

**A SURVEY OF REGULATIONS USED TO CONTROL THE USE
AND DISPOSAL OF STORMWATER POND SEDIMENTS
IN THE UNITED STATES AND CANADA**

by

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TABLE OF CONTENTS

Acknowledgements	ii
List of Tables	iv
I. INTRODUCTION	1
II SURVEY PROCEDURE	2
III. SURVEY RESULTS	
A. Summary	3
B. Agency Specific	
1. General	4
2. California	4
3. Delaware	4
4. Florida	4
5. Georgia	5
6. Iowa	5
7. Kansas	5
8. Kentucky	6
9. Maryland	6
10. Minnesota	7
11. Mississippi	7
12. Montana	7
13. Nebraska	7
14. Nevada	8
15. New Jersey	8
16. New Mexico	8
17. New York	9
18. North Dakota	9
19. Oklahoma	9
20. Pennsylvania	9
21. South Carolina	10
22. South Dakota	11
23. Tennessee	11
24. Utah	11
25. Washington	11
26. West Virginia	11
27. Wyoming	12
28. Alberta	12
29. Ontario	12
30. Quebec	14
31. Saskatchewan	14
IV. Discussion and Conclusions	14
References	15
Appendix	18

LIST OF TABLES

	page
1. SUMMARY OF REPORTED POND SEDIMENT DATA	2
2. SUMMARY OF SURVEY RESULTS	3
3. FLORIDA CHEMICAL CRITERIA FOR BENEFICIAL USE	5
4. MARYLAND CLASSIFICATION OF STORMWATER HOTSPOTS	7
5. PENNSYLVANIA CLEAN FILL CONCENTRATION LIMITS FOR METALS AND INORGANICS	10
6. WASHINGTON LIMITS FOR UNRESTRICTED USE OF POND SEDIMENTS	12
7. ONTARIO SEDIMENT GUIDELINES FOR METALS AND NUTRIENTS	13

I. INTRODUCTION

The USEPA's most recent evaluation of the nation's water bodies found that 35% of stream miles and 45% of lake-area were impaired. Although agricultural activities were found to be the major source of impairment, urban runoff accounted for approximately 32,000 miles of stream and 930,000 acres of lake impairment.¹ It is clear that, although urban runoff is not the major source of water quality impairment from a national perspective, it certainly does produce local impacts. As a result, communities use a variety of management practices to mitigate the impacts of urban runoff.

The stormwater pond is perhaps the most common structural management practice used to control and/or treat urban stormwater discharges. Although a pond and its associated buffer can require 2% to 4% of the area available for development, it is popular with both developers and governmental agencies for a number of reasons. Ponds provide open space, esthetic quality, wildlife habitat, and require little maintenance. In fact, EPA has identified a number of case studies where properties, located near or within sight of a wet pond, generated rent/sell premiums of 10% to 150%.² With the implementation of EPA's phase I and II rules for separate storm sewer systems, it is anticipated that use of stormwater ponds, along with other structural and nonstructural approaches, will continue to expand.

Removal of accumulated sediment is the primary long-term maintenance activity for stormwater ponds. Relatively high sediment loads are expected during the period required for build-out of a typical development. After removing this initial sediment load, solids may accumulate in the pond for many years. The Minnesota Pollution Control Agency (MPCA) recommends that ponds should be constructed with approximately 25 years of sediment storage.³ The Wisconsin Department of Natural Resources (WDNR), on the other hand, recommends that sediment should be removed every 5 to 10 years.⁴ In any case, pond cleaning is conducted on an infrequent basis and there is a dearth of local data on the quantity and quality of the sediment that is removed. In fact, WDNR found that the long-term accountability for pond maintenance was often difficult to determine.

A recent MCES literature review summarized available sediment data, which illustrated significant variability in the concentration of metals and nutrients.⁵ The concentration ranges are summarized in TABLE 1 along with sludge data from treatment plants operated by the Metropolitan Council Environmental Services (MCES). It should be noted that, with the exception of copper and lead, the metal content of sludge generated at wastewater treatment facilities and pond sediment are similar. Pond sediments appear to have significantly higher lead concentrations but lower copper concentrations.

Typical reported urban runoff loadings (kg solids per hectare per year) fall in the range of 400 for high density residential⁶ up to 12,000 for highways⁷. Recent sediment excavation data collected by the Minnehaha Creek Watershed District for four ponds found volumetric yields in the range of 0.1 to 0.65 cubic yard per acre per year.⁸ At an assumed dry bulk density of 2,000 lb per cubic yard, the runoff loadings fell in the range of approximately 200 to 1,450 kg per hectare per year.

Assuming a runoff loading of 400 kg/ha/yr and a solids capture rate of 80%, a pond with a one square mile residential watershed would accumulate approximately 90 tons of dry solids per year. Although 90 tons of dry solids are not a major issue in terms of materials handling, consider the sediment generated in a moderate sized city of 10,000 with a population density of 500/mi² (approximate density for Mpls/St Paul in 1990⁹). If all of the surface runoff in this city of 20 square miles is routed through ponds, this city would generate approximately 1,800 tons of sediment per year. If the sediment was allowed to accumulate for 10 years, the dredging and disposal project (18,000 tons of dry solids) would certainly be significant – both in terms of materials handling and potential environmental impact. Given that actual sediment yields will be a function of impervious area, soil type and slope, commercial and industrial development, etc., it is acknowledged that this estimate may not be appropriate for planning purposes. It does, however, illustrate the magnitude of the potential problems associated with sediment accumulation in stormwater ponds.

