733 0
File: 541.460.000n
C.H.

THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 733

DEPARTMENT OF HEALTH & HUMAN SERVICES 733 1 Public

File: C.H. 541.460.000 m

733

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

May 12, 2003

Mr. John De Back
DOD Base Transition Coordinator
2163 Airways Boulevard, Suite 104B
Memphis, TN 38114

Dear Mr De Back

Enclosed please find a copy of the health consultation for Memphis Defense Depot (Defense Logistics Agency) (a/k/a USA Defense Depot Memphis), Memphis, Shelby County, Tennessee, EPA FACILITY ID: TN4210020570, dated May 7, 2003. The purpose of this health consultation was to determine whether the U.S. Environmental Protection Agency's sampling may be a current risk of exposure from site-related contaminants in these predominantly residential areas.

Please address correspondence to the Chief, Program Evaluation, Records, and Information Services Branch, Division of Health Assessment and Consultation, Agency for Toxic Substances and Disease Registry, ATTN: Memphis Defense Depot, 1600 Clifton Road, NE (E60), Atlanta, Georgia 30333

If there are any questions, please direct them to John Crellin, health assessor, at (404) 498-0441.

Sincerely yours,

Max M Howie, Jr.
Chief, Program Evaluation, Records
and Information Services Branch
Division of Health Assessment
and Consultation

Enclosure

You May Contact ATSDR TOLL FREE at
1-888-42ATSDR
or
Visit our Home Page at: http://www.atsdr.cdc.gov

Health Consultation

Evaluation of Results from a U.S. Environmental Protection Agency
Investigation of Contaminants in Surface Soil near
Surface Water Drainage Ditches from Memphis Depot

MEMPHIS DEFENSE DEPOT (DEFENSE LOGISTICS AGENCY)
(a/k/a USA DEFENSE DEPOT MEMPHIS)

MEMPHIS, SHELBY COUNTY, TENNESSEE

EPA FACILITY ID: TN4210020570

MAY 7, 2003

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

HEALTH CONSULTATION

Evaluation of Results from a U.S. Environmental Protection Agency
Investigation of Contaminants in Surface Soil near
Surface Water Drainage Ditches from Memphis Depot

MEMPHIS DEFENSE DEPOT (DEFENSE LOGISTICS AGENCY)
(a/k/a USA DEFENSE DEPOT MEMPHIS)

MEMPHIS, SHELBY COUNTY, TENNESSEE

EPA FACILITY ID: TN4210020570

Prepared by

Superfund Site Assessment Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Table of Contents

Introduction

Statement of Issues, Background, and Findings

The Defense Distribution Depot, Memphis, Tennessee (DDMT) consists of 642 acres in a mixed residential/commercial/industrial area in south-central Memphis. The facility is made up of two adjacent sections: Dunn field, an open storage and burial area of about 60 acres, and the main installation. The Depot has conducted numerous operations with hazardous substances with contamination resulting from leakage, spillage, and disposal of out of date materials. Removal actions in 1998-99 excavated small volumes of lead and pesticide contaminated soil at the main installation

During public involvement in the Public Health Assessment (PHA) process for the Depot by the Agency for Toxic Substances and Disease Registry (ATSDR), local residents indicated that there had been past instances where storm water in surface drainage ways from the Depot had overtopped the banks and flooded adjacent property [1] This presents a potential migration pathway for hazardous substances, pollutants, or contaminants to have migrated from the depot and been deposited in these areas. ATSDR identified this as a data gap

The U S Environmental Protection Agency (EPA) agreed to collect and analyze soil from areas near the Depot and adjacent to the drainage ways [2]. The purpose of EPA's sampling was to determine whether there may be a current risk of exposure from site-related contaminants in these predominantly residential areas.

In consultation with ATSDR staff, three areas of concern were identified: the Rozelle neighborhood, the southeast drainage ditches, and the Tarrent Branch [2]. These locations are displayed on Figure 1.

As indicated on Figure 1, samples were taken from ten locations in the southeast drainage area [2] Eight of these ten samples were composites and the other two grab (discrete) samples. The grab samples were obtained just south of the Memphis Depot boundary in the drainage ditches near the intersections of Ball and Mullen Roads and Ball and Ketchum Roads. Four samples were collected from or near the ditch parallel to Mullen Road between Ball and Ketchum Roads. ATSDR staff observed children playing in and around this ditch in February 1999 [3].

In the Tarrent Branch area, one composite sample was collected in the area north of the drainage ditch and west of Sparks Road [2]. In the Rozelle area, four samples were collected. One linear composite sample was collected on the north side of the northernmost ditch in the Rozelle area and east of Rozelle Street. In addition, one linear composite and one discrete sample were collected from the area to the west of the southern end of Rozelle Street and adjacent to the southern-most ditch in the Rozelle area. Another composite sample was taken from this southern-most ditch a little west of Dunn Field. These sampling locations are also displayed on Figure 1.

In December 2000, EPA collected the samples following the standard operating procedures for EPA Region 4 and analyzed them at an EPA approved laboratory using standard EPA methods [2]

For this health consultation, ATSDR reviewed the data provided by EPA and concluded the following:

- It is very unlikely that there will be adverse health effects or excess risk of cancer due to exposure to the contaminants identified in the samples taken in EPA's investigation of three drainage areas near Memphis Depot ATSDR identifies this situation as ***No Apparent Public Health Hazard.***

- The available evidence indicates that there are multiple sources for PAH contamination found at the end of Rozelle Street

Child Health Initiative

ATSDR recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of environmental media As part of the ATSDR child health initiative, ATSDR health consultations must indicate whether any site-related exposures are of particular concern for children The areas sampled are in or near residential areas and use by children has been observed Therefore, the possibility of adverse health effects in children was carefully analyzed and found to be very unlikely because contaminant concentrations were too low.

