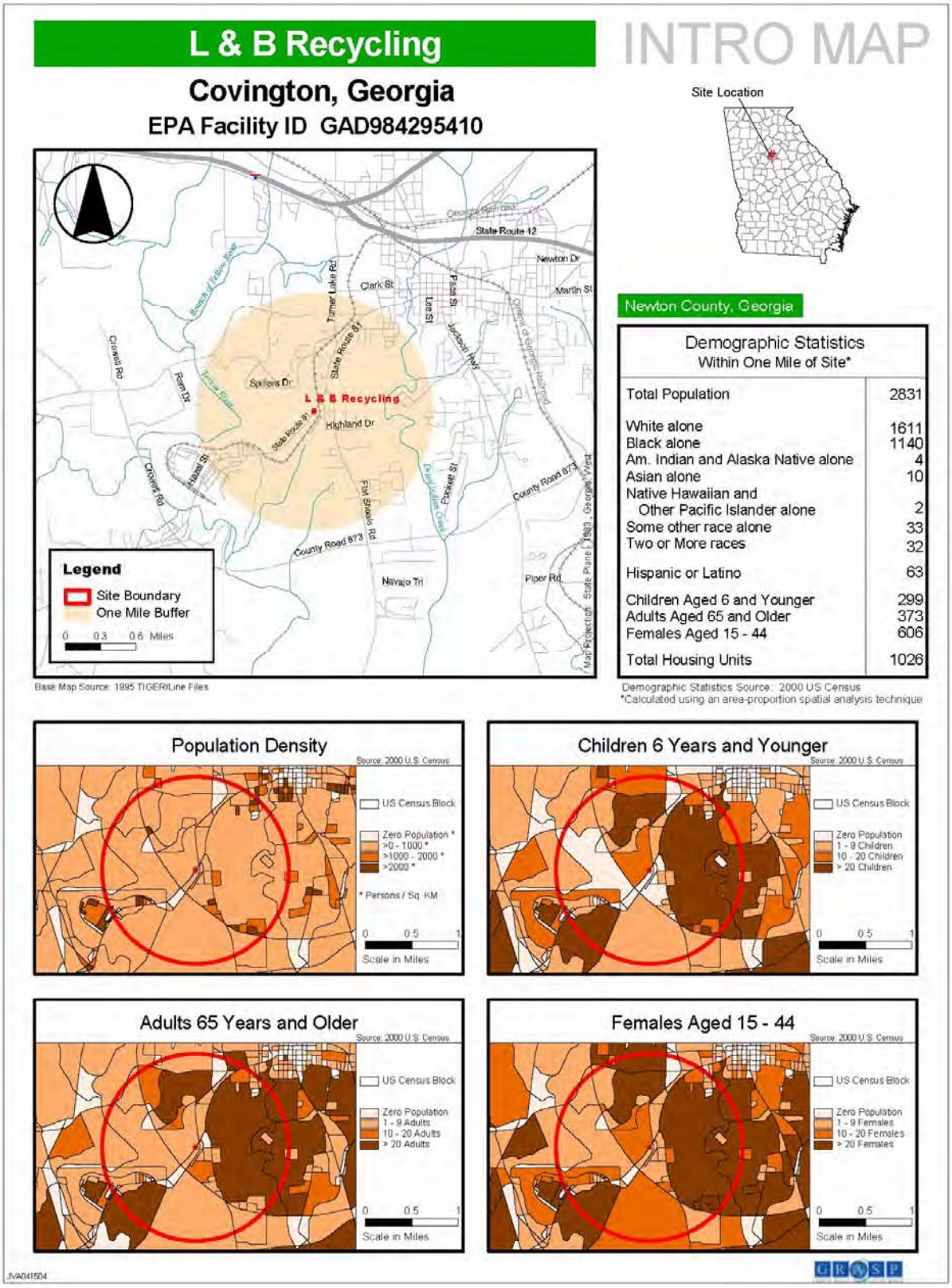

FIGURE 2: Site Diagram

(Source: Georgia Environmental Protection Division, Preliminary assessment for L.B. Recycling; June 18, 1993.)