Because of the potential environmental impact associated with the dredging and disposal of accumulated stormwater pond sediments, it was decided to contact US state and Canadian provincial environmental agencies and ask if/how they regulated pond sediments.

TABLE 1. SUMMARY OF REPORTED POND SEDIMENT DATA

Constituent	Concentration Range mg/kg dry	MCES Sludge Range mg/kg dry¹⁰
Arsenic	1.3 – 75	3.2 – 33
Cadmium	0.4 – 30	2 – 6
Chromium	7 – 817	
Copper	2 – 310	368 – 1,635
Lead	2 – 1,280	11 – 146
Nickel	3 – 300	16 – 162
Zinc	29 – 3,170	283 – 3,507
Mercury	0.03 – 8	0.2 – 6.9
PCB	0.04 – 1	< 0.2 – 0.33
Total Phosphorus	725 - 1,790	
Total Kjeldahl Nitrogen	1,370 – 13,990	

II. SURVEY PROCEDURE

The points of contact for the 48 contiguous states and six southern Canadian provinces were obtained from the web sites for their respective environmental agencies. For each of the 54 environmental agencies, it was attempted to identify the organizational unit that was responsible for urban nonpoint sources. A simple questionnaire was prepared and mailed to that organizational unit on July 6, 2004. Approximately two months later, a reminder was mailed to those agencies that had not yet responded. Examples of the questionnaire and cover letters are presented in the Appendix.

Approximately one-third of the surveys required follow-up communications to obtain additional information. Most of the survey respondents provided their agencies'

regulations by providing a web site. In many cases, however, a request was made to provide a document-specific address.

III. SURVEY RESULTS

A. Summary

As of November 15, 2004 a total of 30 environmental agencies returned completed questionnaires – 26 states and 4 provinces. Unfortunately, not all of the replying agencies answered all of the questions. The agencies’ responses are summarized in TABLE 2. Only 6 of the 30 agencies specifically regulate sediment disposal and/or use. The placement of fill material is regulated by 14 of the 30 agencies and the fill regulations apply to sediments in at least 12 of the states and provinces. Other control mechanisms exist to control sediment disposal and/or use in 13 of the 30 jurisdictions.

TABLE 2. SUMMARY OF SURVEY REPLIES

State	Regulate Sediment Specifically	Fill Regulations	Fill Regulations Apply to Sediment	Other Control Mechanism
California	NO	NO		NO
Delaware	NO	YES	YES	NO
Florida	YES	YES	YES	YES
Georgia	NO	NO		NO
Iowa	NO	NO		NO
Kansas	NO	NO		YES
Kentucky	NO	YES	YES	?
Maryland	YES	YES	YES	YES
Minnesota	YES	YES	YES	YES
Mississippi	NO	YES	NO	YES
Montana	NO	NO		NO
Nebraska	NO	NO		YES
Nevada	NO	NO		NO
New Jersey	NO	YES	YES	YES
New Mexico	YES	YES	YES	YES
New York	YES	YES	YES	NO
North Dakota	NO	NO		YES
Oklahoma	NO	NO		NO
Pennsylvania	NO	YES	YES	YES
South Carolina	NO	NO		NO
South Dakota	NO	NO		YES
Tennessee	NO	YES	?	NO
Utah	NO	NO		NO
Washington	YES	YES	YES	NO
West Virginia	NO	YES	YES	NO
Wyoming	NO	NO		NO
Province				
Alberta	NO	NO		NO
Ontario	NO	YES	YES	YES
Quebec	NO	NO		NO
Saskatchewan	NO	NO		YES

B. Agency Specific

1. General

The following paragraphs provide limited descriptions of the tools that state and provincial agencies have available to them to regulate sediment use and/or disposal. For those agencies, which supplied access to regulations, it appears that pond sediment falls within the definition of a solid waste. In those cases, the general provisions of the solid waste rules (not to pollute) could be used to control sediment handling and disposal/use. Several state and provincial agencies have promulgated specific rules addressing the disposal and use of sediments and fill materials. Their approaches are summarized and references are provided for specific rules, guidelines, and manuals when they were made available.

2. California

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

3. Delaware

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	YES	YES	NO

The Delaware Sediment and Stormwater Regulations require that approval of the Department of Natural Resources and Environmental Control (DNREC) be obtained prior to any land change or construction activity. Since depositing fill on land is defined as a “land disturbing activity” the DNREC has jurisdiction over the disposal and/or use of sediments. The same regulations require that an area adjacent to each pond be set aside for sediment disposal. That area must be sufficient to accept sediment equal to 2% of the basin volume, when the fill depth is one foot.¹¹

4. Florida

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
YES	YES	YES	YES

Florida Administrative Code (FAC) chapter 62-343.050 requires that the construction, operation, and maintenance of all stormwater management systems be governed by permit(s) issued by the Department of Environmental Protection (FDEP).¹² The FDEP recently developed a set of guidelines for the disposal of street sweepings, catch basin sediments, and stormwater pond sediments.¹³ The guidelines address both disposal and beneficial use and are based on the expectation that the sediments *are not contaminated by petroleum products or other hazardous chemicals such as might occur as a result of a spill or the cleanup of a spill.*

Dewatered stormwater sediments from non-industrial areas can be disposed of in Class I and II landfills (lined) or in Class III landfills (unlined). Dewatered sediments from industrial stormwater systems are limited to Class I or II landfills unless specifically approved by the FDEP for a Class III landfill. Dewatered sediments from non-industrial stormwater systems can be used for initial cover at Class I, II, or III landfills if the

material meets the normal requirements for cover material. This material may also be used in road construction and maintenance.

