

# **PUBLIC HEALTH ASSESSMENT**

## **Tucson International Airport Tucson, Arizona**

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### **El Vado Residential Site**

Health Evaluation of Remediated Residential Soils:  
*A residential site located adjacent to the Three Hangars Facility  
at the Tucson International Airport*

**CERCLIS # AZD980737530**

**Prepared By**

**Arizona Department of Health Services  
*The Office of Environmental Health***

**February 24, 1999**

**Under Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR)**

**EXECUTIVE SUMMARY**

The Agency for Toxic Substances and Disease Registry (ATSDR) has asked the Arizona Department of Health Services (ADHS), Office of Environmental Health, to conduct a health assessment for the off-site residential area located adjacent to the Tucson Industrial Center (TIC), also known as the 3 Hangars site, within the larger Tucson International Airport Area Superfund site (TIAA), in Tucson, Arizona. Previous investigations found that elevated levels of polychlorinated biphenyls (PCBs) in the drainage areas at the TIC site had migrated off-site into residential areas presenting a health threat to residents. The purpose of this Public Health Assessment is to evaluate if a public health hazard still exists since the remediation activities have been conducted at the off-site El Vado residential area.

Remediation activities occurred during the period March to May, 1997. These consisted of the removal of contaminated surface soil in the backyards of 3 residential properties, vacant areas north and west of a church, and a vacant lot all located west of Highway 89 between East El Vado and East Corona Roads. They also included the area in the associated drainages west of the 3 Hangars area. The areas were replaced with clean fill dirt and new landscaping. In addition, voluntary removal actions conducted by the Tucson Airport Authority (TAA) at the 3 Hangars site included the removal of PCB contaminated pipe sludge from the inlets to the drain pipes in the 3 Hangars area and plugging the floor drains and other inlets to the drain pipe systems to prevent future surface water flows from entering the pipe systems and facilitating PCB migration to off-site areas.

Results from the 31 confirmatory soil samples taken in these areas after the remediation was conducted were found to be below the Arizona Residential Soil Remediation Level (SRL) of 0.66 mg/kg for PCBs indicating that all contaminated soil had been removed. (Conestega 1997)

ADHS concludes that no current public health hazard exists as a result of ingestion, dermal, or inhalation exposures by residents, children, or transients to the post remediated soil in the residential areas on El Vado Road. Replacement of the top soil with certified clean soil has removed all contact with the soil containing PCBs eliminating any future public health hazard.

## **SUMMARY**

The Agency for Toxic Substances and Disease Registry (ATSDR) has asked the Arizona Department of Health Services, Office of Environmental Health, to conduct a Public Health Assessment for the off-site residential area located adjacent to the Tucson Industrial Center (TIC) within the larger Tucson International Airport Area Superfund site (TIAA), in Tucson, Arizona. Previous investigations found that elevated levels of polychlorinated biphenyls (PCBs) in the drainage areas at the TIC site had migrated off-site into residential areas presenting a health hazard to residents. The purpose of this Public Health Assessment is to evaluate if a public health threat posed by PCBs still exists since the off-site remediation activities have been conducted at the El Vado residential area.

## **BACKGROUND**

### **A. SITE DESCRIPTION AND HISTORY**

The TIAA Superfund Site has been the site for various aviation, aerospace, and electronic industrial facilities since 1942. In May 1983, the TIAA site was added to the National Priorities List (NPL) after the discovery of a major groundwater plume containing several organic compounds, including trichloroethylene (TCE), 1,1-dichloroethylene (DCE), trans-1,2-dichloroethylene, chloroform, and chromium. (ADHS 1996). The TIC site, also known as the 3 Hangars site, is located on the central western portion of the TIAA site and is zoned as industrial property suitable for several types of manufacturing activities. The 3 Hangars area was used for aircraft modification operations between 1954 - 1960. Currently, it is used by a number of tenants performing a variety of industrial activities including general aircraft and vehicle maintenance, synthetic rubber and plastics manufacturing, and charter services. Several other building structures located in this area include small businesses involved in, but not limited to, aircraft maintenance, overhaul and repair, sandblasting, and degreasing of aircraft parts prior to plating.