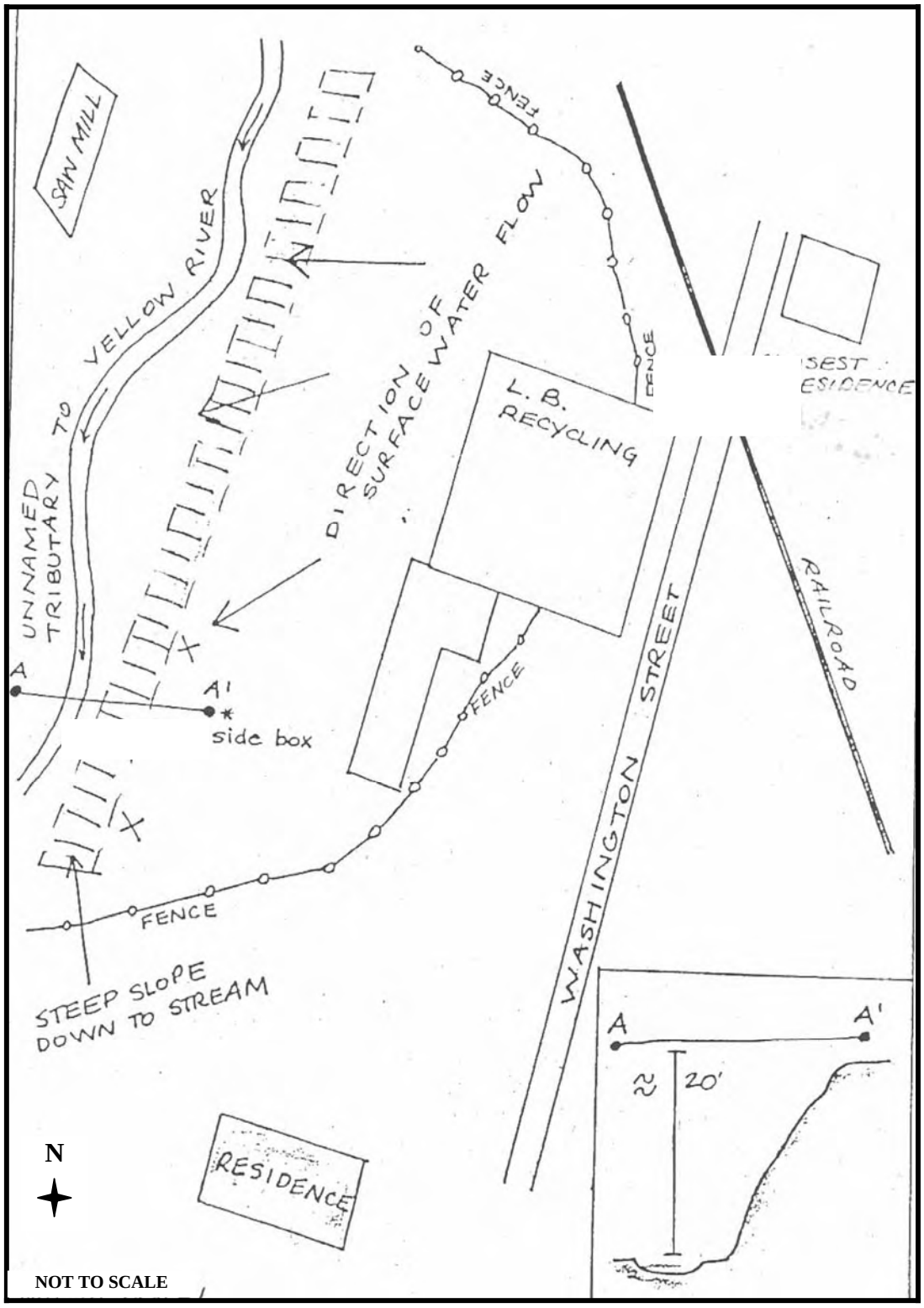

FIGURE 3: Aerial Photograph

L & B Recycling facility. The site is bordered to the north by several businesses, to the west by a small creek that is a unnamed tributary of the Yellow River, and to the south and east by Washington Street and private residences.

APPENDICES

APPENDIX A: Cancer Incidence, 1999 - 2001

(Source: GDPH, Cancer Control Section)

ZIP CODE 30014	Total		Male		Female	
Site	**Cases**	**Rate***	**Cases**	**Rate**	**Cases**	**Rate**
All Sites	320	421.2	176	533.7	144	335.4
Oral Cavity	7	~	6	~	<5	~
Esophagus	13	~	9	~	<5	~
Stomach	<5	~	<5	~	<5	~
Colon and Rectum	29	39.5	15	~	14	~
Liver	<5	~	<5	~	<5	~
Pancreas	9	~	<5	~	6	~
Larynx	<5	~	<5	~	<5	~
Lung and Bronchus	51	67.5	36	109.2	15	~
Bone and Joints	<5	~	<5	~	<5	~
Melanoma	15	~	8	~	7	~
Breast	--	--	--	--	49	116.7
Uterine Cervix	--	--	--	--	5	~
Uterine Corpus	--	--	--	--	5	~
Ovary	--	--	--	--	6	~
Prostate	--	--	60	177.0	--	--
Testis	--	--	<5	~	--	--
Kidney and Renal Pelvis	7	~	5	~	<5	~
Bladder (Incl in situ)	7	~	<5	~	<5	~
Brain and Other Nervous System	6	~	<5	~	<5	~
Thyroid	<5	~	<5	~	<5	~
Hodgkin Lymphoma	<5	~	<5	~	<5	~
Non-Hodgkin Lymphoma	16	~	10	~	6	~
Multiple Myeloma	<5	~	<5	~	<5	~
Leukemias	5	~	<5	~	<5	~

Average annual rate per 100,000, age-adjusted to the 2000 US standard population.

*GDPH does not calculate rates where the number of cases (or deaths) is less than twenty. This is a fairly standard policy across the nation and it has to do with statistical stability. For small numbers, the rates can vary dramatically with the slightest shift in actual numbers. "<5" is used in cells where the count is less than five. This is for confidentiality purposes.

DATA SUMMARY

All Cancer Sites

- 320 new cancer cases were diagnosed in Zip Code 30014 from 1999 to 2001, an average of 107 new cases every year.
- It is expected that about 59 men and 48 women will be diagnosed with cancer every year in Zip Code 30014.
- The overall age-adjusted cancer incidence rate in Zip Code 30014 is 421.2 per 100,000 population. This is lower than the rate for Georgia (453.3 per 100,000) but this difference is not statistically significant.

Males

- Men are 59% more likely than women to be diagnosed with cancer in Zip Code 30014.
- Men in Zip Code 30014 have a lower age-adjusted cancer incidence rate (533.7 per 100,000) than Georgia (558.1 per 100,000), but this difference is not statistically significant.
- Prostate and lung are the top cancer sites among men in both Zip Code 30014 and the State of Georgia.
- The age-adjusted prostate cancer incidence rate is higher for men in Zip Code 30014 (177.0 per 100,000) than for Georgia men (164.8 per 100,000), but this difference is not statistically significant.
- The age-adjusted lung cancer incidence rate for men in Zip Code 30014 (109.2 per 100,000) is similar to that for Georgia men (108.9 per 100,000).

Females

- Women in Zip Code 30014 have a lower age-adjusted cancer incidence rate (335.4 per 100,000) than Georgia (385.9 per 100,000), but this difference is not statistically significant.
- Breast is the top cancer site among women in both Zip Code 30014 and the State of Georgia.
- The age-adjusted breast cancer incidence rate is lower for women in Zip Code 30014 (116.7 per 100,000) than for Georgia women (123.4 per 100,000), but this difference is not statistically significant.

APPENDIX B: The Agency For Toxic Substances And Disease Registry

What is the Agency for Toxic Substances and Disease Registry (ATSDR)?

ATSDR is the principal federal public health agency involved with hazardous waste issues. The agency helps prevent or reduce the harmful effects of exposure to hazardous substances on human health. The Superfund Law created ATSDR, an agency of the U.S. Department of Health and Human Services, in 1980.

Where is ATSDR located? How big is it?

ATSDR's headquarters are in Atlanta, Georgia. The agency has 10 regional offices and an office in Washington D.C. The multi- disciplinary staff of approximately 400 includes epidemiologists, physicians, toxicologists, engineers, public health educators, health communication specialists, and support staff.

What does ATSDR do?

ATSDR conducts a number of activities to help prevent or reduce the harmful effects of exposure to hazardous substances, including:

- Advises federal and state agencies, community members, and other interested parties on the health impacts of Superfund sites and other petitioned sites.
- Identifies communities where people might be exposed to hazardous substances in the environment.
- Determines the level of public health hazard posed by a site.
- Recommends actions that need to be taken to safeguard people's health.
- Conducts health studies in some communities that are located near Superfund sites or in locations where people have been exposed to toxic materials.
- Funds research conducted by colleges, state agencies, and others who study the relationship between hazardous waste exposure and illnesses.
- Educates physicians, other health care professionals, and community members about the health effects of--and how to lessen exposure to--hazardous substances.
- Provides technical support and advice to other federal agencies and state and local governments.
- Maintains registries of people who are exposed to the most dangerous substances.

What can ATSDR do to help a community that may be exposed to hazardous substances?