Discussion

In evaluating these data, ATSDR used comparison values (CVs) to determine which chemicals to examine more closely CVs are contaminant concentrations found in a specific media (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 water and soil that someone may inhale or ingest each day

As health-based thresholds, CVs are set at a concentration below which no known or anticipated adverse human health effects are expected to occur. Different CVs are developed for cancer and non-cancer health effects. Non-cancer levels are based on valid toxicological studies for a chemical, with appropriate safety factors included, and the assumption that small children (22 pounds) and adults are exposed every day. Cancer levels are the media concentrations at which there could be a one in a million excess cancer risk for an adult eating contaminated soil or drinking contaminated water every day for 70 years. For chemicals for which both cancer and non-cancer numbers exist, the lower level is used to be protective. Exceeding a CV does not mean that health effects will occur, just that more evaluation is needed. The results of that evaluation are displayed on Table 1 on page 11. The contaminants identified were arsenic,

benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, dieldrin, and indeno(1,2,3-c,d)pyrene.

The next step is to calculate the exposure doses and cancer risk for these eight contaminants for the site-specific exposure scenario. Exposure doses, the amount of a contaminant that gets into a person's body, were calculated for children and adults using the following formula.

Dose (mg/kg/day) = C * IR * (EF/365) / BW

where C = the chemical concentration in milligrams per kilogram (mg/kg), IR = soil ingestion rate in kilograms per day (kg/d), EF = exposure frequency in events per year, and BW = body weight in kilograms (kg) For the initial evaluation of this situation, the mean chemical concentration for all the samples was used for C. The soil ingestion rates (IR) used were 0 0002 kg/d for a small child and 0 0001 kg/d for an adult. Body weight (BW) of 10 and 70 kg (22 and 154 pounds) for children and adults, respectively. These are the standard assumptions for ingestion rates and body weight used by ATSDR and EPA (4,5). An exposure frequency of 350 days a year was used.

The mean soil concentration was used in this situation because it represents the best estimate of what an individual might be exposed to over a long period of time [5,6]. Evaluation of maximum levels is appropriate when the concentrations are great enough so that one or two exposures to the maximum would result in health effects. The maximum concentrations in this sampling are far too low for this to happen

These calculated exposure doses were then compared to an appropriate health guideline for that chemical. Health guidelines were available for arsenic and dieldrin, but not for the other six chemicals. Health guideline values are considered safe doses; that is, health effects are unlikely below this level. The health guideline value is based on valid toxicological studies for a chemical, with appropriate safety factors built in to account for human variation, animal-to-human differences, and/or the use of the lowest adverse effect level. The results of the comparisons of exposure doses for arsenic and dieldrin to their health guidelines are displayed in Table 2 on page 12.

For arsenic and dieldrin, the estimated child and adult exposure doses were less than the health guideline values. Therefore, exposures to arsenic and dieldrin are unlikely to cause a non-carcinogenic health effect. These toxicological values are doses derived from human and animal studies which are summarized in the ATSDR Arsenic and Dieldrin Toxicological Profiles (7,8).

The estimated risk of developing cancer from exposure to the eight contaminants above their comparison values (CVs) was calculated by multiplying the site-specific adult exposure dose by EPA's corresponding Cancer Slope Factor. The results displayed in Table 2 on page 12 estimate the maximum increase in risk of developing cancer after 70 years of exposure to the contaminant.

The actual risk of cancer is probably lower than the calculated number The method used to calculate EPA's Cancer Slope Factor assumes that high-dose animal data can be used to estimate the risk for low dose exposures in humans The method also assumes that there is no safe level for exposure Little experimental evidence exists to confirm or refute those two assumptions Lastly, the method computes the 95% upper bound for the risk, rather than the average risk, suggesting that the cancer risk is actually lower, perhaps by several orders of magnitude [6,9].

The cancer risks identified in this evaluation of the mean concentrations of the 15 samples taken were all below the action level of 1 in 10,000 additional risk of cancer recommended by EPA and ATSDR [6,9]

In addition to the above evaluation of all 15 samples, the Rozelle and southeast drainage areas were also evaluated separately Exposure doses were calculated using the means for all the chemicals identified in the 4 samples from the Rozelle area and the 10 samples from the southeast drainage In addition, the exposure doses were calculated for the means of the chemicals found in the 2 samples obtained at the end of Rozelle Street [1] Of the 4 samples taken in the Rozelle area, these 2 were taken in the area where exposure is most likely

None of these exposure doses exceeded a health guideline except for benzo(a)pyrene from the end of Rozelle Street where the mean concentration was 13 3 ppm The cancer risk for this level slightly exceeded the guideline of 1 in 10,000.

However, it is unlikely that exposure to benzo(a)pyrene at the end of Rozelle Street would significantly increase the risk of cancer for someone living in this area. This is due to the uncertainty about whether exposure to PAHs in soil would actually result in cancer in humans. Coal tars, which have PAHs as their major constituent, are identified as human carcinogens by the U.S. Public Health Service, EPA, and other agencies (10). However, the evidence on coal tars being carcinogenic indicates that cancer is caused through long-term contact with skin and not through ingestion or other routes of exposure. Animal studies support this observation. Since the possible exposures at DDMT were ingestion of PAH-contaminated soil, it is unlikely that these exposures, even if they did occur, could have resulted in cancer.