Dewatered sediment from non-industrial areas may be beneficially used in nonresidential areas as construction or industrial fill or soil amendment provided that: [1] the benzo(a)pyrene in the material *will not cause a significant threat to public health or the environment as managed*, [2] the sediment is not used within 200 feet of a potable well, [3] the sediment is not deposited below the water table or in bodies of water, and [4] the projects are under the control of the generator of the sediment.

For all other beneficial uses, it must be demonstrated that the sediment meets specified chemical criteria as illustrated in TABLE 3. If these criteria are met, the material may have unlimited distribution.

Sediments from industrial stormwater systems may not be beneficially used without prior approval from the FDEP.

TABLE 3. FLORIDA CHEMICAL CRITERIA FOR BENEFICAL USE

Parameter	Total Concentration - mg/kg	Leach Concentration* – mg/l
4-4 DDT	NA	0.000065
Aluminum	NA	0.52
Arsenic	0.722	0.0036
Barium	13.25	NA
Benzo(a)pyrene	0.1	NA
Beta-BHC	NA	0.000055
Chromium	7.5	NA
Copper	12.59	NA
Iron	NA	0.41
Lead	10.63	0.0037

*Synthetic Precipitation Leaching Procedure, EPA Method 1312

5. Georgia

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

6. Iowa

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

7. Kansas

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		YES

The survey response referenced Kansas stature 65-164 which provides that if the Secretary of the Department of Health and Environment finds that any waters of the state have been or are being polluted in a manner prejudicial to the health of any of the inhabitants of the state, the Secretary has the authority to order the pollution to stop within a reasonable time.¹⁴

8. Kentucky

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	YES	YES	YES

Sediments removed from stormwater ponds are considered to be solid waste and are addressed by the general provisions of the solid waste regulations. Specifically, the placement of pond sediments must comply with Kentucky Administrative Regulations 401KAR 47:030 and 401 KAR 47:150^{15, 16}

When the sediments are beneficially used as fill material (filling and leveling of land to improve the property for development) or spread for nutrient value, the activities may be conducted as permit-by-rule without further permission from the State. The referenced KAR are narrative in nature but do establish specific limits for contamination of an underground drinking water source which may not be exceeded. In addition, limits are established for cadmium when pond sediment is applied to land used for food chain and tobacco crops. The annual application of cadmium may not exceed 0.44 pounds per acre and the maximum cumulative application varies from 4.46 to 17.84 pounds per acre depending on soil pH and cation exchange capacity. Finally, materials with a PCB concentration greater than 1 mg/kg (dry weight basis) may not be applied to land. Permitted landfills, however, may dispose of materials with PCB concentrations as high as 49 mg/kg (dry weight basis).

9. Maryland

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
YES	YES	YES	YES

Sediments removed from stormwater ponds are addressed in the *2000 Maryland Stormwater Design Manual Volumes I & II*¹⁷. Sediment removal from a stormwater pond forebay is required when 50% of the forebay capacity has been lost. Sediment removal and disposal are considered to be normal maintenance and must be addressed in the local permitting process. All sediments removed from stormwater ponds must be handled as per Maryland erosion and sediment control regulations. These regulations (Title 26, Subtitle 17, Chapter 01¹⁸), in turn incorporate a 1994 design manual which, at a minimum, requires that sediments be placed in an area not subject to further erosion.¹⁹

If the stormwater pond treats flow from a “hotspot”, sediment testing may be required prior to disposal. Maryland has developed a list of 11 categorical land use hotspots as summarized in TABLE 4.¹⁷

In addition to six of the hotspot categories, golf courses and commercial nurseries may also be required to implement a stormwater pollution prevention plan. Other land uses and/or activities may be designated a hotspot by an appropriate review authority. Typical residential and commercial developments are not considered to be hotspots.

TABLE 4. MARYLAND CLASSIFICATION OF STORMWATER HOTSPOTS

Vehicle salvage yards and recycling facilities*
Vehicle service and maintenance facilities*
Vehicle and equipment cleaning facilities*
Fleet storage areas (bus , truck, etc)*
Industrial sites – see Appendix D.6 of Design Manual for specifics
Marinas (service and maintenance)*
Outdoor liquid container storage
Outdoor loading and unloading facilities
Public works storage areas
Facilities that generate and/or store hazardous materials*
Commercial container nurseries

* stormwater pollution prevention plan required

10. Minnesota

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
YES	YES	YES	YES

The Minnesota Pollution Control Agency (MPCA) regulates the disposal of dredged material via the State Disposal System permit program and sediments removed from stormwater ponds are considered to be dredged materials.