A remedial investigation (RI) of the 3 Hangars site began in 1992. Samples were taken for metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), organochlorine pesticides, and PCBs throughout the 3 Hangars area, and the adjacent drainage ditch located just east of Hwy 89. Elevated levels of PCBs in the drainage ditch area led to additional sampling on the vacant lot west of Highway 89 and the wash areas behind the residences on El Vado Road. In February 1996, an investigation was conducted on the residential properties which identified PCB concentrations ranging from less than 0.056 mg/kg to 6.2 mg/kg posing a health threat to residents, children, and transients. (USEPA, 1996). The waste-related activities at the 3 Hangars site consisted of discharging waste fluids directly into floor drains, inside Hangar 1 of the TIC site, which were then connected to the storm water drain pipe that discharged to the adjacent Highway 89 drainage ditch. A culvert extended under Highway 89 from the drainage ditch allowing the contaminants in the underlying soils in the drainage ditch to migrate into off-site residential properties. See Figure 1 in Appendix.

In 1996, voluntary removal actions were conducted by the Tucson Airport Authority (TAA) on the 3 Hangars site. These activities included the removal of PCB contaminated pipe sludge from the inlets to the drain pipes in the Hangar area and plugging the floor drains and other inlets to the drain pipe systems to prevent future surface water flows from entering the pipe systems and facilitating PCB migration. In March 1997, the USEPA conducted soil remediation activities for the off-site residential areas. Contaminated soil on the off-site residential properties and vacant lot was removed and replaced with clean fill dirt and new landscaping. Replacement of the top soil with certified clean soil has removed all contact with the soil containing PCBs eliminating any future public health threat.

## **B. SITE VISIT**

The El Vado residential site consists of a vacant lot, the backyards of 3 residences, the vacant area north and west of the church all of which area located on the north side of El Vado Road. The residential properties were built in the 1970's and 1980's.

A site visit was conducted by ADHS on January 7 and 20, 1999. Activities included visiting the 3 Hangars site and the surrounding residential areas. The following observations were made:

2. The 3 Hangars are currently leased to Tucson Industrial Centers, which sub-leases space to industrial operations primarily aircraft-related firms. Buildings 25 and 24 which were located to the west of the 3 Hangars site have been torn down but the foundations are still visible.
3. The drainage outfall areas are located to the west of the 3 Hangars, next to the railroad tracks and Highway 89. They are covered with desert vegetation such as grass, bushes, and small trees. A culvert crosses under Highway 89 into a vacant lot on the west side of the railroad tracks.
4. The off-site properties that were remediated include a vacant lot, the area behind 3 residences and a church, and an additional vacant lot to the west of the church. Two of the three residential properties are owned by one family. There are three houses located on these two properties. The third residential property, which only has 1 house on it, is owned by a separate family. The remediated areas have been appropriately landscaped and successfully molded into the surrounding area.
5. The residential backyards are covered primarily with dirt and gravel. There are horse stables, animal stalls, a mobile home behind one residence, and parking areas.
6. A church is located in the remediation area. A vacant lot which is probably used for parking is to the west of the church and had an area where remediation occurred.

ADHS obtained information about the El Vado site from the Pima County Department of Environmental Quality (PCDEQ), residents who live on El Vado, and from attending the community meeting on Wednesday, January 20, 1999. Additional soil data was obtained from the TCE library located at the El Pueblo Clinic on January 7, 1999. The TCE library collects data and information that is provided by various governmental and community sources relating to the larger TIAA Superfund Site. This information is available to the public.

## **C. DEMOGRAPHICS, LAND USE, NATURAL RESOURCES**

### **Demographics**

The residential site is located on El Vado road directly west of the 3 Hangars site which is located in the central western portion of the larger TIAA Superfund Site. El Vado Road extends westward from Highway 89 which runs north and south. There are two vacant lots on the northwest and southwest corners of El Vado and Highway 89 and are covered primarily with dirt, gravel, and some grassy areas. Single family homes are located on the north and south sides of El Vado Road to the west of the vacant lots and are landscaped with typical desert plants and trees. The drainage ditch areas located to the east of 89 have typical native desert brush and trees. (USEPA Memo, Sept. 10, 1996).

### **Land Use and Natural Resources Use**

The major residential area of contamination is located on the north side of El Vado Road. This includes the

backyards of the Young, Alcoverde, and the Martinez residences, the vacant lot located on the northwest corner to of El Vado Road and Highway 89, and the vacant areas north and west of the church. The backyards of the residences are primarily covered with dirt and desert vegetation. There are open spaces, horse stables, animal stalls, a mobile home, and parking areas throughout the remediated areas.