While the Rozelle area is next to Dunn Field, it is unlikely that Dunn Field was the only source for the benzo(a)pyrene and the other polycyclic aromatic hydrocarbons (PAHs) found at the end of Rozelle Street. The data from recent sampling of Dunn Field identified a maximum benzo(a)pyrene concentration of 6.7 ppm and a mean of 3.4 ppm in the 61 surface soil samples [11] In contrast, the benzo(a)pyrene levels at the end of Rozelle Street were 12 and 20 ppm. The drainage ditch that flows past the end of Rozelle Street also receives flow from the industrial

---

[1] Because one of these samples was a five point composite and the other a grab sample, the mean was calculated by multiplying the value for the composite sample (12 ppm) by 5 then adding that result to the value for the grab (20 ppm) then dividing by 6

facilities which adjoin the southern end of this neighborhood.[2] The benzo(a)pyrene levels from the other two locations sampled in EPA's investigation were 1.2 and 0 25 ppm These locations receive flow only from Dunn Field Similar results were observed for the other PAHs identified in this investigation

Conclusions

- It is very unlikely that there will be adverse health effects or excess risk of cancer due to exposure to the contaminants identified in the rest of the samples taken in EPA's investigation of three drainage areas near Memphis Depot. ATSDR identifies this situation as ***No Apparent Public Health Hazard***.

- The available evidence indicates that there are multiple sources for PAH contamination found at the end of Rozelle Street

Public Comments

This public health consultation (PHC) was available for public review and comment at 3 locations in Memphis, Tennessee (the Cherokee Branch of the Memphis/Shelby County Public Library, the Memphis/Shelby County Health Department, and Memphis Depot Community Reading Room) from October 8, 2002 to March 15, 2003. The comment period for this document originally was October 8 to November 8, 2002 It was extended twice at the request of Mrs Doris Bradshaw, President of DDMT- Concerned Citizen's Committee.

The public comment period was announced in local newspapers The PHC was sent to members of DDMT-CCC; the DDMT Restoration Advisory Board (RAB); Memphis-Shelby County Health Department; Tennessee Departments of Environmental Conservation and Health, U.S Environmental Protection Agency (EPA); DDMT; Defense Logistics Agency (DLA); and Department of Defense (DOD)

Comments were received from the Military Waste Cleanup Program at Hampshire College in Amherst, MA. They can be found in Appendix 3 beginning on page 18 along with ATSDR responses to them.

---

[2] This conclusion is based on review of the maps of the drainage from Dunn Field and observations of the author of this report

ATSDR Site Team

Author of Report

John R. Crellin, Ph D.
Senior Environmental Epidemiologist
Superfund Site Assessment Branch
Division of Health Assessment and Consultation

Regional Representative

Ben Moore
Regional Representative
ATSDR Region 4
Regional Operations

References

1 ATSDR *Memphis Depot Public Health Assessment , Memphis, Tennessee* Atlanta, GA· U.S Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR) . November 15, 2000.

2 EPA Field Sampling Investigation Defense Depot Memphis Tennessee, Memphis, Shelby County, Tennessee. SESD Project Number 01-0211 Athens, GA: U.S. Environmental Protection Agency, Region 4, Science and Ecosystem Support Division December 2000.

3 Moore B Site Visit to Memphis to attend Restoration Advisory Board (RAB), and evaluate surface water drainage. February 18-19, 1999. Atlanta, GA: Agency for Toxic Substances and Disease Registry (ATSDR) February 1999.

4. EPA *Exposure Factors Handbook* Washington, DC. U.S. Environmental Protection Agency. Office of Research and Development. EPA/600/C-99/001 1999 February

5 ATSDR *Public Health Assessment Guidance Manual* Atlanta, Georgia· U S. Department of Health and Human Services, Public Health Service Agency for Toxic Substance and Disease Registry (ATSDR) March 1992 Can be accessed at http://atsdr1 atsdr.cdc gov.8080/HAC/HAGM/

6. EPA. *Risk Assessment Guidance for Superfund Volume 1, Part A.* Washington, DC· U S Environmental Protection Agency Office of Emergency and Remedial Response. 1989 December.

7. ATSDR. *Toxicological Profile for Arsenic. Update.* Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, TP-92/02. 1993.

8. ATSDR. *Toxicological Profile for Aldrin/Dieldrin. Update.* Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service, TP-92/01 1993

9. ATSDR. *Cancer Policy Framework.* Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service. Agency for Toxic Substance and Disease Registry (ATSDR). January 1993.

10. ATSDR. *Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs). Update.* Atlanta, Georgia: U.S. Department of Health and Human Services, Public Health Service. 1995.

11. **CH2M**HILL. Memphis Depot - Dunn Field Remedial Investigation Report. Sections 1 - 18. Huntsville, Alabama: **CH2M**HILL under contract to the U.S. Army Engineering and Support Center. April 2002.