The MPCA design manual²⁰ recommends that ponds be designed to hold between 5 and 25 years of sediment accumulation and that sediment disposal be provided on-site whenever possible. Dewatered sediments can be used as daily cover on landfills, *although the MPCA prefers that they be used as cover on lined areas of permitted sanitary landfills or demolition landfills that have ground-water-monitoring systems.* Although individual counties may have additional restrictions, the MPCA considers upland areas acceptable for sediment disposal as long as human contact with the sediment will be avoided.

11. Mississippi

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	YES	NO	YES

In terms of fill regulations, only animal wastes and sewage sludge are regulated. The State, however, does regulate the removal and use/disposal of pond sediments via general provisions that make it unlawful for any person to cause pollution of waters of the state – Mississippi code 49-17-29(2)(a)(Revised 2003).

12. Montana

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

14. Nebraska

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	YES	NO	YES

Unfortunately three different responses to the questionnaire were received. The following is based on comments received and a review of the Department of Environmental Quality (DEQ) rules that were referenced.

If the sediment is not determined to be a hazardous waste, it is regulated as a special waste, which is a solid waste that is different from general municipal solid waste. All special wastes must be placed in a permitted solid waste area unless the DEQ grants prior written approval for an alternate location and/or management method. The placement of fill on land is regulated unless the material is considered to be “beneficial fill”, which is defined as *uncontaminated sand, gravel, stone, soil, rock, brick, concrete rubble, asphalt rubble, or similar material, or some combination thereof, for the purpose of erosion control, erosion repair, channel stabilization, landscaping, road bed preparation or other land improvement.*²¹ If stormwater pond sediment is uncontaminated, its placement would not be regulated. It is not clear, however, how the contaminated vs uncontaminated judgement should be made.

13. Nevada

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

15. New Jersey

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	YES	YES	YES

Stormwater pond sediments, that are not hazardous wastes, are regulated via the Department of Environmental Protection (DEP) solid waste regulations (NJAC 7:26). If sediment is to be managed for beneficial use (landfill cover, aggregate substitute, or fill material) the sediment would have to meet the DEP’s soil cleanup criteria (SCC).²² The SCC addresses a total of 109 elements and compounds for three exposure scenarios – residential direct contact, non-residential direct contact, and impact to groundwater.

In July of 2004, the DEP requested public comment on the draft soil remediation standards that will replace the SCC.²³ The proposed standards address a total of 140 contaminants using exposure scenarios (ingestion, dermal, inhalation) and impact to ground water.²⁴ The proposed numerical standards are summarized by the DEP at http://www.state.nj.us/dep/srp/regs/srs/proposed/master_table.htm.

16. New Mexico

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
YES	YES	YES	YES

The survey response referenced the 170 page solid waste management rule, 20NMAC9.1. It is clear that dredged stormwater pond sediments do fall within the definition of a solid waste.²⁵ However, it is not clear how stormwater pond sediments are specifically regulated or how the placement of fill on land is regulated. Unfortunately, the response did not include the name of a contact at the New Mexico Environment Department.

17. New York

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
YES	YES	YES	NO

The survey response referred to New York Department of Environmental Conservation (NYDEC) rules 360-1.15 and 360-7.1(b) as the basis for specifically regulating stormwater pond sediments. The first reference addresses the beneficial use of solid wastes and lists a number of materials that will not be considered to be solid waste under certain conditions. One of the exemptions reads as follows: *solid wastes which are approved in advance, in writing, by the department for use as daily cover material or other landfill liner or final cover system components pursuant to the provisions of subdivision 360-2.13(w) of this Part when these materials are received at the landfill.*²⁶ (Note that subdivision 360-2.13 addresses the landfill construction requirements including cover materials.) The second reference, 360-7.1(b) addresses exemptions from the permit requirements of the construction and demolition debris landfill section of the rule.²⁷ It identifies types and location of landfills but does not address sediments.

Based on the above, it is not clear how stormwater pond sediments are specifically regulated but it is clear that these sediments are included in the NYDEC definition of solid waste.

The survey response indicated that NYDEC regulates the placement of fill on land and referenced the general provisions of the solid waste rule and the section addressing construction and demolition debris landfills.^{26, 27} Based on a cursory review of the rules, it is not clear how they relate to fill material and sediments.

18. North Dakota

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		Yes

North Dakota does not specifically regulate stormwater pond sediments. The standard conditions in the North Dakota stormwater permit, however, require that any control facility be maintained in good working order so as to minimize the discharge of pollutants.²⁸

19. Oklahoma

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

20. Pennsylvania

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	YES	YES	NO

The Department of Environmental Protection (DEP) defines two general classes of fill material – clean fill and regulated fill. The use of clean fill does not require a solid waste management permit and may be used in an unrestricted manner. Regulated fill, however, must be managed according to the DEP municipal or residual waste regulations. Regulated fill may be beneficially used if the use meets the conditions of the permit.²⁹

The DEP defines a total of 21 metals and inorganic compounds (TABLE 5) along with 320 organic compounds as regulated substances.³⁰ If there is no evidence of a release of a regulated substance, the material may be managed as clean fill. However, if there is evidence of a release, the material must be tested to determine if it qualifies as clean fill. DEP defines the sampling and testing protocols along with statistical tests to interpret the test data.

