

Stormwater U

Stormwater Pond Management: Pond Sediment Excavation

The Fourth in a series on stormwater pond management

Stormwater Wetland Management

Dale Thompson, Supervisor

Municipal Stormwater Unit , MN Pollution Control Agency

Wednesday, May 6, 2009

North St. Paul Community Center



ST. ANTHONY FALLS LABORATORY



UNIVERSITY OF MINNESOTA

EXTENSION



Ramsey-Washington Metro Watershed District





Minnesota Pollution Control Agency

Dale Thompson

MPCA

Guidance on Stormwater Pond
Sediment Testing, Results, Permits

My topics for today:

- Guidance – checklist vs. requirements
- Sediment Testing
 - Screening level
 - Data for decisions
- How to use the lab results
- Permit requirements

Guidance

- Dredge Material Management Guidance
 - Update – May 2009?
 - Applies to all dredge material
 - Refer to Chapter 4 first:
 - Special section on Stormwater Ponds
- Dredge- Web Page & Fact Sheets
- Stormwater Pond section TRUMPS
 - (so don't get confused)
- MS4 Page Web site Links to Application forms, spreadsheet and Guidance

Modified Characterization and Permit Approach for Urban Stormwater Ponds

Sediment Characterization

This section specifically addresses the process to be used for municipal or urban stormwater systems. The modified permit process and requirements are described below. Protocols for the baseline sampling parameters in sediment, as described in Chapter 4, have been modified for projects involving the removal and management of sediment from an urban stormwater treatment system. A stormwater system will accumulate sediment in many different parts of a stormwater system including stormwater ponds, sediment basins, or other management practices used to pre-treat stormwater in a treatment train approach. For simplicity all are hereafter referred to as stormwater ponds that may or may not be a part of a Municipal Separate Storm Sewer System (MS4). The baseline set of parameters identified in the Dredge Manual are modified here based on current knowledge of typical urban stormwater runoff and appropriate consideration of the environmental risk associated with sediment from stormwater systems.

Sediment Testing

- ❑ Typical residential or mixed urban?
 - ❑ Grain size analysis
 - ❑ Metals= Copper & Arsenic
 - ❑ Polycyclic Aromatic Hydrocarbons (PAHs)
 - List of both carcinogenic and non-carcinogenic
- ❑ Stormwater from commercial or industrial properties?
 - ❑ Grain size analysis, 2 Metals + PAHs
 - ❑ Additional parameters maybe needed based on sources from risk assessment
- ❑ How many samples are needed?

Key information

Estimated Volume of Dredge Material (cu.yd.)	Number of samples for Particle Size Distribution recommended	Maintain records at the MS4	Minimum Sample analysis required	Permit review required if >3000 cu.yd. of sediment & exceeds level 1
0 to 100	0	Y	0	
100 to 500	1	Y	1	
500- to 3,000	2	Y	2	
3,000-30,000	3	Y	3	Y
30,000-100,000	5	Y	5	Y
100,000-500,000	6	Y	6	Y
500,000-1,000,000	8	Y	8	Y
1,000,000	X>8	Y	>8	Y

Sediment Testing

□ Sediment Samples

- A challenging sample media for labs

□ Lab Methods

■ Grain Size Analysis-

- 200 Wash= ASTM C-117 & ASTM D-1140
- others= ASTM C-136; D-2487 & D-422

■ Metals – EPA Methods-6010 or 6020

■ PAHs - EPA Method 8270 full scan GCMS

- Not 8270 SIM

Summary of Stormwater Pond Sediment Testing Results (revised 4/28/09)

Project Name:															
Sample Date:															
Parameters	Insert Reporting Limit****	Dredge Mgmt. Level 1	Dredge Mgmt. Level 2	Sample Locations and Depths											
				Core Location #1		Core Location #2		Core Location #3							
		mg/kg	mg/kg	0 - 2 feet	2 - 4 feet	0 - 2 feet	2 - 4 feet	0 - 2 feet	2 - 4 feet						
Grain Size Analysis *															
Metals															
mg/kg															
Arsenic		9	20												
Copper		100	9000												
Polycyclic Aromatic Hydrocarbons (PAHs) -use EPA Method 8270 full scan GCMS (report conc. in mg/kg)															
Noncarcinogenic PAHs															
Acenaphthene	mg/kg	1,200	5,260												
Acenaphthylene		na	na												
Anthracene		7,880	45,400												
Benzo(g,h,i)perylene		na	na												
Fluoranthene		1,080	6,800												
Fluorene		850	4,120												
2-Methylnaphthalene		100	369												
Naphthalene		10	28												
Phenanthrene		na	na												
Pyrene		890	5,800												
Quinoline**		4	7												
Carcinogenic PAHs & BaP Equiv.															
	Insert Reporting Limit****	Potency Equiv. Factor (PEF)		Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.
Benz[a]anthracene		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Benzo[b]fluoranthene		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Benzo[k]fluoranthene**		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Benzo[a]pyrene		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Chrysene		1.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dibenz[a,h]acridine		0.01		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dibenz[a,h]anthracene		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dibenz[a,h]acridine		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dibenz[a,h]anthracene		0.56		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7H-Dibenzo[c,g]carbazole		1.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dibenzo[a,e]pyrene		1.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dibenzo[a,h]pyrene		10.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dibenzo[a,i]pyrene		10.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dibenzo[a,j]pyrene		10.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7,12 Dimethylbenz-anthracene		34.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,6-Dinitropyrene		10.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,8-Dinitropyrene		1.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Indeno[1,2,3-c,d]pyrene		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3-Methylcholanthrene		3.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5-Methylchrysene		1.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5-Nitroacenaphthene		0.02		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1-Nitropyrene		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4-Nitropyrene		0.10		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6-Nitrochrysene		10.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2-Nitrofluorene		0.01		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(BaP) Equivalent***		2 mg/kg	3 mg/kg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dredge Management Level 1 = results less than SRV 1 (suitable for residential landuse)															
Dredge Management Level 2 = results less than SRV 2 (suitable for industrial landuse)															
Dredge Management Level 3 = exceeds SRV2 (must be treated or disposed in a landfill with MPCA approved industrial waste management plan)															
Highlight value when sample concentration is above Method Detection Level (MDL) but is below Reporting Limit (RL) = those with a "J" flag.															
"J" flag results the cell formula for BaP equiv. must be modified to = (0.5 * column "B") * (column "C" PEF value) quotient for BaP equivalent															
[Labs must use "J" flag on lab sheets if value is between the Method Detection Level (MDL) and Reporting Limit (RL) (see note on BaP equiv.)															
* Grain Size Analysis - note: if initial testing determines that 93% or more of the sediment is retained on a #200 sieve then material is not required to be tested for remaining parameters															
** Quinoline is a carcinogenic PAH that does not have a PEF therefore they are not included in the BaP equivalent calculation															
*** BaP Equivalent - this sheet is set up to multiply the sample concentration for each parameter by the Potency Equivalency Factor (PEF) and sum them to determine the BaP Equivalent for each sample allowing comparison to the Mgmt. Level (see formula in cells E27:P51)															
Calculating the BaP equivalents when conc. below the RL; use 1/2 the reporting limit multiplied by the PEF (change default formula for "J" flagged results).															
**** Reporting Limits - insert reporting limits in this column from the lab analytical results reports (converting to mg/kg if necessary)															

Using the lab results

- ❑ Objective is to compare the results to Dredge Material Management Levels
- ❑ Interpretation of the results
- ❑ Read the guidance and footnotes
- ❑ Reporting Limits (RL)
- ❑ "J" Flag on a compound

Summary of Stormwater Pond Sediment Testing Results

Project Name: Example Ponds

Sample Date: 03/01/09

		Sample Locations and Depths													
		Dredge Mgmt. Level 1	Dredge Mgmt. Level 2	Pond A - Core Location #1		Pond A -Core Location #2		Pond A -Core Location #3							
Parameters	Insert Reporting Limit****	mg/kg	mg/kg	0 - 2 feet	2 - 4 feet	0 - 2 feet	2 - 4 feet	0 - 2 feet	2 - 4 feet	0 - 2 feet	2 - 4 feet	0 - 2 feet	2 - 4 feet	0 - 2 feet	2 - 4 feet
Grain Size Analysis *															
Metals															
mg/kg															
Arsenic	0.42	9	20	5.3	5.3	6	4.1	4	3						
Copper	0.04	100	9000	21	19	21	18	15	12						
Polycyclic Aromatic Hydrocarbons (PAHs) -use EPA Method 8270 full scan GCMS (report conc. in mg/kg)															
Noncarcinogenic PAHs															
mg/kg															
Acenaphthene	0.339	1,200	5,260												
Acenaphthylene	0.339	na	na												
Anthracene	0.339	7,880	45,400	0.546	0.301	1.94	0.397	1.5	1.1						
Benzo(g,h,i)perylene	0.339	na	na	1.74		1.23	1.94	1.1	0.75						
Fluoranthene	1.690	1,080	6,800	10.7	0.97	25.4	9.1	7.4	6.5						
Fluorene	0.283	850	4,120			0.828	0.191	0.121	0.11						
2-Methylnaphthalene	0.339	100	369												
Naphthalene	0.339	10	28												
Phenanthrene	0.339	na	na		0.345	19.9	3.18	0.256	0.19						
Pyrene	1.690	890	5,800	7.44	0.738	2.66	6.29	3.45	2.5						
Quinoline**		4	7												
Carcinogenic PAHs & BaP Equiv.															
	Insert Reporting Limit****	Potency Equiv. Factor (PEF)		Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.	Site Conc.	BaP Equiv.
Benz[a]anthracene	0.339	0.10		2.97	0.297	0.261	0.034	8.080	0.808	2.430	0.243	0.157	0.034	0.450	0.045
Benzo[b]fluoranthene	0.678	0.10		5.41	0.541	0.710	0.071	14.800	1.480	5.350	0.535	0.000	0.000		0.000
Benzo[k]fluoranthene**	0.339	0.10		1.81	0.181	0.120	0.012	0.000	0.000	0.001	0.000	0.000	0.000		0.000
Benzo[a]pyrene	0.339	1.00		4.45	4.450	0.340	0.340	8.520	8.520	3.070	3.070	0.560	0.560	0.480	0.480
Chrysene	0.339	0.01		0	0.000	0.000	0.000	10.300	0.103	4.430	0.044	0.640	0.006	0.490	0.005
Dibenz[a,j]acridine	0.339	0.10		0	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000		0.000
Dibenz[a,h]acridine	0.339	0.10		0.000	0.000	0.000	0.000	0.161	0.034	0.000	0.000		0.000		0.000
Dibenz[a,h]anthracene	0.339	0.56		0.518	0.290	0.158	0.190	0.881	0.493	0.396	0.222	0.320	0.190	0.520	0.291
7H-Dibenzo[c,g]carbazole	0.339	1.00		0.000	0.000	0.000	0.000		0.339		0.000		0.000		0.000
Dibenzo[a,e]pyrene	0.339	1.00		0.422	0.422	0.000	0.000	1.060	1.060	0.596	0.596	0.410	0.410	0.610	0.610
Dibenzo[a,h]pyrene	0.339	10.00		0.148	3.390	0.270	3.390	0.391	3.910	0.284	2.840		0.000		0.000
Dibenzo[a,i]pyrene	0.339	10.00		0.378	3.780	0.000	0.000	0.650	6.500	0.336	3.360	0.000	0.000		0.000
Dibenzo[a,l]pyrene	0.339	10.00		0.000	0.000	0.000	0.000		0.000		0.000		0.000		0.000
7,12 Dimethylbenz-anthracene	0.339	34.00		0.000	0.000	0.000	0.000		0.000		0.000		0.000		0.000
1,6-Dinitropyrene	0.339	10.00		0.000	0.000	0.000	0.000	0.050	0.500	0.001	0.005		0.000		0.000
1,8-Dinitropyrene	0.339	1.00		0.000	0.000	0.000	0.000	0.050	0.050		0.000		0.000	0.350	0.350
Indeno[1,2,3-c,d]pyrene	0.339	0.10		1.770	0.177	0.000	0.000	4.020	0.402		0.000		0.000		0.000
3-Methylcholanthrene	0.339	3.00		0.000	0.000	0.000	0.000		0.000		0.000		0.000		0.000
5-Methylchrysene	0.339	1.00		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000		0.000
5-Nitroacenaphthene	0.339	0.02		0.000	0.000	0.000	0.000	0.000	0.000		0.000		0.000		0.000
1-Nitropyrene	0.339	0.10		0.000	0.000	0.000	0.000		0.000		0.000		0.000		0.000
4-Nitropyrene	0.339	0.10		0.000	0.000	0.000	0.000	0.010	0.001	0.008	0.001		0.000		0.000
6-Nitrochrysene	0.339	10.00		0.000	0.000	0.000	0.000	0.010	0.100	0.045	0.450	0.000	0.000		0.000
2-Nitrofluorene	0.339	0.01		0.000	0.000	0.000	0.004	0.708	0.007	0.456	0.005	0.350	0.004		0.000
(BaP) Equivalent***		2 mg/kg	3 mg/kg	13.877	1.075	24.774	11.545	1.238	1.817						

Dredge Management Level 1= results less than SRV 1 (suitable for residential landuse)
 Dredge Management Level 2= results less than SRV 2 (suitable for industrial landuse)
 Dredge Management Level 3- exceeds SRV2 (must be treated or disposed in a landfill with MPCA approved industrial waste management plan)
 Highlight value when sample concentration is above Method Detection Level (MDL) but is below Reporting Limit (RL) = those with a "J" flag;
 "J" flag results the cell formula for BaP equiv. must be modified to = (0.5 * column "B") * (column "C" PEF value) quotient for BaP equivalent
 Labs must use "J" flag on lab sheets if value is between the Method Detection Level (MDL) and Reporting Limit (RL) (see note on BaP equiv.)

* **Grain Size Analysis**- note: if initial testing determines that 93% or more of the sediment is retained on a #200 sieve then material is not required to be tested for remaining parameters

** **Quinoline** is a carcinogenic PAH that does not have a PEF therefore they are not included in the BaP equivalent calculation

*****BaP Equivalent** - this sheet is set up to multiply the sample concentration for each parameter by the Potency Equivalency Factor (PEF) and sum them to determine the BaP Equivalent for each sample allowing comparison to the Mgmt. Level (see formula in cells E27:P51)
 Calculating the BaP equivalents when conc. below the RL; use 1/2 the reporting limit multiplied by the PEF (change default formula for "J" flagged results).

**** **Reporting Limits**- insert reporting limits in this column from the lab analytical results reports (converting to mg/kg if necessary)

Permit Requirements

- ❑ First- decide on reuse – disposal - treatment
- ❑ Dredge Projects need a Permit Review when:
 - 1) Tier 2 sediment for reuse
 - 2) More than 3000 cubic yards of sediment
 - 3) Dredge Supplement attached to CSW Permit
 - Note: no review needed if:
 - ❑ Tier 1 material
 - ❑ Tier 1, 2 or 3 material goes to a landfill
- ❑ All projects that disturb more than 1 acre
 - Need a Construction Stormwater (CSW) Permit

What are the documents needed?