Appendix 1 - Tables

Table 1 - Contaminants above a Comparison Value (CV) in Surface Soil from Three Drainage Areas near Memphis Depot*

Contaminant	Range in Soil mg/kg[1]	Mean in mg/kg	Samples > DL[2]	Samples > CV	CV	CV Source
Arsenic	3.4 - 23	10	15/15	15/1[3]	0.5/20[4]	CREG[5]/EMEG[6]
Benzo(a)anthracene	ND - 20	2.8	13/15	5	0.9	EPA SSL[7]
Benzo(a)pyrene	ND - 20	3.2	13/15	14	0.1	CREG[5]
Benzo(b)fluoranthene	ND - 28	4.8	13/15	6	0.9	EPA SSL[7]
Benzo(k)fluoranthene	ND - 11	2	13/15	1	9	EPA SSL[7]
Dibenz(a,h)anthracene	ND - 0.59	0.25	4/15	4	0.09	EPA SSL[7]
Dieldrin	ND - 1.3	0.3	13/15	9/0[3]	0.04/3[4]	CREG[5]/EMEG[6]
Indeno(1,2,3-c,d)pyrene	ND - 15	2.1	13/15	4	0.9	EPA SSL[7]

* The source of these data are files provided to ATSDR by EPA in July 2001
1 - mg/kg = milligrams per kilogram
2 - DL = detection limit
3 - The first number is the samples above the CREG and the second is samples above the EMEG
4 - The first number is the CREG and the second is the EMEG
5 - CREG = A cancer risk evaluation guide is the estimated contaminant concentration that would be expected to cause no more than one additional excess cancer in a million persons exposed over a lifetime. CREGs are calculated from EPA's cancer slope factors (CSF)
6 - EMEG = A environmental media evaluation guide is estimated contaminant concentrations in a media where no chance exists for non-carcinogenic health effects to occur. The EMEG is derived from U.S Agency for Toxic Substances and Disease Registry's (ATSDR) minimal risk level (MRL)
7 - EPA SSL = EPA's soil screening level is the estimated contaminant concentration in soil at which additional evaluation is needed to determine if action is required to eliminate or reduce exposure.

Table 2 - Estimated Exposure Doses and Cancer Risk for Contaminants in Surface Soil from Three Drainage Areas near Memphis Depot Compared to Health Guidelines for Ingestion[1]

Contaminant	Mean Level in parts per million (ppm)	Estimated Child Exposure Doses in mg/kg/day*	Estimated Adult Exposure Doses in mg/kg/day*	Health Guideline in mg/kg/day*	Source of Guideline	Cancer Risk
Arsenic	10	0 0002	0 00001	0 0003	MRL[2]	2 in 100,000[3]
Benzo(a)anthracene	3 1	0 00006	0 000004	none	none	3 in 1,000,000[4]
Benzo(a)pyrene	3.3	0 00006	0 000005	none	none	3 in 100,000[3]
Benzo(b)fluoranthene	5.2	0 0001	0 000007	none	none	5 in 1,000,000[4]
Benzo(k)fluoranthene	2 1	0 00004	0 000003	none	none	2 in 10,000,000[5]
Dibenz(a,h)anthracene	0.23	0.000004	0 0000003	none	none	2 in 1,000,000[4]
Dieldrin	0 3	0 000006	0 0000004	0 00005	MRL[2]	7 in 100,000[3]
Indeno(1,2,3-c,d)pyrene	2 2	0 00004	0 000003	none	none	2 in 1,000,000[4]

* mg/kg/day = milligrams/kilogram/day

1 An explanation of how these exposure doses and cancer risk were calculated can be found on page 5 No health guidelines are available for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-c,d)pyrene, benzo(k)fluoranthene, and dibenz(a,h)anthracene The cancer slope factors came from the October 2001 EPA Region 3 Risk-Based Concentration (RBC) Table http //www epa gov/reg3hwmd/risk/riskmenu htm

2 MRL = ATSDR's minimal risk level. For more information on the MRL for arsenic or dieldrin, see the arsenic or dieldrin toxicological profiles

