

HEALTH CONSULTATION

BROWN'S DUMP

JACKSONVILLE, DUVAL COUNTY, FLORIDA

CERCLIS NO. FLD980847016

FEBRUARY 6, 1997

Prepared by:

**Bureau of Environmental Toxicology
Division of Environmental Health
Florida Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry**

Summary

Brown's Dump site in Jacksonville, Florida, was a disposal site for municipal solid waste and municipal incinerator ash. In this health consultation, we evaluate the potential for health effects in children from exposure to lead in the soil.

This site is a public health hazard because children could incidentally ingest soil with high concentrations of lead. Recent blood lead data, however, demonstrate that this pathway is not currently complete. If this pathway should become complete in the future, this site could pose a risk. We recommend restricting site access and additional soil testing.

Background and Statement of Issues

On November 8, 1996, the Environmental Protection Agency (EPA) requested the Agency for Toxic Substances and Disease Registry (ATSDR) determine if a health threat exists at the Brown's Dump Site in Jacksonville, Florida. On November 21, 1996 ATSDR requested the Florida Department of Health make this determination. In this health consultation report we review the existing health and environmental data to determine if a health threat exists.

The Brown's Dump site at 4330 Pearce Street encompasses approximately 50 acres (Figure 1,2,3). From 1949 to 1955, the City of Jacksonville used the site for the disposal of municipal solid waste and municipal incinerator ash. In 1955, the City built the Mary McLeod Bethune Elementary School on 14 acres in the central portion of the site. The Jacksonville Electric Authority electrical substation occupies about 2 acres in the northeastern portion of the site. The site includes residential areas such as Bessie Circle apartments to the west of the elementary school and Moncrief Village and Palm Terrace Apartment Complexes in the northern part of the site. Moncrief Creek runs through the northwestern part of the site [1].

The major public health concern at this site is lead in the soil. Previous investigations did not find significant levels of other contaminants. Most of the lead in the soil is in an ash layer. The ash is present to a depth of thirteen feet deep in the western portion of the site. The City has not determined the full areal extent of the ash but it includes all of the school property, the electric substation, and part of the residential area [1].

Soil Samples. In 1985, the EPA collected surface water, groundwater and soil samples. They found high levels of lead in the three surface soil samples at the elementary school [1]. Between 1994 and 1996, the City and the Duval County Health Department collected additional soil samples and found incinerator ash with lead levels above 500 parts per million (ppm). On January 27, 1994, the County Health

Department found a maximum of 910 ppm lead in the playground soil at the elementary school. In February 1995, contractors for EPA (Kiber Environmental Services Inc. Laboratory) found a maximum of 2,600 ppm of lead in surface soil samples. The Duval County Health Department took forty more soil samples on April 27, 1995 and found a maximum of 7,000 ppm lead [2,3,4]. In November 1995, contractors for the City (EMCON) collected and analyzed eighteen more soil samples. They found a maximum of 7,460 ppm lead. In April 1996, EMCON collected and analyzed nineteen more soil samples and found a maximum of 78,800 ppm lead in the soil in a neighborhood near Moncrief Creek north of the school [1,5,6]. Forty percent of the samples collected between 1994 and 1996 had more than 500 ppm lead.

These data show that a significant portion of the soil on the site has levels of lead above 500 ppm. Table 1, below, summarizes these data.