Water for the site is supplied by the City of Tucson municipal water system. The climate of Tucson, Arizona is semi-arid with an average of between 10 and 11 inches of rainfall annually.(ADHS 1996a).

**D. HEALTH OUTCOME DATA**

In 1996, ADHS conducted residential serum PCB blood tests for residents who live adjacent to the 3 Hangars site. Results were as follows:

*Residential Serum PCB Blood Tests*

Upon finding elevated levels of PCBs in the residential area, ADHS was asked to conduct a health consultation to determine the health implications of the possible PCB exposure to the residents. A total of 4 houses are located on the 3 residential properties. Three houses are owned and occupied by members of the same family. The fourth house is owned and occupied by members of a separate family. In May 1996, ADHS staff arranged to have blood tests conducted for serum PCB levels on 16 members of the two families whose yards were found to have elevated levels of PCBs.

Interviews were conducted with the two families living on the properties, as well as the grown children whom had lived on the property during the past 10 years and had children of their own while living on the site. Several members of one family expressed concerns regarding symptoms experienced over the years that could not be explained by their physicians. The symptoms ranged from severe acne to fainting spells. In order to address their concerns, ADHS made arrangements to have interviews and blood tests for PCBs conducted for the families. (ADHS, 1996b). ADHS made arrangements with the Pima County Health Department to conduct the blood draw, and with Sonora Labs to perform the blood analysis. Twelve members of the one family and 4 members of the second family were tested for PCBs in their blood. Results of these blood tests are shown in Table 1.

**Table 1: PCB Blood Levels in 16 Residents Living Adjacent to the 3 Hangars Site (1996)**

Residents	PCB Levels in Microgram/Liter (µg/l)
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Resident 1	Less than 3 µg/l
Resident 2	Less than 3 µg/l
Resident 3	Less than 3 µg/l
Resident 4	Less than 6 µg/l*
Resident 5	Less than 6 µg/l *
Resident 6	3.4 µg/l
Resident 7	Less than 3 µg/l
Resident 8	Less than 3 µg/l
Resident 9	Less than 3 µg/l
Resident 10	Less than 3 µg/l
Resident 11	Less than 3 µg/l
Resident 12	Less than 3 µg/l
Resident 13	Less than 3 µg/l
Resident 14	Less than 3 µg/l
Resident 15	Less than 3 µg/l
Resident 16	Less than 3 µg/l

# Studies by the Centers for Disease Control and Prevention (CDC) demonstrate that most people without occupational exposure have median blood PCB levels between 5 and 7 µg/l. Approximately 95% of these values are below 20 µg/l. (ATSDR, 1999).

\* These two results were as accurate as the testing procedure and quality control criteria would allow on the samples submitted.

### COMMUNITY CONCERNS

During the site visit on January 7, 1999, ADHS staff had the opportunity to speak with members of one of the families whose backyard had been remediated. They said that they were quite pleased with the outcome of the remediation activities and has no complaints or further concerns. They also stated that their neighbors

who backyards were also remediated were very pleased with the results. They showed me around the backyards and pointed out the areas that were remediated. The areas have blended into the natural landscaping so there is no apparent area of differentiation. The areas are clean and have been well kept. They were pleased that someone had followed up on the situation.

**1. How does EPA know that they found all the PCBs?**

Sampling locations are determined by the geography, type of soil, and chemical that is being identified. These properties allow EPA to choose the best sampling plan for a site. During the sampling of the yards, PCBs were found to be concentrated in particular areas. The boundaries of these areas were determined when PCBs did not show up in samples taken further away from these areas. Additional soil sampling all depended upon how the PCB concentrations presented themselves. EPA has told all the families that if there is still some concern about the presence of PCBs that might have gone undetected, they should call or write to the EPA and express their concerns. Until now, no response has been received.

**2. Since the blood samples showed that the PCBs were not hurting anyone and didn't present a health threat, then why did EPA clean up the yards?**

The decision to clean up the PCBs was not just to prevent any possible future exposures to the PCBs but also to meet regulations and prevent further ecological damage. The previous ATSDR Health Consultation conducted in 1997 stated that despite the presence of PCBs in the residential yards, nobody had elevated levels of PCBs in their blood. This shows that even if people were getting exposed to the PCBs, it wasn't enough to show up in the blood. If the blood levels were high, this would indicate that people were being or were exposed to the PCBs. EPA has a responsibility to make sure that any known contamination is below certain standards, and also to address ecological concerns.

