Health Consultation

Redwood Early Childhood Center Asbestos Removal
Redwood Early Childhood Center
401 Redwood Street
North Little Rock, Pulaski County, AR 72114
EPA Contract Number: EP-W-06-077

Prepared by
Arkansas Department of Health

MARCH 5, 2013

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR Toll Free at
1-800-CDC-INFO
or
Visit our Home Page at: http://www.atsdr.cdc.gov

HEALTH CONSULTATION

Redwood Early Childhood Center Asbestos Removal
Redwood Early Childhood Center
401 Redwood Street
North Little Rock, Pulaski County, AR 72144
EPA Contract Number: EP-W-06-077

Prepared By:

Arkansas Department of Health
Environmental Epidemiology
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry (ATSDR)

Table of Contents

SUMMARY

INTRODUCTION

In the areas surrounding the Redwood Early Childhood Center site, the top priority of ADH/ATSDR is to ensure that the community has the best information possible to safeguard its health and prevent people from coming in contact with harmful toxic materials.

CONCLUSION

No known information exists to determine the extent to which people living nearby this site or utilizing the Redwood Early Childhood Center were exposed ***in the past*** to asbestos in ambient (outdoor) air. ADH/ATSDR conclude that *past* exposures to outdoor air inhalation at this site are unknown.

While recently sampling for asbestos contamination at Redwood Early Childhood Center, no soil or air sample concentrations were found to be above health screening levels. Therefore, ADH/ATSDR conclude that for ***present*** and ***future*** exposures, inhalation of air particles at the Redwood Early Childhood Center site is not expected to harm people's health because soil with elevated asbestos levels has been removed.

BASIS FOR DECISION

EPA contractors have removed and disposed of all hazardous asbestos-containing soil identified at the Redwood Early Childhood Center site. The contractors took samples of the backfill soil during excavation activities and took continuous air samples daily while site excavation occurred.

NEXT STEPS

Since all debris and asbestos-contaminated soil has been removed from the Redwood Early Childhood Center site, and the site has been backfilled with clean soil and seeded with grass, there are no further recommendations at this time.

FOR MORE INFORMATION

If you have concerns about your health, you should contact your health care provider. You can also call the Agency for Toxic Substances and Disease Registry (ATSDR) at 1-800-CDC-INFO or the Arkansas Department of Health (ADH) at 501-661-2936 and ask for information on the Redwood Early Childhood Center site.

Statement of Issues

In response to a request from the U.S. Environmental Protection Agency (EPA) Region 6, the Arkansas Department of Health (ADH) has been assisting in public health education and public health exposure evaluation in the Dixie Lane Community of North Little Rock near the former W.R. Grace facility. Recent sampling activities close to the former facility (within a half-mile radius) in the nearby neighborhood led EPA to sample at the Redwood Early Childhood Center. Elevated levels of chrysotile asbestos were detected at this site. This health consultation evaluates the data collected during sampling activities at the Redwood Early Childhood Center as it relates to public health exposure. ADH has prepared this report under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), U.S. Department of Health and Human Services.

Background and History

EPA initially sampled the Redwood Early Childhood Center on December 11 – 12, 2011, as part of an ongoing investigation of the former W.R. Grace facility where tremolite asbestos has been detected. The former W.R. Grace vermiculite processing facility, also known as North Little Rock Auto Salvage, is located within a half-mile of the Redwood Early Childhood Center. Soil samples were collected at the Redwood Early Childhood Center to determine if Libby, Montana asbestos (specific to W.R. Grace vermiculite) had migrated to the school or had been placed on the school grounds as dirt fill [1].

The Redwood Early Childhood Center is an early childhood program within the North Little Rock School District (NLRSD). It houses an infant and toddler center (children six weeks through three years of age) and a pre-K program (children three to four years old). The Redwood Early Childhood Center accepts and serves families in the NLRSD that fall below the federal poverty level [2].

The school, which is situated on 8.55 acres, consists of three buildings that were constructed in the 1950's and 1960's, three outside playground areas, an asphalt playground area, and a large vacant field that contains a baseball field backstop (see Appendix A for site map). The

playground equipment is surrounded by cedar wood chips. A decorative metal fence is located on the west property boundary, and a chain link fence exists along the east property boundary. There are no fences along the north and south property boundaries. Children from a neighboring multi-family housing project located west of the property can access the school playground equipment after school hours and on the weekends [1].

The entire Redwood Early Childhood Center property was divided into 32 grids. The approximate size of the each grid area was 100 feet by 100 feet (100' x 100'). EPA soil sampling at the Redwood Early Childhood Center detected elevated levels of chrysotile asbestos in only one of the soil grids on the school property. This grid, number AR-020, is located outside one of the buildings where children attend classes daily. The grid is between Building 2 and Mulberry Street, west of the playgrounds (see Appendix B for sampling site sketch). Therefore, the area in this grid is accessible to children and the public. This grid was identified as containing chrysotile asbestos in soil at 6.88%. The source of this asbestos is not known. However, it is known that chrysotile asbestos is not related to vermiculite processed by W.R. Grace from their former mine in Libby, Montana [1].