Table . Summary of Soil Lead Data

Date	Sampling Agency	Number of Samples	Maximum (ppm)	Percentage greater than 500 ppm*	EPA Recommendations [7]
1/94-4/94	Duval Health Department: playground samples [2]	4	910	50%	Change use patterns and create barriers in all contaminated areas
2/95	Kiber: surface soil [3]	9	2600	11%	Change use patterns and create barriers in all contaminated areas
4/95	Duval Health Department [4]	40	7000	18%	Reduce levels in soil when levels are above 5000 ppm
11/95	EMCON CAR: within the ash [1]	18	7460	88%	Reduce levels in soil when levels are above 5000 ppm
12/95	EMCON: within ash [5]	13	9110	61%	Reduce levels in soil when levels are above 5000 ppm
4/96	EMCON: within ash [6]	19	78800	42%	Reduce levels in soil when levels are above 5000 ppm

ppm = parts of lead per million parts of soil

* 500 ppm = health action level

The areas with the highest soil lead concentrations (more than 5,000 ppm) are around Moncrief Creek. Figure 4 shows the location of soil samples with more than 2,000 ppm of lead. Figure 5 describes the proportion of "typical" soil samples (1000-2000 ppm) compared to the proportion of the highest concentrations found (frequency distribution of soil lead levels).

Other Environmental Samples. Groundwater, surface water and sediment samples from Moncrief Creek were not contaminated with site related chemicals [1]. The soil

has not been analyzed for organic chemicals typically found in incinerator ash, such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs)[8,9,10].

Biological Samples. Between May 24 and June 5, 1995, the Duval County Health Department conducted free lead screenings for Pre-K and Kindergarten children attending the elementary school. Using the capillary method, they found five out of 100 children screened (5%) had between 10-15 micrograms of lead per deciliter of blood (ug/dL). They screened 30 more children in the Bessie Circle apartment area; one child had a blood lead level of 10-15 ug/dL [11]. The Health Department screened nine more area children. One child had a blood lead level of 12 ug/dL. The Health Department then screened 56 more children in the Moncrief Village and Palm Terrace Apartment Complexes (see Figure 3) and they found 1 out of 56 had a blood lead level of 10 ug/dL. They screened eight children at a nearby day care; none had a blood lead level greater than 10 ug/dL. In summary, the County Health Department screened a total of 194 area children. Eight (4.1%) had capillary blood lead levels greater than 10 ug/dL [12].

Remedial Actions. In late 1995 and early 1996, the City placed six inches of clean soil around the basketball court and playground area, at the gate along the western property line near the Bessie Circle apartments and on the western entrance to the courtyard between the southern two elementary school buildings (Figure 3). They repaired the fence along the elementary school's western property line. They installed a fence around the parking lot in the front of the elementary school to control pedestrian access during and after school hours [5].

Site Visit. On December 3, 1996 Randy Merchant and Julie Smith of the Florida Department of Health, Bureau of Environmental Toxicology, visited the site. They were accompanied by representatives of the Florida Department of Environmental Protection and the Duval County Health Department. They observed some ash (soil with broken glass and fused particles called clinker) on the ground outside the Bessie Circle apartments. They observed the northern portion of the elementary school property was fenced and covered with grass. The fence gates, however, were open. They observed an opening in the fence at Bessie Circle. This opening provides access to Moncrief Creek from Bessie Circle. Parking on the eastern portion of the elementary school property along Pearce Street is unpaved and fenced. The neighborhood north of Moncrief Creek along Nash Road has unpaved dirt roads. The City is digging up area streets to install storm drains. Mr. Merchant and Ms. Smith observed older houses in the area, possibly up to fifty years old. They observed Moncrief Creek but did not see evidence of children playing along the creek, although there are reports that children have played in Moncrief Creek [13].

Discussion

In this health consultation, we evaluate the risk of illness from exposure to the contaminated soil. Lead in the soil is the primary identified contaminant of concern at this site. Since shallow groundwater and surface water were not contaminated and there are no drinking water wells within a 0.5 mile radius of the school, we did not evaluate the potential public health threat from exposure through these media.

