ECOLOGYCENTER
Healthy People, Healthy Planet

June 13, 2019

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Report on lead in poured in place (PIP) rubber playground at
***Takoma Education Campus*, 7010 Piney Branch Rd. NW;**
***Truesdell Education Campus*, 800 Ingraham St NW; and**
***Janney Elementary School*, 4130 Albemarle St. NW**
Washington DC

The Ecology Center, a Michigan-based non-profit environmental organization, was contacted by the Safe Healthy Playing Fields regarding concerns about metals and other chemicals of concern that may be in rubber shred-based PIP playgrounds and athletic fields. The Ecology Center has been conducting ongoing analysis of samples provided by Safe Healthy Playing Fields.

On May 2, 2019 the Ecology Center provided a report to Deputy Mayor of Education Paul Kihn and Chancellor Lewis Ferebee regarding elevated lead levels at ***Janney Elementary School*, 4130 Albemarle St. NW, Washington, DC.** The report showed 24% of the portion of the bulk sample analyzed contained shred with high levels (greater than 1,951 ppm) of lead. ICP-MS analysis of these samples confirmed that some shred contained up to 7,000 ppm lead.

Subsequently, several additional samples were sent to the Ecology Center. Public Employees for Environmental Responsibility (PEER) observed the collection of these samples at the Takoma and Truesdell Campuses, immediately took custody of each sample after testing, and retained full custody of materials until the PEER representative sent the samples by FedEx to the Ecology Center. PEER has certified an unbroken chain of custody of materials. The second Janney sampling was done by a Safe Healthy Playing Fields representative. These samples included a 177.4 gram sample of coarse rubber shred from a playground at **Takoma Education Campus,** 7010 Piney Branch Rd. NW**;** a 91.5 gram sample of fine rubber shred from **Truesdell Education Campus**, 800 Ingraham St NW; and a 82.3 gram sample from **Janney Elementary,** 4130 Albemarle St. NW. The Janney sample is second from that playground we have analyzed. Most of the shred particles from Takoma and Janney ranged in size between approximately 0.25 – 1.5 centimeters, and the shred from Truesdell was smaller, ranging from 0.1 – 0.5 centimeters.

The rubber shred was analyzed by the Ecology Center using High Definition X-ray Fluorescence (HD XRF) manufactured by XOS (https://www.xos.com/HDXRF). The instrument used monochromatic excitation energies of 7, 17, and 33 KeV. The spot size is one millimeter. Our test method uses Certified Reference Materials ERM-EC680k and ERM-EC681k as reference standards (http://publications.jrc.ec.europa.eu/repository/bitstream/JRC37540/7540%20-%20ERM-EC680k%20%20ERM-EC681k_report_complete.pdf).

Lead Testing Results

The Ecology Center analyzed by HD XRF 60 individual rubber shreds from the Takoma and Truesdale playgrounds. These 60 shreds represented less than 10% by mass of the bulk samples received. The lead content in the individual shred samples varied widely. The results for these sites are summarized below along with the initial sample collected from Janney Elementary. The previous Janney School Report is also attached. In absence of a clear regulatory standard for these materials, we have summarized our data in comparison to EPA and CPSC standards. The Environmental Protection Agency (EPA) asserts 400 ppm as a safe standard for lead in play areas and the U.S. Consumer Product Safety Commission (CPSC) sets a standard of 90 ppm for children's toys.

Summary Table of Rubber Shreds Analyzed

Site	No. Rubber Shreds Analyzed	Ave Lead	Max Lead	Number Shreds >90 ppm	Percent Shreds >90 ppm	Number Shreds >400 ppm	Percent Shreds >400 ppm
Takoma Education Campus	18	1,027	3,941	5	28%	5	28%
Truesdell Education Campus	42	126	4,023	5	12%	1	2%
Janney Elementary, New Sample	35	117	3,953	1	3%	1	3%
Janney Elementary *(previously reported)*	34	2,417	59,096	8	24%	8	24%

As in the testing results for Janney Elementary School previously reported on May 2, 2019, several of the tested shreds of material at Takoma Education Campus and Truesdell Education Campus contained high concentrations of lead (greater than 90 ppm, most cases greater than 400 ppm). In addition, a second sample collected from Janney Elementary also contained a shred with nearly 4,000 ppm lead. **At all three playgrounds, lead concentrations in pieces of material as high as 4,000 ppm were identified**. Images of shred samples from Takoma and Truesdale are included with this report to illustrate our results.