3 Maximum additional lifetime risk of cancer per 100,000 individuals

4 Maximum additional lifetime risk of cancer per 1,000,000 individuals

5 Maximum additional lifetime risk of cancer per 10,000,000 individuals

Appendix 2 - Figures

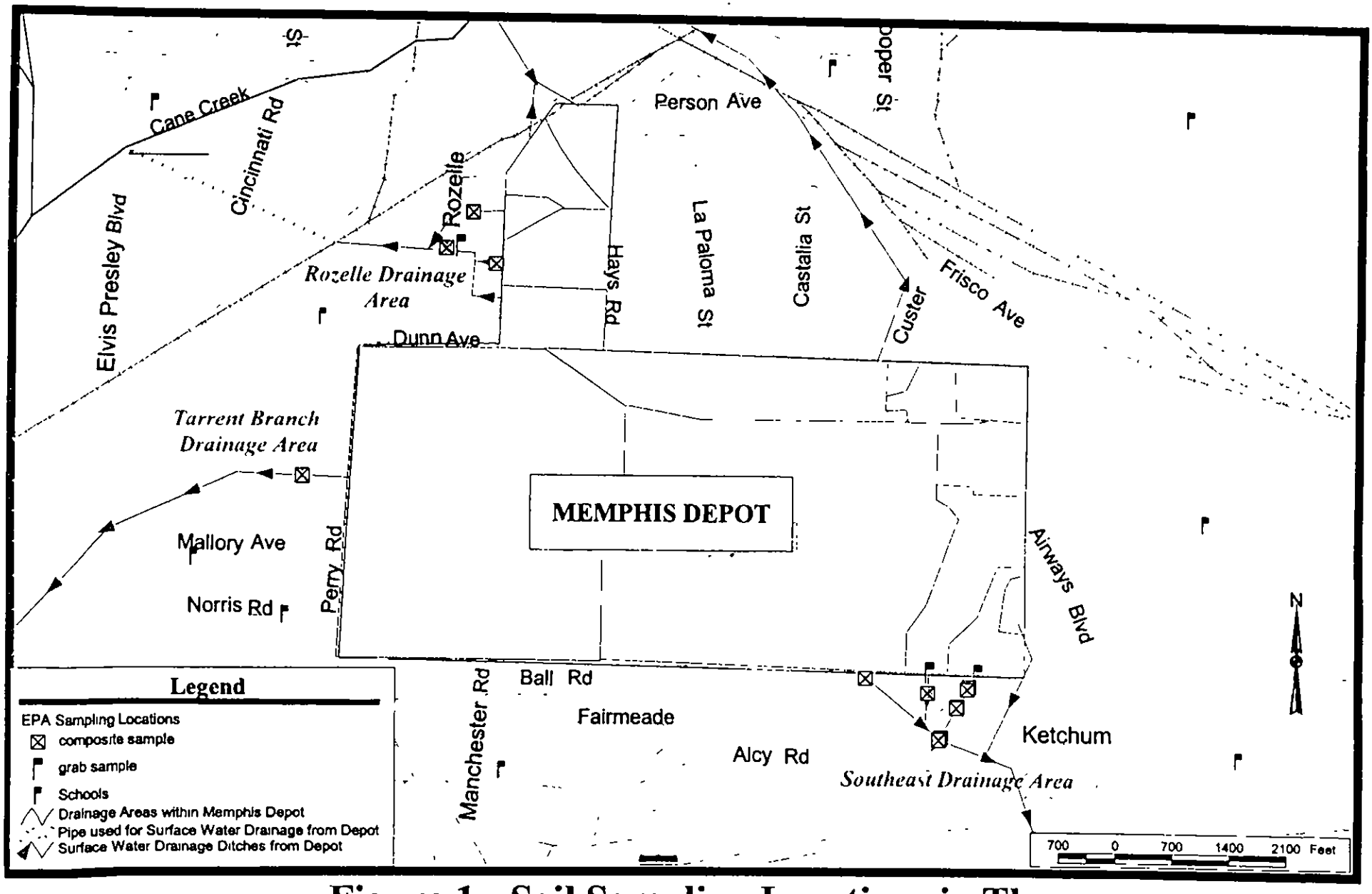

Figure 1 - Soil Sampling Locations in Three Drainage Areas around Memphis Depot

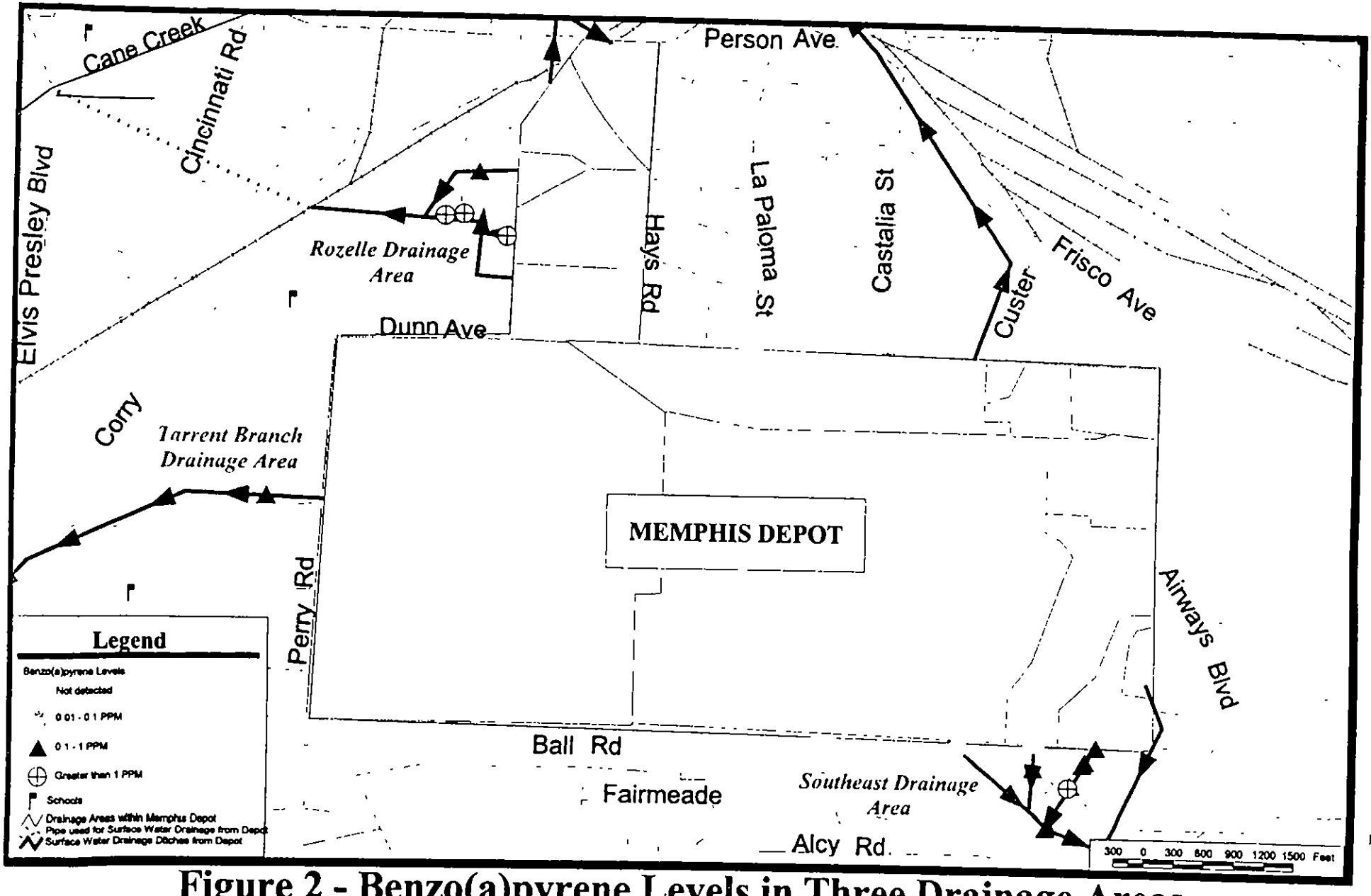

Figure 2 - Benzo(a)pyrene Levels in Three Drainage Areas near Memphis Depot

733 17

Appendix 3 – Public Comments

Public Comments

This public health consultation (PHC) was available for public review and comment at 3 locations in Memphis, Tennessee (the Cherokee Branch of the Memphis/Shelby County Public Library, the Memphis/Shelby County Health Department, and Memphis Depot Community Reading Room) from October 8, 2002 to March 15, 2003. The comment period for this document originally was October 8 to November 8, 2002. It was extended twice at the request of Mrs. Doris Bradshaw, President of DDMT- Concerned Citizen's Committee.

The public comment period was announced in local newspapers. The PHC was sent to members of DDMT-CCC; the DDMT Restoration Advisory Board (RAB), Memphis-Shelby County Health Department; Tennessee Departments of Environmental Conservation and Health; U S. Environmental Protection Agency (EPA); DDMT; Defense Logistics Agency (DLA), and Department of Defense (DOD).

Comments were received from the Military Waste Cleanup Program at Hampshire College in Amherst, MA. They are listed below along with ATSDR responses to them.

Comment 1: This document is a public comment on the Public Health Consultation (PHC) by ATSDR of soil sampling and evaluation in the neighborhoods surrounding the Defense Depot Memphis Tennessee (DDMT) Superfund site Since the PHC is based on the EPA "Field Sampling Investigation" SESD Project Numbers 01-0211, December 2000, some of the comments will also refer to that document. The third document that is relevant to the PHC is ATSDR's original work plan, referred to below. These three documents must be considered together to assess the PHC document

On the Public Health Consultation, the first significant point we wish to make is that the original work plan as laid out in ATSDR's "Environmental Media Investigation Work Plan for the Defense Depot Memphis Tennessee Site (CR #40EC)," dated August 23, 1999, seemed like a well-reasoned and thorough plan, responsive to some of the community concerns. However, this plan was apparently not followed completely in the EPA "Field Sampling Investigation" SESD Project Numbers 01-0211, December 2000. Specifically, the ATSDR work plan called for soil vapor gas sampling and exposure pathway investigation, but this does not appear to have been done. Considering newly emerging