Asbestos is a general name applied to a group of silicate minerals consisting of thin, separable fibers in a parallel arrangement. Asbestos minerals fall into two classes: serpentine and amphibole. Serpentine, or chrysotile, asbestos has relatively long and flexible crystalline fibers, and it is the predominant type of asbestos used commercially. (Chrysotile is the type of asbestos associated with this site.) Amphibole asbestos minerals are brittle and have a rod- or needle-like shape. (Amphibole is the type of asbestos related to the former W.R. Grace Facility.) Asbestos fibers do not have any detectable odor or taste. They do not dissolve in water or evaporate, and they are resistant to heat, fire, and chemical and biological degradation [3].

Upon learning of the elevated levels of chrysotile asbestos at the Redwood Early Childhood Center, EPA contacted the NLRSD. Personnel from the NLRSD asked for EPA assistance with the removal of this contaminated soil. EPA Region 6 On-Scene Coordinators immediately initiated an emergency response and mobilized to the North Little Rock site on February 17, 2012. Soil excavation at the Redwood Early Childhood Center began on Saturday, February 18,

2012. Removal of the contaminated grid and then backfilling with clean soil was completed by Monday, February 20, 2012. All soil was hauled directly to a nearby asbestos-approved landfill in the city. EPA's Superfund Technical Assessment & Response Team (START) contractor also conducted air monitoring at the site to assure that no dust or particulate matter escaped during the excavation work [1].

Discussion

Exposure to asbestos is determined by examining human exposure pathways. An exposure pathway has five parts:

1. A source of contamination (e.g., hazardous compound),
2. An environmental medium such as air, soil, or water that can hold or move the contamination,
3. A point at which people come in contact with a contaminated medium such as a school yard or playground,
4. An exposure route, such as inhalation of (or breathing) airborne asbestos fibers, and
5. A population who could come in contact with the contaminants.

An exposure pathway is eliminated if at least one of the five parts is missing and will not occur in the future. For a completed pathway, all five parts must exist and exposure to a contaminant must have occurred, is occurring, or will occur.

If disturbed, the chrysotile asbestos found on the Redwood Early Childhood Center property can become airborne and inhaled. There is a potential human exposure pathway present at this site since asbestos has been found, and there is a common route of exposure (inhalation) for infants, children, or adults if that asbestos becomes airborne. Although asbestos ingestion and dermal (skin) exposure pathways could exist, health risks from these pathways are minor in comparison to those resulting from inhalation exposure to asbestos. Therefore, this health consultation does not evaluate the ingestion or absorption (dermal contact) pathways.

Exposure to asbestos, depending on the duration (*i.e.,* how long), intensity or concentration (*i.e.*, how much), and frequency (*i.e.,* how often), may increase these residents' or visitors' risks of asbestos related diseases. There are other factors as well, including size and type (mineralogy)

of fibers to which a person is exposed, and personal risk factors such as smoking history, history of lung disease, and genetic susceptibility (family heredity). No known information exists to determine the extent to which people living nearby this site or utilizing the Redwood Early Childhood Center were exposed ***in the past*** to asbestos in ambient (outdoor) air.

Asbestos content in soil and bulk material samples is commonly determined using polarized light microscopy (PLM), a method that uses polarized light to compare refractive indices of minerals and can distinguish between asbestos and non-asbestos fibers and between different types of asbestos. The PLM method can detect fibers with lengths greater than ~1 micro meter (μm), widths greater than ~0.25 μm, and aspect ratios (length to width ratios) greater than 3. Detection limits for PLM methods are typically 0.25%–1% asbestos [4].

Transmission electron microscopy (TEM) is a more sensitive method that can detect smaller fibers than light-microscopic techniques, so more precise data can be collected on fiber length and diameter distribution. TEM can be used to determine mineral characteristics in bulk materials that may become airborne and is used to determine asbestos fibers in the optically visible range. This method is typically the most common for measuring asbestos in ambient air or inside buildings, since TEM can visualize fibers of all sizes [4].

Air samples were also analyzed by phase contrast microscopy (PCM). PCM air samples are usually collected and analyzed on-site using the National Institute of Occupational Safety and Health (NIOSH) 7400 method. PCM methods accurately assess fiber exposure levels, but PCM cannot differentiate between asbestos and non-asbestos fibers. Hence, TEM methods are also used in order to identify the fibers.

Surface Soil Samples

For the December 2011 soil sampling event, the Redwood Early Childhood Center site was divided into 32 grids and five-point composite soil samples were collected from each grid at 0 to 1 inch below ground surface (bgs) and 1 to 6 inches bgs. Thus, two surface soil samples were collected from each grid for a total of 64 samples. The samples were collected with dedicated stainless steel trowels, packaged and shipped to BATTA Laboratories, located in Newark,

Delaware, for asbestos identification and quantification utilizing PLM and TEM. PLM analysis, based on point counting, did not detect the presence of asbestos in any of the 64 soil samples collected from the site. However, TEM analysis identified chrysotile asbestos at 6.88% in grid AR-020 and trace chrysotile (< 0.02%) in an additional six grids. The grids that showed trace amounts of chrysotile asbestos were not included as part of the removal action since they fell below the 0.25% clean-up criteria [5].