ATSDR helps communities in a variety of ways, including:

- Helps communities by working with them to resolve their health concerns.
- Determines whether the community is or was exposed to hazardous substances.
- Visits the community to hear residents voice their health concerns.
- Educates residents about any health hazards posed by environmental contaminants.
- Works with local health care providers to ensure they have the information needed to evaluate

possible exposures to hazardous substances in their community.

- Visits a community to draw blood or to collect urine to determine if people have been or are being exposed to a hazardous substance when such actions are required.
- Provides medical monitoring in communities exposed to hazardous substances if such action is needed.

What can't ATSDR do to help a community?

- ATSDR does not have the legal authority to conduct certain activities, such as the following:
- Cannot provide medical care or treatment to people who have been exposed to hazardous substances, even if the exposure has made them ill.
- Cannot provide funds to relocate affected residents or to clean up a site.
- Cannot close down a plant or other business, but can make recommendations to the U.S. Environmental Protection Agency (EPA).

How is ATSDR's role in helping communities different from EPA's role?

Unlike EPA, ATSDR is not a regulatory agency. ATSDR is a public health agency that advises EPA on the health aspects of hazardous waste sites or spills. ATSDR makes recommendations to EPA when specific actions are needed to protect the public's health. For example, ATSDR might recommend providing an alternative water supply, removing contaminated material, or restricting access to a site. EPA usually follows these recommendations. However, ATSDR cannot require EPA to follow its recommendations.

How does ATSDR become involved with a site? How can I get ATSDR involved with a site?

ATSDR is required by the Superfund law to become involved with all sites that are on or proposed for the National Priorities List (NPL). Specifically, ATSDR conducts public health assessments of NPL sites, as well as of all sites proposed for the NPL. EPA, states, local governments, or other federal agencies may request ATSDR's help with a site, such as in cases of accidental spills or releases. Anyone may request or "petition" that ATSDR to do a health consultation. Most requests for health consultations come from EPA and state and local agencies. Anyone may also petition ATSDR to conduct a public health assessment of a site. For more information about how to petition ATSDR to conduct a public health assessment, call ATSDR's toll-free information line, 1-888-42-ATSDR (1-888-422-8737), or send an e-mail request to ATSDRIC@cdc.gov

How does ATSDR work with states and local health departments?

ATSDR has cooperative agreements (partnerships) with 23 states to conduct site-related public health assessments or health consultations, health studies, and health education. In states that have co-operative agreements, ATSDR provides technical assistance and oversees site evaluations and related activities done by state staff. ATSDR also assists local health departments.

Does ATSDR assist communities located near hazardous waste sites that are not on the NPL?

Yes. More than half of the sites ATSDR has worked at are not on the NPL.

What information does ATSDR provide through its Internet web site?

Information that can be accessed through ATSDR's web site includes these items: information about ATSDR; a database containing information on all sites where ATSDR has worked; short, easy-to-read fact sheets on 60 of the most common contaminants at Superfund sites; and links to related sites.

APPENDIX C: Explanation Of Toxicological Evaluation

Step 1--The Screening Process

In order to evaluate the available data, GDPH used comparison values (CVs) to determine which chemicals to examine more closely. CVs are contaminant concentrations found in a specific environmental media (for example: air, soil, or water) and are used to select contaminants for further evaluation. CVs incorporate assumptions of daily exposure to the chemical and a standard amount of air, soil, or water that someone may inhale or ingest each day. CVs are generated to be conservative and non-site specific. The CV is used as a screening level during the public health assessment process where substances found in amounts greater than their CVs might be selected for further evaluation. CVs are not intended to be 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 CVs are calculated from the U.S. Environmental Protection Agency's (EPA) oral cancer slope factors for ingestion exposure, or inhalation risk units for inhalation exposure. Non-cancer CVs are calculated from ATSDR's minimal risk levels, EPA's reference doses, or EPA's reference concentrations for ingestion and inhalation exposure. When a cancer and non-cancer CV exist for the same chemical, the lower of these values is used as a conservative measure. The chemical and media-specific CVs used in the preparation of this public health assessment are:

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

A **Cancer Risk Evaluation Guide (CREG)** is an estimated comparison concentration that is based on an excess cancer rate of one in a million persons exposed over a lifetime (70 years), and is calculated using EPA's cancer slope factor.

Step 2--Evaluation of Public Health Implications

The next step in the evaluation process is to take those contaminants that are above their respective CVs and further identify which chemicals and exposure situations are likely to be a health hazard. Separate child and adult exposure doses (or the amount of a contaminant that gets into a person's body) are calculated for site-specific scenarios, using assumptions regarding an individual's likelihood of accessing the site and contacting contamination. Usually little or no information is available for a site to know exactly how much exposure is actually occurring, so assessors assume that maximum exposure is taking place. That assumption would include any worse case scenarios where someone received a maximum dose. Actual exposure is likely much less than the assumed exposure.

An explanation of the calculation of estimated exposure doses used in this public health assessment are presented below. Calculated doses are reported in units of milligrams per kilogram per day (mg/kg/day).

Ingestion of contaminants present in soil

Exposure doses for ingestion of contaminants present in soil were calculated using the maximum detected concentrations of contaminants in milligrams per kilogram (mg/kg [mg/kg = ppm]). The following equation is used to estimate the exposure doses resulting from ingestion of contaminated soil:

$$ED_s = \frac{C \times IR \times EF \times CF}{BW}$$

where;
ED_s = exposure dose soil (mg/kg/day)
C = contaminant concentration (mg/kg)

IR = intake rate of contaminated medium (based on default values of 100 mg/day for adults; 200 mg/day for children, and 5000 mg/day for a children with *pica*)
EF = exposure factor (based on frequency of exposure, exposure duration, and time of exposure). The exposure factor used is 0.2, based on exposure for 13* years, 4 hours/day, 7 days/week, 50 weeks/year. The exposure factor used for children with *pica* is 0.2 based on exposure for 1 year, 4 hours/day, 7 days/week, 50 weeks/year.
CF = kilograms of contaminant per milligram of soil (10^{-6} kg/mg)
BW = body weight (based on average rates: for adults,70 kg; children, 25 kg; children with *pica*,16 kg)

** 13 years was used as the length of time for exposure because L&B Recycling began operations in 1990, and residents vacated the home with known contaminated soil in 2003. There is no evidence that previous site activity contributed additional exposure and remediation will eliminate future exposure.*

Non-cancer Health Risks

The doses calculated for exposure to individual chemicals are then compared to an established health guideline, such as an ATSDR minimal risk level (MRL) or an EPA reference dose (RfD), in order to assess whether adverse health impacts from exposure are expected. Health guidelines are chemical-specific values that are based on available scientific literature and are considered protective of human health. 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 to derive health guidelines is to identify, usually from animal toxicology experiments, a no observed adverse effect level (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 known toxicological values are doses derived from human and animal studies that are summarized in ATSDR's *Toxicological Profiles (www.atsdr.cdc.gov/toxpro2.html).* The NOAEL is modified with an uncertainty (or safety) factor, which reflects the degree of uncertainty that exists when experimental animal data are extrapolated to the human population. The magnitude of the uncertainty factor considers various factors such as sensitive subpopulations (e.g., children, pregnant women, the elderly), extrapolation from animals to humans, and the completeness of the available data. Thus, exposure doses at or below the established health guideline are not expected to cause adverse health effects because these values are much lower (and more human health protective) than doses, which do not cause adverse health effects in laboratory animal studies.