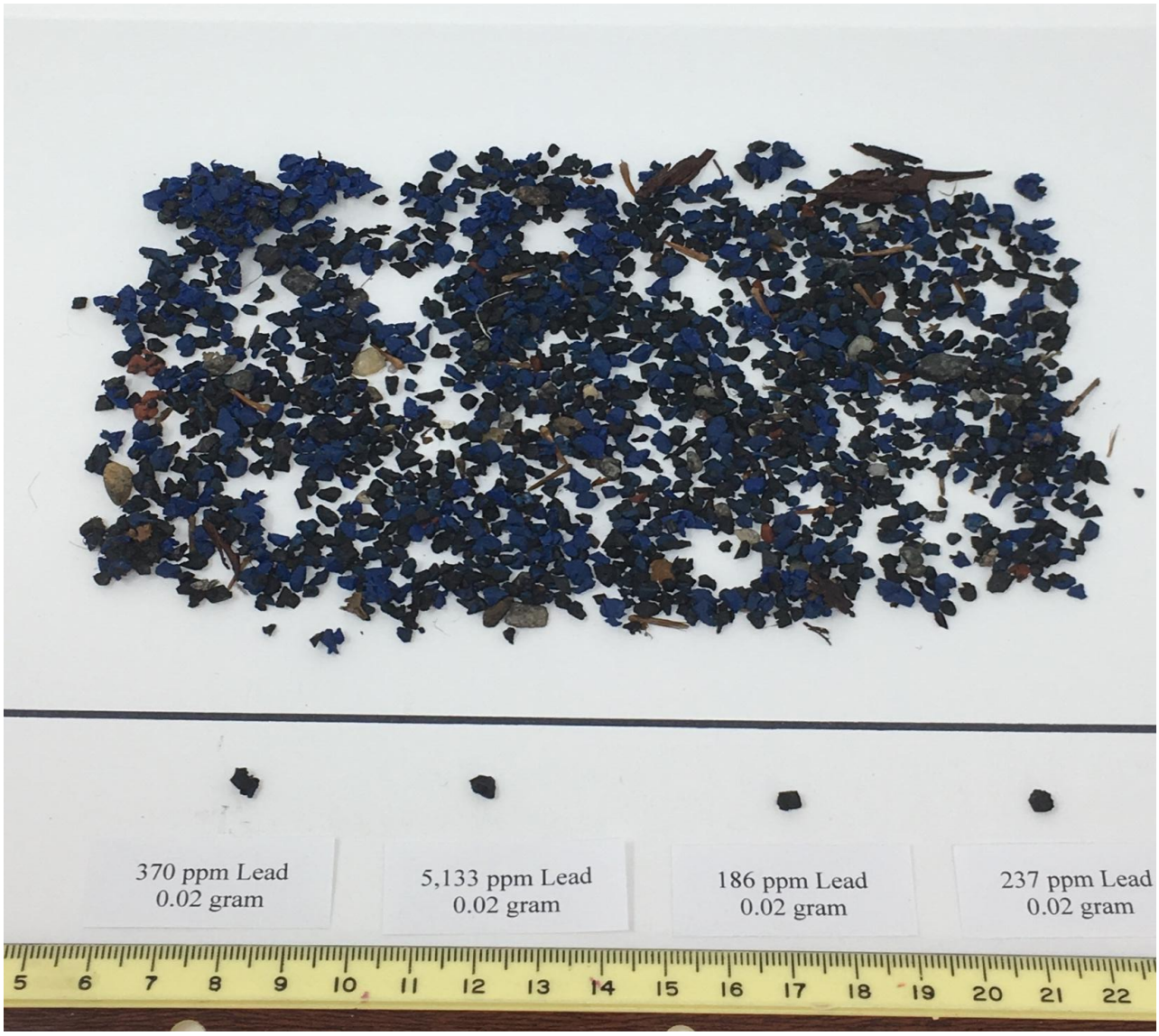
Conclusion

The collected rubber shred was found to be highly heterogeneous, containing a wide range of lead levels. HD XRF provide useful data about the lead content of the shred. The study illustrates the importance of analyzing individual shreds to fully characterize the lead content of rubber shred. According to HD XRF, which sampled small spots of individual shreds, all of the playgrounds sampled had at least one shred with up 4,000 ppm lead. We are concerned that the sampling that the DC schools has conducted to date has been inadequate to fully characterize the lead hazards at these sites. We have sampled 129 shreds from three playgrounds and have found a wide range of lead levels in shred. These levels range from non-detect to 4,000 ppm or higher. *There clearly is lead in rubber shred at these playgrounds, and there is no safe level of exposure to lead. We recommend further investigation and potential closure of these and similar playgrounds, and the exploration of non-synthetic alternatives.*

Please note all samples have been retained and we are able to split samples and so that the DC government may send it to a lab of their choice for further analysis.

The Ecology Center welcomes the opportunity to discuss these findings with you further. Please contact Jeff Gearhart at 734-369-9276 or jeffg@ecocenter.org.