The first response activity at the Redwood Early Childhood Center site was to excavate the asbestos-contaminated soil from grid AR-020. The next steps were to load and transport the contaminated soil for disposal at the Two Pines Landfill managed by Waste Management located in North Little Rock, Arkansas. Lastly, EPA and START contractors would conduct site restoration activities (e.g., backfill grid, compact soil in grid, and re-sod the excavated grid) during the President's Day holiday from February 18, 2012 to February 20, 2012 [5]. Twenty-three dump truck loads (approximately 480 tons) of contaminated soil from grid AR-020 were hauled to the Two Pines Landfill. During all excavation and truck loading activities, dust suppression with the use of water, was conducted by START personnel to reduce or eliminate airborne migration of dust and possible chrysotile asbestos. [5].

During removal activities, START personnel collected a backfill soil sample that was shipped to a laboratory for the following chemical analyses: *Target Compound List (TCL):* (1) Volatile Organic Compounds (VOCs), (2) Semivolatile Organic Compounds (SVOCs), (3) pesticides, (4) herbicides, and (5) polychlorinated biphenyls (PCBs); *Target Analyte List (TAL):* (6) total metals, (7) mercury, and (8) cyanides [1]. Laboratory results from the backfill soil sample (BF-01) are presented in the Table 1 in Appendix C [6]. EPA compared the detected concentrations to EPA regional screening levels (RSL).

ADH/ATSDR screened the detected concentration results using ATSDR Health Comparison Values (HCV) for soil, where available. HCVs are substance concentrations set well below levels that are known or anticipated to result in adverse health effects; therefore, concentrations at or below the relevant HCVs may reasonably be considered protective. All concentrations of the detected compounds were below the HCV levels.

Air Samples

During the excavation and truck loading activities at Redwood Early Childhood Center, two methods of air monitoring were used. START personnel conducted continuous air monitoring for particulates with personal DataRam (pDR)-1000AN particulate meters attached directly to their bodies. Individual exposures to air particulates while working were measured. For a three-day span (February 18 – 20, 2012), the real-time measurements were recorded on a daily air monitoring log sheet. During the individual continuous air sample collection process conducted on the days of February 18 - 20, 2012, there were no particulate concentration exceedances of 2.5 milligrams/liter (mg/L) [7].

The other air monitoring method was conducted utilizing an on-site field monitor. On February 18, 2012, two air samples and a field blank were collected for fiber analysis, per laboratory protocol using PCM (NIOSH 7400 methodology). On February 19, 2012, four air samples (two air samples near the grid AR-020 area and two air samples near the grid perimeter closest to Mulberry Street), a lot blank, and a field blank were collected for fiber analysis, per laboratory protocol. On February 20, 2012, three air samples and a field blank were collected for fiber analysis, per laboratory protocol. All air samples were collected during excavation and truck loading activities, which lasted approximately six to eight hours daily [8]. All air sampling data were entered into a database and the air sample cassettes were kept in a secure location until they were shipped to BATTA laboratories for fiber determination. All PCM analytical results reported a detection limit of 0.001, 0.0005, or 0.0004 fiber concentration in air (fibers/cc). Results were listed as either less than the respective detection limit (<0.001, <0.0005, or < 0.0004 fibers/cc) or non-detectable (see Appendix D for data table provided by EPA). Therefore, fiber analysis of the collected air samples did not indicate the presence of fibers in any of the air samples associated with the Redwood Early Childhood Center site [7].

Community Health Concerns

Although ADH/ATSDR is aware of community concerns related to activities surrounding the former W.R. Grace site, no official community concerns or complaints have been made regarding the Redwood Early Childhood Center site. EPA worked directly with the NLRSD

authorities to remediate the asbestos contamination in a timely manner, and the school is fully operational at present.

Child Health Considerations

In communities faced with soil contamination, the many physical differences between children and adults may require special emphasis. Children could be at greater risk than adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are adults; this means they breathe dust, soil, and vapors closer to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Additionally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Therefore, adults need as much information as possible to make informed decisions regarding their children's health.

During this evaluation of asbestos-contaminated soil samples from the Redwood Early Childhood Center, the HCVs for infants and children were examined due to the factors listed above. Infants, children and/or adults who visit, attend, or work at this child-care facility may have been exposed to asbestos-containing airborne particles while on the property before remediation took place. Because EPA has identified and removed any hazardous asbestos levels found in the soil at the Redwood Early Childhood Center, the current threat of potential health risks from on-site exposure to asbestos particles has been greatly reduced.

Conclusions

No known information exists to determine the extent to which people living nearby this site or utilizing the Redwood Early Childhood Center were exposed *in the past* to asbestos in ambient (outdoor) air. ADH/ATSDR conclude that *past* exposures to outdoor air inhalation at this site are unknown.

