

Letter Health Consultation

NORTHERN LAND & LUMBER/AMERICAN TIMBER HOMES

GLADSTONE, DELTA COUNTY, MICHIGAN

**Prepared by the
Michigan Department of Community Health**

AUGUST 30, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
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.

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LETTER HEALTH CONSULTATION

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STATE OF MICHIGAN

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August 17, 2010

Ralph Dollhopf, OSC
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Emergency Response Branch
801 Garfield Avenue, #229
Traverse City, MI 49686

Mr. Dollhopf:

At the request of the United States Environmental Protection Agency (EPA) and Hannahville Indian Community, I have reviewed the Summary Report for the Northern Land & Lumber/American Timber Homes Site Assessment¹. My comments and recommendations are below.

Background

Northern Land & Lumber/American Timber Homes (the site) is located at 7000 P Road in Gladstone (Delta County), Michigan along the shore of the Little Bay De Noc of Lake Michigan. Parcels of the site are located on both sides of P Road and total approximately 35 acres. In the early 1900s, Michigan Tanning & Extract Company carried out vegetable tanning activities in several buildings and outdoor locations on the site. Over the years, the site was occupied by Universal Cinder Products Company, Delta County Road Commission, Wells Crate and Lumber Company, Early American Fence Company, and possibly the Birdseye Veneer Company. Most recently (1956-1981) the site was the home of Northern Land & Lumber, a wood preserving facility. Wood preservatives used at the site may have included pentachlorophenol (PCP), creosote derivatives, and inorganic arsenical or chromate salts. Multiple transformers, possibly containing polychlorinated biphenyls (PCBs), and aboveground storage tanks were present at the site. The aboveground storage tanks were reported to contain hydraulic oil, fuel oil, and liquefied petroleum gas.

Discussion

An initial screening was carried out in July 2009. Soil samples (zero to three inches below ground surface) were screened with an x-ray fluorescence (XRF) analyzer² with several soil samples sent for laboratory analysis. Several months later (September 2009), additional surficial soil samples (zero to three inches below ground surface) were screened with an XRF analyzer, with a subset sent for laboratory analysis.

¹ Weston Solutions, Inc. (Weston). Summary Report for the Northern Land & Lumber/American Timber Homes Site Assessment Revision 1 Gladstone, Delta County, Michigan. Prepared for the Region V Emergency Response Branch, United States Environmental Protection Agency. Contract No.: EP-S5-06-04. Document Control No.: 634-2A-AEQE. June 21, 2010.

² XRF analyzers are able to measure levels of metals in the field. Results from XRF analysis may differ from laboratory analysis due to different sample preparation, quality assurance/quality control sampling, and instrument calibration and usage conditions. Field conditions are difficult, if not impossible, to control.

Contaminants of concern, arsenic and lead, were identified at the site. Arsenic levels in soil on the site were near the Michigan Department of Natural Resources and Environment's Part 201 Residential Direct Contact Criteria (DCC) of 7.6 ppm with a 95% upper confidence limit (UCL) of 6.5 parts per million (ppm) for laboratory-analyzed samples and 15.2 ppm for XRF-analyzed samples³. The XRF arsenic results appear to be an overestimation of actual arsenic levels when compared to laboratory analyzed arsenic levels. Most arsenic levels in the soil were less than the DCC, however two (samples A77 and A79, located west of the former leach house) were approximately ten times higher (79 and 80 ppm) than the DCC. Arsenic levels at these locations were attributed to proximity to foundations made of treated lumber. Table 1 presents the levels, from XRF and laboratory analysis, of arsenic in the soil samples.

Table 1: Arsenic levels in soil (in parts per million [ppm]) from Northern Land & Lumber/American Timber Homes in Gladstone, Delta County, Michigan⁴.

Sampling date	Range of Arsenic levels (ppm)	Number of exceedences	Total number of samples
July 2009 – XRF ^a	<LOD ^b – 27	1	26
September 2009 – XRF	<LOD – 96	35	211
September 2009 – Laboratory ^c	0.44 – 80	9	37

a = X-ray fluorescence (XRF) analyzed samples.

b = <LOD is below the method detection limit for the XRF analyzer.

c = Laboratory analyzed samples.

People ingest small amounts of arsenic in food and water⁵. Foods that contain arsenic, mainly in the form of organic arsenic, are dairy products, meat, poultry, fish, grains, and cereal. Although there currently is no known function for arsenic in humans, animal studies have shown that arsenic is necessary in the diet⁶. Exposure to elevated levels of arsenic may cause health effects in people. Dermal exposure to arsenic can result in direct irritation of skin. Both children and adults can experience vomiting, respiratory, cardiovascular, dermal, and neurological effects from arsenic exposure⁵. Long term oral exposure to arsenic is also known to increase the risk of skin cancer and cancer in the lungs, bladder, liver, kidney and prostate⁵.