For non-cancer health effects, the following health guidelines were used in this public health assessment

A **minimal risk level (MRL)** is an estimate of the daily human exposure to a chemical that is likely to be without a significant risk of harmful effects over a specified period of time. MRLs are developed for ingestion and inhalation exposure, and for lengths of exposures; acute (less than 14 days), intermediate (between 15-364 days), and chronic (365 days or greater). ATSDR has not developed MRLs for dermal exposure (absorption through skin).

A **Reference Dose (RfD)** is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. It is derived from a calculated dose, with uncertainty factors generally applied to reflect limitations of the data used.

If the estimated exposure dose to an individual is less than the health guideline value, the exposure is unlikely to result in non-cancer health effects. If the calculated exposure dose is greater than the health guideline, the exposure dose is compared to known toxicological values for the particular chemical and is discussed in more detail in the text of the public health assessment. A direct comparison of site-specific exposure and 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.

It is important to consider that the methodology used to develop health guidelines does not provide any information on the presence, absence, or level of cancer risk. Therefore, a separate cancer risk evaluation is necessary for potentially cancer-causing contaminants detected at this site.

Cancer Risks

Exposure to a cancer-causing chemical, even at low concentrations, is assumed to be associated with some increased risk for evaluation purposes. The estimated risk for developing cancer from exposure to contaminants associated with the site was calculated by multiplying the site-specific doses by EPA's chemical-specific cancer slope factors (CSFs) available at *www.epa.gov/iris*. This calculation estimates a theoretical excess cancer risk expressed as a proportion of the population that may be affected by a carcinogen during a lifetime of exposure. For example, an estimated risk of 1×10^{-6} predicts the probability of one additional cancer over background in a population of 1 million. An increased lifetime cancer risk is not a specified estimate of expected cancers. Rather, it is an estimate of the increase in the probability that a person may develop cancer sometime in his or her lifetime following exposure to a particular contaminant under specific exposure scenarios. For children, the theoretical excess cancer risk is not calculated for a lifetime of exposure, but from a fraction of lifetime; based on known or suspected length of exposure, or years of childhood.

Because of conservative models used to derive CSFs, using this approach provides a theoretical estimate of risk; the true or actual risk is unknown and could be as low as zero. Numerical risk estimates are generated using mathematical models applied to epidemiologic or experimental data for carcinogenic effects. The mathematical models extrapolate from higher experimental doses to lower experimental doses. Often, the experimental data represent exposures to chemicals at concentrations orders of magnitude higher than concentrations found in the environment. In addition, these models often assume that there are no thresholds to carcinogenic effects--a single molecule of a carcinogen is assumed to be able to cause cancer. The doses associated with these estimated hypothetical risks might be orders of magnitude lower that doses reported in toxicology literature to cause carcinogenic effects. As such, a low cancer risk estimate of 1×10^{-6} and below may indicate that the toxicology literature supports a finding that no excess cancer risk is likely. A cancer risk estimate greater than 1×10^{-6}, however, indicates that a careful review of toxicology literature before making conclusions about cancer risks is in order.

APPENDIX D: Best Practices To Reduce Exposure To Lead

Lead in Soil
To reduce exposure to lead in soil, follow these guidelines:

- Have children play in grassy areas in your yard and not on bare soil (cover bare soil areas)
- Clean or remove shoes before entering your home to avoid tracking in lead from soil
- Wash children's hands often, especially after playing outdoors and before they eat
- Wash toys used outdoors often
- Because children often handle pets, and for the health of the pet, keep pets away from areas of contaminated soil. Wash pets after they are exposed to contaminated soil.

Lead in Dust
Lead dust can form from many sources, such as contaminated soil, and when lead-based paint is dry scraped, dry sanded, or heated. Dust also forms when painted surfaces bump or rub together. Lead chips and dust can get on surfaces and objects that people touch. Settled lead dust can re-enter the air when people vacuum, sweep, or walk through it.

Lead in Paint
Other potential sources of lead exposure might come from lead based paint used in older homes. The federal government banned lead-based paint for indoor use in housing in 1978. If a home or dwelling was built before 1978, and especially if the paint is deteriorating (peeling, cracking, chipping or damaged), you may want to test your home for lead. Lead-based paint in good condition is not usually a hazard except on impact or friction surface that rub against each other and create dust, like a windowsill. Removing lead-based paint improperly can increase the danger to your family. If you suspect that your house has lead hazards, you can take immediate steps to reduce risk:

- Renters should notify landlords of peeling or chipping paint
- Clean up paint chips immediately.
- Clean floors, window frames, windowsills and other surfaces weekly. Use a mop or sponge with warm water and a general all-purpose cleaner.
- Keep children away from chipping paint on windowsills or other surfaces
- Keep play areas clean and wash pacifiers, bottles and stuffed animals regularly
- Have your home inspected by a trained or certified professional

Lead in Your Home
If you suspect that your house has lead hazards, you can take some immediate steps to reduce your family's risk:

- Clean floors, window frames, window sills, and other surfaces weekly. Use a mop, sponge, or paper towel with warm water and a general all-purpose cleaner or a cleaner made specifically for lead.
- Thoroughly rinse sponges and mop heads after cleaning dirty or dusty areas.
- Wash children's hands often, especially before they eat and before nap time and bed time.
- Keep play areas clean. Wash bottles, pacifiers, toys, and stuffed animals regularly.
- Clean or remove shoes before entering your home to avoid tracking in lead from soil.
- Make sure children eat nutritious, low-fat meals high in iron and calcium, such as spinach and dairy products. Children with good diets absorb less lead.

In addition to day-to-day cleaning and good nutrition, you can temporarily reduce lead hazards by taking actions such as planting grass to cover soil with high lead levels and repairing damaged painted surfaces. These actions (called "interim controls") are not permanent solutions and will need ongoing attention. You can get your home checked in one of two ways, or both:

- A paint inspection tells you the lead content of every different type of painted surface in your home. It won't tell you whether the paint is a hazard or how you should deal with it.
- A risk assessment tells you if there are any sources of serious lead exposure (such as peeling paint and lead dust). It also tells you what actions to take to address these hazards.

