" SOIL TESTING "

Cullen, Thomas

Sent: Thursday, September 23, 2010 1:45 PM
To: All Principals; Mary Hogue
Cc: Central Office Administrators; Fitzpatrick, Joann; Cleary, Sands
Subject: Garden Information - Lead Testing
Attachments: School Gardens Lead Results.xls; School Garden Testing Lab sheets.pdf; LeadGardenSoils.pdf; Excerpt from Lead in Garden Soils.doc

Dear Principals,

As promised, I want to take a moment and provide you with information regarding the lead testing we had performed this past summer at the Fairfield Schools that currently have gardens.

Once we decided to partner with the PTA Garden initiative as part of the Wellness Committee's work and the Fairfield Department of Health, one of the requirements was to provide soil sampling and testing for lead. This is because we will have staff and students working in the school gardens as well as consuming the fruits and vegetables in the school lunch program.

Attached you will find the testing results for the school gardens that were tested. The first sheet is the Department of Health's spreadsheet showing all schools tested and the results. The second sheet is the analytical data straight from the laboratory. Other attachments include some helpful data/information that we feel you may need and you may want to share with parents.

All tests came back below the State of Connecticut, Department of Environmental Protection Agency guidelines. However, we developed the Fairfield Program to a more stringent level and those levels are as follows:

- All gardens with lead levels 99ppm and below (parts per million) are approved for use once we receive the compliance forms signed by the principals.

- All gardens with lead levels between 100ppm and 400ppm are not approved for use until the garden PTA reps provide a truckload of clean tested soil to be mixed in with the existing garden beds and is retested by the Fairfield Department of Health for a level below 100ppm.

As you will see from the testing spreadsheet, Fairfield Ludlowe High School and Dwight Elementary School had lead levels above 100ppm. At this time Dwight School's garden bed is being retested because there is more than one garden bed at this site and brand new organic soil was brought in for the garden bed that is slated to be used.

Fairfield Ludlowe High School will need to provide a new truck load of clean tested soil to be mixed in to the existing garden bed so we can provide a new lead test.

We will keep you informed as we move forward and if you have any questions at all please feel free to contact me.
Thank you,
Tom Cullen

Fairfield School Gardens Soil Testing		
School	**Raised/Ground Bed**	**Lead Results (ppm)**
Dwight	Raised	103
Ludlow High	Ground	71.2
Ludlow High	Raised	114
Ludlow Middle	Raised 1	33.2
Ludlow Middle	Raised 2	30.5
Ludlow Middle	Raised 3	27.6
Ludlow Middle	Raised 4	28.5
Ludlow Middle	Raised 5	34.8
Ludlow Middle	Raised 6	26.7
McKinley	Raised	32.9
McKinley	Pots	< 19
Mill Hill	Ground	61.7
Mill Hill	Raised	54.5
North Stratfield	Raised	31.4
Sherman	Box	21.8
Sherman	Raised	27.9
Tomlinson	Raised	<19
Fairfield Woods	Raised	32
EPA General Soil Reccomendations		
<400ppm: No action required		
>400ppm: Do not use as child's play area. Cover with grass, mulch or plantings to limit exposure		
University of Connecticut and CT Department of Public Health Gardening Reccomendations		
<100ppm: Can be used for gardening with no action required		
100-399ppm: Can be used for growning vegatables but certain precations should be taken - see excerpt		
>400ppm: Do not use for growing vegatable or herbs		

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ANALYTICAL RESULTS

Workorder 30706 FAIRFIELD SCHOOLS

Lab ID:	30706001				Date Received: 8/16/2010		Matrix: Soil		
Sample ID:	LUDLOW MIDDLE SCHOOL #1				Date Collected: 8/11/2010				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared By	Analyzed	By	Qual RegLmt
--- METALS ---									
Preparation Method: EPA 3050B									
Analytical Method: EPA 239.1									
Lead	33.2	mg/kg	19		1	8/18/2010 GG	8/18/2010	GG	

Lab ID:	30706002				Date Received: 8/16/2010		Matrix: Soil		
Sample ID:	LUDLOW MIDDLE SCHOOL #2				Date Collected: 8/11/2010				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared By	Analyzed	By	Qual RegLmt
--- METALS ---									
Preparation Method: EPA 3050B									
Analytical Method: EPA 239.1									
Lead	30.5	mg/kg	20		1	8/18/2010 GG	8/18/2010	GG	

Lab ID:	30706003				Date Received: 8/16/2010		Matrix: Soil		
Sample ID:	LUDLOW MIDDLE SCHOOL #3				Date Collected: 8/11/2010				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared By	Analyzed	By	Qual RegLmt
--- METALS ---									
Preparation Method: EPA 3050B									
Analytical Method: EPA 239.1									
Lead	27.6	mg/kg	20		1	8/18/2010 GG	8/18/2010	GG	

Lab ID:	30706004				Date Received: 8/16/2010		Matrix: Soil		
Sample ID:	LUDLOW MIDDLE SCHOOL #4				Date Collected: 8/11/2010				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared By	Analyzed	By	Qual RegLmt
--- METALS ---									
Preparation Method: EPA 3050B									
Analytical Method: EPA 239.1									
Lead	28.5	mg/kg	20		1	8/18/2010 GG	8/18/2010	GG	

REPORT OF ANALYSIS

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ANALYTICAL RESULTS

Workorder 30706 FAIRFIELD SCHOOLS

Lab ID: **30706005** Date Received: 8/16/2010 Matrix: Soil
Sample ID: **LUDLOW MIDDLE SCHOOL #5** Date Collected: 8/11/2010

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---											
Preparation Method: EPA 3050B											
Analytical Method: EPA 239.1											
Lead	34.8	mg/kg	18		1	8/18/2010	GG	8/18/2010	GG		

Lab ID: **30706006** Date Received: 8/16/2010 Matrix: Soil
Sample ID: **LUDLOW MIDDLE SCHOOL #6** Date Collected: 8/11/2010

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---											
Preparation Method: EPA 3050B											
Analytical Method: EPA 239.1											
Lead	26.7	mg/kg	20		1	8/18/2010	GG	8/18/2010	GG		

Lab ID: **30706007** Date Received: 8/16/2010 Matrix: Soil
Sample ID: **LUDLOW HIGH -GROUND BEDS** Date Collected: 8/11/2010

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---											
Preparation Method: EPA 3050B											
Analytical Method: EPA 239.1											
Lead	71.2	mg/kg	20		1	8/18/2010	GG	8/18/2010	GG		

Lab ID: **30706008** Date Received: 8/16/2010 Matrix: Soil
Sample ID: **LUDLOW HIGH -RAISED BEDS** Date Collected: 8/11/2010

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---											
Preparation Method: EPA 3050B											
Analytical Method: EPA 239.1											
Lead	114	mg/kg	18		1	8/18/2010	GG	8/18/2010	GG		

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ANALYTICAL RESULTS

Workorder 30706 FAIRFIELD SCHOOLS

Lab ID:	30706009				Date Received: 8/16/2010			Matrix:	Soil		
Sample ID:	MILL HILL-GROUND BEDS				Date Collected: 8/11/2010						
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	By	Analyzed	By	Qual	RegLmt
— METALS —											
Preparation Method: EPA 3050B											
Analytical Method: EPA 239.1											
Lead	61.7	mg/kg	16		1	8/18/2010	GG	8/18/2010	GG		

Lab ID:	30706010				Date Received: 8/16/2010			Matrix:	Soil		
Sample ID:	MILL HILL-RAISED BEDS				Date Collected: 8/11/2010						
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	By	Analyzed	By	Qual	RegLmt
— METALS —											
Preparation Method: EPA 3050B											
Analytical Method: EPA 239.1											
Lead	54.5	mg/kg	19		1	8/18/2010	GG	8/18/2010	GG		

Lab ID:	30706011				Date Received: 8/16/2010			Matrix:	Soil		
Sample ID:	DWIGHT SCHOOL-RAISED BEDS				Date Collected: 8/11/2010						
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	By	Analyzed	By	Qual	RegLmt
— METALS —											
Preparation Method: EPA 3050B											
Analytical Method: EPA 239.1											
Lead	103	mg/kg	20		1	8/18/2010	GG	8/18/2010	GG		

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ANALYTICAL RESULTS

Workorder 32829 SHERMAN SCL 250 FERN ST

Lab ID: 32829001 Date Received: 8/31/2010 Matrix: Soil
Sample ID: #1 SHERMAN SCHOOL BOX Date Collected: 8/26/2010

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---										
Preparation Method: EPA 3050B										
Analytical Method: EPA 239.1										
Lead	21.8	mg/kg	14	1	8/31/2010	GG	8/31/2010	GG		

Lab ID: 32829002 Date Received: 8/31/2010 Matrix: Soil
Sample ID: #2 SHERMAN SCHOOL RAISED Date Collected: 8/26/2010

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---										
Preparation Method: EPA 3050B										
Analytical Method: EPA 239.1										
Lead	27.9	mg/kg	19	1	8/31/2010	GG	8/31/2010	GG		

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ANALYTICAL RESULTS

Workorder 32121 FAIRFIELD SCHOOLS (SOILS)

Lab ID: **32121001** Date Received: 8/25/2010 Matrix: Soil
Sample ID: **#1 NORTH STRATFIELD** Date Collected: 8/18/2010

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---										
Preparation Method: EPA 3050B										
Analytical Method: EPA 239.1										
Lead	31.4	mg/kg	20	1	8/31/2010	GG	8/31/2010	GG		

Lab ID: **32121002** Date Received: 8/25/2010 Matrix: Soil
Sample ID: **#2 MCKINLEY BEDS** Date Collected: 8/18/2010

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---										
Preparation Method: EPA 3050B										
Analytical Method: EPA 239.1										
Lead	32.9	mg/kg	18	1	8/31/2010	GG	8/31/2010	GG		

Lab ID: **32121003** Date Received: 8/25/2010 Matrix: Soil
Sample ID: **#3 MCKINLEY POTS** Date Collected: 8/18/2010

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---										
Preparation Method: EPA 3050B										
Analytical Method: EPA 239.1										
Lead	<19	mg/kg	19	1	8/31/2010	GG	8/31/2010	GG		

Lab ID: **32121004** Date Received: 8/25/2010 Matrix: Soil
Sample ID: **#4 TOMLINSON** Date Collected: 8/18/2010

Parameters	Results	Units	Report Limit	DF	Prepared	By	Analyzed	By	Qual	RegLmt
--- METALS ---										
Preparation Method: EPA 3050B										
Analytical Method: EPA 239.1										
Lead	<19	mg/kg	19	1	8/31/2010	GG	8/31/2010	GG		

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Soil Nutrient Analysis Laboratory

Soil Nutrient Analysis Laboratory; 6 Sherman Place, Unit 5102, Storrs, CT 06269-5102 • Phone: 860-486-4274
Fax: 860-486-4562 Location: Union Cottage, Depot Campus, Mansfield

Lead in Garden Soils

By Dawn Pettinelli, Assistant Extension Educator

What is lead?
Lead is a soft, grayish-white, naturally occurring metal that has been mined for thousands of years. Early Egyptians, Greeks and Romans used it for water pipes and in ceramic glazes and paint pigments. In the eighteenth century, lead poisoning among Americans and the English was traced to cider vats made with lead. Early tinkers and printers were exposed to lead through their daily work activities. Lead was an ingredient in paints for many years because it created a tough, lasting film when dry. Although the dangers of lead poisoning have been know for almost 2000 years, lead still continues to be used for industrial purposes. It remains in use because it has properties that make it a versatile, durable and economical material.

Where is lead and what are considered to be normal background levels?
Lead is everywhere. It is present in water, soil, our homes, our cars, our food and even in our bodies. In fact, no other contaminant has accumulated in humans to average levels so close to those which are potentially clinically poisonous. In native, undisturbed soils, lead generally ranges from 2 to 60 parts per million. Over the years, human activity has increased the levels of lead in some soils to hazardous levels.

How did soils become contaminated with lead?
Lead contamination and health problems caused by the contamination are associated mostly with mining, smelting and other industrial activities. In New England, lead contamination is primarily due to three sources – lead paint, exhaust from leaded gasoline, and the use of lead arsenate as a pesticide, particularly in old orchards. Use of these products has been phased out, but lead is a persistent pollutant and will remain in the soil pretty much indefinitely. Because it is a mineral, it will not decompose. Lead can, however, accumulate in plant tissues.

Many homes in New England were built before 1978 when lead was banned from paints for U.S. homes. As the paint aged and peeled, it was scraped off, sanded or sand-blasted resulting in paint chips and dust falling to the ground. The older the home, the more likely this process was repeated over the years. Even rain washing down buildings covered with lead-based paints may carry some lead into the surrounding soil. Unless the soil was physically disturbed, a typical scenario results in soil lead levels being highest closest to the homes with the levels decreasing as the distance from the building increases. The U.S. Environmental Protection Agency (EPA) found that the highest soil lead levels were located within the 1- to 3- foot dripline around the home.

Lead was used in gasoline as an anti-knock ingredient. Two forms of lead were used as additives, tetraethyl lead and tetramethyl lead. These were banned in 1991 as a result of the Clean Air Act. By some estimates, hundreds of thousands of pounds of lead found their way into the air each year via vehicle exhausts. Because of the use of lead in gasoline, soils along heavily traveled roadways are often found to contain elevated levels of lead.

Sometime in the late 1800's, lead arsenate was introduced as an insecticide for fruit trees. Orchards were a common site across the New England landscape. Many are still in production today. Although use of lead arsenate was discontinued in the 1950's, lead as well as arsenic remains in the soil on these old orchard sites, some of which have been developed and sold as residential properties.

Who is affected by lead?
While lead poisoning knows no age boundaries, most at risk from exposure to lead are children between the ages of six months to six years. This is because they most commonly engage in hand-to-mouth activities through which lead can be ingested. Toys or food can be dropped on contaminated soil and picked up by children who may put this item or their dirty hands in their mouths. Children often engage in physical activities on the ground that may stir up dust, which is then breathed in. Contaminated soil inadvertently brought into homes on shoes or dust from home renovations may also be ingested by young children. Older homes may have peeling paint chips that children could ingest.

How does lead affect children and adults?

Excerpt from Lead in Garden Soils by Dawn Pettinelli of the University of Connecticut Soil Nutrient Analysis Laboratory

Areas with total lead levels greater than 100 but less than 400 can be used for growing vegetables if certain precautions are taken. If children are playing in these areas, install a physical barrier to prevent them from coming in contact with the bare soil. Suggested barriers include dense turf, several inches of mulch or landscape fabric covered with mulch, sand or uncontaminated soil. Sandboxes in these areas should be lined with landscape fabric or have solid bottoms of wood or plastic. If mulch or sand is placed under swing sets or in other play areas, be prepared to renew these barriers occasionally if bare soil becomes apparent.

Can Vegetables Be Grown In Soils With Elevated Lead Levels? Many vegetable and herb plants accumulate lead in their leaves and stems so avoid growing green leafy vegetables or herbs even in moderately contaminated sites (100 – 400 ppm total lead). Lead can also accumulate in the roots of plants. It is not advised to grow root crops like potatoes, carrots or beets. However, if these are grown, peeling the skin before eating will remove much of the lead. Best choices for moderately contaminated sites are fruiting plants like tomatoes, peppers, eggplants, beans, peas, corn and squash. Lead does not readily accumulate in the fruiting parts of the plant.

Suggestions for Reducing Lead Availability in Vegetable Gardens

Soils can be amended to lessen the amount of lead available for plant uptake. Generally this is accomplished by maintaining the soil pH around 6.5, maintaining adequate phosphorus in the soil, and increasing organic matter levels. The soil pH is a measurement of the acidity of a soil. A pH of 7.0 is neutral, a pH below 7.0 indicates acidity, and a pH above 7.0 indicates alkalinity. Most soils in Connecticut are acidic. If non-native vegetables and herbs are to be grown, the soil pH would be raised to the pH level these plants prefer, typically in the mid 6's. Limestone is commonly used to raise the soil pH. The soil pH is important because it affects the solubility, and thus, the availability of both plant nutrients and contaminants in the soil. Lead is less available for plant uptake in near neutral soils. Recommended amounts of ground limestone to apply will be listed on your soil test results. Strive to maintain Modified-Morgan extractable soil phosphorus at optimum (13 to 20 lbs/acre) or slightly above optimum (21 to 60 lbs/acre) levels. Maintaining optimum soil phosphorus assists in reducing lead availability to plants because phosphorus forms insoluble lead phosphate in soils. The soil pH also affects the solubility of phosphorus. Phosphorus is most available togarden plants when the pH is between 6.0 and 7.0. A major drawback to using phosphorus solely to reduce lead availability to plants is that quantities in excess of plant requirements are needed. Excess phosphorus in soils can leach through the soil profile or be carried away by surface runoff, and this can lead to surface and groundwater pollution causing environmental degradation. Adding organic matter to the soil will reduce the lead available for plant uptake because some organic compounds in the organic matter will chemically react with the lead and make it insoluble. Some sources of organic matter include organic fertilizers, compost, leaf mold, manure, reed-sedge Michigan peats, and organic mulches. Keep in mind that some composts and most manures contain significant amounts of nutrients and excess amounts of nutrients should not be applied. If the organic matter in the soil is low and the nutrients are already at optimum levels, select low nutrient leaf-based composts, leaf mold and reed-sedge Michigan peats. If the more acidic sphagnum peat moss is used, plan on adding limestone to counteract the acidity. Aim to increase your soil organic matter content 1 to 2 %, for example, from 3 % to 4 % or from 5 % to 7%. Greater increases require careful monitoring of soil phosphorus. Have your soil retested every 2 to 3 years to monitor nutrient and pH levels. If you are applying manure or compost to increase soil organic matter content, test your soil annually. Do not increase Modified-Morgan extractable phosphorus above 60 lbs/acre because above 60 lbs/acre you increase the chance of phosphorus contamination of water bodies. The standard nutrient analysis offered by the UConn Soil Nutrient Analysis Laboratory measures soil pH, available macro- and micro-nutrients using Modified-Morgan as the extractant, and screens for lead contamination. The laboratory can also determine the organic matter content of soils.

While the above guidelines are important, good hygiene practices are also essential:

1) Do not bring food or drink into the garden.
2) Wash your hands and tools if gardening in contaminated soil.
3) Keep children away from bare soil, wash their hands before they eat, and wash any toys that come in contact with the soil.
4) All produce should be washed thoroughly to remove any soil particles before consumption.
5) Wipe your shoes on a utility mat or remove them before entering a home.
6) Clean your pet's feet as well if they are muddy to avoid transporting soil into the house.