In addition to contaminated soil at the site, there are many ways children may be exposed to lead. Soil may be contaminated from paint, gasoline, vehicle emissions and industrial sources. Children, especially those under the age of six, put many things into their mouths. Their hands, toys and other items may have soil and dust containing lead on them. In addition to the lead in soil, another common source of lead exposure for children is lead-based paint. Children are exposed when they eat chips of lead based paint or breathe paint-contaminated dust from home renovations. Lead can contaminate drinking water if the water distribution system has lead soldered joints or connectors or other fixtures. Children may be exposed to lead when parents take home lead on their clothing from work or from certain hobbies like furniture refinishing or making stained glass or pottery. Improperly fired ceramicware and lead-soldered cans can result in lead-contaminated foods [14].

Children are at the greatest risk for lead-induced illnesses. Children less than five years old absorb lead into their body more efficiently than adults. They do not remove lead from their bodies as quickly as adults do. Children with nutritional deficiencies may absorb the lead even faster. A blood lead level of greater than 10 ug/dL indicates that children may be exposed to higher than average levels of lead [14].

Data Reviewed. The 194 children which the County Health Department screened for blood lead are representative of children under six that live in the area for the following reasons. First, children under six are most sensitive to lead exposure. Most of the children screened were under six years old. Even though children older than six years old are more likely to play outside of the elementary school property and along the creek, they don't exhibit the hand - mouth behavior that young children do and are less likely to ingest the soil. Second, the locations of the homes of the children the County Health Department screened are representative of all the area homes. Even if residents in the apartment complexes move frequently, the blood lead screening represents recent exposure to lead and would still be representative of children living in the area. Third, the County Health Department screened children in May and June. Children play outside during these months and are likely to come into contact with the soil.

The Centers for Disease Control and Prevention (CDC) does not consider children with



blood lead levels less than 10 ug/dL to be lead-poisoned. If a large portion of children have blood lead levels between 10 and 14 ug/dL, the CDC recommends community childhood lead poisoning prevention activities and more frequent screening [15]. Blood lead levels actually measured in children living near the site (10-20 ug/dL) do not cause distinctive symptoms but are associated with decreased intelligence and impaired neurobehavioral development. These blood lead levels can also cause decreased stature or growth, decreased hearing acuity and decreased ability to maintain a steady posture. These blood lead levels could also interfere with vitamin D metabolism [15].

The County Health Department reported that the percentage of children in this area with blood lead levels greater than 10 ug/dL (4%) was less than the county-wide percentage (9%)[12]. The EPA recommends limiting exposure so that no more than 5% of a group of similarly exposed children will exceed a blood lead level of 10 ug/dL [7].

We obtained the blood lead data for 127 of the 194 children screened, including the eight children with blood lead levels above 10 ug/dL. We compared areas with soil contamination above 2,000 ppm with the blood lead data. There does not appear to be any correlation between location of children with blood lead above 10 ug/dL and location of contaminated soil. However, the number of children with blood lead levels above 10 ug/dL is small (eight). This reduces our ability to detect a correlation.

The body eliminates most of the lead in the blood in four to five months (half-life 28-36 days) [14]. Therefore, blood measurements reflect only recent exposure -- not long term exposure. Following increased awareness due to soil sampling and publicity about the site, people may have modified their behavior and reduced their exposure (i.e. washing children's hands after playing). If people reduced their exposure, their blood lead levels would decrease. Therefore, blood lead levels below 10 ug/dL do not prove that significant lead exposure did not occur in the past [16].

We used the Integrated Exposure Uptake Biokinetic (IEUBK) model to predict blood lead levels following exposures at this site. This model predicts blood lead levels in children between the ages of 0 and 6 years in a residential setting. The model predicts blood lead levels for children exposed to lead in soil and other sources. Since behavior patterns (i.e. time spent outdoors) and size of child (i.e. lung size and amount of air a child can breathe) change with age, default data used in the model changes with age. We used site specific data for exposure resulting from incidental ingestion of soil. Incidental soil ingestion among children may occur through the mouthing of objects or hands. Mouthing behavior is considered to be a normal phase of childhood behavior. For ingestion of soil and dust, the model uses the value of 0.1 grams of soil and dust per day [17].

