Public Discussion Draft
RSR Wave 2 - Potential Changes to RSRs
Urban Soil
March 26, 2015 DRAFT

The Department of Energy and Environmental Protection is developing "public discussion drafts" of ideas for potential future amendments to DEEP regulations, or new provisions for regulations, to address remediation of releases and sites where hazardous substances or oil have been released. Many of the subject matters for these drafts grew out of the Cleanup Transformation workgroup recommendations from November 2012. The purpose of the public discussion drafts is to provide more detail to the concepts set forth in the November 2012 Workgroup reports and the February 2013 Cleanup Transformation draft report. As a discussion draft, the language is not structured to read exactly as regulation language would, and does not attempt to propose section and subsection outline format. Also, this discussion draft is not a public hearing draft of a proposed regulation. DEEP will further shape and refine the discussion draft after considering public feedback, before proposing any formal proposed regulation for amendment/adoption and before initiating the formal regulation adoption process.

PURPOSE

Revisions to the RSRs are contemplated which will specifically define the conditions and threshold concentrations for materials to be classified as Urban Soil. They will also facilitate the remediation of those soils through the use of self-implementing engineered controls. In combination with guidance to assist in the streamlining of the requirements for characterization of Urban Soil, the defining of conditions associated with Urban Soil and the self-implementing option for standardized engineered control designs are expected to reduce the cost and timeframe for remediation and redevelopment of sites where historic land use practices have marginally impacted soils with contaminants unrelated to the industrial and commercial activities at the site.

Most of the concepts in this Discussion Draft have been generated by the Urban Soil Workgroup sponsored by the Remediation Roundtable, which operated from June 2011 to January 2013. The goal of that workgroup had been to create a guidance document for how these materials should be handled under the current RSRs. These proposed Wave 2 changes to the RSRs will allow the recommendations of that work group to be more fully implemented.

BACKGROUND

Soils that are located in areas where there is a long history of human development can be affected by a number of contaminants from material mixed into natural soil over time, or associated with material mixed into relocated soils (i.e., polluted fill) used to change the topography of urban areas. Non-industrial activities commonly have resulted in the presence of coal, coal ash, wood ash and

asphalt fragments in soil and fill materials, although numerous other materials such as brick, concrete, glass, wood and ceramics can also be present. As a result of these materials, soils in urban settings typically contain heavy metals and poly-nuclear aromatic hydrocarbons (PAHs) which may not be related to operational-specific releases, but are nonetheless present at concentrations that exceed regulatory criteria and may pose an unacceptable health risk for the general public coming into contact with the soil.

The presence of these contaminants in the soils at concentrations greater than background levels is considered to be the result of a "release" according to the RSRs and does not constitute natural soil conditions. Where these contaminants are present at concentrations greater than the applicable RSR criteria, the need for clean-up measures at sites in a State remedial program are triggered. These obligations complicate, and may increase the cost of, redevelopment of sites that are in such programs. This is especially true, given the often ubiquitous and heterogeneous distribution of the contaminants associated with such soils in urban areas. These proposed modifications to the RSRs would reduce this disparity between sites and encourage the implementation of protective measures.

The RSRs provide an exception to the Pollutant Mobility Criteria (PMC) for soil where contaminants are associated only with coal, coal ash, wood ash and asphalt fragments (see R.C.S.A. subsection 22a-133k-2(c)(4)(B)); however, it does not provide an exception from the requirement to meet Direct Exposure Criteria (DEC). These proposed changes to the RSRs will facilitate the ability to address these DEC exceedances by streamlining the process for characterization and for approval of engineered controls for Urban Soil.

CONCEPT

A new definition would be added to the RSRs for the term "Urban Soil":

Material on a parcel that is predominantly soil or fill and contains a mixture of one or more of the following: coal ash, coal slag, coal fragments, wood ash, asphalt paving fragments, brick, concrete, glass, ceramics, metal fragments and incidental amounts of other construction and land-clearing debris, provided that:

- *Contaminants present above RSR criteria in the material are not the result of another release (for example, Urban Soil would not include those portions of sites where the presence of foundry slag, casting sand or coal tar are identified); and*
- *Deposition of the material was not prohibited at the time of the placement.*

Urban Soil would be exempt from the Pollutant Mobility Criteria if consistent with Section 22a-133k-2(c)(4)(B) or 22a-133k-2(f)(1)of the RSRs.

Since the date of the placement is not a consideration in the 22a-133k-2(c)(4)(B) - commonly referred to as "the coal ash exception," it is not a factor in determining whether material meets the definition of Urban Soil, other than the requirement that "deposition of the material was not prohibited at the time of placement."