## **ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS**

This Public Health Assessment evaluates if a public health hazard still exists to off-site residents since the remediation activities were conducted in 1997. The discussion addresses the available data; the methodology used in the identification process; the criteria for selection; and determination of the extent and levels of any residual off-site contamination.

At the time this investigation was conducted, the Interim June, 1995 Arizona Residential Health Based Guidance Levels (HBGLs) were used as comparison values to determine if all the contaminated soil had been removed. Remediation activities continued until all confirmatory samples were below 0.18 mg/kg. Since then, the HBGLs were replaced by the Soil Remediation Levels (SRLs) which were promulgated in November, 1997 and are currently used as comparison values. The HBGL for PCBs was more conservative than the current SRL which indicates that all the confirmatory soil samples are below the respective SRL for PCBs of 0.66 mg/kg.

Site-specific soil contaminant concentrations are compared to SRLs to determine which soil contaminants will be evaluated further in the Health Assessment. SRLs for soil ingestion were calculated by the Arizona Department of Health Services, Office of Environmental Health. SRLs are protective of human health, including sensitive groups, over a lifetime. Chemical concentrations in soils that exceed SRLs may not necessarily represent a health risk. Rather, when contaminant concentrations in soil exceed these standards, further evaluation may be necessary to determine whether the site poses an unacceptable risk to human

health. (ADHS, 1997a).

The public health hazard from exposure to groundwater contamination is not analyzed in this public Health Assessment as this exposure pathway was the focus of an USEPA Private Well Study conducted in 1994. (USEPA, 1994).

**A. ON-SITE CONTAMINATION**

This Public Health Assessment does not evaluate the source contamination at the 3 Hangars site. This will be reviewed in the final ATSDR Health Assessment for the complete TIAA site and for which a draft has already been completed. (ATSDR, 1996).

**B. OFF-SITE CONTAMINATION**

This section reviews the pre-remediation soil data and remediation confirmatory sample data to verify that the remediation activities have eliminated any future health hazard.

**Results from Pre-remediation Off-Site Investigations**

In 1996, 82 shallow soil samples were collected at grid locations placed throughout the drainage areas, the vacant lot, the backyards of four residential properties, and the area north and west of the church. The results identified Aroclor 1260 and 1254 in 30 and 6 samples, respectively, in concentrations in excess of the HBGLs for PCBs in soils of 0.18 mg/kg. In 1997, an additional 30 samples were taken. The results identified Aroclor 1260 in 10 samples in concentrations in excess of the HBGL for PCBs.

As indicated in the final report of the remedial investigation, the overall pattern of the PCB distribution consisted of a decreasing width of contaminated soils and decreasing concentrations as one moved to the west from the 3 Hangars site. This pattern suggested that by the time surface water transporting or containing the PCBs suspended soils reached the residential properties, most of the PCBs had been deposited in the soils prior to the property lines. The areas of highest PCB soil concentrations were east of the residential areas. (Daniel, July 2, 1996).

**Post Remediation Soil Samples**

Post remediation activities occurred during the period March to May, 1997. It consisted of the removal of surface soils in the backyards of 4 residential properties, the vacant area north and west of the church, a vacant lot all located west of Highway 89 between East El Vado and East Corona Roads, and the associated drainages west of the 3 Hangars site. The remediation area was divided into five separate sections. These five sections included:

- ◆ Area A Drainage area east of Hwy.89;
- ◆ Area B Vacant lot west of Hwy. 89;
- ◆ Area C Backyard areas of the residences;
- ◆ Area D1 Vacant area behind the church;
- ◆ Area D2 Vacant area to the west of the church.

A total of 31 confirmatory soil samples were taken in these 5 areas during the remediation activities. Remediation continued until samples indicated that the interim Arizona HBGL of 0.18 mg/kg PCBs had been achieved. For this health assessment, the final confirmatory soil samples were compared to and were found to be below the PCB Residential Arizona SRL of 0.66 mg/kg. Sample results are provided in Table 2 and corresponding diagrams are provided in the Appendix. (Conestoga, 1997).