Results of the IEUBK model are based on exposure that might occur, not from

exposure that has actually occurred. The model predicts that exposure to lead at the maximum soil level found near Moncrief Creek (78,800 ppm) would result in a blood lead level which could result in serious illness (1,200 ug/dL) [17]. Since we believe the model is accurate, we conclude children probably have not been exposed to this highly contaminated soil. For comparison, we used the model to predict blood lead levels from contact with the highest lead level found in soil on the school property (2,530 ppm). The predicted blood lead level was about 12 ug/dL, similar to the blood lead levels found in eight children screened who had blood lead levels above 10 ug/dL (average 11.5 ug/dL).

To assess the public health threat at this site, we used a combination of measured blood lead data and predicted blood lead levels based on soil lead concentrations. Since the highest measured blood level was only 18 ug/dL, there is either an incomplete exposure pathway for area children or the lead is not being absorbed into the body (non-bioavailable). Based on measured blood lead data, the children do not appear to have been exposed to the soil with the highest levels of lead. Because, blood lead tests only reflect recent exposure, we do not know if children were exposed to the highly contaminated soil before 1995 or if they will be exposed in the future.

Soil lead concentrations greater than 500 ppm in residential areas should be considered a potential health threat. Based on the levels of lead in the soil along Moncrief Creek, we consider this site a public health hazard. Long-term incidental soil ingestion by children of the most contaminated soil could result in serious illness.

Conclusions

1. Based on the levels of lead in the soil, this site is a public health hazard. Incidental soil ingestion by children of the most contaminated soil near Moncrief Creek could result in serious illness. Although the back of the elementary school property was fenced, the gate was not locked. There is an opening in the fence at the end of Bessie Circle leading to Moncrief Creek. Children at the Mary McLeod Bethune Elementary School and in the surrounding neighborhood do not appear to have been exposed to the most highly lead contaminated soil in the first six months of 1995.
2. The soil at this site has not been analyzed for complex organic chemicals typical in incinerator ash such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs).
3. The extent of the lead and ash contamination in the surrounding neighborhood has not been delineated.

Recommendations

1. Restrict access to the most contaminated soil near Moncrief Creek and post warning signs. Repair and maintain the fence at the end of Bessie Circle. The City of Jacksonville should post and restrict access to the most contaminated soil along Moncrief Creek. The City should also repair and maintain the fence at the end of Bessie Circle. The elementary school should keep the gate to the back portion of the property locked.
2. Sample and analyze site soil for complex organic chemical typically found in incinerator ash. The City of Jacksonville should sample and analyze site surface soil (0-3 inches deep) for complex organic chemicals typically found in incinerator ash such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs).
3. Delineate the extent of lead contaminated soil and ash in the surrounding neighborhood. The City of Jacksonville should delineate the extent of lead contaminated soil and ash in the surrounding neighborhood.

The conclusions and recommendations in this report are based on the information reviewed. If additional information becomes available, we will evaluate it to determine what, if any, additional actions are necessary. The conclusions and recommendations in this report are site specific and are not necessarily applicable to other sites.

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CERTIFICATION

This Health Consultation was prepared by the Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