Minor amounts of various types of debris are considered to be consistent with the concept of Urban Soil. This would include metal fragments, demolition debris, trash, wood, brush and street sweepings. However, concentrated deposits of these materials would not be eligible for this characterization and remedial approach. The regulation may also specify a maximum allowable percentage for any individual component listed in the definition. Any PCBs present in the soil would need to be addressed consistent with Federal regulations. Depending on whether historically dredged sediments deposited on a site were from an impaired water body, some dredge fill may not meet the Urban Soil definition because of additional constituents of concern (COCs) above RSR criteria and the potential for contaminants to have a higher leachability than in other fill or soil types.

- The Department is open to suggestions on how to set-up a process for evaluation of dredge fill to address the different leachability issues and COCs, and defining circumstances where such a process might be self-implementing rather than being subject to Commissioner's approval.

Individual sample analytical results, not averages or composites, collected from outside potential operational-specific release areas should be used to determine if material qualifies as Urban Soil. Sample results which are above the "maximum" would represent a "hot spot" which would need to be evaluated and possibly addressed separately. Once these areas of higher concentrations have been addressed, the remainder of the applicable soils could be evaluated as Urban Soil.

CONTAMINANT THRESHOLDS

Key COCs have been identified and a draft proposal for maximum concentrations which may be considered representative of Urban Soil have been compiled in Table 1. The purpose of the COC list in Table 1 is to aid characterization of Urban Soil by identifying constituents common to Urban Soil and setting the upper limits for Urban Soil concentrations. These threshold values for the common constituents in Urban Soil represent the levels above which a release from another source should be considered.

- The Department is open to suggestion regarding whether setting a maximum concentration is the best approach. An alternative approach has been suggested which would have lower thresholds but allow higher discrete concentrations to be present through the use of 95% UCL calculations for the entire data set. Another suggestion was for allowing higher concentrations if accompanied with a demonstration of its suitability to the Commissioner's satisfaction.

Appendix A provides a more detailed summary of the data, along with additional data from Massachusetts, New York, New Jersey and Illinois.

The list of chemical constituents associated with Urban Soil was developed by evaluating soil data from eight (8) sites which had a significant body of analytical results for the characterization of Urban Soil in seven (7) different urban settings in Connecticut. Project managers (LEPs) screened the data so that results were only used from portions of the sites where additional releases were not present. To further support the ranges of concentrations considered to be associated with Urban Soil, research was also collected from other states by conducting a survey through ITRC (Interstate Technology & Regulatory Council). Nine (9) states responded.

A value for Total Petroleum Hydrocarbons (ETPH) is included in Table 1.

- The Department is open to suggestion on whether ETPH should be retained in the table as is or dropped in favor of language differentiating between petroleum and combustion/asphalt related hydrocarbons. Suggestions are welcome concerning what alternative analytical methods would be appropriate, such as EPH, VPH, APH, or other forms of fingerprinting.

The presence of additional constituents in soil does not preclude soils from being characterized as Urban Soil, provided results are below applicable RSR criteria. Not every listed constituent would be expected to be present in any given Urban Soil and some Urban Soil may have additional constituents. Where additional constituents are detected below RSR criteria, the possibility of an alternate release should be considered using the Conceptual Site Model for the site. The data for Urban Soil presented in Appendix A suggests the additional constituents that are commonly present are below RSR criteria. Therefore, where additional constituents are present above RSR criteria, those additional constituents are likely related to an alternate source.

For those contaminants detected in the Urban Soil which correspond to COCs associated with the operations known to have occurred at the site, an appropriate characterization for the three dimensional extent and degree of these contaminants to evaluate whether their presence is related to discrete releases and not to the Urban Soil must be undertaken. This is because the characteristics of such releases may have differing fate and transport mechanisms from comparatively inert materials comprising Urban Soil that are subject to the coal ash exemption, which in most cases have had the leachable portion of its contaminants substantially diminished in the decades since being deposited.

- As with any self-implementing provision, the Department recognizes that there would be the need for consistency in the manner in which different LEPs make a determination that a material meets the definition of Urban Soil. Recommendations are welcome to help clarify the standard of care and decision making process that should be implemented to support such a determination. Since the PMC exception being used is dependent on the coal-ash exception, it has been suggested that visual identification of the presence of these materials might be sufficient, however additional information and/or characterization would also be necessary to support the assertion that there had not been other releases into these materials which would have the potential to contribute similar constituents in a leachable form. The Department does not currently favor the need for microscopic particle identification.

Using analytical results from that data, maximum concentrations for the 17 PAHs and 7 heavy metals most commonly present in these Urban Soil were determined for each site. By comparing these maximums, a proposed upper threshold was determined for distinguishing between what could be expected to comprise/ be found in an Urban Soil and what would be considered anomalous and indicative of a separate release.

REMEDIAL APPROACH

Most Urban Soil qualifies for the exception to the PMC under Section 133k-2(c)(4)(B) of the RSRs, leaving the DEC as the primary compliance concern. Any releases present in the materials being considered Urban Soil which are not covered by this "coal-ash exception" must otherwise demonstrate compliance with the PMC. Additional releases which have occurred within the footprint of the area containing Urban Soil would need to be investigated and remediated separately.

All contaminated soil in excess of applicable DEC will need to be addressed through some form of remedial measure. For the Urban Soil that is to remain on the site, this could be accomplished by rendering them inaccessible in accordance with the definition of "Inaccessible Soil" provided in 22a-133k-1(a)(32)(C) of the RSRs. (This includes: soils under a building; soils more than four feet below the ground surface; soils more than two feet below qualifying pavement or concrete; soils beneath a three-inch cover of pavement or concrete having metals concentrations no more than two times applicable direct exposure criteria; or soils beneath an Engineered Control as provided in 22a-133k-1(a)(16) of the RSRs).

Tables 2 and 3 describe the Engineered Controls considered appropriate for the self-implementing option envisioned in this RSR Revision Discussion Draft. Table 2 summarizes several standardized Engineered Control designs that will provide both a sufficient barrier to direct contact with the Urban Soil and protect it from erosion. However, in some situations, existing conditions at a site would be sufficiently similar to the default Engineered Control designs to be allowed to be used in place of new constructed measures. Table 3 presents descriptions of these existing cover conditions that would also qualify as a self-implementing Engineered Control. In concept, these existing conditions are substantially similar to those required for new construction, described in Table 2; however, they will typically lack the warning layer. As a result, they would be subject to a higher frequency for inspection and a higher surety.

Additional information regarding conceptual regulation language for self-implementing Engineered Controls are provided in the Wave 2 discussion document on that topic found at http://www.ct.gov/deep/lib/deep/site_clean_up/remediation_regulations/discussiondraft_ec.pdf Inconsistencies between the default designs presented in that document and this one will be addressed once comments have been received.

Alternative designs for Engineered Controls may be requested, but would not be self-implementing, and so such designs would be subject to the standard review and approval process by the Department.

To ensure the Urban Soil is not disturbed and the Engineered Control is properly maintained and not otherwise disturbed, in many cases a Deed Notice / Activity and Use Limitation (Notice AUL) could be placed on the Urban Soil release area, rather than a full Environmental Land Use Restriction (ELUR). Presently, the statutory language in Public Act 13-308 authorizing the AUL limits its use to cases where concentrations do not exceed ten times the DEC, however in many cases the Urban Soil will exceed ten times DEC.

- Public input is welcome regarding whether it is preferable to require such sites to continue to be subject to an ELUR; whether some increase to that ten times multiplier should be allowed for Notice AULs specifically in the context of Urban Soil as a regulatory change allowable under the language of that statute; or an outright waiver of the AUL multiplier should be used.

PUBLIC NOTICE

Currently, each Engineered Control requires a public notice prior to its approval by the Commissioner. It is presently envisioned that this provision would remain unchanged for the self-implementing option for Engineered Controls.

DISCUSSION DOCUMENT NOT FOR FINAL USE

Table 1
Urban Soil
Constituent of Concern Thresholds

Urban Soil COC List		CT DATA SUMMARY		RSR Criteria		SEH Levels	
Constituent of Concern	**Threshold for Designation as Urban Soil**	**Average of Maximum Detections (8 sites)**	**Maximum Detection**				
All units in mg/kg				RDEC	I/CDEC	RDEC	I/C DEC
PAHs							
Acenaphthene	*50*	*13.9*	*34*	*1,000*	*2,500*	*30,000*	*75,000*
Acenaphthylene	50	12.5	33	1,000	2,500	30,000	75,000
Anthracene	100	36.7	100	1,000	2,500	30,000	75,000
Benzo(a)anthracene	**250**	85.5	210	1	7.8	30.0	234.0
Benzo(a)pyrene	**250**	83.5	280	1	1	30.0	30.0
Benzo(b)fluoranthene	**250**	102.7	300	1	7.8	30.0	234.0
Benzo[k]fluoranthene	**150**	48.0	160	8.4	78	252	2,340
Benzo[g,h,i]perylene	*100*	*49.2*	*190*	*1,000*	*2,500*	*30,000*	*75,000*
Chrysene	***200***	*75.6*	*190*	*84*	*780*	*2,520*	*23,400*
Dibenzo(a,h)anthracene	***40***	*10.9*	*39*	*1*	*1*	*30.0*	*30.0*
Fluoranthene	500	182.2	430	1,000	2,500	30,000	75,000
Fluorene	100	22.8	83	1,000	2,500	30,000	75,000
Indeno(1,2,3-cd)pyrene	***150***	*44.2*	*190*	*1*	*7.8*	*30.0*	*234.0*
2-Methylnaphthalene	*50*	*14.7*	*41*	*474*	*2,500*	*14,220*	*75,000*
Naphthalene	30	11.3	43	1,000	2,500	30,000	75,000
Phenanthrene	400	138.0	360	1,000	2,500	30,000	75,000
Pyrene	500	174.5	410	1,000	2,500	30,000	75,000
Petroleum Hydrocarbons	**4,200**	3,320.0	4,200	500	2,500	Not Applicable	Not Applicable
Metals							
Arsenic	**110**	57.0	107	10	10	300	300
Cadmium	**70**	66.0	380	34	1,000	1,020	30,000
Chromium, total	**600**	209.0	830	100	100	3,000	3,000
Lead	**5,000**	3,669.0	8,900	400	1,000	15,000	30,000
Mercury	**300**	82	283	20	610	600	18,300
Thallium	**10**	NA	9	5.4	160	162	4,800
Other Metals (Present below criteria)							
Antimony	10	NA	9	27	8,200	810	246,000
Barium	2,500	2,058	7,300	4,700	140,000	141,000	4,200,000
Beryllium	1	NA	1	2	2	60	60
Copper	1600	605	1560	2,500	76,000	75,000	2,280,000
Nickel	700	299	650	1,400	7,500	42,000	225,000
Selenium	25	11	24	340	10,000	10,200	300,000
Silver	50	14	50	340	10,000	10,200	300,000
Vanadium	100	76	100	470	14,000	14,100	18,300,000
Zinc	4500	1561	4470	20,000	610,000	600,000	18,300,000

Footnotes for Table 1

1. Shading indicates:

   Above R-DEC

   Above R & I/C DEC

   Above Significant Environmental Hazard reporting limits for RDEC

   Above Significant Environmental Hazard reporting limits for I/C DEC

2. Compounds in *italics* do not have 1996 RSR values. 2008 draft RSR values listed for information only.
3. The presence of additional constituents in soil does not preclude soils from being characterized as urban fill provided results are below applicable RSR criteria and not indicative of a separate AOC release.
4. Hexavalent chromium RSRs listed on table. If hexavalent RSR is exceeded, identification of the actual form of chromium in Site samples is strongly recommended.
5. If Site Urban Soils do not meet the PMC exception of CGS 22a-133-2(c)(4), PMC must be considered and if exceeded the approach discussed in this Urban Soil Guidance Document may not be available.

Table 2
Urban Soil Cover Requirements
Self-Implementing Engineered Control Options
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	Erodible surfaces		***Semi-durable surface***		***Durable surfaces***
Cover Options	Clean soil	Clean soil	Gravel / Stone	Other surfaces	Pavement / Concrete
Specific Uses	Lawns	Trees and shrubs; flower beds; mulch cover; traffic islands	Gravel parking areas; gravel roadways; rip-rap; storm water drainage; retaining walls	Stone or concrete pavers as walkways, courtyards or parking	Bituminous or concrete traffic areas, parking, walkways
Minimum Cover Thickness	9”	18”	9”	9”	3”
DEC Compliant Sub-base	Yes	Yes	Yes	Yes (Reuse of asphalt fragments allowed)	No (Limited to existing Urban Soil and reuse of asphalt fragments)
Warning Layer	Puncture resistant brightly colored warning layer at base	Puncture resistant brightly colored warning layer at base. Warning layer below root balls must be suitable as a root barrier.	Brightly colored warning layer at base	Brightly colored warning layer	Brightly colored warning layer
Cover Layer Details	2” to 3” top soil overlying DEC-compliant soil, a minimum of 9" thickness combined. A turf management plan is required. Clean corridors would be needed for deeper irrigation systems.	A landscaping soil management plan is required. A covering of landscaping stone, wood chips, and/or bark mulch are allowed as a substitute for DEC-compliant soil.	Stone or gravel surface over appropriate sub-base or other DEC-compliant soil. Specifications of cover and method of application must be provided.	Durable surface such as pavers; over appropriate sub-base or other DEC-compliant soil (minimum 9" thickness combined); depth of warning layer in relation to sub-base is flexible	Minimum 3" bituminous concrete or concrete; over minimum 6 inches of suitable sub-base; depth of warning layer in relation to sub-base is flexible
Maintenance Plan	Inspection annually (spring) and after significant storm events; Annual reporting	Inspection annually (spring) and after significant storm events; Annual reporting	Inspection annually (spring) and after significant storm events; Annual reporting	Inspection annually (spring); Annual reporting	Inspection annually (spring); Annual reporting

Table 3

Urban Soil Cover Requirements
Existing Conditions Providing Sufficient Protection
Self-Implementing Engineered Control Options
DISCUSSION DOCUMENT NOT FOR FINAL USE

	Erodible surfaces		***Semi-durable surfaces***		***Durable surfaces***
Cover Options	Clean soil	Clean soil	Gravel / Stone	Other surfaces	Pavement / Concrete
Specific Uses	Lawns	Trees and shrubs, flower beds, mulch cover, traffic islands	Gravel parking areas, gravel roadways, rip-rap, stormwater drainage, retaining walls	Stone or concrete pavers as walkways, courtyards or parking	Bituminous or concrete traffic areas, walkways, parking [1]
Minimum Cover Thickness	12”	18"	9"	9"	3"
Cover Layer Details	DEC-compliant soil. A turf management plan is required.	DEC-compliant soil (landscaping stone, wood chips, and/or bark mulch are allowed as a substitute for soil). A landscaping soil management plan is required.	Minimum 1” dia. gravel	DEC-compliant sub-base (Reuse of asphalt fragments allowed)	Minimum 3" bituminous concrete or concrete in good condition over suitable sub-base totaling a minimum of 9 inches (Sub-base may consist of Urban Soil or asphalt fragments)
Maintenance Plan	Inspection quarterly and after significant storm events. Annual reporting.	Inspection quarterly and after significant storm events. Annual reporting.	Inspection quarterly and after significant storm events. Annual reporting.	Inspection quarterly and after significant storm events. Annual reporting	Semi-annual inspection. Annual reporting

Notes: 1 Unpaved, existing traffic islands must meet “Erodible Surfaces” cover option requirements.

APPENDIX A
Table 1 of 2
Urban Soil
Constituent of Concern Data Survey
DISCUSSION DOCUMENT NOT FOR FINAL USE

Urban Soil Proposed COC List						CT DATA SUMMARY		Waterbury 1			Stamford 1			East Hartford 1			New Haven Fill-1			Middletown-1			Hartford Site-1			New London-1			Bridgeport Urban Fill - 1		
Compounds of Concern	RSR Criteria (see note 1)		SEH Levels		Suggested Thresholds	Ave of Maxes (8 sites)	Max of Maxes	Approx 62 PAHs, 10 ETPH, 30 to 83 metals			49-78 metals 29 PAH 25 ETPH			58 PAHs, 49 metals, 56 ETPH			43 PAH, 18 to 56 Metals			Soil & Ash - 334 PAHs, 22 to 57 metals			77 PAH, 12-56 metals			61 PAHs, 34 ETPH, 58 - 61 Metals			64 PAH, 59 ETPH, 28 - 51 Metals		
PAHs	RDEC	I/CDEC	RDEC	I/C DEC				mean	95% UCL	max	mean	95% UCL	max	mean	95% UCL	max	mean	95% UCL	max	mean	95% UCL	max	mean	95% UCL	max	mean	95% UCL	max	mean	95% UCL	max
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg																									
Acenaphthene	*1,000*	*2,500*	*30,000*	*75,000*	50	13.9	34	0.2	0.2	4.1	0.2	0.2	2.8				2.6	3.7	34.0				0.3	0.3	8.0	1.4	2.2	20.0	1.5	0.4	14.0
Acenaphthylene	1,000	2,500	*30,000*	75,000	50	12.5	33	0.2	0.2	3.0	0.2	0.2	0.9				3.9	11.5	33.0	0.8	0.6	18.7	0.2	0.2	0.8	1.8	2.6	24.0	1.5	0.6	6.9
Anthracene	1,000	2,500	*30,000*	75,000	100	36.7	100	0.3	0.7	31.0	0.4	0.5	2.2				9.7	40.1	100.0	0.7	0.4	18.7	0.5	0.4	14.0	0.0	5.3	58.0	2.4	1.2	32.0
Benzo(a)anthracene	1	7.8	30.0	234	**250**	85.5	210	1.4	4.0	210.0	0.9	1.9	7.0	0.9	1.3	5.4	22.2	112.2	210.0	2.0	1.8	47.0	0.8	0.8	22.0	10.4	17.5	140.0	3.7	6.3	39.0
Benzo(a)pyrene	1	1	30.0	30	**300**	83.5	280	1.5	5.1	280.0	0.9	1.8	5.8	1.1	1.4	6.2	19.3	85.5	190.0	1.7	1.8	36.8	0.7	0.8	14.0	7.2	12.4	100.0	3.7	6.3	30.0
Benzo(b)fluoranthene	1	7.8	30	234	**300**	102.7	300	2.4	5.7	300.0	1.0	2.4	6.8	1.3	1.8	8.5	25.1	126.6	250.0	2.3	2.6	49.3	0.8	0.8	15.0	9.8	18.1	160.0	3.8	7.8	26.0
Benzo[k]fluoranthene	8.4	78	252	2,340	**175**	48.0	160	0.8	2.3	120.0	0.7	1.1	4.8	0.6	0.8	3.4	17.7	78.1	160.0	0.9	0.8	17.2	0.4	0.4	5.0	3.8	6.3	47.0	3.2	4.7	24.0
Benzo[g,h,i]perylene	*1,000*	*2,500*	*30,000*	*75,000*	200	49.2	190	1.0	3.5	190.0	0.5	1.0	3.4				5.5	14.9	50.0	0.8	0.7	15.2	0.6	0.6	10.0	3.1	5.0	54.0	2.3	2.5	18.0
Chrysene	*84*	*780*	*2,520*	*23,400*	**200**	75.6	190	1.6	3.7	190.0	1.0	2.1	7.5	1.0	1.4	6.3	19.5	88.9	180.0	2.3	2.4	51.2	0.8	0.8	21.0	8.6	15.7	110.0	4.3	8.8	35.0
Dibenzo(a,h)anthracene	*1*	*1*	30	30	**40**	10.9	39	0.3	0.5	19.0	0.2	0.2	0.9	0.2	0.3	1.4	3.5	6.8	39.0	0.3	0.3	3.8	0.2	0.2	2.8	1.2	2.1	15.0	1.5	0.5	5.1
Fluoranthene	1,000	2,500	*30,000*	75,000	500	182.2	430	3.6	8.1	430.0	2.3	8.0	15.0				46.2	281.7	420.0	4.1	4.9	10.2	1.6	1.8	42.0	14.1	27.7	250.0	7.8	12.9	100.0
Fluorene	1,000	2,500	*30,000*	75,000	100	22.8	83	0.2	0.2	3.0	0.2	0.2	0.9				4.7	8.8	83.0	0.7	0.3	18.3	0.3	0.3	8.4	2.3	2.9	30.0	1.6	0.5	16.0
Indeno(1,2,3-cd)pyrene	*1*	*7.8*	30	*234.0*	**200**	44.2	190	1.2	3.6	190.0	0.5	0.7	2.8	0.7	1.0	4.9	5.8	16.4	47.0	0.9	0.8	17.5	0.5	0.5	7.8	3.8	5.9	63.0	2.4	2.9	17.0
2-Methylnaphthalene	*474*	*2,500*	*14,220*	*75,000*	50	14.7	41										2.7	3.8	41.0	0.2	0.2	3.8	0.2	0.2	0.2	0.8	2.0	6.8	1.3	0.3	7.0
Naphthalene	1,000	2,500	*30,000*	75,000	50	11.3	43	0.2	0.2	3.2	0.1	0.1	0.4				2.8	4.1	43.0	0.2	0.2	3.8	0.2	0.2	4.9	0.8	1.5	10.5	0.5	0.4	13.0
Phenanthrene	1,000	2,500	*30,000*	75,000	400	138.0	360	1.8	3.0	130.0	1.2	2.9	9.3				35.5	249.0	360.0	3.0	1.9	85.8	1.4	1.1	48.0	11.7	15.3	210.0	6.2	6.4	120.0
Pyrene	1,000	2,500	*30,000*	75,000	500	174.5	410	3.5	7.7	410.0	1.3	3.4	9.9				37.5	217.0	350.0	4.0	4.4	99.1	1.5	1.6	39.0	14.8	32.2	220.0	7.1	16.6	86.0
Petroleum Hydrocarbons	500	2,500	*N/A*	N/A	**4200**	3320	4200			900	377	676	3800	345	480	1900	670	2831	3400							347.0	1933.0	4200.0	229.0	747.0	2400.0
Metals	mg/kg	mg/kg	mg/kg	mg/kg																											
Antimony	27	8,200	810	246,000	10	NA	9																			1.3	2.5	8.8			
Arsenic	10	10	300	300	**110**	57	107	9.8	16.0	91.0	9.6	15.0	76.0	6.0	8.9	51.0	2.5	3.0	17.0	9.0	10.1	107.0	4.2	5.0	40.0	6.4	7.5	42.9	8.6	12.3	34.5
Barium	4,700	140,000	141,000	4,200,000	**7500**	2058	7300	101.8		260.0	395.4		2300.0				58.5		230.0	156.5		1140.0	696.4		7300.0	171.2		1117.9			
Beryllium	2	2	60	60	1	NA	1																			0.4	0.4	0.9			
Cadmium	34	1,000	1,020	30,000	**380**	66	380	16.3	3.6	380.0	5.9	12.0	27.0				0.6		1.2	0.7	0.7	5.5	1.1		5.5	0.7	0.9	3.2	3.3	3.4	38.9
Chromium, total	100	100	3,000	3,000	**850**	209	830	8.4	9.0	17.0	45.5	56.0	360.0				6.8		14.0	13.2	14.7	27.4	86.1		830.0	10.1	11.0	35.9	18.6	23.3	182.0
Copper	2,500	76,000	75,000	2,280,000	1600	605	1560										26.5		252.0	33.2		258.0	56.9		440.0	72.2		516.0	160.9		1560.0
Lead	500	1,000	15,000	30,000	**9000**	3669	8900	161.3	524.0	1500.0	906.7	2287.0	8900.0	384.0	611.0	4900.0	215.8	597.0	2100.0	278.0	485.0	3590.0	112.8	191.0	670.0	627.0	2164.0	4510.0	176.7	823.0	3180.0
Mercury	20	610	600	18,300	**300**	82	283	10.9		140.0	0.8		6.6				0.1		0.1	0.3		3.7	0.2		0.6	7.0		283.0	16.9		141.0
Nickel	1,400	7,500	42,000	225,000	700	299	650	53.4		650.0							4.0		4.0	10.2		13.3	56.8		510.0	7.5		19.8			
Selenium	340	10,000	10,200	300,000	25	11	24	1.4		8.3	1.3		9.3				24.0		24.0	0.0		3.0	2.3		15.0	2.0		9.0			
Silver	340	10,000	10,200	300,000	50	14	50	3.3		50.0	1.4		14.0				1.0		1.0	0.4		2.9	1.2		2.0	0.5		15.4			
Thallium	5.4	160	162	4,800	**10**	NA	9																			1.6	3.2	9.0			
Vanadium	470	14,000	14,100	420,000	100	76	100				31.5		100.0													15.4		34.3	31.9		95.1
Zinc	20,000	610,000	600,000	18,300,000	4500	1561	4470										68.4		447.0	178.5		949.0	184.5		800.0	184.8		1140.0	409.6		4470.0

APPENDIX A
Table 2 of 2
Urban Soil
Constituent of Concern Data Survey
DISCUSSION DOCUMENT NOT FOR FINAL USE

Urban Fill Proposed COC List						CT DATA SUMMARY		NYS DOH Buffalo Study				MassDEP Technical Update (see note 2)				NJ Title 7		Illinois Title 35	
Compounds of Concern	RSR Criteria (see note 1)		SEH Levels		Work Group Suggested Thresholds	Ave of Maxes (8 sites)	Max of Maxs	Seneca-Babcock		Mineral Springs		Urban Soil (90%ile)	95%ile max	coal/wood ash max	Natural Soil	Ave	Max	Chicago Bkgd	MSA Bkgd
PAHs	RDEC	I/CDEC	RDEC	I/C DEC				Min	Max	Min	Max								
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg														
Acenaphthene	*1,000*	*2,500*	*30,000*	*75,000*	50	13.9	34	0.0	0.5	0.0	0.5	2.0	4.1	42.0	0.5				
Acenaphthylene	1,000	2,500	*30,000*	75,000	50	12.5	33	0.0	0.6	0.0	0.1	1.0	1.9	10.0	0.5				
Anthracene	1,000	2,500	*30,000*	75,000	100	36.7	100	0.0	1.6	0.0	0.9	4.0	10.0	130.0	1.0				
Benzo(a)anthracene	1	7.8	30.0	234	**250**	85.5	210	0.3	7.7	0.1	3.4	9.0	19.0	796.0	2.0	1.4	160.0	1.1	1.8
Benzo(a)pyrene	1	1	30.0	30	**250**	83.5	280	0.3	6.9	0.1	3.1	7.0	17.0	230.0	2.0	1.9	120.0	1.3	2.1
Benzo(b)fluoranthene	1	7.8	30	234	**250**	102.7	300	0.3	7.0	0.2	3.9	8.0	18.0	270.0	2.0	1.9	110.0	1.5	2.0
Benzo[k]fluoranthene	8.4	78	252	2,340	**150**	48.0	160	0.3	6.3	0.1	2.4	4.0	9.7	150.0	1.0	1.8	93.0	1.0	1.7
Benzo[g,h,i]perylene	*1,000*	*2,500*	*30,000*	*75,000*	100	49.2	190	0.3	6.0	0.1	3.1	**3.0**	7.7	77.0	1.0				
Chrysene	*84*	*780*	*2,520*	*23,400*	**200**	75.6	190	0.5	8.2	0.2	3.9	7.0	18.0	420.0	2.0				
Dibenzo(a,h)anthracene	*1*	*1*	30	30	**40**	10.9	39	0.0	0.8	0.2	0.4	1.0	2.1	39.0	0.5	1.2	25.0	0.2	0.4
Fluoranthene	1,000	2,500	*30,000*	75,000	500	182.2	430	0.7	18.0	0.2	6.7	10.0	33.0	490.0	4.0				
Fluorene	1,000	2,500	*30,000*	75,000	100	22.8	83	0.1	1.4	0.0	0.5	2.0	5.5	79.0	1.0				
Indeno(1,2,3-cd)pyrene	*1*	*7.8*	30	*234.0*	**150**	44.2	190	0.3	6.3	0.1	2.8	3.0	7.0	130.0	1.0	1.4	67.0	0.9	1.6
2-Methylnaphthalene	*474*	*2,500*	*14,220*	*75,000*	50	14.7	41	0.0	5.7	0.0	0.3	1.0	2.2	13.0	0.5				
Naphthalene	1,000	2,500	*30,000*	75,000	30	11.3	43	0.1	4.2	0.0	0.0	1.0	3.0	28.0	0.5				
Phenanthrene	1,000	2,500	*30,000*	75,000	400	138.0	360	0.0	12.0	0.1	4.4	20.0	38.0	480.0	3.0				
Pyrene	1,000	2,500	*30,000*	75,000	500	174.5	410	0.6	14.0	0.2	7.1	20.0	35.0	440.0	4.0				
Petroleum Hydrocarbons	500	2,500	*N/A*	N/A	**4200**	3320.0	4200.0	NR	NR	NR	NR								
Metals	mg/kg	mg/kg	mg/kg	mg/kg															
Antimony	27	8,200	810	246,000	10	NA	9	60.0	60.0	ND	ND	7.0	12.0	160.0	1.0				
Arsenic	10	10	300	300	**110**	57	107	6.0	97.0	4.9	18.0	20.0	24.5	99.0	20.0	13.2	1098.0		
Barium	4,700	140,000	141,000	4,200,000	2500	2058	7300					50.0	89.3	680.0	50.0				
Beryllium	2	2	60	60	1	NA	1	0.6	2.0	0.5	1.1	0.9	2.0	7.5	0.4	1.2	80.0		
Cadmium	34	1,000	1,020	30,000	**70**	66	380	2.0	8.0	2.0	4.0	3.0	5.0	25.0	2.0	11.2	510.0		
Chromium, total	100	100	3,000	3,000	**600**	209	830	26.0	126.0	28.0	53.0	40.0	50.0	530.0	30.0				
Copper	2,500	76,000	75,000	2,280,000	1600	605	1560					200.0	320.0	5300.0	40.0				
Lead	500	1,000	15,000	30,000	**5000**	3669	8900	168.0	2520.0	58.0	609.0	600.0	1100.0	11000.0	100.0	574.0	10700.0		
Mercury	20	610	600	18,300	**300**	82	283					1.0	2.6	23.0	0.3				
Nickel	1,400	7,500	42,000	225,000	700	299	650					20.0	70.0	220.0	20.0				
Selenium	340	10,000	10,200	300,000	25	11	24					1.0	2.1	57.0	0.5				
Silver	340	10,000	10,200	300,000	50	14	50					5.0	7.3	81.0	0.6				
Thallium	5.4	160	162	4,800	**10**	NA	9	NR	NR	NR	NR	5.0	5.0	50.0	0.6				
Vanadium	470	14,000	14,100	420,000	100	76	100					30.0	38.5	46.6	30.0				
Zinc	20,000	610,000	600,000	18,300,000	4500	1561	4470					300.0	590.0	5000.0	100.0	575.0	10900.0		

Footnotes for Appendix A

1. Compounds in italics do not have 1996 RSR values. 2008 draft RSR values listed for information only.
2. Mass DEP urban fill is coal/wood ash containing. Urban fill column – data from CDM study (90th percentile values. Max values up to five sources – highest value selected (generally CA/T).
3. The presence of additional constituents in soils does not preclude soils from being characterized as Urban Soil provided results are below applicable RSR criteria and not indicative of a separate AOC release.
5. Hexavalent chromium RSRs listed on table. If hexavalent RSR is exceeded, identification of the actual form of chromium in the site samples is strongly recommended.
6. Shading indicates:

   Above R-DEC

   Above R & I/C DEC

   Above Significant Environmental Hazard reporting limits for RDEC

   Above Significant Environmental Hazard reporting limits for I/C DEC

7. If site Urban Soils do not meet the PMC exception of CGS 22a-133k-2(c)(4), PMC must be considered and if exceeded the approach discussed in this Urban Soil Discussion Document may not be available.
8. 95% UCL calculated using Students' t-test. Other methods are expected to provide relatively similar (order of magnitude) results.