EPA and START contractors have removed and disposed of all hazardous asbestos-containing soil identified at the Redwood Early Childhood Center site. The contractors took samples of the backfill soil during excavation activities and took continuous air samples daily while site excavation occurred. No soil concentrations of detected compounds were found to be above health screening levels. Air sample results were listed as either less than the respective detection limit (<0.001, <0.0005, or < 0.0004 fibers/cc) or non-detectable. Therefore, ADH/ATSDR conclude that for ***present*** and ***future*** exposures, inhalation of air particles at the Redwood Early Childhood Center site is not expected to harm people's health because soil with elevated asbestos levels has been removed.

Recommendations

Since all debris and asbestos-contaminated soil has been removed from the Redwood Early Childhood Center site, and the site has been backfilled with clean soil and seeded with grass, there are no further recommendations at this time.

Public Health Action Plan

The purpose of the Public Health Action Plan (PHAP) is to ensure that this health consultation not only identifies any 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. The PHAP implemented by ADH/ATSDR with regards to the Redwood Early Childhood Center is as follows:

Completed Actions

- ADH responded to a request from EPA Region 6 to assist in public health exposure evaluation at the site.
- ADH conducted an area site visit (November 16, 2011) along with EPA On-Scene Coordinator and the EPA Contractor (see Appendix E for site photos).
- ADH attended a public meeting held by EPA (December 8, 2011) and answered citizen questions regarding potential adverse health effects from exposure to asbestos-contaminated soils.
- ADH/ATSDR assessed soil and air data via this health consultation.

Future Activities

- ADH/ATSDR will continue to provide public health evaluation of future environmental data and assistance to federal and state agencies with regards to this site, as needed or requested.
- ADH/ATSDR will continue to provide education to the public and address community member's requests with regards to this site, as needed or requested.

REPORT PREPARATION

This Health Consultation for the Redwood Early Childhood Center was prepared by the Arkansas Department of Health (ADH) under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication. Editorial review was completed by the cooperative agreement partner. ATSDR has reviewed this document and concurs with its findings based on the information presented.

Authors

Health Assessor

Ashley Whitlow, M.S.
Arkansas Department of Health
4815 West Markham, Mail Slot 32
Little Rock, AR 72205

State Designated Reviewer

Lori Simmons, M.S.
Arkansas Department of Health
4815 West Markham, Mail Slot 32
Little Rock, AR 72205

Independent Reviewers

Shirley Louie, M.S., CIH
Applied Epidemiology Branch Chief & Deputy State Epidemiologist, ADH

Barbara Anderson, PE, MSEnvE
Environmental Health Scientist, ATSDR

Jill J. Dyken, PhD, PE
Environmental Health Scientist, ATSDR

ATSDR Technical Project Officer

Jeff Kellam, M.S.
Technical Project Officer
Division of Community Health Investigations

References

1. U.S. Environmental Protection Agency, POLLUTION/SITUATION REPORT "Redwood Early Childhood Center - Asbestos Removal - Removal Polrep Final Removal Polrep". February 2012.

2. North Little Rock School District Early Childhood Program website: http://pre-k.nlrsd.org/modules/groups/integrated_home.phtml?gid=1928321&sessionid=bf8ec1b57704c52984efb0cda2c1c4d6. Accessed May 2012.

3. Midwest Research Institute, "Collection, analysis, and characterization of vermiculite samples for fiber content and asbestos contamination;" Prepared for the U.S. Environmental Protection Agency Office of Pesticides and Toxic Substances, Kansas City. September 1982.

4. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for Asbestos. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. September 2001.

5. U.S. Environmental Protection Agency, "Emergency Response Report for Redwood Early Childhood Center Asbestos Removal North Little Rock, Pulaski County, Arkansas"; Dynamac Corporation. May 2012.

6. Test America, "ANALYTICAL REPORT; Job Number: 700-65350-1; Job Description: North Little Rock Auto Salvage; For: Dynamac Corporation"; February 2012.