**Table 2: Confirmatory Sample Results From Remediated Areas in El Vado Residential Area (1997)**



Remediation Area	Number of Samples	Range of PCB Concentrations (mg/kg)	Mean (mg/kg)	SRL for PCBs (mg/kg)	Above SRL
<b>AREA A: Drainage Area</b>	12	0.643 - <0.033	0.32	0.66	NO
<b>AREA B: Vacant Lot</b>	9	0.182 - <0.033	0.100	0.66	NO
<b>AREA C: Backyards of Residences</b>	5	0.122 - <0.033	0.076	0.66	NO
<b>AREA D1: Vacant Area North of the Church</b>	3	0.120 - 0.045	0.07	0.66	NO
<b>AREA D2: Vacant Area West of the Church</b>	2	0.039 - 0.035	0.037	0.66	NO

Results from Conestoga 1997

### Groundwater Contamination

According to the USEPA, the leaching rate of PCBs downward through the soil and into the groundwater does not pose a threat to human health and the environment. PCBs generally bind to surface soils and do not leach to groundwater. PCBs have not been detected in the groundwater and have not been detected in soils deeper than one (1) foot below ground surface at the Removal Site. Moreover, precipitation in the form of rain, which facilitates the leaching process, averages about only 11 inches per year in the Tucson area. Therefore, it can be assumed that PCB contamination at the Removal Site is not leaching toward the groundwater table. (USEPA, 1996).

### C. QUALITY ASSURANCE AND QUALITY CONTROL

The Quality Assurance/Quality Control (QA/QC) summary appears to be of adequate quality for use in this assessment. Sample concentration data, recording codes, reporting periods, monitor well identification, and compound names were checked for consistency. Samples were analyzed by approved test methods. (ADHS 1996a). This health assessment uses qualified data from investigations conducted thus far to evaluate health threats from potential exposure to contaminants in surface soils.

### PATHWAY ANALYSES

To determine whether residents and transients are currently or could be exposed to any remaining soil contaminants, ADHS evaluated the environmental and human components that lead to human exposure. This pathway analysis consists of five elements:

- ◆ A source of contamination;
- ◆ Transport through an environmental medium;
- ◆ A point of exposure;

- ◆ A route of exposure; and
- ◆ An exposed population.

This health assessment focuses on human populations living on El Vado Road. ADHS categorizes an exposure pathway as a completed or potential exposure pathway if the exposure pathway cannot be eliminated. Completed pathways require that the five elements exist and indicate that exposure to a contaminant has occurred in the past, is currently occurring, or will occur in the future. Potential pathways, however, require that at least one of the five elements is missing, but could exist. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring presently, 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.

Completed and potential exposure pathways and quality of the accompanying sampling data used to identify the exposure scenarios are discussed below.

### A. COMPLETED EXPOSURE PATHWAYS

#### Past Exposure Pathways

The receptor populations and exposure pathways that were identified before the remediation activities include the following:

- Residential exposure to off-site contaminated surface soil
  - ◆ Inhalation, Ingestion, Dermal

Before remediation occurred, dermal, ingestion, and inhalation exposures to contaminated soil were identified for residents and transients. The backyards and vacant lot are areas where children play and transient activity occurs. Children would have been exposed to the PCBs while playing in these areas via incidental soil ingestion, inhalation of fugitive soil dust, and dermal exposures. There are small, poorly worn trails through the brush in the vacant lot, indicating that some transient exposure may have occurred and may still continue. Transients would have been exposed via inhalation and dermal exposures while walking through the area. This does not appear to be an area where transients will sleep or temporarily camp out. The past exposure pathways are summarized in Table 3 below.

**Table 3: Complete Past Exposure Pathways at the El Vado Residential Site Before Remediation**

Pathway Name	EXPOSURE PATHWAY ELEMENTS					Time
	Source	Environmental Media	Point of Exposure	Route of Exposure	Exposed Pop.	

Surface Soil	3 Hangars	Surface Soil	Residential backyards, drainage areas, vacant lot	Ingestion Inhalation Dermal	Residents Transients Children	Past
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It is estimated that approximately 30 people could be exposed to the post-remediated soil. This includes the residential families, and persons who would visit the church for weekly services and activities.

**B. ELIMINATED EXPOSURE PATHWAYS**

**Current and Future Exposure Pathways**

The contaminated soil in the backyards and vacant lot have been remediated but these areas continue to be areas where children play and transient activity occurs. Children are exposed to the remediated soil while playing via soil ingestion, inhalation of fugitive soil dust, and dermal exposures. Transients are exposed to the remediated soil via inhalation and dermal exposures while walking through the area.

