Exposure Investigation

VERTAC, INCORPORATED
JACKSONVILLE, PULASKI COUNTY, ARKANSAS
CERCLIS NO. ARD000023440
AUGUST 11, 1997

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia
EXPOSURE INVESTIGATION II

VERTAC, INCORPORATED

JACKSONVILLE, PULASKI COUNTY, ARKANSAS

CERCLIS NO. ARD000023440

Prepared by:

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

In April 1997, the Agency for Toxic Substances and Disease Registry (ATSDR) conducted a second environmental exposure investigation (EI) at two residences where one of the inhabitants in each home participated in the Arkansas Department of Health's serum dioxin health study. Health scientists conducted the second EI to confirm the qualitative environmental sampling results for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) found in the first EI[1]. The initial EI identified 2,3,7,8-TCDD and other dioxins/furans in residential surface soil and indoor wipe/dust samples. However, the analytical results had significantly low percent recoveries for the contaminants. Conclusions from the results were that 2,3,7,8-TCDD (up to approximately 10 parts per billion [ppb] in one sample) is present in the areas sampled, but the results could not be used to make a scientifically defensible public health decision for the residents.

The Exposure Investigation Section, the health assessor, and the Arkansas Department Of Health (ARDOH) agreed that environmental sampling should be repeated. In addition, because the presence of 2,3,7,8-TCDD was confirmed in the first EI, they agreed that serum dioxin testing would be offered to the four residents of the homes. Refer to attachments 1 and 2 for the results of the first EI and the respective workplan.

METHODS

With coordination from the (ARDOH) and permission from the homeowners, ATSDR collected surface soil, indoor dust, and indoor surface wipe samples for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and TCDD equivalent analyses. Sample locations approximated those of the first exposure investigation. Refer to the attached workplan for a more detailed description of activities (Attachment 2).

Investigators collected three composite surface soil samples and two indoor floor dust samples at one residence. They collected two composite surface soil samples, two wipes from surfaces of utility shelves used for canned goods storage, two indoor floor dust samples, and one dust trip blank at the second residence.

Samples were shipped to Midwest Research Institute (MRI) for analyses through an Inter Agency Agreement with the Division of Federal Occupational Health. Data Chem weighed the surface dust samples before their shipment to MRI. We requested a four-month analytical turnaround time.

One resident agreed to serum dioxin testing. This resident participated in the health study, making it this person's third serum dioxin test. The American Red Cross (Little Rock, AR) drew and shipped the blood sample to the Centers for Disease Control
and Prevention (CDC) Center for Environmental Health laboratories for analyses. Results of this test are pending.

RESULTS

Table 1 summarizes the results of the environmental sampling.

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Number of Samples</th>
<th>2,3,7,8-TCDD* Concentration Range</th>
<th>TCDD Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Soil Composite</td>
<td>5</td>
<td>0.172 - 2.81** ug/kg</td>
<td>0.18 - 2.8 ug/kg</td>
</tr>
<tr>
<td>Indoor Surface Wipe***</td>
<td>2</td>
<td>13.0** - 14.0 ng/m2</td>
<td>13.4 - 14.7 ng/m2</td>
</tr>
<tr>
<td>Indoor Surface Dust</td>
<td>4</td>
<td>ND - 0.697 ug/kg</td>
<td>0.17 - 0.71ug/kg</td>
</tr>
<tr>
<td>Surface Dust Blank</td>
<td>1</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>

* TCDD = tetrachlorodibenzo-p-dioxin
** = concentration exceeded the upper limit of the calibration range
*** = from shelving

ug/kg = microgram (ug) contaminant per kilogram (kg) of soil or dust or part per billion (ppb)
ng/m2 = nanogram (ng) contaminant per square meter of surface
ND = not detected

DISCUSSION

The Agency for Toxic Substances and Disease Registry's (ATSDR's) policy regarding dioxins in soil indicates that a level of 1 microgram per kilogram of soil (ug/kg) or part per billion, (ppb) or less of 2,3,7,8-TCDD equivalents in residential surface soil is protective of public health [2-5].

In one residence, the TCDD equivalents (TEQ) in 2 of the 3 surface soil samples exceeded 1 ppb (2.8 and 1.6 ppb TEQ). These levels confirm the results of the first exposure investigation. The indoor dust results of this residence did not exceed the 1 ppb action level; the back door and front door entryway results identified 0.26 and 0.71 ppb TEQ, respectively. The indoor areas
sampled should reflect worst case concentrations from contaminated soil track-in. If this is the case, then levels in dust elsewhere in the home should be lower.