Note: Home test kits for lead are available, but studies suggest that they are not always accurate.

APPENDIX E: ATSDR Lead Model

((Source: Agency for Toxic Substances and Disease Registry, Draft toxicological profile for lead, 1997.)

Numerous longitudinal and cross-sectional studies have attempted to correlate environmental lead levels with blood lead levels. The studies have provided a number of regression analyses and corresponding slope factors for various media including air, soil, dust, water, and food. In an attempt to use this valuable body of data, ATSDR has developed an integrated exposure regression analysis. This approach utilizes slope values from selected studies to integrate all exposures from various pathways, thus providing a cumulative exposure estimate expressed as total blood lead. The worktable in the text can be used to calculate a cumulative exposure estimate on a site-specific basis. To use the table, environmental levels for outdoor air, indoor air, food, water, soil, and dust are needed. In the absence of such data, default values can be used. In most situations, default values will be background levels unless data are available to indicate otherwise. Based on the US Food and Drug Administration's Total Diet Study data, lead intake from food for infants and toddlers is about 5 micrograms per day. In some cases, a missing value can be estimated from a known value**.** For example, EPA has suggested that indoor air can be considered 0.03 times the level of outdoor air.

Empirically determined or default environmental levels are multiplied by the percentage of time one is exposed to a particular source and then multiplied by an appropriate regression slope factor. Slope factor studies were based upon an assumption that exposure is continuous. The slope factors can be derived from regression analysis studies that determine blood lead levels for a similar route of exposure. Typically, these studies identify standard errors describing the regression line of a particular source of lead exposure. These standard errors can be used to provide an upper and lower confidence limit contribution of each estimate of blood lead. The individual source contributions can then be summed to provide an overall range estimate of blood lead. While it is known that such summing of standard errors can lead to errors of population dynamics, detailed demographic analysis (e.g., Monte Carlo simulations) would likely lead to a model without much utility. As a screening tool, estimates provided by the table have a much greater utility than single value central tendency estimates, yet still provide a simple-to-use model that allows the health assessor an easy means to estimate source contributions to blood lead.

Table E-1 provides estimated blood lead levels from exposure to environmental and dietary lead for persons exposed to contaminated off-site surface soil at L&B Recycling.

Table E.1: Estimated blood lead levels from exposure to environmental and dietary lead for persons exposed to contaminated off-site surface soil at L&B Recycling

Media	Concentration*	Relative Time (fraction of a day)	Slope Factor**	Estimated Blood Lead Level micrograms per deciliter (µg/dL)	
Outdoor Air	0.15 µg/m^3	0.2	1.32 (low)[1]	0.0396	
			2.52 (high)[1]		0.0756
Indoor Air	0.15 µg/m^3	0.8	1.32 (low)[2]	0.1584	
			2.52 (high)[2]		0.3024
Food	5 µg/day	1	0.24 [3]	1.2	
Water	4 µg/day	1	0.16 [4]	0.64	
Soil	2,200 mg/kg #	0.2	0.00583 (low)[5]	2.56	
			0.00777 (high)[5]		3.42
Dust	40 mg/kg	0.8	0.00628 (low)[6]	0.201	
			0.008 (high)[6]		0.256
			Total	**4.8**	**5.9**

Relative Times are default values and similar to the values found at this site. When suggested default values are a range of values, the average of the range is used as the default value.

Highest off-site surface soil concentration of lead found above the EPA screening level of 400 ppm.

* Suggested default values references:
Outdoor Air 0.1–0.2 µg/m^3 [1]
Indoor Air 0.1–0.2 µg/m^3 [2]
Food 5 µg/day [3]
Water 4 µg/day [4]
Dust 10–70 mg/kg [5]

** Slope values references:

[1,2]Outdoor, Indoor air	1.32 (low)–2.52 (high)	µg/dL per µg Pb/m^3 [6]
[3]Food	0.24	µg/dL per µg Pb/day [8]
[4]Water	0.16	µg/dL per µg Pb/day [8]
[5]Soil	0.00583 (low)–0.008 (high)	µg/dL per µg Pb/kg [6]
[6]Dust	0.00628 (low)–0.008 (high)	µg/dL per µg Pb/kg [6]

APPENDIX E References:

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APPENDIX F: ATSDR Public Health Hazard Categories

No Public Health Hazard

A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances

No Apparent Public Health Hazard

A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects

Indeterminate Public Health Hazard

The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.

Public Health Hazard

A category used in ATSDR's public health assessments for sites that pose a public health hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or radionuclides that could result in harmful health effects

Urgent Public Health Hazard

A category used in ATSDR's public health assessments for sites where short-term exposures (less than 1 year) to hazardous substances or conditions could result in harmful health effects that require rapid intervention.

APPENDIX G: Glossary of Environmental Health Terms

Absorption
The process of taking in. For a person or animal, absorption is the process of a substance getting into the body through the eyes, skin, stomach, intestines, or lungs.

Acute
Occurring over a short time [compare with **chronic**].

Acute exposure
Contact with a substance that occurs once or for only a short time (up to 14 days) [compare with **intermediate duration exposure** and **chronic exposure]**.

Additive effect
A biologic response to exposure to multiple substances that equals the sum of responses of all the individual substances added together [compare with **antagonistic effect** and **synergistic effect]**.

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

Aerobic
Requiring oxygen [compare with **anaerobic**].

Ambient
Surrounding (for example, *ambient* air).

Anaerobic
Requiring the absence of oxygen [compare with **aerobic**].

Analyte
A substance measured in the laboratory. A chemical for which a sample (such as water, air, or blood) is tested in a laboratory. For example, if the analyte is mercury, the laboratory test will determine the amount of mercury in the sample.

Analytic epidemiologic study
A study that evaluates the association between exposure to hazardous substances and disease by testing scientific hypotheses.

Antagonistic effect
A biologic response to exposure to multiple substances that is **less** than would be expected if the known effects of the individual substances were added together [compare with **additive effect** and **synergistic effect**].

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

Biodegradation
Decomposition or breakdown of a substance through the action of microorganisms (such as bacteria or fungi) or other natural physical processes (such as sunlight).

Biologic indicators of exposure study
A study that uses (a) **biomedical testing** or (b) the measurement of a substance [an **analyte**], its **metabolite**, or another marker of exposure in human body fluids or tissues to confirm human exposure to a hazardous substance [also see **exposure investigation**].

Biologic monitoring
Measuring hazardous substances in biologic materials (such as blood, hair, urine, or breath) to determine whether exposure has occurred. A blood test for lead is an example of biologic monitoring.