**PUBLIC HEALTH IMPLICATIONS**

**A. TOXICOLOGIC EVALUATION**

This sections reviews the potential for adverse health effects in persons exposed to specific contaminants through completed or potential exposure pathways. ADHS has analyzed the off-site exposure scenarios to determine what, if any public health threat continues to exist from inhalation, dermal, and ingestion exposures by residents and transients to the off-site remediated soil. A toxicological profile is located in the Appendix.

If the PCB levels in the confirmatory samples are found to be above the respective SRL, exposure intakes are then calculated and compared to the corresponding ATSDR Minimal Risk Levels (MRL). The MRL is an estimate of daily human exposure to a contaminant below which non-cancer, adverse health effects are unlikely to occur. MRLs are not used to determine the specific adverse health effects of exposure, rather they are used to determine if there is the need for more thorough, contaminant specific investigation. MRLs are not used to determine a safe level of contaminants at a site. MRLs are developed for each route of exposure, such as inhalation and ingestion, and for a length of exposure, such as acute (less than 14 days), intermediate (14 to 356 days), and chronic (greater than 365 days). Therefore, if exposures intakes are found to be above their respective MRLs further evaluation is made to assess the health threats. (ATSDR, 1997).

The PCB soil concentrations in the confirmatory soil samples are well below the respective SRL. Therefore, estimates of pathway specific exposure intake doses and exposure concentrations did not have to be quantified for any specific on-site or off-site exposure pathways. As described previously in this assessment, chemicals were eliminated as chemicals of concern (COCs) in these media if there were no positive detections in the respective data set; or if the highest detected value was less than the corresponding Arizona SRL. Since all site related contaminants met these criteria, it was not necessary to calculate exposure intakes for further assessment. Therefore, current and future ingestion, inhalation, and dermal exposures to the remediated soil at the current levels presented in this assessment, do not currently pose a public health hazard to residents who live in the vicinity or children who play in the backyards where the soil was remediated.

**B. HEALTH OUTCOME DATA EVALUATION**

In 1996, 16 residents were sampled for blood PCB levels by the ADHS. Thirteen residents had serum blood

levels below 3 µg/l, one resident had a level of 3.4 µg/l, and the remaining 2 residents had blood levels less than 6 µg/l. According to population based studies conducted by the Centers for Disease Control and Prevention (CDC), the average serum PCB levels in the U.S. range from 5 to 7 µg/l. (ATSDR, 1999). Therefore we can conclude that the blood levels of PCBs detected are below the national average.

### **C. ATSDR'S CHILD HEALTH INITIATIVE**

The ADHS has prepared this public health assessment under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). ADHS has included the following information in accordance with ATSDR's Child Health Initiative.

Sub-populations of concern are sensitive receptor populations who may be particularly susceptible to chemical exposure. They may include infants, the elderly, or individuals with respiratory problems depending on the chemicals of concern and the nature of the exposures. The exposure points for sensitive residents in this case include the backyards of the residences, the vacant areas north and to the west of the church, and the vacant lot. Since the contamination has been remediated, future exposure to PCBs by children who live and play in the area has been removed.

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of their water, soil, air, or food. Children are at greater risk than adults from certain kinds of exposures to hazardous substances emitted from waste sites and emergency events. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors close to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. SRLs are protective of human health, including sensitive groups, over a lifetime. Residential SRLs are specifically protective of childhood exposure for systemic toxicity. Most importantly, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care.

## **CONCLUSIONS**

In summary, ADHS concludes that no current or future public health hazard exists as a result of ingestion, dermal, or inhalation exposures by residents, children, or transients to the remediated soil in the residential areas on El Vado Road.

The confirmatory soil samples from the remediated yards, vacant lot, and areas near the church did not contain elevated levels of PCBs when compared to the respective SRLs. This indicates that the public health hazard that had existed prior to the remediation has been eliminated. Therefore, current and future residential exposures via inhalation, ingestion, or dermal exposures to the remediated soil does not pose a

health hazard.

Results of the health outcome data suggest that, despite the elevated levels of PCBs before the remediation activities in the residential yards, no significant exposures had occurred. Since the PCB contamination in the residential areas has now been removed, there is no future threat of exposure.