information on the vapor gas intrusion pathway and solvent contamination, we believe that soil vapor gas and pathway should be examined. Because of the lack of the vapor gas pathway analysis, this PHC is not a complete, multi-route assessment of the impact of the contaminants potentially affecting the health of the community. Additionally, calling for soil vapor gas analysis suggests an underground plume, however, there is no reference to such a plume in the PHC. According to the EPA Federal Facilities Fact Sheet on DDMT: "the [Dunn Field] RI report identified significant source areas for the VOC contamination seen in ground water both on- and off-site." [a] Is there a plume beneath the sampling areas? What kinds of chemicals are contained within the plume?

Response

In response to your query about the August 1999 ATSDR work plan, ATSDR planned to conduct the sampling described in that work plan in September 1999. This plan included flux sampling to evaluate the vapor intrusion pathway. The decision to include an evaluation of this pathway in sampling effort grew out of concerns expressed to ATSDR by Memphis Depot area residents during the development of the Memphis Depot Public Health Assessment. To address these concerns, ATSDR had one of its geologists evaluate the available groundwater data in 1998. One of the conclusions of this evaluation was the extent of the contaminant plume coming from Dunn Field needed to be determined. Flux sampling was chosen by ATSDR's experts in this issue as the most appropriate way to determine the extent of the plume.

However, Mrs. Doris Bradshaw and her group, DDMT-CCC, disagreed with the flux sampling methodology that ATSDR planned to use to evaluate the vapor gas pathway They wanted this pathway to be evaluated using soil borings. ATSDR management decided to delay the sampling so this issue could be resolved through negotiation with Mrs Bradshaw and her technical advisors. A meeting to do this was held at Howard University in Washington, D C in March 2000 among DDMT-CCC, ATSDR, Howard, and other interested parties. However, the issue of whether to conduct flux sampling or soil borings to evaluate the vapor gas pathway was never resolved

In the spring of 2000, Mrs. Bradshaw expressed in several forums her concern about the possible health effects from exposure to contaminants being carried from Memphis Depot in the ditches that drain that facility. The Chief of the Federal Facilities Branch, EPA Region 4 decided to respond to these concerns by having EPA conduct the sampling of the drainage ditches described in ATSDR August 1999 work plan.

EPA requested that ATSDR evaluate the possible health consequences of the results of their sampling. This public health consultation (PHC) reports that evaluation.