In addition to the above, DEP can regulate stormwater pond sediments via their dam safety regulations if the pond has a constructed berm. DEP must approve the location and manner of disposing of dredged material.³¹

TABLE 5. PENNSYLVANIA CLEAN FILL CONCENTRATION LIMITS FOR METALS AND INORGAINCS³²

Parameter	Total Analysis - mg/kg dry
Antimony	27
Arsenic	12 or 20♣
Barium and Compounds	8,200
Beryllium	320
Boron and Compounds	6.7
Cadmium	38
Chromium III	190,000
Chromium VI	94
Cobalt	8.1
Copper	8,200
Cyanide – free	200
Lead	450
Manganese	31,000
Mercury	10
Nickel	650
Selenium	26
Silver	84
Thallium	14T
Tin	240
Vanadium	1,500
Zinc	12,000

♣ 12 applies to all releases of arsenic. 20 applies to construction materials not subject to direct contact after construction is completed and must be approved by DEP.

21. South Carolina

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

22. South Dakota

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		YES

The survey response from the South Dakota Department of Environment and Natural Resources stated that they control the use and/or disposal of stormwater pond sediments via the USEPA sludge regulations (40 CFR503) which were adopted by reference into state regulations.

23. Tennessee

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	Yes	YES	NO

The survey response indicated that the Tennessee Department of Environment and Conservation (TDEC) regulates the placement of fill via construction stormwater permits and that the permit does apply to borrow pits and spoil piles. In addition, a review of their general permit for small municipal separate storm sewer systems suggests that TDEC has the authority to regulate the disposal of accumulated sediments because they must approve the proposed operation and maintenance program.³³

24. Utah

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

25. Washington

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
YES	YES	YES	NO

In the state of Washington, pond sediment is considered solid waste and local health departments have primary jurisdiction over solid waste. The Washington Department of Ecology, however, has developed a detailed stormwater management manual that includes recommendations on sediment handling and disposal.³⁴

Recommended limits for unrestricted use of pond sediments and street wastes are based the State’s Model Toxics Control Act Cleanup Regulation Method A (a risk assessment based on a child’s exposure scenario). The limits are found in TABLE G-7 of Volume IV of the manual and are summarized TABLE 6 below.

26. West Virginia

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	YES	YES	NO

Based on a search of the West Virginia Department of Environmental Protection (WVDEP) web site, it appears that the use of stormwater pond sediments is regulated by way of standards established for the beneficial use of materials similar to sewage sludge.³⁵ Limits have been established for the maximum concentration of metals in the material as well as the maximum allowable soil concentrations. The limits are identical to those established for land application of sewage sludge in West Virginia.

TABLE 6. WASHINGTON LIMITS FOR UNRESTRICTED LAND USE OF POND SEDIMENTS

Parameter	Suggested Maximum Value – mg/kg dry
Arsenic	20.0
Cadmium	2.0
Chromium	42
Lead	250
Nickel	100*
Zinc	270
Mercury – inorganic	2.0
PAH – carcinogenic	0.1
TPH – heavy fuel oil	200*
THP – diesel	200*
THP – gasoline	100
Benzene	0.03
Ethylbenzene	6
Toluene	7
Xylenes – total	9

*protection of plants and animals

27. Wyoming

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

28. Alberta

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

29. Ontario

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	Yes	YES	NO

The Ontario Ministry of the Environment (MOE) classifies dredged material, based on the chemical and physical characteristics of the material, into five categories as follows.³⁶

- A. Suitable for open water disposal
- B. Suitable for agricultural/residential/parkland (“urban residential fill”)
- C. Suitable for commercial/industrial (“urban industrial fill”)
- D. Contaminated material requiring disposal at a certified confined disposal facility (dewatering permitted)
- E. Severely contaminated material requiring specialized disposal at a certified confined disposal facility (no dewatering) (“controlled fill” or “hazardous waste”)

The sediment parameters and associated levels of interest are summarized in TABLE 7. Analysis must be conducted for all parameters unless previous data suggests absence of certain parameters. In addition to the metals, nutrients, PCBs and pesticides, the MOE may require analysis for a suite of PAH if there is reason to suspect contamination.

For category A, open water disposal, the limits are a function of the existing conditions at the proposed disposal site. For areas with existing sediment quality equal to or better than the no effect level, the dredged material must not exceed the no effect level. For areas where the existing sediment exceeds the no effect level, the dredged material must be below the lowest effect level. In areas where the existing sediment exceeds the lowest effect level, the decision matrix becomes more complicated and is beyond the scope of this discussion.

TABLE 7. ONTARIO SEDIMENT GUIDELINES FOR METALS & NUTRIENTS
ug/g dry unless otherwise indicated

Material	No Effect Level	Lowest Effect Level	Severe Effect Level*
Arsenic		6	33
Cadmium		0.6	10
Chromium		26	110
Copper		16	110
Iron - %		2	4
Lead		31	250
Manganese	460	1,100	
Mercury		0.2	2
Nickel		120	820
TOC		1	10
TKN		550	4,800
TP		600	2,000
Aldrin		0.002	8
BHC		0.003	12
ABHC		0.006	10
BBHC		0.005	21
GBHC	0.0002	(0.003)	(1)
Chlordane	0.005	0.007	6
DDT (total)		0.007	12
op+pp-DDT		0.008	71
pp-DDD		0.008	6
pp-DDE		0.005	19
Dieldrin	0.006	0.002	91
Endrin	0.0005	0.003	130
HCB	0.01	0.02	24
Heptachlor	0.0003		
H epoxide		0.005	5
Mirex		0.007	130
PCB (total)	0.01	0.07	530

Notes:

() denotes tentative guidelines.