Nearly all of the lead levels in both the XRF- and laboratory-analyzed samples were below the DCC for lead (400 ppm). Four of the XRF-analyzed samples were over the DCC for lead, including the sample of the white powder in a 55-gallon drum. Two laboratory-analyzed samples were over the DCC, one from a sample of the white powder (7,900 ppm lead) and one from

³ Two arsenic values, 80 ppm and 79 ppm for laboratory-analyzed samples and 96 ppm and 65 ppm for XRF-analyzed samples, were determined to be an outliers using the EPA's ProUCL version 4.00.04 program. It was not included in the data set for calculation of a 95% UCL. However, the 80 and 79 ppm values represent the soil arsenic levels near foundations made of treated lumber.

⁴ Weston Solutions, Inc. Summary Report for the Northern Land & Lumber/American Timber Homes Site Assessment Revision 1 Gladstone, Delta County, Michigan. Prepared for the Region V Emergency Response Branch, United States Environmental Protection Agency. 2010 June 21. Contract No.: EP-S5-06-04. Document Control No.: 634-2A-AEQE.

⁵ Agency for Toxic Substances and Disease Registry. 2007. Toxicological profile for Arsenic. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

⁶ Institute of Medicine. 2001. Dietary Reference Intakes: Elements. Washington, DC: The National Academies Press. <http://www.iom.edu/Global/News%20Announcements/~media/48FAAA2FD9E74D95BBDA2236E7387B49.ashx>.

nearby soil (620 ppm lead). Ninety-five percent UCLs for lead levels in XRF- (61.2 ppm) and laboratory-analyzed (181.4 ppm) samples were lower than the DCC⁷. Table 2 presents the levels of lead, from XRF and laboratory analysis, in soil samples from the site.

Table 2: Lead levels in soil (in parts per million [ppm]) from Northern Land & Lumber/American Timber Homes in Gladstone, Delta County, Michigan⁸.

Sampling date	Range of Lead levels (ppm)	Number of exceedences	Total number of samples
July 2009 – XRF ^a	<LOD ^b – 185	0	30
September 2009 – XRF	6 – 519	3	211
September 2009 – Laboratory ^c	1.4 – 620	1	37

a = X-ray fluorescence (XRF) analyzed samples.

b = <LOD is below the method detection limit for the XRF analyzer.

c = Laboratory analyzed samples.

Although sources of lead have been reduced, as from leaded gasoline or paint, people still encounter lead in their daily lives. Children are more vulnerable to lead poisoning as compared to adults. In both adults and children, the main target is the nervous system, but lead will affect every organ system. Large amounts of lead can cause anemia, kidney damage, colic, muscle weakness, and brain damage. Small amounts of lead can also cause effects on blood, development, and behavior. Even at low blood lead levels, adverse effects in children may include delays or impairments in development. Adults older than 60 years and postmenopausal women are vulnerable to specific effects of lead, which include cognitive deficiency, hypertension, and depressed glomerular filtration rate (kidney function). There is a significant association of an increase in systolic blood pressure with an increase of blood lead levels⁹.

Other inorganic contaminants tested were below the applicable DCC. Organic contaminants, including benzo(a)pyrene, were measured in soil samples. Almost all of the levels of organic contaminants were below applicable DCC. One sample had an estimated level slightly above (2,100 parts per billion [ppb]) the DCC of 2,000 ppb for benzo(a)pyrene. This level of benzo(a)pyrene at one sampling location is not likely to harm people's health.

Transformers, potentially containing oil with polychlorinated biphenyls were previously reported at the site. No transformers were identified on the site at the time of the initial site visit (May 21, 2009) and all soil samples were below DCC for total PCBs and many samples were below the detection limit, based on Aroclor standards.

A survey for gamma radiation was also carried out on the site. Background levels of radiation were 4,000-5,000 counts per minute (cpm). Elevated levels were located in areas with slag.

⁷ One lead value, 7,900 ppm for laboratory-analyzed samples and 7,313 ppm for XRF-analyzed samples, was not included in the data set for calculation of a 95% UCL as it was not a soil sample. It was white powder from a 55-gallon drum. (That sample was also determined to be an outlier using the EPA's ProUCL version 4.00.04 program.)

⁸ Weston Solutions, Inc. Summary Report for the Northern Land & Lumber/American Timber Homes Site Assessment Revision 1 Gladstone, Delta County, Michigan. Prepared for the Region V Emergency Response Branch, United States Environmental Protection Agency. Contract No.: EP-S5-06-04. Document Control No.: 634-2A-AEQE. June 21, 2010.