In this comment it is observed that "...this PHC is not a complete, multi-route assessment of the impact of the contaminants potentially affecting the health of the community." That is an accurate observation. ATSDR's PHCs focus on a single issue and for this PHC, that issue was an evaluation of EPA's sampling results. ATSDR conducted a multi-route assessment of the potential impact of the Memphis Depot contaminants on the health of the community around the Depot when it developed the Memphis Depot Public Health Assessment (PHA). This document was finalized in November 2000. ATSDR's planned sampling in 1999 would have filled the data gap that existed at that time on the extent of the groundwater plume coming from Dunn Field. The results would have been included in the Memphis PHA and thus the concerns about the vapor intrusion pathway would have been addressed in 2000.

However, this issue was comprehensively addressed in the Memphis Depot Remedial Investigation Report released in April 2002. This evaluation reports the results for over

400 groundwater samples taken in the Dunn Field area. The groundwater plume was detected offsite southwest, west, northwest, and north of Dunn Field. Concentrations of VOCs ranged from less than 0 0001 mg/L to 33 mg/L. Nine chlorinated hydrocarbon compounds were the chemicals most frequently detected in this plume. These 9 were 1,1,1,2-PCA, CCl4, 1,1,2-TCA, chloroform, PCE, cis- and trans-1,2-DCE, total 1,2-DCE, and TCE. It was concluded in this report that, "Since contamination has been detected in selected offsite wells, indoor air exposures are the most pertinent exposure pathway. Risks through this pathway to the offsite residents are well within the acceptable limits, presenting negligible risks .."

ATSDR has reviewed this document and concurs with its conclusion about indoor air exposures Our review of this issue included an evaluation of EPA's use of the Johnson-Ettinger to analyze vapor intrusion. ATSDR found the use of Johnson-Ettinger was valid In addition, we found that the results of this modeling, based on the large amount of pertinent data available, made unnecessary the flux sampling proposed by ATSDR in 1999.

Comment 2: A second comment on the sampling that underlies this PHC is the fact that the EPA Field Sampling Investigation report claims that in reference to the drainage ditch running parallel to Mullen Road: "Field observations indicated that the ditch had been recently excavated prior to the initiation of the sampling investigation." This brings into question the usefulness of these samples to the investigation. Were samples able to be gathered from undisturbed locations in the ditch?

Response

The answer to this concern can be found in the EPA Field Sampling Investigation report. As indicated in the sentences that follow the above quote from EPA's report, the EPA investigators took samples from outside of the ditch and from an area of the ditch that had not been excavated. In addition, the report indicated that this area was subjected to considerable overflow which would maximize the amount of contamination. The pertinent sentences from the report are "Additional composite samples were taken outside of the ditch adjacent to each of the bottom samples. One sample, not discussed in the study plan, was collected adjacent to the ditch on the facility side of Ball Street. This area was selected because it appeared it had not been recently excavated. This location, DDE-SE07, also was likely to be inundated in the event of a ditch-overflow situation."

Comment 3: It would be useful to know how the exact sampling locations were determined. Were these areas that the community reported received overflow from the drainage ditches, and thus are suspected "hot spots"? Was there any statistical or other sampling regimen used in determining what locations to test? How were the number of samples to be taken determined?

Response

The community's concerns about these issues were the main factor in determining sampling locations This is evaluated in some detail in the Memphis Depot PHA

Here is a summary of how the locations were identified. The sampling done in the Rozelle area, near Ball Road, and near Sparks Road were based on concerns expressed by Mrs Doris Bradshaw and other residents and tours that ATSDR staff took of these locations that were conducted by Mrs Bradshaw. The sampling along Mullen Road was based on observations of children playing in the ditch by ATSDR staff These locations were proposed and described in ATSDR 1999 Sampling Protocol They were discussed with Mrs Bradshaw and other residents at a meeting at Howard University in March 2000. This discussion included the distribution of maps identifying the proposed sampling locations. These maps and the ATSDR Sampling Protocol were used by EPA to develop their sampling plan ATSDR staff showed EPA's field staff where these locations were and observed the actual sampling

Regarding the number of samples, it was based on the level of sampling being conducted (i.e , site investigation) and in accordance with the USEPA, Region 4 document, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual.

Comment 4: Additionally, in order to be comprehensive, a public health assessment of the residential areas surrounding the Depot should include data on any plume migration from Dunn Field, or other sources of contaminants, other than soil contaminants.

Response

The existing PHA on the Memphis Depot is a very comprehensive evaluation of potential exposures. The only area not fully addressed was the potential for vapor intrusion due to the lack of data. As described above, ATSDR identified this data and attempted to fill it. The evaluation of this issue described in the Dunn Field Remediation Investigation report does adequately fill/address this issue.

Comment 5: In determining the soil contaminants of concern, ATSDR has used a two-level screening/risk analysis approach First, concentrations of contaminants in the soil were matched to comparison values (CV), and if they exceeded the CVs, exposure doses were then calculated and either compared to health guidelines, where available, or excess cancer risks were calculated using EPA Region 3 cancer slope factors. Risk was apparently determined based on a soil ingestion scenario, for an adult and for a child.

The PHC shows two tables: Table 1 indicates soil contamination levels (in mg/kg) for the eight contaminants found to be above comparison levels. Any contaminant found that was under the CV of 1 was not analyzed any further at this point. Table 2 indicates the estimated exposure doses and cancer risk for the eight contaminants, based on either ATSDR's own Health

Guidelines, or on the EPA Cancer Slope Factors. As a result of this analysis, only benzo(a)pyrene was found to have a risk factor higher that 1 in 10,000.