The residents whose yards were remediated are satisfied with the remediation results and have no further concerns of exposures to the PCBs.

### **PUBLIC HEALTH ACTION PLAN**

The Public Health Action Plan (PHAP) for the El Vado Residential Site contains a description of actions taken, to be taken, or under consideration by ATSDR and ADHS at and near the site. The purpose of the PHAP is to ensure that this public health assessment not only identifies public health hazards, but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. ADHS and ATSDR will follow-up on this plan to ensure that actions are carried out.

#### *Actions Completed*

1. In May 1996, ADHS staff arranged to have blood tests conducted for serum PCB levels on 16 members of the two families whose yards were found to have elevated levels of PCBs.
2. In July 1996, ADHS staff sent letters to the residents explaining test results.
3. In 1996, the ADHS conducted a health consultation addressing the health concerns at the site.
4. In March 1997, EPA remediated the residential yards at the El Vado Residential site.
5. In January 1999, ADHS staff met with the El Vado residents on a one-to-one basis to discuss the health assessment in order to address their concerns and questions. ADHS also attended a public meeting at the Tucson UCAB (Unified Community Action Board) to speak with members about the health assessment and their concerns.
6. In February 1999, ADHS submitted a public health assessment for the El Vado Residential Site to the ATSDR.
7. In June 1999, ADHS staff sent out notices to area newspapers and radio stations to announce the public comment period on the health assessment.
8. In June 1999, ADHS staff was interviewed by Tucson radio station and newspaper on the El Vado Site health assessment.
9. In September 1999, ADHS staff attended the UCAB meeting in Tucson to answer any questions on the El Vado Site. Staff also met with the residents at the El Vado site to discuss the results of the health assessment and answer any questions.

*Actions Proposed*

1. ADHS will continue to meet with the community residents at the UCAB meetings on a regular basis to communicate the ADHS activities being conducted at the Tucson site. Specific goals are to increase the understanding of the technical aspects of the area contaminants and their fate and transport, and to educate the community on ways to minimize their exposures to site-related contaminants and physical hazards.
2. ADHS will continue to work with EPA on any additional health concerns at the El Vado site.

**RECOMMENDATIONS**

This Public Health Assessment has determined that no current public health hazard exists to residents from exposure to the post remediated soil. It can be assumed that whose backyards were remediated. Therefore, the ADHS has no recommendation for further action on this site.

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# APPENDIX

- ◆ Figures for Confirmatory Soil Remediation Sample Concentrations
- ◆ Toxicological Profile for PCBs

## Toxicological Profile for PCBs

Dermal and ocular effects in the form of chloracne, skin rashes, and eye irritation have been observed with occupational inhalation exposure to Aroclors. Chloracne is a distinctive acneform eruption manifested by keratinous plugs called comedones and skin-colored cysts. Mild to moderate chloracne was seen in 7 of 14 workers exposed to 0.1 mg/m<sup>3</sup> of Aroclors for an average period of 14.3 months. However, PCBs were not the only substance to which workers were exposed. Workers receiving exposures at levels as low as 0.003 mg/m<sup>3</sup> for >5 years had dermal effects which included rashes, pigmentation changes of the skin and nails, and other skin changes. Eye irritations have also been documented with airborne PCB exposure. In these studies, workers received exposure to various Aroclors at concentrations between 0 and 2.2 mg/m<sup>3</sup> for >3 years.

Human health effects have been documented more frequently for inhalation exposure to PCBs than for ingestion and dermal exposures. Respiratory symptoms have been reported for inhalation exposures to Aroclor-exposed workers. Upper respiratory tract or eye irritation, cough, and tightness of the chest were documented for 326 capacitor workers with inhalation exposure levels of 0.007-11 mg/m<sup>3</sup>. Limitations of the study included the absence of a control group, poor definition of cohort, and other factors. Of 243 workers involved in the above study, 14% demonstrated a decline in forced vital capacity (FVC) when compared to the standard values. Of those with a decline in FVC, 80% manifested a restrictive pattern of impairment without radiologic changes. There is limited evidence of neurological effects from inhalation exposure. In one study, almost half of the workers at a capacitor plant receiving exposure to mean concentrations of Aroclors at 0.007-11 mg/m<sup>3</sup> for 5 years complained of headache, dizziness, depression, fatigue, and nervousness. In addition, switchgear workers exposed to Aroclor 1260 and 1242 at concentrations of 0.00001-0.012 mg/m<sup>3</sup> had higher incidence of headaches and problems with memory and sleeping compared to unexposed workers.