Rubber shred material from poured in place (PIP) playground
at* Takoma Education Campus, 7010 Piney Branch Rd. NW, *(measurement units centimeters)



Rubber shred material from poured in place (PIP) playground at <u>Truesdell Education Campus</u>,* 800 Ingraham St NW, Washington DC *(measurement units centimeters)

Homogeneous

Element	Concentration /ppm	Uncertainty /ppm	Area Density (µg/cm²)	Counts
S 16	17102	±1933	-	355.4
Ca 20	25378	±495	-	10622.1
Ti 22	236	±33	-	239.5
Fe 26	210	±16	-	1625.3
Ni 28	1.0	±0.1	-	16.4
Zn 30	16879	±101	-	506562.3
Sr 38	16	±1.7	-	1524.9
Pb 82	5133	±155	-	192687.4
Bi 83	24	±6.9	-	818.3
Al 13	<21606	±21606	-	0.0
Si 14	<3674	±3674	-	0.0
P 15	<2072	±2072	-	0.0
Cl 17	<481	±481	-	0.0
K 19	<70	±70	-	0.0
V 23	<8.8	±8.8	-	0.0
Cr 24	<2.7	±2.7	-	0.0
Mn 25	<3.5	±3.5	-	0.0
Co 27	<7.0	±7.0	-	0.0
Cu 29	<3.4	±3.4	-	0.0
Ga 31	<5.4	±5.4	-	0.0
As 33	<212	±212	-	0.0
Se 34	<1.5	±1.5	-	0.0
Br 35	<1.1	±1.1	-	0.0
Rb 37	<0.8	±0.8	-	0.0
Ag 47	<2.4	±2.4	-	0.0
Cd 48	<3.1	±3.1	-	0.0
In 49	<3.9	±3.9	-	0.0
Sn 50	<9.6	±9.6	-	0.0
Sb 51	<14	±14	-	0.0
Ba 56	<33	±33	-	0.0
La 57	<53	±53	-	0.0
Ce 58	<36	±36	-	0.0
Hf 72	<5.6	±5.6	-	0.0
W 74	<24	±24	-	0.0
Au 79	<36	±36	-	0.0
Hg 80	<2.1	±2.1	-	0.0
Compton	174840	±0.0	-	697145.9
Rayleigh	760180	±0.0	-	119215.5