* Numbers in this column are to be converted to bulk sediment values by multiplying by the actual TOC concentration in the sediments (to a maximum of 10%) prior to comparing with limits. For a TOC value of 5% and a total PCB of 30 ug/g, the limit is $530 \times 0.05 = 26.6$ ug/g.

Based on follow up communication with a MOE representative, it appears that the criteria for categories B through E were never formally adopted, however, information on the approach was supplied as follows.³⁷ Category B (urban residential) fill was to be

regulated based on criteria generated from soil background concentrations collected from sites not impacted by local point sources of land or air pollution. Ontario Typical Range values were generated for 16 metals, 64 organic compounds, chloride, total nitrogen, nitrate/nitrite, and sodium adsorption ratio.³⁸ The numerical criteria were based on the 98th percentile of the background concentration plus two standard deviations. The numerical criteria were doubled for Category C (urban industrial) fill. For categories D and E the numerical criteria were to be increased by a factor of 10 or 20.

30. Quebec

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		NO

31. Saskatchewan

Regulate Sediment	Regulate Fill	Fill Regulations Apply to Sediment	Other
NO	NO		YES

The Saskatchewan Department of Environment (SE) can regulate the disposal stormwater pond sediments under general provisions of the law which prohibit unauthorized discharges.³⁹ SE does not directly regulate the placement of fill material unless that material is contaminated with a hazardous substance or a waste dangerous good. The hazardous substance list includes approximately 1,000 specific compounds whereas the list of waste dangerous goods consists primarily of used oil, oil filters, and waste antifreeze.⁴⁰

IV. DISCUSSION AND CONCLUSIONS

Based on the survey responses, 11 of the 30 states and provinces have no mechanism for regulating the disposal of sediments removed from stormwater ponds. It was anticipated that jurisdictions with major urban/suburban areas and populations would routinely utilize stormwater ponds and have some mechanism to control sediment dredging and disposal and that jurisdictions in arid regions and those having a more rural character may well have other environmental priorities. The responses don't support the initial assumptions.

For the 20 states and provinces that do regulate sediment disposal, the approaches vary from simple narratives prohibiting pollution to numerical sediment quality criteria for long lists of pollutants of concern.

In all cases where state and provincial solid waste regulations were reviewed, it did appear that pond sediments met the definition of solid waste. States and provinces that regulate pond sediments as solid wastes appear to have considerable flexibility in deciding which disposal options to approve. Protection of ground and surface waters, however, remains a high priority in the reviewed solid waste regulations as well as regulations specifically addressing pond sediments and fill materials.

Given the number of political jurisdictions and exposure scenarios that exist, it is unlikely that the states and provinces will ever agree on numerical criteria or risk assessment approaches, but it is worth pointing out that USEPA is in the process of developing ecological soil screening levels (Eco-SSLs). *The Eco-SSLs are concentrations of*

contaminants in soil that are protective of ecological receptors that commonly come into contact with soil or ingest biota that live in or on soil.⁴¹ The EPA is developing the SSLs so that risk assessors do not have to conduct literature searches for toxicity data for each project. SSLs have been completed (as of November, 2004) for aluminum, antimony, barium, beryllium, cadmium, cobalt, iron, lead and dieldrin. The EPA web page announcing the publications, and listing future documents, is reproduced in the appendix.

REFERENCES

¹ EPA, *National Water Quality Inventory: 1998 Report to Congress* (Washington, DC: U. S. Environmental Protection Agency, 2000).

² EPA, *Economic Benefits of Runoff Controls EPA 841-S-95-002* (Washington, DC: Environmental Protection Agency, 1995).

³ MPCA, *Protecting Water Quality in Urban Areas: Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas in Minnesota* (St. Paul, MN: Minnesota Pollution Control Agency, 2000).

⁴ Donovan, T., *The Wisconsin Storm Water Manual: Wet Detention Basins* (Madison, WI: Wisconsin Department of Natural Resources, 2000).

⁵ Polta, R. C., *Fate and Environmental Impact of Sediments Removed from Stormwater Ponds - A Review* (St Paul, Minnesota, Metropolitan Council Environmental Services, 2001).

⁶ Novotny, V, and H. Olem, *Water Quality Prevention Identification and Management for Diffuse Pollution* (New York, NY: Van Nostrand Reinhold, 1994).

⁷ Young, G.K., S. Stein, P. Cole, T. Kammer, F. Graziano, and F. Bank, *Evaluation and Management of Highway Runoff Water Quality (Revised August 1998)* (Washington, DC: Federal Highway Administration, 1998).

⁸ Hafner, J. and M Panzer, "Stormwater Retention Ponds: Maintenance vs. Efficiency", Presented at the 37th Annual Water Resources Conference, October 26, 2004. Brooklyn Center, Minnesota.

⁹ Yax, L. K., [Land Area, Population, and Density for Metropolitan Areas](http://www.census.gov/population/www/censusdata/density.html): 1990 <http://www.census.gov/population/www/censusdata/density.html> (U.S. Census Bureau, Population Division, Population & Housing Programs Branch, 1999).

¹⁰ Stark, S., Private communication, 2000.