Neurological effects have been seen in humans but, particularly, in animals with oral exposure to PCB. Farm families who ate dairy products and beef contaminated with PCBs had a 19% prevalence of numbness. Because of the subjectivity of symptoms and the lack of controls, no definitive association could be shown between PCB exposure and the neurological effect. In animals, doses between 0.8 and 3.2 mg/kg-day of Aroclor 1016 in the diet for 20 weeks did not influence the concentrations of noradrenaline, adrenaline, or serotonin in monkey brains. In addition, no histological changes were reported in the brains of rats administered 100 mg/kg-day of Aroclor 1242 by gavage every second day for three weeks. Changes in the neurotransmitter serotonin were documented in several areas of the brain when rats received a mixture of Aroclor 1254 and 1260 at single, high doses of 500 and 1,000 mg/kg.

Animal studies have shown that PCBs containing 60% chlorine by weight are carcinogenic. At an estimated dose of 5 mg/kg-day, Aroclor 1260, fed to female Sherman rats, resulted in the formation of hepatocellular carcinomas. Sprague-Dawley rats formed liver tumors after receiving an estimated 3.45 mg/kg-day of Aroclor 1260 in their diet for 24 months. In a National Cancer Institute study, no treatment-related liver tumors manifested in Fisher-344 rats receiving estimated doses of 1.25, 2.5 or 5.0 mg/kg-day dietary Aroclor 1254 for 104-105 weeks. However, nonhepatic tumors (i.e. adenocarcinoma of the stomach, jejunum, or cecum) were positively associated to the Aroclor 1254 treatment in male and female rats.

Cancer effects have been seen in workers exposed to PCBs by inhalation. The studies have had limitations resulting in no definitive statement regarding PCBs cancer-causing effects. In one study, an excess risk for cancers of the liver, biliary tract, or gall bladder was detected in 2,588 workers employed in two capacitor factories. The workers had been employed between 1940 and 1976, at least three months, in areas with the most exposure to PCBs. Aroclor 1254 was initially used, then Aroclor 1242 and finally Aroclor 1016. Personal time-weighted average concentrations of Aroclor 1016 in 1977 were 0.024 to 0.393 mg/m<sup>3</sup> at plant 1 and 0.170 to 1.26 mg/m<sup>3</sup> at plant 2. There were three cases of liver, gall bladder, and/on biliary tract cancer as compared to 1.07 expected, and four cases of rectal cancer as compared to an expected 1.19. One of the study's limitations was the small number of cases. In another study, increased mortality due to cancer was found in 544 male and 1,556 female workers of a capacitor manufacturing plant in Italy. The workers had been employed

between 1946 and 1978 for at least one week. PCB mixtures containing 54% chlorine were in use until 1964 and eventually mixtures of 42% chlorine were in use until 1970. Area samples obtained in 1954 and 1977 revealed PCB air levels of 5.2 to 6.8 mg/m<sup>3</sup> (54% chlorine) and 0.048 to 0.275 mg/m<sup>3</sup> (42% chlorine). Among the findings, deaths from all cancers in males were significantly greater than expected when contrasted to national and local rates (14 observed versus 1.7 national and 2.2 local) and in females contrasted with local rates (12 observed versus 5.3 expected). A significantly higher death rate from gastrointestinal tract cancer was seen in males when contrasted to national and local rates. The study's limitation involved the small number of cases, short minimum exposure, and other factors. In addition, a mortality study of 3,643 workers of a capacitor manufacturing facility revealed some indication of PCB exposure-related malignant melanoma. The mean duration of employment was 4.1 years while the mean age at hire was 27 years. PCB had been utilized from 1957 -1977, and this was the period in which the workers had been employed. Aroclor 1242 was utilized until 1970 followed by Aroclor 1016. Area monitoring in 1977 detected mean concentrations of PCBs ranging from 16 to 76 µg/m<sup>3</sup>. The workers were also exposed to various other chemicals. A statistically significant difference was seen for malignant melanoma when the observed cases (8) were contrasted to the expected number of cases (2). The study had a number of limitations which included the small number of deaths, insufficient monitoring data and other factors.