Biologic uptake
The transfer of substances from the environment to plants, animals, and humans.

Biomedical testing
Testing of persons to find out whether a change in a body function might have occurred because of exposure to a hazardous substance.

Biota
Plants and animals in an environment. Some of these plants and animals might be sources of food, clothing, or medicines for people.

Body burden
The total amount of a substance in the body. Some substances build up in the body because they are stored in fat or bone or because they leave the body very slowly.

CAP
See **Community Assistance Panel**.

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

Cancer risk
A theoretical risk of for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

Carcinogen
A substance that causes cancer.

Case study
A medical or epidemiologic evaluation of one person or a small group of people to gather information about specific health conditions and past exposures.

Case-control study
A study that compares exposures of people who have a disease or condition (cases) with people who do not have the disease or condition (controls). Exposures that are more common among the cases may be considered as possible risk factors for the disease.

CAS registry number
A unique number assigned to a substance or mixture by the American Chemical Society Abstracts Service.

Central nervous system
The part of the nervous system that consists of the brain and the spinal cord.

CERCLA [see **Comprehensive Environmental Response, Compensation, and Liability Act of 1980**]

Chronic
Occurring over a long time (more than 1 year) [compare with **acute**].

Chronic exposure
Contact with a substance that occurs over a long time (more than 1 year) [compare with **acute exposure** and **intermediate duration exposure**].

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

Community Assistance Panel (CAP)
A group of people, from a community and from health and environmental agencies, who work with ATSDR to resolve issues and problems related to hazardous substances in the community. CAP members work with ATSDR to gather and review community health concerns, provide information on how people might have been or might now be exposed to hazardous substances, and inform ATSDR on ways to involve the community in its activities.

Comparison value (CV)
Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

Completed exposure pathway [see **exposure pathway**].

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
CERCLA, also known as **Superfund**, is the federal law that concerns the removal or cleanup of hazardous substances in the environment and at hazardous waste sites. ATSDR, which was created by CERCLA, is responsible for assessing health issues and supporting public health activities related to hazardous waste sites or other environmental releases of hazardous substances.

Concentration
The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

Contaminant
A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.

Delayed health effect
A disease or injury that happens as a result of exposures that might have occurred in the past.

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

Dermal contact
Contact with (touching) the skin [see **route of exposure**].

Descriptive epidemiology
The study of the amount and distribution of a disease in a specified population by person, place, and time.

Detection limit
The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.
Disease prevention
Measures used to prevent a disease or reduce its severity.

Disease registry
A system of ongoing registration of all cases of a particular disease or health condition in a defined population.

DOD
United States Department of Defense.

DOE
United States Department of Energy.

Dose (for chemicals that are not radioactive)
The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An "exposure dose" is how much of a substance is encountered in the environment. An "absorbed dose" is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.

Dose (for radioactive chemicals)
The radiation dose is the amount of energy from radiation that is actually absorbed by the body. This is not the same as measurements of the amount of radiation in the environment.

Dose-response relationship
The relationship between the amount of exposure [**dose**] to a substance and the resulting changes in body function or health (response).

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

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

EPA
United States Environmental Protection Agency.

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

Epidemiology
The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

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

Exposure assessment
The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with.

Exposure-dose reconstruction
A method of estimating the amount of people's past exposure to hazardous substances. Computer and approximation methods are used when past information is limited, not available, or missing.

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

Exposure pathway
The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a **source of contamination** (such as an abandoned business); an **environmental media and transport mechanism** (such as movement through groundwater); a **point of exposure** (such as a private well); a **route of exposure** (eating, drinking, breathing, or touching), and a **receptor population** (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a **completed exposure pathway**.

Exposure registry
A system of ongoing follow up of people who have had documented environmental exposures.

Feasibility study
A study by EPA to determine the best way to clean up environmental contamination. A number of factors are considered, including health risk, costs, and what methods will work well.

Geographic information system (GIS)
A mapping system that uses computers to collect, store, manipulate, analyze, and display data. For example, GIS can show the concentration of a contaminant within a community in relation to points of reference such as streets and homes.

Grand rounds
Training sessions for physicians and other health care providers about health topics.

Groundwater
Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with **surface water**].

Half-life ($t_{½}$)
The time it takes for half the original amount of a substance to disappear. In the environment, the half-life is the time it takes for half the original amount of a substance to disappear when it is changed to another chemical by bacteria, fungi, sunlight, or other chemical processes. In the human body, the half-life is the time it takes for half the original amount of the substance to disappear, either by being changed to another substance or by leaving the body. In the case of radioactive material, the half life is the amount of time necessary for one half the initial number of radioactive atoms to change or transform into another atom (that is normally not radioactive). After two half lives, 25% of the original number of radioactive atoms remain.

Hazard
A source of potential harm from past, current, or future exposures.

Hazardous Substance Release and Health Effects Database (HazDat)
The scientific and administrative database system developed by ATSDR to manage data collection, retrieval, and analysis of site-specific information on hazardous substances, community health concerns, and public health activities.

Hazardous waste
Potentially harmful substances that have been released or discarded into the environment.

Health consultation
A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical [compare with **public health assessment**].

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

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

Health promotion
The process of enabling people to increase control over, and to improve, their health.

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

Indeterminate public health hazard
The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.

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

Ingestion
The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see **route of exposure**].

Inhalation
The act of breathing. A hazardous substance can enter the body this way [see **route of exposure**].

Intermediate duration exposure
Contact with a substance that occurs for more than 14 days and less than a year [compare with **acute exposure** and **chronic exposure**].

In vitro
In an artificial environment outside a living organism or body. For example, some toxicity testing is done on cell cultures or slices of tissue grown in the laboratory, rather than on a living animal [compare with **in vivo**].

In vivo
Within a living organism or body. For example, some toxicity testing is done on whole animals, such as rats or mice [compare with **in vitro**].

Lowest-observed-adverse-effect level (LOAEL)
The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.

Medical monitoring
A set of medical tests and physical exams specifically designed to evaluate whether an individual's exposure could negatively affect that person's health.

Metabolism
The conversion or breakdown of a substance from one form to another by a living organism.

Metabolite
Any product of **metabolism**.

mg/kg
Milligram per kilogram.

mg/cm^2
Milligram per square centimeter (of a surface).

mg/m^3
Milligram per cubic meter; a measure of the concentration of a chemical in a known volume (a cubic meter) of air, soil, or water.

Migration
Moving from one location to another.

Minimal risk level (MRL)
An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see **reference dose**].

Morbidity
State of being ill or diseased. Morbidity is the occurrence of a disease or condition that alters health and quality of life.

Mortality
Death. Usually the cause (a specific disease, condition, or injury) is stated.