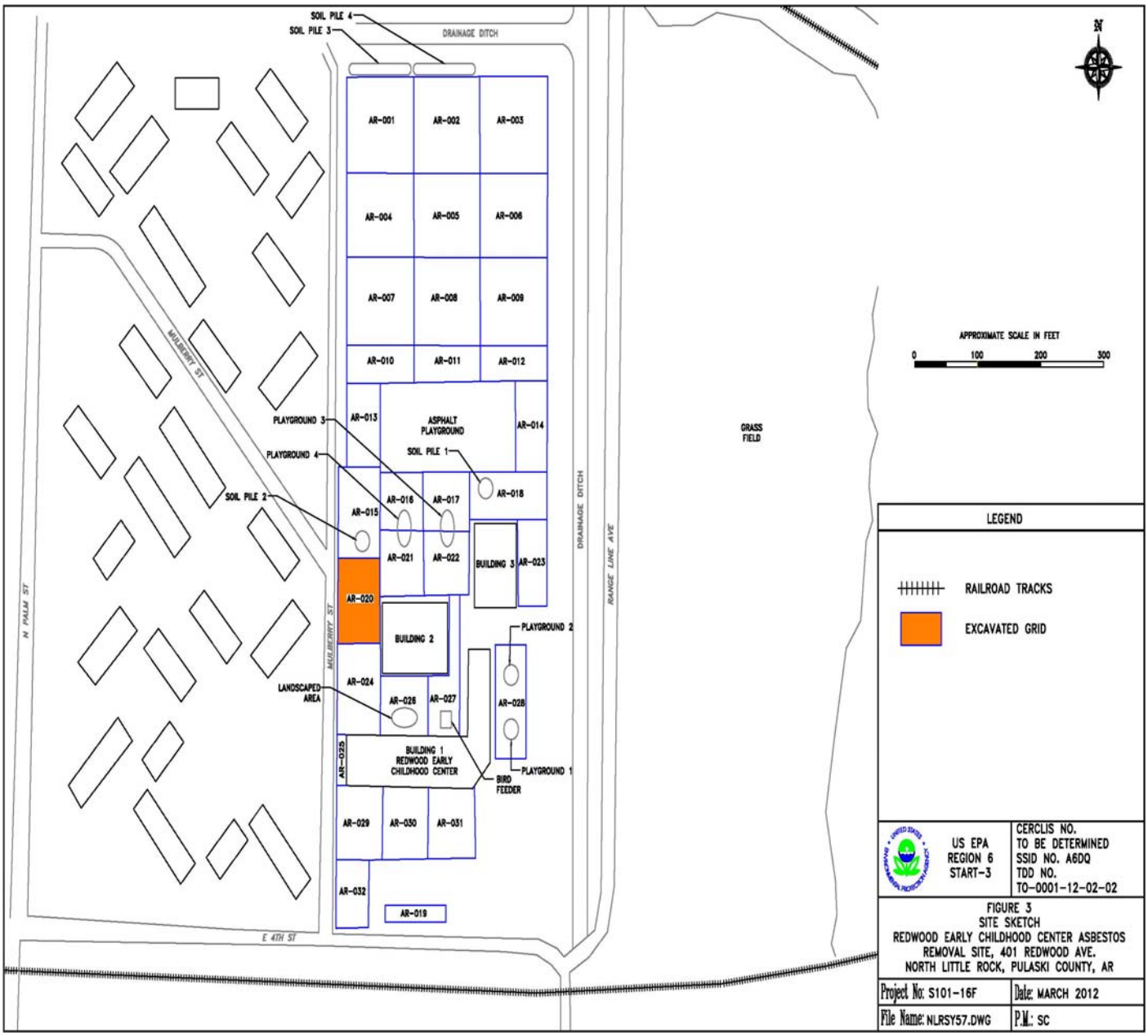
7. U.S. Environmental Protection Agency, "START-3 Perimeter Air Sampling Log"; Dynamac Corporation. February 2012.

8. U.S. Environmental Protection Agency, "Appendix F: Daily Air Monitoring/Sampling Log"; Dynamac Corporation. February 2012.

Appendix A: Site Map

Map provided by EPA Region 6.

Appendix B: Sampling Site Sketch



Sampling site sketch provided by EPA Region 6.

Appendix C: Soil Data Table

TABLE 1: Backfill Soil Results for Total Compound List (TCL) and Target Analyte List (TAL) Constituents

Sample ID	TCL or TAL Constituents	MSSL (mg/kg)		Detected Concentration (mg/kg)	Reporting Limit (mg/kg)
		Residential	Industrial		
BF-01	**TCL Constituents**				
	Carbon tetrachloride	0.61	3.0	0.0025 J	0.0062
	Bis (2-ethylhexyl) pthalate	35	120	0.350 JB	0.41
	4, 4'-DDE	1.4	5.1	0.0035 J	0.0041
	TAL Constituents				
	Aluminum	77,000	990,000	14,000	120
	Antimony	31	410	0.74 J	2.3
	Arsenic	0.39	1.6	**7.2**	**1.7**
	Barium	15,000	195,000	120	5.8
	Beryllium	160	200	0.6	0.46
	Cadmium	70	800	0.13 J	0.58
	Calcium	NA	NA	2300	58
	Chromium (total)	NA	NA	15	1.2
	Cobalt	23	300	8.2	1.2
	Copper	3,100	41,000	8.8	2.3
	Iron	55,000	720,000	14,000 B	29
	Lead	NA	NA	10	4.3
	Magnesium	NA	NA	3,600 B	58
	Manganese	NA	NA	500	1.2
	Molybdenum	390	5,100	0.17 J	1.2
	Nicke1	1,500	20,000	14	4.6
	Potassium	NA	NA	2,200	120
	Selenium	390	5,100	0.44 J	1.7
	Sodium	NA	NA	180	120
	Strontium	47,000	610,000	14	1.2
	Titanium	NA	NA	130	1.2
	Vanadium	390	5,200	24	1.2

	Zinc	23,000	310,000	35	2.3
	Cyanide (total)	1,600	200,000	0.20 J	1.2

KEY:

TCL = Target Compound List

TAL = Target Analyte List

mg/kg = milligrams per kilogram

MSSLs = Medium-Specific Screening Levels

NA = No

Laboratory Data Qualifiers
B = Compound was found in the blank and sample.