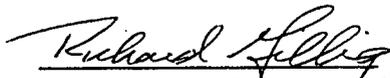


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ATSDR

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



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MAP OF FLORIDA

SHOWING COUNTY OF INTERES

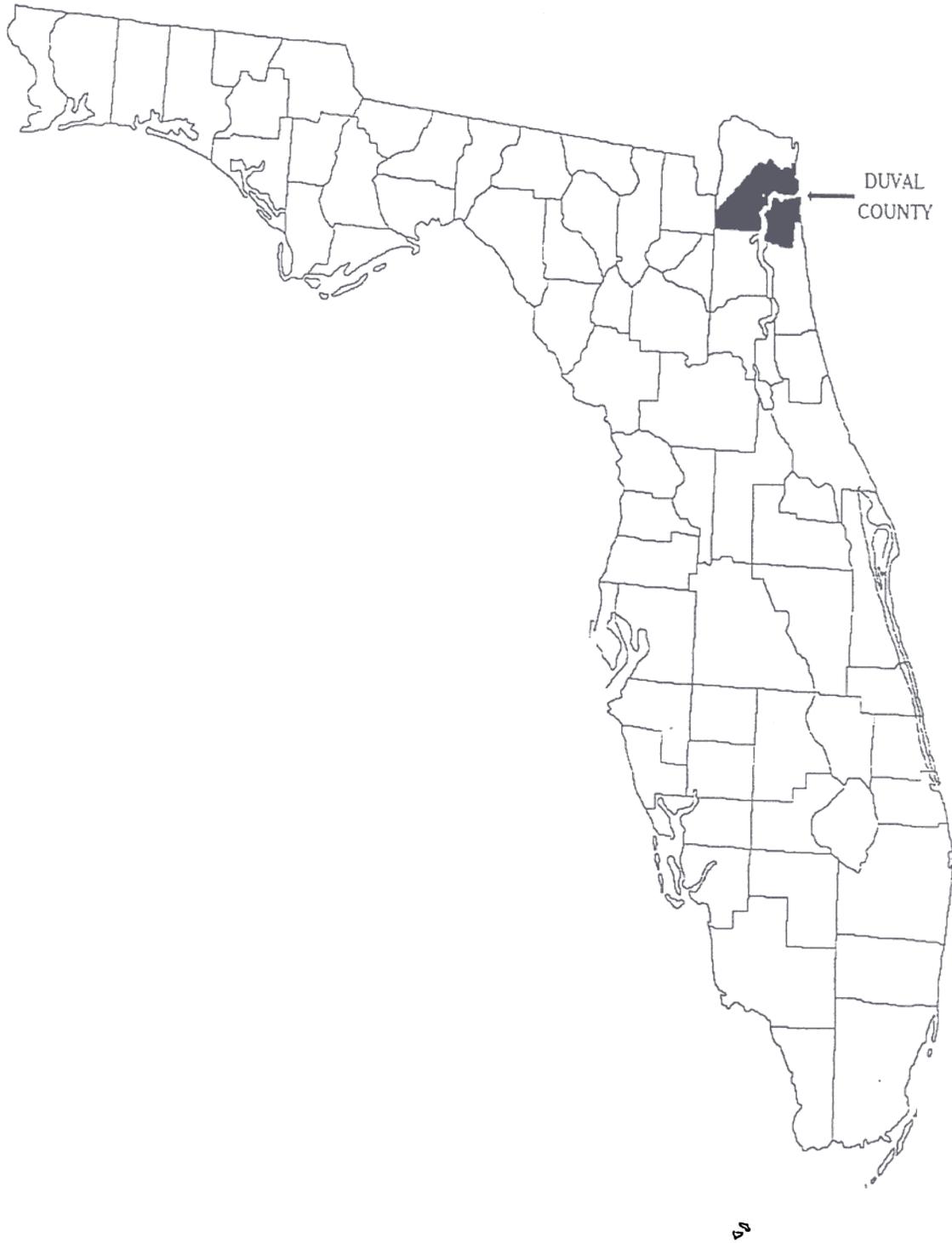
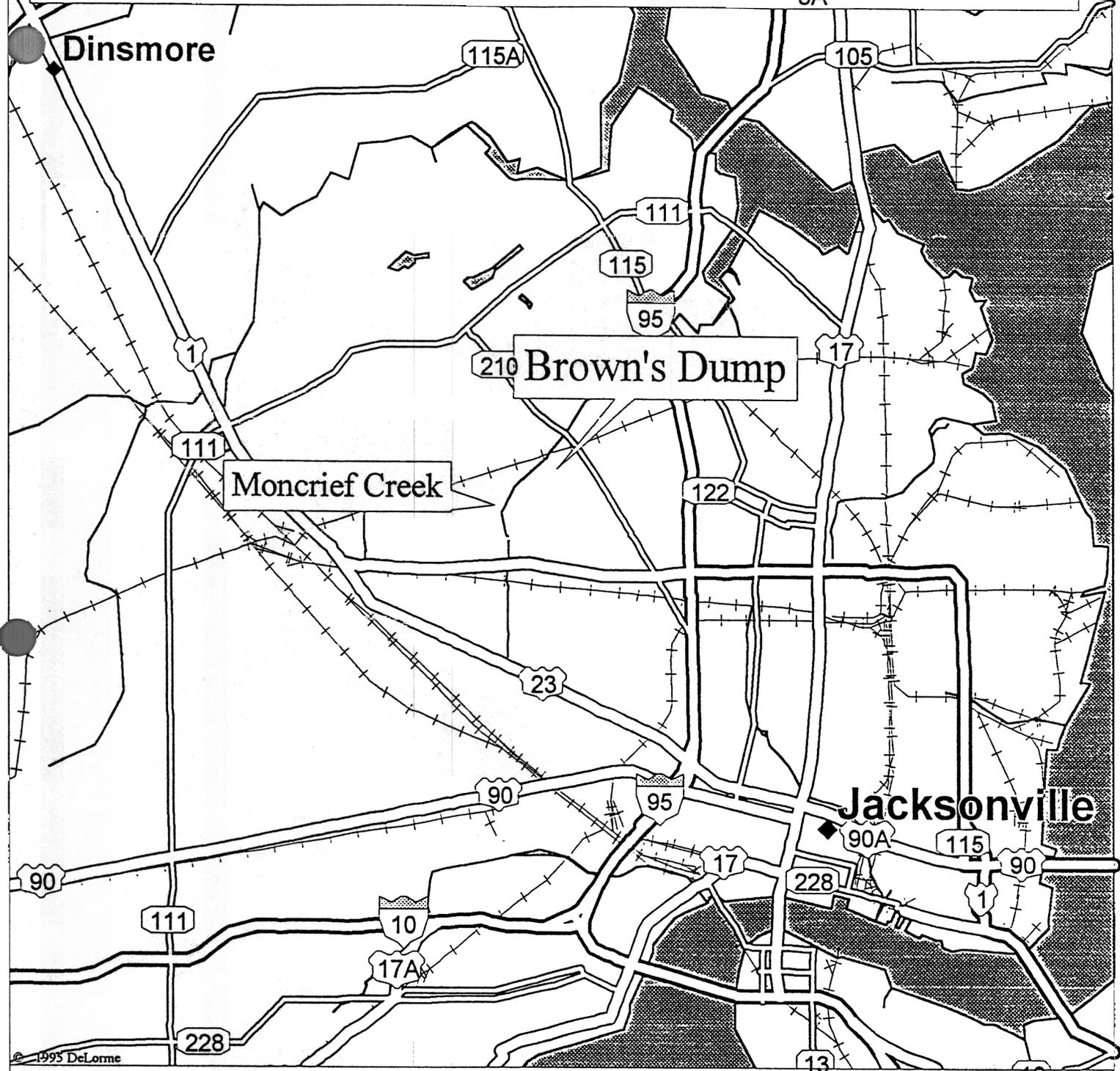


Figure Duval County Florida

Figure 2. Jacksonville, Florida



Mag 12.00
 Mon Feb 03 10:41 1997
 Scale 1:62,500 (at center)

1 Miles
 2 KM

- Major Connector
- State Route
- US Highway
- Interstate/Limited Access
- Railroad
- Town, Small City
- Large City
- Land
- Lake, Ocean, Large River
- River, Canal

Figure 4. Soil Lead Levels > 2000 ppm

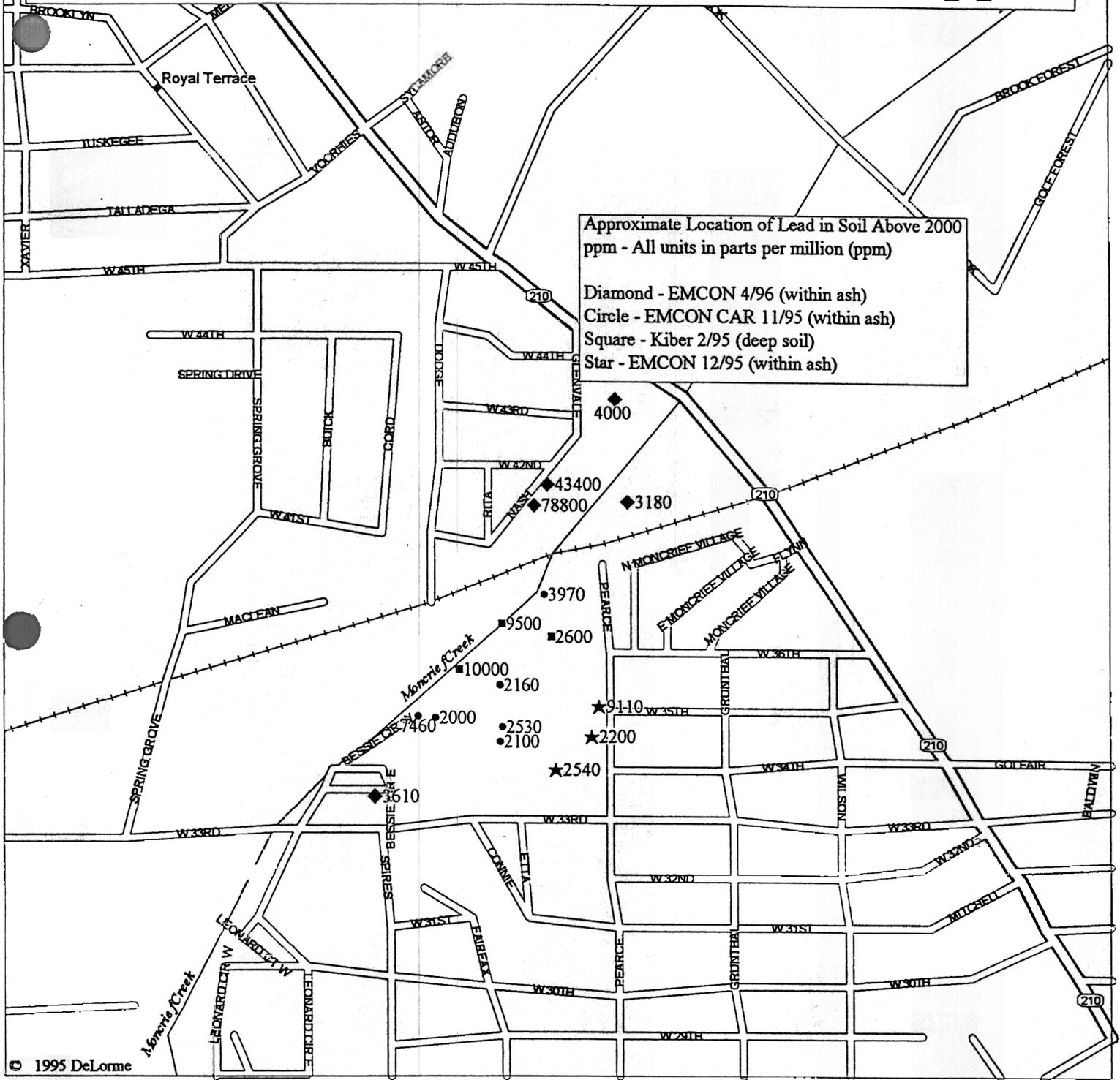


Figure 5. Soil Lead Distribution