Our first comment on this approach is that ATSDR has established Guidelines[b] for the assessment of chemical mixtures. These guidelines state that "further evaluation of additivity and interactions is necessary for components with risks > 1×10^{-6}." It appears that in Table 2 several of the PAHs (and arsenic and dieldrin) have cancer risk factors above this level. Additionally, PAH concentrations were apparently higher for the Rozelle sites and therefore a separate analysis was then conducted for this site. Again, although the report only discusses B(a)P cancer risk for the Rozelle site (the report indicates that it "slightly exceeded 1 in 10,000"), we wonder if the other PAHs at Rozelle would have been above the suggested cutoff of 1×10^{-6}, thereby qualifying them for a mixtures or additive assessment. It would be helpful if there were some explanation as to why no consideration was given to an evaluation of these chemicals as a mixture

Response

*ATSDR has yet to finalize its **Guidance Manual for the Assessment of Joint Toxic Action of Chemical Mixtures** so it was not appropriate to use it in this PHC. The web reference provided by the commenter is to the draft document*

Comment 6: Since the Rozelle neighborhood is the site for B(a)P exposures, and ATSDR has looked at the Rozelle sampling results separately, we would like to see a table showing each sample and each analysis (e.g., calculated dose compared to Health Guideline or cancer risk) from Rozelle independent from the other sampling sites. We are also curious about how the means for the Rozelle B(a)P samples were calculated. According to the document, the mean for one of the samples was calculated using five times the concentration of a 5-point composite sample (which had a soil concentration of 12 ppm) added to the grab sample (with a concentration of 20 ppm) and divided by 6. Is this a standard technique? Had the sample with 20 ppm received more weight would the calculated cancer risk have more than "slightly exceeded the action level of 1 in 10,000"?

Response

The technique used to calculate the BAP concentration in the Rozelle area was used so that that the grab sample (20 ppm) would be given "more weight". Both ATSDR and EPA calculate cancer risk based on either mean levels or the 95% confidence level of the mean rather on a single data point. This better represents the exposure an individual would receive during a chronic or long-term exposure. Typically, the grab sample would be excluded from an evaluation. Incidentally, the calculated risk for the 13.3 ppm BAP level used by ATSDR is 1.3 in 10,000. The calculated risk for 20 ppm identified in the grab sample is 2 in 10,000.

Comment 7: Although the report does appear to consider children's exposure (and as noted by ATSDR, children would be more likely exposed, given their tendency to play in such ditches) –

we wonder if children were considered when comparing values to the Health Guidelines? Are Health Guidelines designed for adults or children? If Health Guidelines or slope factors are specific to children, it would be useful to state this. If the Guidelines were designed for adults, then we wonder if the concentration of arsenic (in which the children's dose is just below the guideline for the mean soil concentration) might present a problem for children.

Response

The health guidelines used by ATSDR are developed so they are applicable to adults and children. In addition, the health guidelines have sufficient uncertainty factors built into them so that any contaminant concentration below a health guideline is very unlikely to result in adverse health effects.

Comment 8: Finally, the treatment of PAHs and B(a)P in this Consultation seems rather inadequate. We are curious about the comparison of PAH in the soil to coal tar. Coal tar -- a complex, very viscous mixture containing many different PAHs -- seems very different from PAHs in the soil. Surely there are data on PAHs in soils. It seems PAH in soils, where PAH might adsorb to soil particles and be bioavailable through inhalation of dust or ingestion of soil and perhaps dermally – is quite different from coal tar for which only the dermal route of exposure applies. There is a large body of information about PAHs and B(a)P available through ATSDR.[4] We wonder why this consultation did not refer to those data, and instead relied upon data for coal tar?

Response

The discussion of coal tar and the other information on the possible health effects due to exposure to BAP comes from the ATSDR Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs). As indicated in that document, which is an extensive review of the literature on polycyclic aromatic hydrocarbons, there are no data on exposure of experimental animals or humans to PAHs in soil.

Comment 9: Since the contaminant B(a)P did exceed the safety level of 1 in 10,000, this should trigger a more extensive examination of the Rozelle neighborhood, rather than a justification for using coal tar as to why it can be ignored. Given the potential for children to be exposed (and the recent EPA attention to increased susceptibility to cancer risk following exposure to carcinogenic contaminants), and the lack of consideration to mixtures of potentially carcinogenic PAHs that were likely present in elevated levels in addition to B(a)P (we say likely because the data for Rozelle were not shown independently of the other sites), a more thorough sampling and analysis study is called for.

Response

The risk level for the 4 samples taken in the Rozelle area is actually slightly below 1 in 10,000 lifetime risk of cancer. As discussed in the public health consultation, the risk for the 2 samples taken at the end of Rozelle Street is slightly above. The importance of the "coal tar" discussion is that this evidence from human exposures and supported by

animal data indicates that the actual risk of cancer is actually much lower than the calculated number Therefore, ATSDR does not believe that additional sampling is justified.

Comment 10: ATSDR's comments that "it is unlikely that Dunn Field was the only source for the benzo(a)pyrene .." seems inappropriate and unrelated to ATSDR's mandate to protect human health of the residents of these neighborhoods. Since B(a)P has been found in the Dunn Field site, it must be considered as a potential source of the contamination

Response

Whatever the source, the BAP concentrations found in the Rozelle area do not represent a public health risk

Comment 11: Thank you for the opportunity to comment on this Public Health Consultation

Response

You are welcome.

---

[a] http //www epa gov/swertfrr/tt/DDmemphis htm

[b] "Guidance Manual for the Assessment of Joint Toxic Action of Chemical Mixtures," ATSDR, February 2001.

[c] E.g , http //www atsdr cdc gov/toxprofiles/tp69-c2 pdf

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE