Village of Croton-on-Hudson
ENGINEERS OFFICE
Stanley H. Kellerhouse Municipal Building
One Van Wyck Street, 2nd floor
Croton-on-Hudson, NY 10520-2501

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Village Engineer/Building Inspector
Daniel O'Connor, P.E.
Asst. Building Inspector/*Assessor*
Joseph Sperber
Fire Inspector
Peter Anfiteatro

MEMORANDUM

Date: September 4, 2009
To: Abe Zambrano
From: Daniel O'Connor, P.E.
Subject: Community Garden Soil Test Results, Nordica Drive

Two soil samples were taken from the community garden one sample from the area with the old road millings and the other a composite sample from the entire garden area. The samples were submitted to the Department of Crop and Soil Sciences at Cornell University for laboratory analysis. The laboratory results were received from Cornell University along with a table of "Recommended Maximum Soil Trace Element Concentrations for Agriculture in the Northeast US", which is attached. The texture of the soil in the community garden is in the silt to clay range.

The laboratory results are listed in the table below and compared to the recommended maximum soil trace element concentration values for a silt-clay soil; all results are in mg/kg (ppm). As can be seen in the table below all trace element concentrations were well below the recommended maximum values. It is also noted that Cornell has indicated in a footnote that recommended maximum values are for total metals and that some fraction of the metals may not be biologically available.

Trace Element	Recommended Maximum Trace Element Concentration for Silt-Clay Soils	Trace Element Concentration in Sample 1 (area of old road millings)	Trace Element Concentration in Sample 2 (composite sample for garden)
Cadmium	3	Below detection limit	Below detection limit
Copper	120	19.42	20.9
Nickel	60	35.49	31.35
Lead	120	8.41	8.29
Zinc	230	141.03	162.40
Arsenic	18	4.03	6.48

Based on the results and comparison to the recommended maximum soil trace element concentration the soil in the Community Garden is acceptable for agricultural use. It is noted however, that the upper organic soil layer in the Community Garden will need to be re-established prior to successful use of the garden. Placement of the upper organic soil layer should commence to allow for settlement and stabilization before the next growing season.

In addition to parameters with recommended maximum values the following parameters were analyzed; the results, in mg/kg, are noted in the table below.

Trace Element	Trace Element Concentration in Sample 1 (area of old road millings)	Trace Element Concentration in Sample 2 (composite sample for garden)
Aluminum	17467.80	16085.90
Phosphorus	444.55	368.66
Sulfur	321.17	340.14
Titanium	353.69	355.70
Manganese	1506.23	1045.22
Iron	29256.00	29253.80
Cobalt	14.25	14.97
Molybdenum	Below detection limit	Below detection limit
Sodium	819.93	984.17
Magnesium	4582.40	4218.46
Potassium	1701.66	1148.29
Calcium	2857.60	2081.75
Vanadium	39.33	37.98
Boron	14.65	14.25
Chromium	38.26	35.10
Strontium	11.56	8.17
Lithium	46.04	37.78
Beryllium	0.69	0.56
Selenium	9.31	6.55
Barium	119.61	91.42

Enc (table of recommended maximum values)

cc: Village Board w/enc.
File w/enc.

Cornell Nutrient Analysis Laboratory
804 Bradfield Hall
Ithaca, New York 14853
Phone: 607-255-4540
Fax: 607-255-7656
Email: soiltest@cornell.edu
Web Link: http://www.cnal.cals.cornell.edu

Recommended Maximum Soil Trace Element Concentrations for Agriculture in the Northeast US

Metal	Soil concentration (mg/kg)[1]		
	Sandy soil	Sandy loam to stilt loam	Slit to clay soil
Cd	1.2	2	3
Cu	50	75	120
Ni	30	40	60
Pb	120	120	120
Zn[2]	90	150	230
As	18		

[1] Data for dry soil maintained at a pH 6 or above.
[2] The lower concentrations are for loamy sand and the higher concentrations are for finer textured soils. The values in this tables are total metals and some fraction of these metals may not be biologically available.
[3] Concentrations limit to prevent phytotoxicity. Higher concentrations can be tolerated in calcareous soils.

Reference: Guidelines for application of sewage biosolids to agricultural lands in the Northeastern US. 2007. Rutgers NJAES Cooperative Extension. Publication number E317.

For additional information visit:

http://www.epa.gov/ecotox/ecossl/

http://www.epa.gov/superfund/health/conmedia/soil/index.htm - information about US EPA's Soil Screening Levels (SSLs) is available at:

		Cornell Nutrient Analysis Laboratory									
804 Bradfield Hall											
Cornell University											
Ithaca, NY 14853											
Ph 607-255-4540											
fax 607-2557656											
Email: soiltest@cornell.edu											
Web:http://cnal.cals.cornell.edu/soiltest											
2020 Acid Soil Package											
FN 22189											
Data submission:08/24/2009											
Date reported: 08/28/2009											
Concentration: mg/kg			**Data on as received base**								
< det = below detection limit											
Sample Name	**Sample Ide**	**Al308.215**	**P213.618**	**S182.034**	**Ti334.941**	**Mn293.930**	**Fe275.573**	**Co228.615**	**Ni231.604**	**Cu324.754**	**Mo202.030**
22189 TOR SPOT	**22189-2**	**17467.80**	**444.55**	**321.17**	**353.69**	**1506.23**	**29256.00**	**14.25**	**35.49**	**19.42**	**<det**
22189 CAR DET	**22189-3**	**16085.90**	**368.66**	**340.14**	**355.70**	**1045.22**	**29253.80**	**14.97**	**31.35**	**20.90**	**<det**

Pb220.351	Cd228.802	Na589.592	Mg279.079	K766.490	Ca211.276	As189.042	V292.402	B249.773	Cr267.716	Zn213.856	Sr421.552	Li670.784
8.41	<det	819.93	4582.40	1701.66	2857.60	4.03	39.33	14.65	38.26	141.03	11.56	46.04
8.29	<det	984.17	4218.46	1148.29	2081.75	6.48	37.98	14.25	35.10	162.40	8.17	37.78

Be313.042	Se203.985	Ba455.404
0.69	9.31	119.61
0.56	6.55	91.42