J = Result is less than the Reporting Limit but greater than or equal to the Maximum Detection Limit and the concentration is an approximate value.

Data table provided by US Environmental Protection Agency Region 6.

Appendix D: Air Sample Results

Dedicated to a Cleaner Environment
Since 1982

batta LABORATORIES

BATTA LABORATORIES, INC.

A Certified MBE Company

Delaware Industrial Park, 6 Garfield Way
Newark, DE19713-5817
Tel. (302)737-3376 Fax (302) 737-5764

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

E.P.A. LAB ID # DE 004

A.I.H.A./NLLP #100448

NVLAP #101032

CERTIFICATE OF PCM ANALYSIS

Test Method: NIOSH 7400, Issue 2: 15 August 1994 Report Date: 2/23/2012

Sample Batch #:
BLI Project #: L6859B
Project Name: DYNAMAC-WALK IN-REDWOOD SCHOOL

Date Sampled: 2/20/2012
Sampled By: CLIENT
Date Analyzed: 2/23/2012

Sample ID		Client-supplied Data			Analytical Result				
Lab Sample#	Client Sample#	Sample Location	Sample Type	Sample Volume	# Fields	# Fibers	Detection Limit (f/cc)	Fiber/mm^2	Fiber/cc
731815	RCW3-022012	AREA R, REDWOOD SCHOOL	N/A	5332	100	<5.5	0.001	<7.0	<0.001
731816	RCW4-021912	AREA R, REDWOOD SCHOOL	N/A	6395.8	N/A	N/A	N/A	SAMPLE VOIDED OVERLOADED	
731817	RDN1-021812	AREA R, REDWOOD SCHOOL	N/A	5050	100	<5.5	0.001	<7.0	<0.001
731818	RDN1-022012	AREA R, REDWOOD SCHOOL	N/A	5815.3	100	<5.5	0.0005	<7.0	<0.0005
731819	RDN2-021812	AREA R, REDWOOD SCHOOL	N/A	4350.2	100	<5.5	0.001	<7.0	<0.001
731820	RDN2-021912	AREA R, REDWOOD SCHOOL	N/A	6386.6	100	<5.5	0.0004	<7.0	<0.0004

ANALYST: D. Beard **REVIEWED BY:** _____

*Sample results are not blank-corrected.

*The test data pertain only to the items tested. No assumptions or conclusions should be made to materials or samples not analyzed. Furthermore, Batta Laboratories, Inc. (BLI) assumes no responsibility for the accuracy of results influenced by the use of improper collection techniques or equipment.

*This report may involve more than one analyst. Refer to Chain of Custody for additional analysts.

* Electronic versions of the certificate of analysis (i.e. Excel files, PDF files, Word files, etc.) are not under the warranty of authenticity and accuracy of the original analytical results kept on file within Batta Laboratories. Under all circumstances BLI should be notified in writing for any changes made to these electronic certificates of analysis. Under no circumstances will BLI be held liable for changes made to the electronic certificate of analysis without BLI's prior consent in writing.

* Current YTD intralaboratory Sr value is 0.22. This value may change slightly over time.

Dedicated to a Cleaner Environment
Since 1982

CELEBRATING 25 Years

batta LABORATORIES

BATTA LABORATORIES, INC.

A Certified MBE Company

Delaware Industrial Park, 6 Garfield Way
Newark, DE19713-5817
Tel. (302)737-3376 Fax (302) 737-5764

Web: http://www.battaenv.com E-mail: battaenv@battaenv.com

E.P.A. LAB ID # DE 004

ACCREDITED LABORATORY AIHA Environmental Lead & Industrial Hygiene — A.I.H.A./NLLP #100448

NVLAP #101032

CERTIFICATE OF PCM ANALYSIS

Test Method: NIOSH 7400, Issue 2: 15 August 1994 Report Date: 2/23/2012

Sample Batch #:
BLI Project #: L6859B
Project Name: DYNAMAC-WALK IN-REDWOOD SCHOOL

Date Sampled: 2/20/2012
Sampled By: CLIENT
Date Analyzed: 2/23/2012

Sample ID		Client-supplied Data			Analytical Result				
Lab Sample#	Client Sample#	Sample Location	Sample Type	Sample Volume	# Fields	# Fibers	Detection Limit (f/cc)	Fiber/mm^2	Fiber/cc
731821	RDN2-022012	AREA R, REDWOOD SCHOOL	N/A	5763	100	<5.5	0.0005	<7.0	<0.0005
731822	RDN3-021912	AREA R, REDWOOD SCHOOL	N/A	6435.3	100	<5.5	0.0004	<7.0	<0.0004
731823	RFB1-021812	AREA R, REDWOOD SCHOOL	N/A	0	100	<5.5	N/A	<7.0	N/A
731824	RFB2-021612	AREA R, REDWOOD SCHOOL	N/A	0	100	<5.5	N/A	<7.0	N/A
731825	RFB3-022012	AREA R, REDWOOD SCHOOL	N/A	0	100	<5.5	N/A	<7.0	N/A
731826	RLB--21920	AREA R, REDWOOD SCHOOL	N/A	0	100	<5.5	N/A	<7.0	N/A

ANALYST: D. Beard **REVIEWED BY:** _____

*Sample results are not blank-corrected.

*The test data pertain only to the items tested. No assumptions or conclusions should be made to materials or samples not analyzed. Furthermore, Batta Laboratories, Inc. (BLI) assumes no responsibility for the accuracy of results influenced by the use of improper collection techniques or equipment.

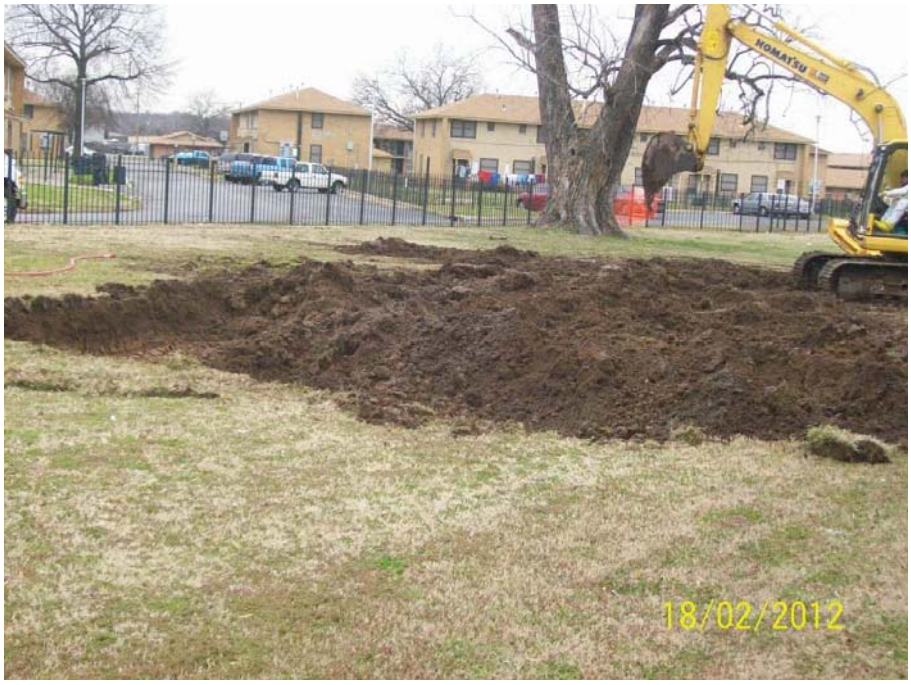
*This report may involve more than one analyst. Refer to Chain of Custody for additional analysts.

* Electronic versions of the certificate of analysis (i.e. Excel files, PDF files, Word files, etc.) are not under the warranty of authenticity and accuracy of the original analytical results kept on file within Batta Laboratories. Under all circumstances BLI should be notified in writing for any changes made to these electronic certificates of analysis. Under no circumstances will BLI be held liable for changes made to the electronic certificate of analysis without BLI's prior consent in writing.

* Current YTD intralaboratory Sr value is 0.22. This value may change slightly over time.

Appendix E: Site Pictures

All pictures provided by US Environmental Protection Agency Region 6.