- ❑ NDPES Construction Stormwater Permit Application form
- ❑ Stormwater Facility Dredge Project Supplement form
 - See list of attachments
- ❑ Summary of Pond Sediment Testing Results
- ❑ Copy of Lab Reports
- ❑ Internal record keeping or permitting

Internal record keeping or permitting

Estimated Volume of Dredge Material (cu.yd.)	Number of samples for Particle Size Distribution recommended	Maintain records at the MS4	Minimum Sample analysis required	Permit review required if >3000 cu.yd. of sediment & exceeds level 1
0 to 100	0	Y	0	
100 to 500	1	Y	1	
500- to 3,000	2	Y	2	
3,000-30,000	3	Y	3	Y
30,000-100,000	5	Y	5	Y
100,000-500,000	6	Y	6	Y
500,000-1,000,000	8	Y	8	Y
1,000,000	X>8	Y	>8	Y



Stormwater Facility Dredge Project

Supplement to NPDES Construction Stormwater Permit Application

Doc Type: Permit Application

Instructions

This Stormwater Facility Dredge Report Supplement form is required to be submitted with a National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Construction Stormwater (CSW) Permit Application only when the dredge sediment sample results exceed Management Level 1 levels and the estimated dredge volume exceeds 3,000 cubic yards. This form gathers information about the activity at the stormwater pond dredging location(s). The NPDES CSW Permit Application collects information about any site disturbance of greater than one acre where dredged material will be deposited, reused as fill, or any other non-permitted site where stockpiling or treatment of the dredge material is to occur. The Minnesota Pollution Control Agency (MPCA) requires neither submittal of a CSW permit application nor this form if stormwater pond dredge material is taken to a permitted, lined landfill.

Facility Information

1. **Stormwater facility owner and/or operator** (Contact information for public entity, city, or business firm legally responsible for facility operation [see Minn. R. 7001.0050].)

Contact name: _____ Contact phone number: _____

Mailing address: _____

City: _____ State: _____ Zip code: _____ Type of ownership: Public Private

2. **Stormwater facility location** (No Post Office Boxes allowed. Actual physical location of facility - must use actual street or highway address or section/township/range coordinates.)

Project name: _____ Phone: _____

Location address: _____

Facility is located in the _____ quarter of the _____ quarter of section _____

township: _____ of _____ county. Range # _____ East West

City: _____ State: _____ Zip code: _____

Is the facility located on tribal land? Yes No If yes, apply to U.S. Environmental Protection Agency (EPA) Region V, John Coletti (312-886-6106)

3. **Technical agent or consulting engineer**

Name of firm or organization: _____ Phone number: _____

Contact name: _____ Title: _____

Mailing address: _____

City: _____ State: _____ Zip code: _____

Basic Information

4. **Description of project**

a. Attach a detailed textual description of the proposed dredging project, including a description of how the dredged material is to be managed in both the short- and long-term. (Label 4A)

b. Name(s) and type of each facility to be dredged (outfall to lake, river, wetland, or constructed stormwater facility):

Facility 1: _____ Location: _____ Type: _____

Facility 1: _____ Location: _____ Type: _____

Facility 1: _____ Location: _____ Type: _____

Facility 1: _____ Location: _____ Type: _____

Attachment checklist (Check all that are attached.)

Question (4A): Textual description of proposed dredging project.

Question (4E): Detailed map: 7.5-minute U.S. Geological Survey quadrangle, County Soil Survey, or County Plat location map.

Question (5B): Copy of U.S. Army Corps of Engineers (USACE) Permit or permit application for dredging or filling activity.

Question (5C): Copy of MDNR Permit or permit application for work in bed of public waters.

Question (5D): Copy of MDNR Permit or permit application for water appropriation.

Question (5E): Copy of completed Environmental Assessment Worksheet (EAW).

Question (8A): Test results for grain size analysis.

Question (10A): Test results for baseline analytes.

Question (11A): Test results for additional analytes.

Summary spreadsheet email to MPCA: ms4permit@pca.state.mn.us

Contact Information

- Dale Thompson
- Municipal Stormwater Unit
- MPCA
- 651-757-2776