RT 0.13538149

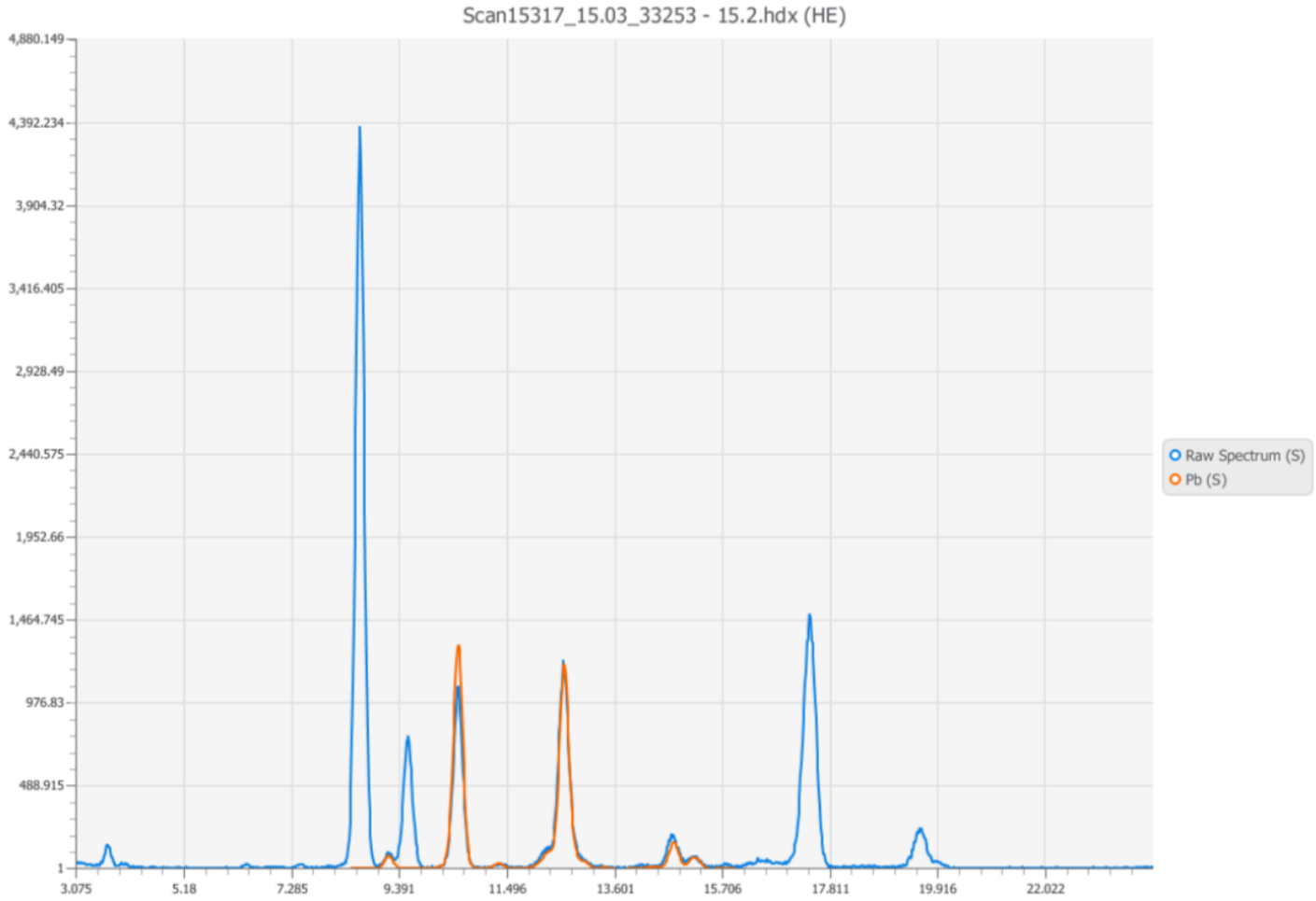
Sample
15317_33253 - 15.2_1503
Coating:
Substrate: Plastic
Name: 33253 - 15.2
Lot:
Optimization: Default
Method: Quantify

System
Scan #: 15317
Serial #: HD100211002
Date: 2019-Jun-07
Time: 15:03:04

Operator: JG
Description: 33253 - 15.2

System Serial Number: HD100211002
GUI Software Version: 1.5.0 1428*
Firmware Version: XOS [HD PRIME 1.2.1 IOP3 L S2]
Solver Version: 2.1.6-11
HW Server Version: 1.5.19
Detector Version: 6.06
OS Version: Windows XP 5.1

HD XRF Output Example: Multi-element Output for Takoma shred with 5,133 ppm lead



HD XRF Out Example: XRF Spectra for Takoma shred with 5,133 ppm lead

May 2, 2019

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Report on lead in pour in place (PIP) rubber playground at
***Janney Elementary School*, 4130 Albemarle St. NW, Washington, DC**

The Ecology Center, a Michigan-based non-profit environmental organization, was contacted by the Safe Healthy Playing Fields in February 2019 regarding concerns about metals and other chemicals of concern that may be in rubber shred-based, PIP playgrounds and athletic fields. Safe Healthy Playing Fields provided a 43.5 gram grab sample of coarse rubber shred from a playground at Janney Elementary School, 4130 Albemarle St. NW, Washington, DC. Most of the shred particles ranged in size between approximately 0.25 – 1.5 centimeters. The rubber shred sampled as part of this study was only collected from the Janney School.

The rubber shred was analyzed by the Ecology Center using High Definition X-ray Fluorescence (HD XRF) manufactured by XOS (https://www.xos.com/HDXRF). The instrument used monochromatic excitation energies of 7, 17, and 33 KeV. The spot size is one millimeter. Our test method uses Certified Reference Materials ERM-EC680k and ERM-EC681k as reference standards

(http://publications.jrc.ec.europa.eu/repository/bitstream/JRC37540/7540%20-%20ERM-EC680k%20%20ERM-EC681k_report_complete.pdf).

Two samples with high HD XRF lead results were sent to a third-party lab, TUV Rheinland of North America, Inc., in April, 2019. The lab measured total lead in accordance with the US Consumer Product Safety Commission testing procedures for lead in children's products, CPSC-CH-E1002-08.3 Standard Operating Procedure for Determining Total Lead (Pb) in Nonmetal Children's Products, Revision November 15, 2012 (https://www.cpsc.gov/s3fs-public/pdfs/blk_pdf_CPSC-CH-E1002-08_3.pdf). *The testing report from TUV is attached.*

Lead Testing Results

The Ecology Center analyzed by HD XRF 34 individual rubber shreds in the 43.5 gram bulk sample. These 34 shreds represented approximately 50% by mass of the bulk sample. The lead content in the individual shred samples was heterogeneously distributed. The results can be grouped in to two categories: Non-detect to low; and high.

- **Non-detect to Low:** 26 of 34 (76%) of the rubber shred samples had lead levels less than 30.2 parts per million (ppm). Average concentration of lead in these samples was 4 ppm.

- **High:** 8 of 34 (24%) of the rubber shred samples had lead levels greater than 1,951 ppm. Detected levels of lead ranged from 1,951-59,096 ppm, with an average of 9,119 ppm. One sample was an outlier at 59,096 ppm. Removing that sample results in an average of 2,872 ppm.

- **All samples:** The average lead for all 34 samples was 2,417 ppm.

Due to the small spot size of HD XRF, only a 1-mm spot of each shred was analyzed by HD XRF. To analyze an entire shred, a third-party lab was contracted to dissolve the shred and measure the lead contained therein by Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS). This method is expected to yield different lead levels compared to HD XRF when the lead is heterogeneously distributed. Two samples from the "high" group were submitted for ICP-MS analysis.