In the other residence, TEQ levels in the two surface soil samples were below 1 ppb (0.18 and 0.48 ppb TEQ). Similarly, the indoor surface dust samples from the back and front entryways were below the soil action level (0.17 and 0.6 ppb TEQ). However, wipe sample results of the pantry utility shelving revealed the presence of 2,3,7,8-TCDD. The shelving, in a utility room in the garage, is used to store canned goods. Wipe sample results are not used for quantitative purposes; the results indicate that the contaminant is present. The use of the shelving for storing food items suggests that dermal and oral exposure to 2,3,7,8-TCDD is possible.

CONCLUSION

The levels of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) equivalents (TEQ) in one residence's soil and in the other residence's utility shelving pose a public health concern.

The number of environmental samples collected does not provide sufficient information to determine the extent of the TEQ contamination at either residence, or in adjacent yards. The results do indicate that TCDD equivalents are present in these residents' environment and that exposures are likely. Additional sampling will be necessary for better characterization of the source and extent of TCDD contamination in this area.

RECOMMENDATIONS

1. Stop exposures to the contaminated shelving.
2. Conduct additional residential surface soil sampling to determine the extent of environmental contamination.
3. Offer serum dioxin testing to the other occupants of the two homes.

Lynn C. Wilder, CIH

Attachments
REFERENCES

1. Exposure Investigation, Vertac Site, Jacksonville, Arkansas. February 1997, ATSDR DHAC EICB.

2. Memorandum, From: Vernon N. Houk, M.D., Assistant Surgeon General, Director, Center for Environmental Health, Subject: Missouri Dioxin Sites Cleanup, To: Barry L. Johnson, Ph.D., Assistant Administrator, ATSDR, Date: May 8, 1987.


4. Letter, From: Barry L. Johnson, Ph.D., Assistant Administrator, ATSDR, To: Mr. David Wagner, Director, Waste Management Division, U.S. Environmental Protection Agency, Region VII, Date: July 30, 1987.

EXPOSURE INVESTIGATION

VERTAC SITE
JACKSONVILLE, ARKANSAS

February 1997

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia
BACKGROUND

In October 1996 an environmental exposure investigation (EI) was conducted at two residences where one of the inhabitants participated in the health study. The EI was requested by the ATSDR health assessor to determine if the homes/yards contained 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). Filling in this data gap would assist in determining the reason for 2 of the occupants' serum dioxin levels increasing, while all other study participants' levels decreased.

METHODS

With coordination from the Arkansas Department of Health (ARDOH) and permission from the homeowners, ATSDR collected surface soil, indoor dust, and indoor surface wipe samples for 2,3,7,8-TCDD and TCDD equivalent (TEQ) analyses. Refer to the attached workplan for a more detailed description of activities.

At one residence, the following samples were collected: 3 composite surface soil; 1 indoor floor surface wipe; 2 indoor floor dust samples; and 1 dust trip blank. At the second residence, the following samples were collected: 2 composite surface soil; 1 indoor floor surface wipe; 3 utility shelf surface wipes (used for canned goods storage); 1 indoor floor dust sample; and 1 trip blank.

Samples were shipped to Midwest Research Institute (MRI) for analyses, through the EICB Inter Agency Agreement with the Division of Federal Occupational Health. The surface dust samples were sent to Data Chem for dust sample weight prior to shipment to MRI. A four-month analytical turnaround time was requested.

RESULTS

Sample results indicated the presence of 2,3,7,8-TCDD and other polychlorinated dioxins and furans. However, the analytical quality assurance tests (spike sampling) indicated that there was a low recovery of the contaminants from the sample extraction process (6 to 17%). Therefore, the data was considered to be qualitative, not quantitative, which renders the data inadequate to make a health determination.

Because the presence of 2,3,7,8-TCDD was found, ATSDR and the Arkansas Department of Health determined that a second exposure investigation was necessary. The next EI would resample the environment and offer serum dioxin testing to each of the 4 residents. This message, along with a copy and explanation of their individual results, was delivered to the residents in-person by the ARDOH. Both households agreed to retesting.

CONCLUSION
The quality of the analytical results for the environmental samples was not precise enough to make a public health impact determination. On a qualitative basis, the data revealed that 2,3,7,8-TCDD and other dioxins and furans are present in the areas sampled.

Additional sampling is needed to better quantitate the potential for adverse health impacts.

RECOMMENDATIONS

Resample indoor surface dust, wipe, and surface soil to better quantitate the concentrations of dioxins.

Offer serum dioxin testing to the occupants of these two homes.

Evaluated the results, when they become available.