⁹ Agency for Toxic Substances and Disease Registry. 2007. Toxicological profile for Lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

These levels are approximately three to four times higher (up to 16,000 cpm) than background levels on the site. Counts per minute cannot be used to determine exposure. However, radiation levels three to four times higher than background levels are not expected to be high enough to result in exposures that could harm people's health¹⁰.

Contaminants that may be present, but were not assessed were pentachlorophenol (PCP) and asbestos. PCP was reported to be used as a wood preservative at the site. No testing has been done for PCP or possible derivatives. This chemical was commonly contaminated with dioxin like chemicals (DLCs), which are very persistent and toxic contaminants. Asbestos could also be present in or around building at the site. Buildings or ruins at the site were repurposed, build, or rebuilt (historical information indicated that there may have been fire-damage) from the early 1900s to the late 1950s and asbestos was commonly used in the past.

Physical hazards may exist on the site. The site has stretches of fencing; however, these do not restrict access. Furthermore, although main buildings were locked, other buildings are missing exterior walls and buildings ruins/old foundations are present on the site. Graffiti is present in some buildings and scrap metal has been stolen from the site¹¹. Wood and scrap metal debris was identified along the shore of Little Bay De Noc. Empty 55-gallon drums and a three-gallon paint container were also identified along the shore. Children may find drums or material inside them an attractive nuisance.

Conclusions

MDCH concludes that long-term exposure to lead levels found in the material from the 55-gallon drum and in nearby soil could harm people's health¹². The lead level in the drum contents is approximately 18 times higher than the lead DCC. Although one soil sample in the vicinity is only slightly higher than the DCC for lead, localized areas of soil around the drums may have spilled material from the drums and have levels of lead that are higher than most of the soil lead levels at the site. Children are especially sensitive to the effects of lead exposure and drums may be an attractive nuisance at the site.

MDCH concludes that long-term exposure to arsenic levels found in soil west of the leach plant building (near treated wood) has the potential to harm people's health¹². Levels of arsenic in the area of the treated wood were approximately 10 times higher than the arsenic DCC. If children or adults came into contact with these areas regularly for many years, these levels of arsenic could harm people's health. The treated wood in that location may be a source for arsenic in the soil.

MDCH cannot currently conclude whether the gamma radiation detected at the site could harm people's health. Levels of gamma radiation in locations with slag were higher than the background radiation for the site. However, radiation levels were measured in counts per minute, which does not allow for an estimation of exposure.

MDCH concludes that levels of other inorganic or organic contaminants that were measured in the soil at the site will not harm people's health. Other inorganic and organic contaminants, including benzo(a)pyrene and PCBs, were measured in soil samples. The levels were at or below the applicable DCC.

¹⁰ Paul A. Charp, Ph.D., Senior Health Physicist, Agency for Toxic Substances and Disease Registry, personal communication, 2010

¹¹ L. Scott Wieting, Environmental Programs Coordinator, Hannahville Indian Community, personal communication, 2010,

¹² Exposure doses are calculated in Appendix A.

Recommendations

- MDCH recommends that the 55-gallon drums and nearby lead-contaminated soil be removed from the site.
- MDCH recommends that localized soil with elevated arsenic and source material (possibly arsenic treated wood) be removed from the site.
- MDCH recommends that gamma radiation be further characterized.
- MDCH recommends that the site be assessed for asbestos and PCP. If PCP was used at the site and/or is determined to be a site contaminant, MDCH further recommends that the site be assessed for DLCs.

Public Health Action Plan

- The EPA will remove the 55-gallon drums and localized soil containing elevated lead and arsenic, further characterize the gamma radiation present at the site, assess the presence of asbestos and PCP, and determine the need to assess for DLCs.
- MDCH will evaluate additional data from the site.

Sincerely,

Jennifer Gray, Ph.D.
Toxicologist

CC: Linda Dykema, Ph.D., Manager, Toxicology and Response Section, Michigan Department of
Community Health
L. Scott Wieting, Environmental Programs Coordinator, Hannahville Indian Community

Appendix A: Exposure Dose Calculations

The property currently called Northern Land and Lumber may be used as a residential area in the future. These exposure dose calculations assume that no soil is removed offsite and that drum material has leaked to the soil. Calculation for the mean and 95% upper confidence limit of the mean (UCL) values of arsenic and lead include all samples from the site. The 95% UCL was included in the calculations to provide a conservative estimate and to account for the possibility that soil was unevenly distributed throughout the site.