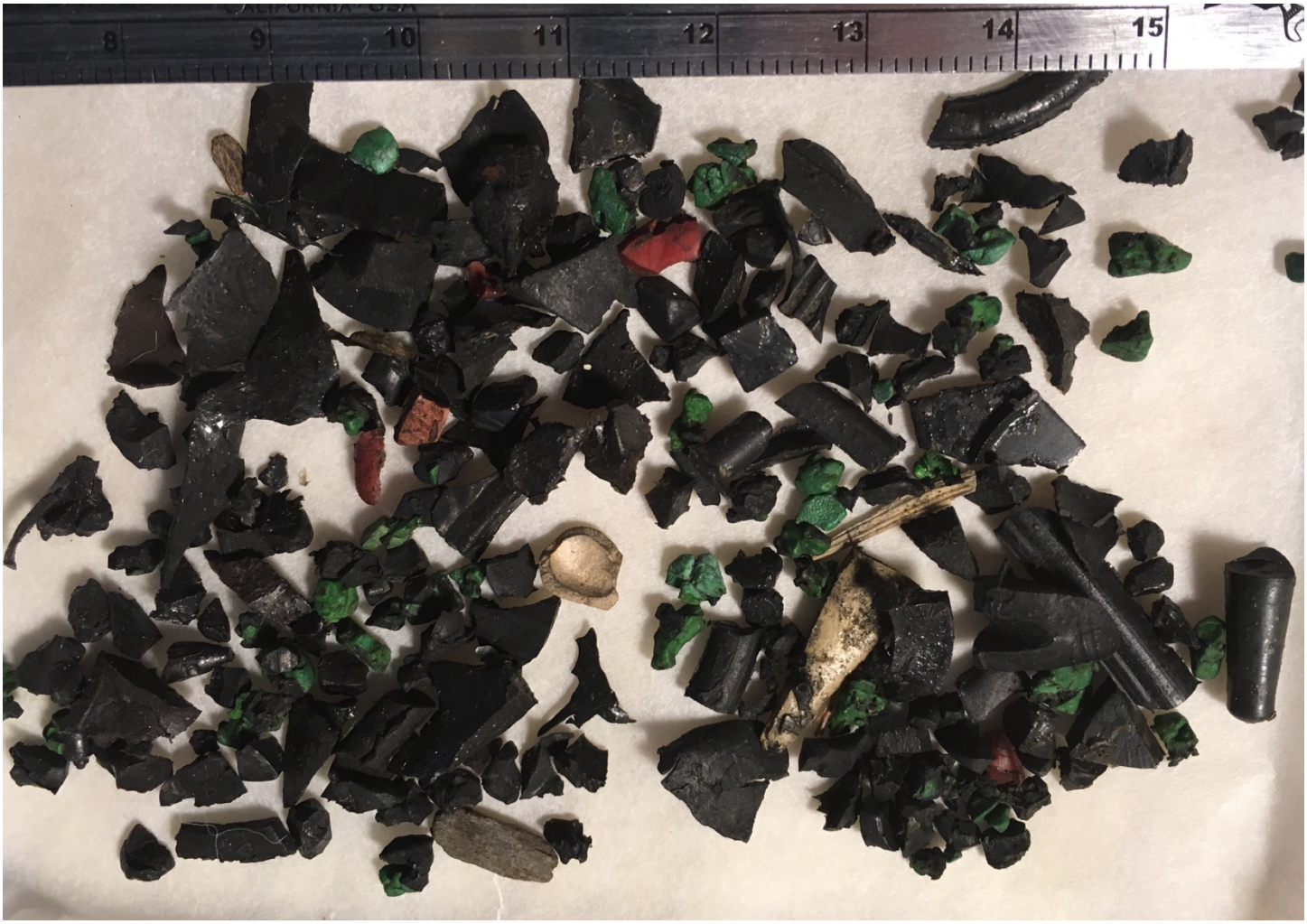
- Shred sample 1: ICP-MS - 7,079 ppm lead; HD XRF – 59,096 ppm lead
- Shred sample 2: ICP-MS – 6,514 ppm lead; HD XRF – 3,612 ppm lead

Third party lab testing verified lead levels of 6,514 and 7,709 in two shred samples.

Conclusion

The collected rubber shred was found to be highly heterogeneous, containing a wide range of lead levels. Both ICP-MS and HD XRF provide useful data about the lead content of the shred. According to HD XRF, which sampled small spots of individual shreds, 24% of the bulk sample contained shred with high levels (greater than 1,951 ppm) of lead. ICP-MS analysis of these samples confirmed that some shred contained up to 7,000 ppm lead. These results illustrate the difficulty of assuring a clean supply of a recycled shred material. We recommend further investigation of this playground and similar playgrounds, and the exploration of non-rubber alternative materials.

If you have any questions about this testing please contact Jeff Gearhart at 734-369-9276 or jeffg@ecocenter.org.



Rubber shred material from poured in place (PIP) playground at Janney Elementary School, (measurement units centimeters)