Construction Site Erosion Control and Phase II of the Stormwater Permit Program

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Some Features of Phase II of Stormwater Permit Program

- Rule became final on Dec 8, 1999.
- Small construction permit applications due starting March 10, 2003.
- Applicable to all construction sites from 1 to 5 acres (Phase I covered larger sites).
- Smaller sites may be covered if part of larger common plan, or if designated as a significant water pollutant contributor.

### Construction Site Erosion Runoff Characteristics, Birmingham, AL (Nelson 1996)

<table>
<thead>
<tr>
<th></th>
<th>Low intensity rains (&lt;0.25 in/hr)</th>
<th>Moderate intensity rains (about 0.25 in/hr)</th>
<th>High intensity rains (&gt;1 in/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspended Solids (mg/L)</td>
<td>400</td>
<td>2,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Particle size, median (μm)</td>
<td>3.5</td>
<td>5</td>
<td>8.5</td>
</tr>
</tbody>
</table>
Waivers Available for Small Construction Sites

- Low predicted rainfall erosion potential (NRCS rainfall erosivity factor, $R$, less than 5 for period of construction activity; not expected to be applicable for Alabama conditions), or
- Determination that controls are not necessary based on TMDL analysis or equivalent (considering proximity to water resources and sensitivity of receiving waters).

Phase II Construction Program Requirements (EPA Guidance)

- EPA recommends the use of existing Phase I general permits as a guide for developing Phase II small construction permits. Three general requirements:
  - Notice of Intent (NOI)
  - Stormwater Pollution Prevention Plan (SWPPP)
  - Notice of Termination (NOT)

Notice of Intent

- Contains general information (location, timing, nearby water resources, etc.)
- Contains certification that the activity will not impact endangered or threatened species (for the EPA’s NOI, not commonly included in delegated state’s NOIs)

Storm Water Pollution Prevention Plan (SWPPP)

- Lists and describes construction site erosion controls that will minimize the discharge of pollutants from the site
- Technology-based standards (Best Available Technology, or BAT)
- Professional judgment of permit writer (Best Conventional Technology, or BCT)
**Notice of Termination**

- This is submitted when the final stabilization of the site has been achieved.

**Recommended Controls for Small Construction Sites (EPA Guidance)**

- Best control accomplished through proper planning, installation, and maintenance of controls.
- Non-Structural Controls:
  - Minimize disturbance
  - Preserve natural vegetation
  - Good housekeeping

**Recommended Controls for Small Construction Sites (cont.)**

- Small sites have less space that prevent use of some controls, plus less access to qualified help.
- Structural Controls:
  - Erosion controls (mulch, grass, and stockpile covers)
  - Sediment controls (silt fence, inlet protection, check dams, stabilized construction entrances, and sediment traps)

**Typical Local Erosion Control Requirements (Storm Water Management Authority, Inc.)**

- All surface waters flowing towards construction areas shall be either passed through the site in protected channels or diverted using berms or channels.
- All slope or fill areas which have been graded shall within 14 days of the completion of grading, or the completion of any phase of grading, be planted or otherwise provided with ground cover to retrain erosion.
Typical Local Erosion Control Requirements (cont.)

- All upslope and downslope controls must be in place before any on-site construction begins.
- No visible floating scum, oil or other matter allowed in discharge.
- All controls shall be checked and repaired monthly and within 24 hrs after any rainfall at the site of 0.75 inch occurring within 24 hrs.

Typical Local Erosion Control Requirements (cont.).

- The control plan must include the size of the disturbed areas and a schedule of the starting and completion dates of land disturbing activities.
- Written descriptions of controls and schedule of their implementation
- Description of procedures for proper storage, handling, and disposal of construction materials.

Typical Erosion Control Plan Contents
(Storm Water Management Authority, Inc.)

- Present contours and drainage facilities on property
- Drainage facilities on adjacent property
- Proposed contours after development (intervals of 2 ft, or less)
- Description of existing site conditions (erosion characteristics of soils, potential problem areas, soil stabilization specifications)

Sediment Sources
Not All Runoff is Sediment-Laden
Sediment Sources
Initial Grading and Street/Utility Placement

Sediment Sources
Bare Soil for Long Periods

Sediment Sources
Unprotected Slopes

Sediment Sources
Failed Drainage and Diversions
Sediment Sources
Eroding Stockpiles

Sediment Sources
Improper On-Site Waste Disposal and Equipment Maintenance

Sediment Sources
Improper Site Clean-up

Sediment Sources
In-Stream Construction
Erosion Controls
General Approach

• Divert upland drainage
• Mulch exposed ground
• Control site discharges
• Good housekeeping
• Proper maintenance

Erosion Controls
Diversion Channels and Berms

Erosion Controls
Protect Channels (Check dams and liners)

Erosion Controls
Slope Protection with Surface Roughening
Erosion Controls
Slope Protection with Blankets

Erosion Controls
Slope Protection with Rock and Asphalt

Erosion Controls
Control Site Discharges

• Filter fencing for small sites (but only for slope lengths less than about 100 ft). Expect about 10 to 50% control of suspended solids.

• Sediment ponds for areas larger than 10 acres. Expect up to 80% control of suspended solids.

Erosion Controls
Filter fences create small ponding areas
Erosion Controls
Filter fences seldom installed or maintained correctly

Erosion Controls
Straw bales seldom effective

Typical Construction Sediment Ponds

General Sediment Pond Configuration
- Additional Storage for Drainage Benefits
- Water Quality Storage
- ‘Dead’ Storage
- MUST PROVIDE EMERGENCY SPILLWAY
Construction Site Sediment Ponds Need Sacrificial Storage

Pond Area as a Percentage of Drainage Area Type

<table>
<thead>
<tr>
<th>Pond Type</th>
<th>5 micron</th>
<th>20 micron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totally paved</td>
<td>2.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Industrial</td>
<td>2.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Commercial</td>
<td>1.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Institutional</td>
<td>1.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Residential</td>
<td>0.8</td>
<td>0.3</td>
</tr>
<tr>
<td>Open space</td>
<td>0.6</td>
<td>0.2</td>
</tr>
<tr>
<td>Construction</td>
<td>1.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

If areas contain infiltration controls then less area needed

Pond Performance Dependent on Particle Characteristics

Typical Runoff Particle Size Distribution

![Particle Size Distribution Graph](image)
### Particle Settling Rates

- **2 μm particle** ⇒ $2 \times 10^{-4} \text{ cm/s}$ or 5.8 days for 1 meter
- **20 μm particle** ⇒ $2 \times 10^{-2} \text{ cm/s}$ or 1.4 hours for 1 meter
- **200 μm particle** ⇒ 2 cm/s or 50 sec for 1 meter
- **2000 μm (2 mm) particle** ⇒ 20 cm/s, or 5 sec for 1 meter

### On-Site Good Housekeeping Controls

- **Gravel Driveways**
- **Inlet Protection**

### Typical Performance for Well-Designed Sediment Pond

Graph showing performance metrics.
On-Site Good Housekeeping Controls
Vehicle Cleaning

Education and Enforcement

Maryland DEP photo