Lynn C. Wilder, CIH

attachment
Indoor Dust Sampling Protocol
Exposure Investigation
Vertac NPL Site, Jacksonville, Arkansas
(CR# 6004)

Introduction

The Arkansas Department of Health (ADH), through a grant from ATSDR’s Division of Health Studies (DHS), conducted an exposure study in March 1991. This investigation found elevated dioxin (2,3,7,8-TCDD) levels in blood lipid for the residents who had been living within 1300 yards of the Vertac NPL site for 15 years or more. In March 1995, a second investigation of blood dioxin levels was conducted by ADH for the same participants. It was reported that two individuals (from different families) had dioxin levels that had increased from their 1991 results. One participant’s levels increased from 90 ppt to 103 ppt; the other participant’s levels increased from 80 ppt to 126 ppt. Dioxin levels for all other participants decreased from 1991 to 1995.

An ATSDR health assessor presented these results to the exposure investigation section (EIS) on August 14, 1996. The EIS, with concurrence from the ADH, agreed that the situation met the criteria for an exposure investigation (El). This El is being conducted to determine if there is an indoor/residential source of dioxin (2,3,7,8-TCDD and total dioxin equivalents (TEQ)) exposure present in the residences of the 2 participants whose dioxin levels were observed to have increased from 1991-1995.

Objective:

In an attempt to better characterize possible sources of exposure to dioxin (2,3,7,8-TCDD and TEQ) in the home, this exposure investigation will:

1) assist in determining if dioxin is present in surface (0- to 3-inch depth) soils near the main residential entryway (leading it to be tracked indoors),

2) determine if dioxin is present in indoor dust (floors), and

3) determine if dioxin is present on any items in the home that may have been brought from the Vertac facility.

This information will be useful to the residents and state and local health agencies in determining if a possible source of dioxin exposure is present in the home. If one or more sources are found, recommendations will be made to mitigate or stop exposures.

Initial Contacts:

The Arkansas Department of Health is scheduling the sampling with residents and ATSDR.
EIS has briefed DHS on our plans to sample (they are supportive of this effort). This El should not interfere with other ongoing health investigation activities.

**Target Areas:**

The residences of the two individuals who were observed to have elevated dioxin levels will be the focus of this El. Areas to be sampled include surface soil near the main entryway; indoor dust (floor) sample from main entryway; indoor dust (floor) sample from main living area; and a wipe sample of any materials once located at the Vertac facility.

**Consent Forms:**

Prior to collecting any environmental samples, the resident/property owner will be asked to provide consent for access and sampling. They will be requested to sign a consent form (attached).

**Sample Collection:**

Up to two surface (0-3") soil samples will be collected from each individual's yard: one sample will be collected near the entryway used the most; based on professional judgement, if another sample is needed, it will be collected from a high-use, unvegetated area of the yard.

Two floor dust samples will be collected inside of each home. One sample will be collected from the main entryway floor and another sample will be collected from the main living area (or other area where the individual spends the bulk of their time). A 1/4 square-meter template will be used to measure the area sampled. For each sample, a composite of 4 adjacent template areas will be collected. Samples will be collected using the "Cincinnati method" (low volume pump with cassette filter). A minimum of 10 grams of dust should be collected for analysis to allow a detection limit of 1 ppt.

If the individual informs the sampling team that some of the materials in the home used to be in the Vertac facility, then 2-3 wipe samples will be collected from these objects. Sampling will focus on areas that are the most accessible to the residents. Wipe samples will be collected using isopropyl alcohol wipes. A 1/4 square-meter template will be used to measure the area sampled.

**Sampling Handling and Storage:**

Samples will be handled, stored, and shipped in accordance with applicable Environmental Protection Agency (EPA) and Department of Transportation (DOT) guidelines.

**Chemical Analysis of Samples:**
Through an Interagency Agreement with Division of Federal Occupational Health, samples will be analyzed for dioxins using EPA method 8290 (9/94). A 1- to 2-month turnaround time for analysis is expected.

QA/QC:

One trip blank will be sent with the samples
Calibration data
Matrix spike

Presentation of Results:

Sample results from individual homes will be provided to the respective resident along with an interpretation of the information. Recommendations for followup actions will be provided if contaminant levels are found above background.

An exposure investigation report will be provided to the ATSDR health assessor, DHS, the ADH, and to the Regional Office for comment/followup activities.

Follow-up Activities:

Depending on the analytical results, follow-up activities may include:

-If contamination is found, recommendations will be made to reduce or eliminate exposure. ADH will work with the residents to ensure that exposure is stopped.

-If contamination is found, the health assessor may request another EI to offer serum dioxin testing to the spouses and other occupants of the 2 residences investigated in this EI.