Mutagen
A substance that causes **mutations** (genetic damage).

Mutation
A change (damage) to the DNA, genes, or chromosomes of living organisms.

National Priorities List for Uncontrolled Hazardous Waste Sites (National Priorities List or NPL)
EPA's list of the most serious uncontrolled or abandoned hazardous waste sites in the United States. The NPL is updated on a regular basis.

No apparent public health hazard
A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the

future, but where the exposure is not expected to cause any harmful health effects.

No-observed-adverse-effect level (NOAEL)
The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.

No public health hazard
A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances.

NPL [see **National Priorities List for Uncontrolled Hazardous Waste Sites]**

Physiologically based pharmacokinetic model (PBPK model)
A computer model that describes what happens to a chemical in the body. This model describes how the chemical gets into the body, where it goes in the body, how it is changed by the body, and how it leaves the body.

Pica
A craving to eat nonfood items, such as dirt, paint chips, and clay. Some children exhibit pica-related behavior.

Plume
A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.

Point of exposure
The place where someone can come into contact with a substance present in the environment [see **exposure pathway**].

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

Potentially responsible party (PRP)
A company, government, or person legally responsible for cleaning up the pollution at a hazardous waste site under Superfund. There may be more than one PRP for a particular site.

ppb
Parts per billion.

ppm
Parts per million.

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

Prevalence survey
The measure of the current level of disease(s) or symptoms and exposures through a questionnaire that collects self-reported information from a defined population.

Prevention
Actions that reduce exposure or other risks, keep people from getting sick, or keep disease from getting worse.

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

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

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

Public health advisory
A statement made by ATSDR to EPA or a state regulatory agency that a release of hazardous substances poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

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

Public health hazard
A category used in ATSDR's public health assessments for sites that pose a public health hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or **radionuclides** that could result in harmful health effects.

Public health hazard categories
Public health hazard categories are statements about whether people could be harmed by conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. The five public health hazard categories are **no public health hazard, no apparent public health hazard**, **indeterminate public health hazard**, **public health hazard**, and **urgent public health hazard**.

Public health statement
The first chapter of an ATSDR **toxicological profile**. The public health statement is a summary written in words that are easy to understand. The public health statement explains how people might be exposed to a specific substance and describes the known health effects of that substance.

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

Radioisotope
An unstable or radioactive isotope (form) of an element that can change into another element by giving off radiation.

Radionuclide
Any radioactive isotope (form) of any element.

RCRA [See **Resource Conservation and Recovery Act (1976, 1984)**]

Receptor population
People who could come into contact with hazardous substances [see **exposure pathway**].

Reference dose (RfD)
An EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans.

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

Remedial Investigation
The CERCLA process of determining the type and extent of hazardous material contamination at a site.

Resource Conservation and Recovery Act (1976, 1984) (RCRA)
This Act regulates management and disposal of hazardous wastes currently generated, treated, stored, disposed of, or distributed.

RFA
RCRA Facility Assessment. An assessment required by RCRA to identify potential and actual releases of hazardous chemicals.

RfD
See **reference dose**.

Risk
The probability that something will cause injury or harm.

Risk reduction
Actions that can decrease the likelihood that individuals, groups, or communities will experience disease or other health conditions.

Risk communication
The exchange of information to increase understanding of health risks.

Route of exposure
The way people come into contact with a hazardous substance. Three routes of exposure are breathing [**inhalation**], eating or drinking [**ingestion**], or contact with the skin [**dermal contact**].

Safety factor [see **uncertainty factor]**

SARA [see **Superfund Amendments and Reauthorization Act**]

Sample
A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger population [see **population**]. An environmental sample (for example, a small amount of soil or water) might be collected to measure contamination in the environment at a specific location.

Sample size
The number of units chosen from a population or environment.

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

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

Special populations
People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations.

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

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

Substance
A chemical.

Substance-specific applied research
A program of research designed to fill important data needs for specific hazardous substances identified in ATSDR's **toxicological profiles**. Filling these data needs would allow more accurate assessment of human risks from specific substances contaminating the environment. This research might include human studies or laboratory experiments to determine health effects resulting from exposure to a given hazardous substance.

Superfund Amendments and Reauthorization Act (SARA)
In 1986, SARA amended CERCLA and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from substance exposures at hazardous waste sites and to perform activities including health education, health studies, surveillance, health consultations, and toxicological profiles.

Surface water
Water on the surface of the earth, such as in lakes, rivers, streams, ponds, and springs [compare with **groundwater**].

Surveillance [see **epidemiologic surveillance**]

Survey
A systematic collection of information or data. A survey can be conducted to collect information from a group of people or from the environment. Surveys of a group of people can be conducted by telephone, by mail, or in person. Some surveys are done by interviewing a group of people [see **prevalence survey**].

Synergistic effect
A biologic response to multiple substances where one substance worsens the effect of another substance. The combined effect of the substances acting together is greater than the sum of the effects of the substances acting by themselves [see **additive effect** and **antagonistic effect**].

Teratogen
A substance that causes defects in development between conception and birth. A teratogen is a substance that causes a structural or functional birth defect.

Toxic agent
Chemical or physical (for example, radiation, heat, cold, microwaves) agents which, under certain circumstances of exposure, can cause harmful effects to living organisms.

Toxicological profile
An ATSDR document that examines, summarizes, and interprets information about a hazardous substance to determine harmful levels of exposure and associated health effects. A toxicological profile also identifies significant gaps in knowledge on the substance and describes areas where further research is needed.

Toxicology
The study of the harmful effects of substances on humans or animals.

Tumor
An abnormal mass of tissue that results from excessive cell division that is uncontrolled and progressive. Tumors perform no useful body function. Tumors can be either benign (not cancer) or malignant (cancer).

Uncertainty factor
Mathematical adjustments for reasons of safety when knowledge is incomplete. For example, factors used in the calculation of doses that are not harmful (adverse) to people. These factors are applied to the lowest-observed-adverse-effect-level (LOAEL) or the no-observed-adverse-effect-level (NOAEL) to derive a minimal risk level (MRL). Uncertainty factors are used to account for variations in people's sensitivity, for differences between animals and humans, and for differences between a LOAEL and a NOAEL. Scientists use uncertainty factors when they have some, but not all, the information from animal or human studies to decide whether an exposure will cause harm to people [also sometimes called a **safety factor**].

Urgent public health hazard
A category used in ATSDR's public health assessments for sites where short-term exposures (less than 1 year) to hazardous substances or conditions could result in harmful health effects that require rapid intervention.

Volatile organic compounds (VOCs)
Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

APPENDIX H: Response to Public Comments

Comment: what happened to the missing drums and are they still a potential environmental and health concern?