¹¹ Division of Water Resources and Division of Soil and Water Conservation, *Delaware Sediment and Stormwater Regulations* (Department of Natural Resources and Environmental Control, 1993). Available at

<http://www.dnrec.state.de.us/dnrec2000/Divisions/Soil/Stormwater/Regs/ssregs1.htm>.

¹² See State of Florida web site <http://www.dep.state.fl.us/legal/Rules/surfacewater/62-343.pdf>.

¹³ Florida Department of Environmental Protection, *Guidance for the Management of Street Sweepings, Catch Basin Sediments and Stormwater System Sediments* (Tallahassee, FL: Department of Environmental Protection, 2004).

¹⁴ See Kansas Legislature web site <http://www.kslegislature.org/cgi-bin/statutes/index.cgi>

¹⁵ See Kentucky web site <http://www.lrc.state.ky.us/kar/401/047/030.htm>

¹⁶ See Kentucky web site <http://www.lrc.state.ky.us/kar/401/047/150.htm>

¹⁷ Center for Watershed Protection and MDE, *2000 Maryland Stormwater Design Manual Volumes I and II* (Baltimore, MD: Maryland Department of the Environment, 2000). Available at Maryland Department of Environment web site http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.asp

¹⁸ See Maryland web sites <http://www.dsd.state.md.us/comar/26/26.17.01.01.htm> through <http://www.dsd.state.md.us/comar/26/26.17.01.11.htm>.

¹⁹ Maryland Department of the Environment, Soil Conservation Service and State Soil Conservation Committee, *1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (Baltimore, MD: Maryland Department of the Environment, 1994). Available at

<http://www.mde.state.md.us/assets/document/sedimentstormwater/1994ErosionSed.pdf>

²⁰ Minnesota Pollution Control Agency, *Protecting Water Quality in Urban Areas: Best management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota* (St. Paul, MN: Minnesota Pollution Control Agency, 2000).

²¹ See Nebraska Department of Environmental Quality web site <http://www.deq.state.ne.us/>.

²² See New Jersey Department of Environment web site http://www.state.nj.us/dep/srp/regs/scc/scc_0599.pdf

²³ See New Jersey Department of Environment web site <http://www.state.nj.us/dep/srp/regs/srs/proposed/>

²⁴ See New Jersey Department of Environment web site <http://www.state.nj.us/dep/srp/regs/srs/>

²⁵ See New Mexico Environment Department web site http://www.nmenv.state.nm.us/NMED_regs/swb/20nmac9_1.html

²⁶ See New York Department of Environmental Conservation web site http://www.dec.state.ny.us/website/regs/subpart360_01.html

²⁷ See New York Department of Environmental Conservation web site http://www.dec.state.ny.us/website/regs/subpart360_07.html

²⁸ See North Dakota Department of health web site http://www.health.state.nd.us/wq/Storm/MS4/NDR04-MS4_Permit.pdf

²⁹ See Pennsylvania Department of Environmental Protection web site <http://164.156.71.80/VWRq.asp?context=2&docid=2087d8407c0e0000000010e0000010e&rqType=J&rqPage=1&convert=&NoMenu=>

³⁰ See Pennsylvania Department of Environmental Protection web site <http://164.156.71.80/VWRQ.asp?docid=2087d8407c0e0000000010b0000010b&context=2&backlink=WXOD.aspx%3ffs%3d8518d740180600008000000000000000%26ft%3d>

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³¹ DEP, *Pennsylvania Code Title 25.Environmental Protection, Chapter 25 Dam Safety and Waterway Management* (Harrisburg, PA: Department of Environmental Protection, 2003).

³² DEP, *Management of Fill* (Harrisburg, PA: Department of Environmental Protection, 2004).

³³ See Tennessee Department of Environment and Conservation web site
<http://www.state.tn.us/environment/wpc/stormh2o/finals/TN%20Small%20MS4%20General%20Permit%202003.pdf>

³⁴ WSDE, *Stormwater Management Manual for Western Washington* (Olympia, WA: Washington State Department of Ecology, 2001). Available at
<http://www.ecy.wa.gov/programs/wq/stormwater/manual.html#How%20to%20Find%20the%20Stormwater%20Manual%20on%20the%20Internet>

³⁵ See West Virginia Secretary of State web site
<http://www.wvsos.com/csrdocs/worddocs/33-08.doc>

³⁶ Ontario Ministry of the Environment and Energy, *Evaluating Construction Activities Impacting on Water Resources Part IIIA Handbook for Dredging and Dredged Material Disposal in Ontario – Legislation, Policies, Sediment Classification and Disposal Options* (Queen's Printer for Ontario, 1994).

³⁷ Fletcher, T. ,Personal Communication of November 5, 2004.

³⁸ Ontario Ministry of Environment and Energy, *Guideline For Use At Contaminated Sites In Ontario: Revised September 1998* (Queen's Printer for Ontario, 1998).

³⁹ Saskatchewan Ministry of the Environment, *The Environmental Management and Protection Act, 2002* (Regina, Saskatchewan: The Queen's Printer, 2003)

⁴⁰ Saskatchewan Ministry of the Environment, *The Hazardous Substances and Waste Dangerous Goods Regulations* (Regina, Saskatchewan: The Queen's Printer, 2000).

⁴¹ USEPA, *Guidance for Developing Ecological Soil Screening Levels* (Washington, DC: USEPA Office of Solid Waste and Emergency Response, 2003).