-If residential contamination is not found, a recommendation to investigate other possible sources of exposure will be made.
Sampling Protocol
Exposure Investigation II
Vertac NPL Site, Jacksonville, Arkansas
(CR# 6004)

Introduction

The Arkansas Department of Health (ADH), through a grant from ATSDR's Division of Health Studies (DHS), conducted an exposure study in March 1991. This investigation found elevated dioxin (2,3,7,8-TCDD) levels in blood lipid for the residents who had been living within 1300 yards of the Vertac NPL site for 15 years or more. In March 1995, a second investigation of blood dioxin levels was conducted by ADH for the same participants. It was reported that two individuals (from different families) had dioxin levels that had increased from their 1991 results. One participant's levels increased from 90 ppt to 103 ppt; the other participant's levels increased from 80 ppt to 126 ppt. Dioxin levels for all other participants decreased from 1991 to 1995. The ATSDR Division of Health Assessment and Consultation's Exposure Investigation Section (EIS), with concurrence from the ADH, agreed that the situation met the criteria for an exposure investigation (El). This El was conducted in October 1996 and involved the collection of surface soil, indoor dust and wipe sampling for 2,3,7,8-TCDD and total dioxin equivalents (TEQ) in the residences of the 2 participants whose dioxin levels were observed to have increased from 1991-1995.

Results of the initial El revealed the presence of 2,3,7,8-TCDD and other dioxin/furans in residential surface soil and indoor wipe/dust samples. However, analytical results had significantly low percent recoveries for the contaminants. Conclusions from the results were that 2,3,7,8-TCDD (up to 10 ppb in one sample) is present in the environments sampled, but the results cannot be used to make a scientifically defensible public health decision for the residents. The EIS and SSAB, with agreement from the ADH, agreed that environmental sampling/testing should be repeated. In addition, because the presence of 2,3,7,8-TCDD was confirmed in the El, it was agreed that serum dioxin testing would be offered to the 4 residences of the two homes.

Objective:

Verify the levels of dioxin (2,3,7,8-TCDD and TEQ) in the homes/yards of the two residences by resampling and testing. Determine if the occupants of these homes have serum dioxin levels above the national average.

This information will be useful to the residents and state and local health agencies in determining if a possible source of dioxin exposure is present in the home. If one or more sources are found, recommendations will be made to mitigate or stop exposures.
Initial Contacts:

The Arkansas Department of Health is scheduling the sampling with residents, the American Red Cross, and ATSDR.

EIS has briefed SSAB, and DHS on our plans to resample and offer serum dioxin testing (they are supportive of this effort). This E1 should not interfere with other ongoing health assessment or investigation activities.

The ATSDR Regional Representative has informed EPA Region VI of our findings to date and our plans to retest.

Target Areas:

The residences of the two individuals who were observed to have elevated serum dioxin levels will be the focus of this E1. Areas to be sampled are the same as in the original exposure investigation (surface soil near the main entryway; indoor dust (floor) sample from main entryway; indoor dust (floor) sample from main living area; and a wipe sample of materials once located at the Vertac facility).

Occupants of these residents will be given the choice to have their blood tested to determine if their serum dioxin level(s) is above the national average.

Consent Forms:

Prior to collecting any environmental samples, the resident/property owner will be asked to provide consent for access and sampling. They will be requested to sign a consent form (attached). If the residents accept the offer for serum dioxin testing, they will be requested to sign a separate consent form (attached).

Sample Collection:

Environmental samples will be collected in the same general areas as in the first E1 and will include surface soil, indoor floor dust, and indoor surface wipe samples.

The ADH is arranging to have a phlebotomist available to draw blood.

Sampling Handling and Storage:

Environmental samples will be handled, stored, and shipped in accordance with applicable Environmental Protection Agency (EPA) guidelines. Biological samples will be packaged, stored, and shipped according to CDC guidelines.

Chemical Analysis of Samples:
Through an Interagency Agreement with Division of Federal Occupational Health, samples will be analyzed for dioxin using EPA method 8290 (9/94). A 1-month turnaround time for analysis is expected.

Blood serum samples will be analyzed for 2,3,7,8-TCDD and TEQ by the CDC's Centers for Environmental Health (CEH) laboratory. A 2- to 3-week analytical turnaround is expected.

**QA/QC:**

One trip blank will be sent with the environmental samples
Calibration data
Matrix spike

**Presentation of Results:**

Sample results from individual homes and persons tested will be provided to the respective resident along with an interpretation of the information. Recommendations for follow-up actions will be provided if contaminant levels are found above background.

An exposure investigation report will be provided to the ATSDR health assessor, DHS, the ADH, and to the EPA Regional Office for comment/follow-up activities.

**Follow-up Activities:**

Depending on the analytical results, follow-up activities may include:

- If contamination is found, recommendations will be made to reduce or eliminate exposure. ADH will work with the residents to ensure that exposure is stopped.

- If residential contamination is not found, a recommendation to investigate other possible sources of exposure will be made.