Exposure doses were calculated for arsenic and lead at this location. Children are assumed to have contact with the soil 350 days out of the 365 day year. As the children in this scenario will be living at this location, they are assumed to have 100% of their daily soil intake from this location. Equation A-1 is for calculation of the exposure dose. Variable for Equation A-1 are in Tables A-1, A-2, and A-3.

Equation A-1: Calculation of exposure dose.

$$Dose = \frac{Concentration \times IntakeRate \times ExposureFrequency \times BioavailabilityFactor \times ConversionFactor}{BodyWeight}$$

Table A-1: Variable for calculation of exposure dose

Variable	Value
Concentration (in milligram/kilogram [mg/kg])	see Tables A-2 and A-3
Intake Rate (in milligram/day [mg/day])	200 mg/day ^a
Exposure Frequency (in days)	350 ^a days out of 365 days (350/365 = 0.96)
Conversion Factor (in kg/mg)	10 ⁻⁶ kg/mg
Bioavailability Factor (unitless)	0.5 ^b (for arsenic and lead)
Body Weight (in kg)	15 kg ^a

a = Values are from MDNRE (2005)¹³

b = Values are from MDNRE (2006)¹⁴

Arsenic concentrations and the calculated exposure doses are in Table A-2.

¹³ Michigan Department of Natural Resources and Environment (MDNRE). Remediation and Redevelopment Division Operational Memorandum No. 1, Technical Support Document - Attachment 6. Part 201 Soil Direct Contact Criteria, Part 213 Tier I Soil Direct Contact Risk-Based Screening Levels. 2005 April. http://www.michigan.gov/documents/deq/deq-rrd-OpMemo_1-Attachment6_285488_7.pdf.

¹⁴ Michigan Department of Natural Resources and Environment (MDNRE). Remediation and Redevelopment Division Operational Memorandum No. 1, Technical Support Document - Attachment 1. Table 4. Toxicological and Chemical-Physical Data for Part 201 Generic Cleanup Criteria and Screening Levels; Part 213 Tier 1 Risk-Based Screening Levels (RBSLs). 2006 January. http://www.michigan.gov/documents/deq/deq-rrd-OpMemo_1-Attachment1Table4ChemicalPhysical_283555_7.pdf.

Table A-2: Arsenic concentrations and calculated arsenic exposure doses (in milligrams/kilogram/day [mg/kg/day])

Arsenic levels	Calculated arsenic exposure dose
Mean of laboratory analyzed samples = 9.0 mg/kg	0.0006 mg/kg/day
Mean of XRF analyzed samples = 15.7 mg/kg	0.0010 mg/kg/day
95% UCL ^a of laboratory analyzed samples = 12.7 mg/kg	0.0008 mg/kg/day
95% UCL of XRF analyzed samples = 27.8 mg/kg	0.0018 mg/kg/day
a = 95% upper confidence limits of the mean (UCL) were calculated to present conservative exposure estimates and in case soil was unevenly distributed across the site	

The calculated arsenic exposure doses ranged from 0.0006 to 0.0018 mg/kg/day. All calculated exposure doses are two to six times higher than the ATSDR chronic MRL of 0.0003 mg/kg/day.

Lead concentrations and the calculated exposure doses are in Table A-3.

Table A-3: Lead concentrations and calculated lead exposure doses (in milligrams/kilogram/day [mg/kg/day])

Lead levels	Calculated lead exposure dose
Mean of laboratory analyzed samples = 291 mg/kg	0.0186 mg/kg/day
Mean of XRF analyzed samples = 78.8 mg/kg	0.0050 mg/kg/day
95% UCL ^a of laboratory analyzed samples = 1192 mg/kg	0.0763 mg/kg/day
95% UCL of XRF analyzed samples = 252 mg/kg	0.0161 mg/kg/day
a = 95% upper confidence limits of the mean (UCL) were calculated to present conservative exposure estimates and in case soil was unevenly distributed across the site	

The calculated lead exposure dose ranges from 0.0050 to 0.0762 mg/kg/day. These values would result in children with a lead intake five to 76 times higher than the average dietary intake (0.001 mg/kg/day¹⁵).

¹⁵ Agency for Toxic Substances and Disease Registry. 2007. Toxicological profile for Lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Certification

The Michigan Department of Community Health prepared this Letter Health Consultation, Northern Land and Lumber/American Timber Homes, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). At the time this Health Consultation was written, it was in accordance with the approved methodologies and procedures. Editorial review was completed by the Cooperative Agreement partner.



Technical Project Officer, Cooperative Agreement Team, CAPEB, DHAC, ATSDR

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



Team Leader, Cooperative Agreement Team, CAPEB, DHAC, ATSDR