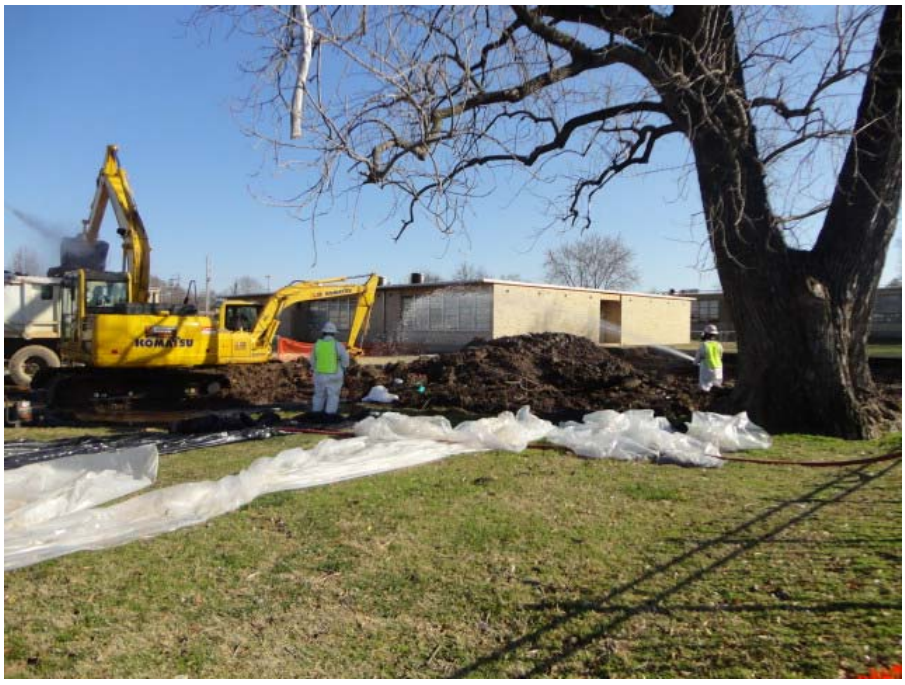


View of excavation activities at Redwood Early Childhood Center within Grid AR-020.

View of Air Sampling Station RDN2 at Redwood Early Childhood Center.

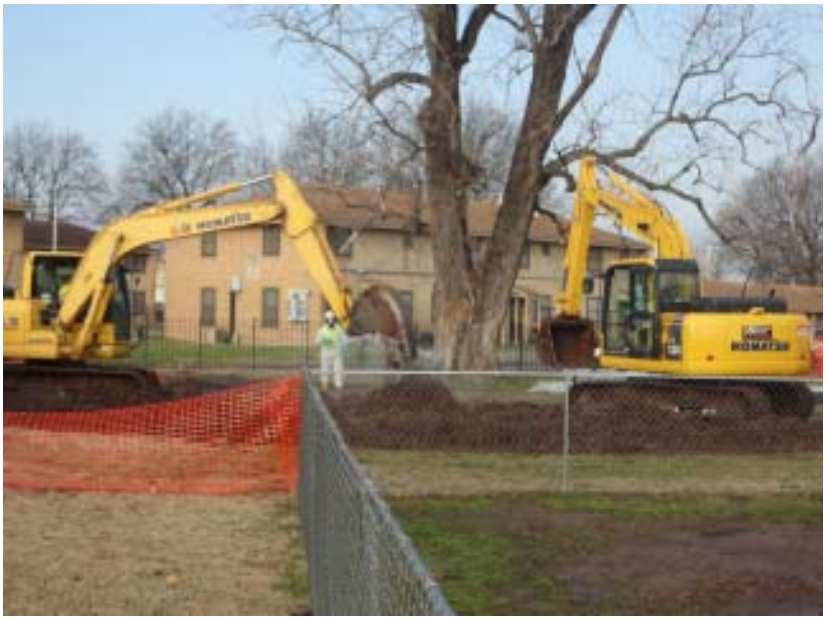
All pictures provided by US Environmental Protection Agency Region 6.

View of soil excavation and dust suppression activities at Redwood Early Childhood Center.

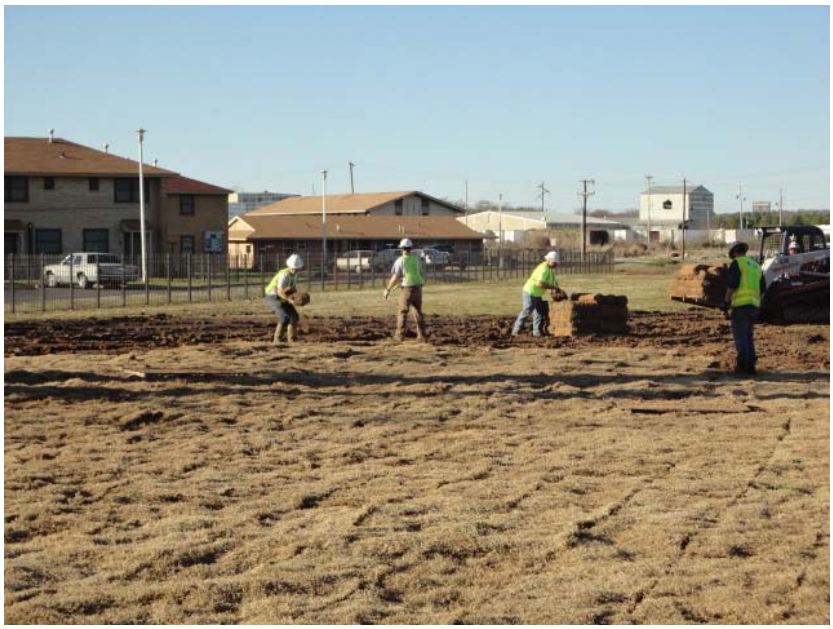


View of soil excavation and dust suppression activities at Redwood Early Childhood Center.

All pictures provided by US Environmental Protection Agency Region 6.



View of two excavators used to excavate soil and load disposal trucks at Redwood Early Childhood Center.



EPA and START contractors placing sod over the former temporary pathway location after excavation was completed at Redwood Early Childhood Center.

All pictures provided by US Environmental Protection Agency Region 6.

View of western side of Redwood Early Childhood Center after being hydro-seeded.

View of blacktop at Redwood Early Childhood Center after full restoration.