Response: we were not able to find documentation about the fate of all the drums. It cannot be assumed that all of the drums contained hazardous waste but, if they did, and they were improperly buried on site or disposed of in another location, we do not believe there is a feasible way to confirm these suspicions. The only way to assure that the environment and human health are not at risk from the contents of the drums was to conduct environmental sampling (i.e., soil, surface water). The results of sampling events do not indicate that there is an unknown source for leaking hazardous waste to soil or surface water. In addition, there are no indications that there are human exposure pathways to contaminated environmental media (i.e., soil, groundwater, surface water, fish), therefore, we do not recommend that additional excavation, sampling, or monitoring above what is already being conducted, is warranted.

Comment: the LB Recycling site has been acknowledged as being contaminated, but no remediation has ever been ordered or done to the site. Shouldn't the contamination be cleaned up?

Response: the Georgia Division of Public Health does not regulate operating facilities of this type, and cannot order remediation. Based on our investigation, we do not recommend that the regulatory authority conduct site remediation at this time.

Many current industrial and commercial sites may be contaminated: what is of public health concern is whether there is/are completed or potential exposure pathways to the general public of contaminants at levels of health concern At this site, two contaminants have been found off site above health screening levels, and the state regulatory agency is requiring off-site remediation.

As for on-site contamination, the Georgia Division of Public Health has no regulatory authority for environmental cleanup levels at sites, or for employee exposures at operating facilities. These suspected exposures must be referred to the U.S. Occupational Safety and Health Administration. Past exposures to employees at levels of health concern can never be accurately verified, but the consistently low levels of three contaminants found above screening values do not lead us to believe that employees would suffer from chronic health effects from repeated exposure over a period of time (total number of years the facility has been in operation). Because of current site conditions and health and safety procedures, we do not believe that employees are currently or, will in the future, be exposed to contaminants on-site at levels of health concern.

Comment: LB Recycling operates on a steep hill overlooking a stream that feeds into the Yellow River. This provides a direct water pathway to the river. Due to the nature of their business, and past history, should this be allowed to continue?

Response: physical barriers can be built and buffer zones can be established to help protect surface water bodies from industrial and commercial releases, but are apparently not required under past or current laws for this site. Based on recent sampling data, we do not believe that contamination is migrating or will migrate to surface water from L&B Recycling at levels of

health concern. Please contact the Watershed Protection Branch of the Georgia Environmental Protection Division to report concerns or request information.

Comment: in summary, there is no public health concern regarding the LB Recycling site. Are the above the intended conclusions on part of the document?

Response: the document concludes that the Georgia Division of Public Health has determined that L&B Recycling poses **no apparent public health hazard**. Please see Appendix F for the distinct difference between these two health hazard categories. We cannot interpret the conclusions you draw. Please review the responses to comments above and the Conclusions section in the document. If you have questions, please contact the author directly for further explanation.

Comment: Page 5 states, "Residents in the area are encouraged to routinely test private well water,…". We have not ever received any encouragement to test. Who is responsible for this encouragement?

Response: The Georgia Division of Public Health encourages all private well water users to maintain their wells, which can include conducting routine testing. The University of Georgia Cooperative Extension Service, Housing Education Program, offers eleven circulars to teach Georgians how to reduce exposure to environmental contaminants in the home. The **Household Water Quality Series** can be found at your county Extension Service office and online at www.fcs.uga.edu/extension/house_pubs.php, and is also available in Spanish.

- *Coliform Bacteria in Your Water*
- *Corrosive or Scaling Water*
- *Disinfecting Your Well Water: Shock Chlorination*
- *Home Water Quality and Treatment*
- *Hydrogen Sulfide and Sulfate*
- *Iron and Manganese*
- *Lead and Copper*
- *Nitrite in Water*
- *Pesticides, Solvents, and Petroleum Products*
- *Protecting Your Well and Wellhead*
- *Testing for Water Quality*

Comment: who has advised the workers to contact U.S. OSHA? If there is no apparent public health hazard, why do the workers have to be advised?

Response: For concerns about on-site contamination at an operating facility and worker exposures, the Georgia Division of Public Health advises workers to contact the U.S. Occupational Safety and Health Administration. In the document, we did not calculate worse case exposure doses for workers, as we did for exposures to children and adults of the general public. The ATSDR Health Hazard Category, *no apparent public health hazard*, refers to the general public, and does not include potential past, current, or future worker exposures.

Comment: page 17 states that the state and federal regulatory levels for lead is 400 ppm. It is my understanding that the state of Georgia limit for lead is 75 ppm for residential property.

Response: Under the Rules of Georgia Department of Natural Resources, Environmental Protection Division, *Chapter 391-3-19, Hazardous Site Response*, the state [and federal] notification concentration and clean up level for lead in residential soil is 400 ppm for Type 2 Soil Criteria. However, under Type 1 Soil Criteria, the clean-up level for residential property is 75 ppm. The Georgia Division of Public Health cannot determine which Soil Criteria will be used by the Georgia Environmental Protection Division during residential property remediation; however, based on the soil samples results indicating that elevated levels of contaminants are confined to isolated "hot spots", and the potential for repeated long term exposure to contaminated soil by young children, we used 400 ppm as a comparison value, and do not believe that recommending Type 1 Soil Criteria clean-up standards are warranted.

Comment: ff your conclusion that of no apparent health hazard is based on the assumption that stated {Consent Order] orders will be done, then please recommend that the orders be executed.

Based on our calculations of exposure doses and the resulting toxicological evaluation for children and adults accessing the residential property of concern, we do not believe that the levels are at, or above, levels of health concern, when applying a worse case exposure scenario. Therefore, we do not specifically recommend that cleanup be conducted based on the health evaluation of exposure pathways. Please contact the Georgia Environmental Protection Division for specific rules pertaining to hazardous site response.

Comment: provide an area map showing the location of Newton Recycling in relation to L&B Recycling.

Response: on page 4, we state that Newton Recycling is located several hundred feet southeast of L&B Recycling. Because of their close proximity, it was not considered necessary to include an additional map.

Comment: the photograph on page 18 shows open burning at Newton Recycling, not at L&B Recycling as might be assumed.

Response: the caption under the photograph on page 18 was edited to identify the location as Newton Recycling. The text in that portion of the document discusses air quality in the general area.

Comment: why did the U.S. EPA conduct the initial investigation of L&B Recycling?

Response: the available site records state that "In 1991, EPA Technical Assistance Team (TAT) members conducted an inspection of L.B. Recycling [to] determine possible hazardous conditions posed by drum and excavated underground storage tanks (UST) being stored on the site [3]." For brevity and clarity, the reason for the initial EPA investigation was stated as on page 5. Whether the site visit was initiated by a routine inspection, or a worker or citizen complaint is not clear in the historical documents.