APPENDIX

Item	page
Letter of July 6, 2004	19
Pond Sediment Questionnaire	20
Letter of September 8, 2004	21
USEPA Soil Screening Levels	22

July 6, 2004

«Company»
«Address1»
«Address2»
«Address3»
«Address_4»
«City», «State» «PostalCode»

Dear Sir/Madam:

We have initiated a project to characterize the sediments which accumulate in stormwater ponds. The limited sediment data which are available in the literature, along with material balance calculations, indicate that the concentration of a number of metals and nutrients are likely to be quite high and may impact the applicability of a number of use and/or disposal options. In addition to collecting field data, we are surveying US State and Canadian provincial environmental agencies to determine if sediment use and/or disposal are regulated.

We are requesting that you or your colleagues complete and return the attached questionnaire. We will be compiling all of the responses in a report and would be happy to provide your agency with a copy if you request.

We did search your agency's web site to find that part of the organization that may have the necessary information. If the above address is in error, we would appreciate it if you could pass on this letter to one of your colleagues who does have the requested information.

Thank you for your consideration of this request.

Yours truly,

Robert Polta, Ph.D., P.E.
Manager, Research & Development
Metro Plant
St. Paul, MN 55106

telephone: 651-602-8390
e-mail: bob.polta@metc.state.mn.us

Pond Sediment Questionnaire

**Please complete and return to the Metropolitan Council Environmental Services
using the enclosed envelope.***

- [1] Does the State of «State» specifically regulate the disposal and/or use of sediments removed from stormwater ponds? **[Yes] [No]**
[A] If yes, please provide a copy of the regulation/criteria or a web address where it can be viewed.
[B] Copy of regulation/criteria enclosed in envelope. **[Yes] [No]**
[C] Web site address:
- [2] Does the State of «State» regulate the placement of fill material on land? **[Yes] [No]**
[A] If yes, are the regulations/criteria applicable to pond sediments? **[Yes] [No]**
[B] If yes, please provide a copy of the regulations/criteria or a web address where they can be viewed.
[i] Copy of regulations/criteria enclosed in envelope. **[Yes] [No]**
[ii] Web site address:
- [3] Does the State of «State» have any other mechanism to control the removal, use, and/or disposal of pond sediments? **[Yes] [No]**
[A] If yes, please describe and enclose available documentation in envelope.
- [4] Do you want a copy of our report on sediment regulations? **[Yes] [No]**
[A] If yes, please provide following information

Name:

Title:

Address:

Phone:

Email:

*Note that sufficient postage is provided on the enclosed envelope for up to 25 pages of copy paper.

September 8, 2004

«Company»
«Address1»
«Address2»
«Address3»
«Address_4»
«City», «State» «PostalCode»

Dear Sir/Madam:

Approximately two months ago, I requested your assistance in completing a survey of state environmental agencies – see attached letter. The survey addresses the disposal and/or use of the sediments that accumulate in stormwater ponds and how they are regulated. As of this week, a total of 14 replies have been received. I will compile the results of the survey in October and early November, and plan to publish and distribute the survey report by the end of this year.

A new copy of the survey is attached. If you would like to participate in the survey please answer questions [1] through [4]. If you do not want to participate in the survey but want a copy of the report, just answer question [4].

Thank you for your consideration of this request.

Yours truly,

Robert Polta, Ph.D., P.E.
Manager, Research & Development
Metro Plant
St. Paul, MN 55106

telephone: 651-602-8390
e-mail: bob.polta@metc.state.mn.us

Ecological Soil Screening Levels

The Ecological Soil Screening Level (Eco-SSL) derivation process represents the collaborative effort of a multi-stakeholder workgroup consisting of federal, state, consulting, industry and academic participants led by the U.S. EPA, Office of Emergency and Remedial Response. It is emphasized that the Eco-SSLs are soil screening numbers, and as such are not appropriate for use as cleanup levels. Screening ecotoxicity values are derived to avoid underestimating risk. Requiring a cleanup based solely on Eco-SSL values would not be technically defensible.

The Eco-SSL web site provides an overview of the contaminant. Separate discussions are provided for each receptor group including a comprehensive list of literature evaluated under the effort, and a summary of data used in deriving Eco-SSL values. For each chemical, Eco-SSL documents are provided in a PDF format which requires the Acrobat Reader. For some documents HTML versions are available with linkages to the toxicity data records within the U.S. EPA's ECOTOX database.

Interim Eco-SSLs and Documentation

METALS

Aluminum PDF (297KB)

Antimony PDF (980KB)

Arsenic (**Pending**)

Barium PDF (1,195KB)

Beryllium PDF (1,162KB)

Cadmium PDF (2,349KB)

Chromium (**Pending**)

Cobalt PDF (1,787KB)

Copper (**Pending**)

Iron PDF (439KB)

Lead PDF (2,540KB)

Manganese (**Pending**)

Nickel (**Pending**)

Selenium (**Pending**)

Silver (**Pending**)

Vanadium (**Pending**)

Zinc (**Pending**)

ORGANICS

DDT and metabolites (**Pending**)

Dieldrin PDF (1,600KB)

Pentachlorophenol (**Pending**)

RDX (**Pending**)

TNT (**Pending**)

Total PAHs (**Pending**)

Original USEAP internet page at <http://www.epa.gov/ecotox/ecossl>