

APPENDIX A Turbidity Reduction Options

NCDOT Turbidity Reduction Options for Construction Activities
Passive, Active, and Semi-Passive Treatment Methods for the use of Flocculants

Passive Treatment					
Treatment Method	Product Type	Application	Positive Aspects	Negative Aspects	Comments
Surface Application	<ul style="list-style-type: none"> • Powder • Granular • Liquid 	Hydro-mulching/seeding, Straw/tackifier, Broadcast spreaders.	Treatment may be applied to a large area in conjunction with groundcover requirements.	<p>Less effective when applied over wet soils.</p> <p>May only be used on slopes or bare areas that drain to sediment storage devices.</p>	Application rates may vary.
Runoff Conveyance Application	<ul style="list-style-type: none"> • Powder • Granular • Tablet • Block 	Silt Check Type A with Excelsior Matting and Flocculant Application; Wattle w/ Flocculant Application.	Provide additional treatment as a supplement to downstream sediment storage devices.	May not be effective during extreme rainfall events on steep terrain.	Broad range of products and product types may be used within channels and diversions throughout site dependent upon unique site conditions.
Semi-Passive Treatment					
Treatment Method	Product Type	Application	Positive Aspects	Negative Aspects	Comments
Watercourse Work Zone Application	<ul style="list-style-type: none"> • Tablet • Liquid • Block 	Bypass pumping and work-zone dewatering.	A broad range of flocculants available for effectiveness on a variety of site conditions to supplement conventional BMP's.	Variable cost dependent upon pumping rate, type of application method, and amount of flocculant for effectiveness.	Broad range of products and product types utilized in various watercourse management and work zone dewatering applications.
Active Treatment					
Treatment Method	Product Type	Application	Positive Aspects	Negative Aspects	Comments
Chemical Treatment Systems including Sand Media Filtration	<ul style="list-style-type: none"> • Liquid- • Injection • Powder • Granular 	Sand Media Filtration; Chitosan-Enhanced Sand Media Filtration.	<p>Land space requirements are typically less than conventional sediment control BMPs.</p> <p>The use of automated chemical injection provides better control of the treatment process. Effluent can be automatically monitored.</p>	High Cost; Must be closely monitored. May only be used to treat effluent draining to sediment storage devices.	Ability to treat and discharge large volumes of construction site runoff at very low turbidity levels.

NCDOT TURBIDITY REDUCTION OPTIONS FOR BORROW PITS*

Tier I Methods
January 1, 2009

<u>Method</u>	<u>Description</u>	<u>Positive Aspects</u>	<u>Negative Aspects</u>	<u>Comments</u>
<i>Pit Dewatering Basin (Compensatory BMP)</i>	These are detention basins that include a forebay and baffle where pit water is pumped and allowed time for suspended material to settle. The baffle is constructed with coir fiber material. Flashboard riser can be used to control the water level. Outlet comprised of rigid riser/barrel.	Basins are easy to build and maintain. They provide further treatment before pit water is discharged to the environment on a continuous basis	Basins are only 60-72% effective at removing total suspended solids under normal conditions. If turbidity (>50 NTUs) is encountered then additional BMPs may be needed. These types of basins alone are ineffective at removing fine or colloidal particles.	Outlet water should be drawn from the surface. Basin sized according to pump capacity and detention time.
<i>Non Compensatory BMPs</i>				
<i>1) Land Application (Irrigation)</i>	Water from pit is pumped to irrigate agricultural crops	Rain and pit water are used by agricultural crops and there is no non-discharge permit required.	Irrigation activity can have no discharge into surface waters and there is no violations of the Capacity Use permit. Limits exist as to the distance that irrigation pipe can be extended.	No chemicals can be added to water being applied.
<i>2) Silt Bag</i>	Pit water is pumped through a water permeable fabric bag resting on a bed of washed aggregate to increase bag discharge area. PAM can also be introduced in the pump system for enhanced sediment removal	Easy to install and remove bag. Effective at removing large size particles. Only a small footprint is required.	Silt bag is limited to a certain flow rate and bag does not remove fine or colloidal particles unless a PAM treatment is also used.	Addition of PAM may cause floc to seal bag.
<i>3) Aluminum Sulfate (Alum)</i>	A granular coagulant material added by spreader to pit water and settle out suspended material. Maximum rate is 25 lb /1,000 cu. ft. of water and keep below 250 PPM sulfate.	Inexpensive and relatively easy to apply. Works well on clay particles. PAM can also be used when a re-suspension occurs	A toxicity (tox.) test is required because of a potential pH shift. Also, a background test of iron and aluminum present in the pit should be conducted. May take 1-2 days to clear water.	pH needs to be above 5.5 to avoid toxic level of aluminum. May need lime for pH adjustment.
<i>4) Gypsum</i>	A powdered coagulant material added by spreader to pit water and settles out suspended material. Maximum rate is 30 lb per 1,000 cu ft of water to keep below 250 ppm sulfate	Relatively easy to spread and takes around two-days to clear the water column before pumping from water surface.	Requires much larger quantities of material (100 times) that of aluminum sulfate and a toxicity (tox) test. Can resuspend in large pits on windy days.	Also can produce pH shifts.
<i>5) Polyacrylamides (PAMs)</i>	A broad range of flocculants in liquid, powder, & solid forms to chemically bind sediment particles together and settle out	Works well under a variety of conditions. Does not affect pH and is not toxic to aquatic organisms at recommended levels.	Needs technical oversight for setup and water test for best product and equipment match. May not work on some clay materials.	Keep sulfate levels below 250 ppm. Use only anionic types. Should not be applied directly to surface waters of the state. Instead, application should be through a pit dewatering basin or other structure. Use PAMs approved by DWQ.

NCDOT TURBIDITY REDUCTION OPTIONS FOR BORROW PITS*

Tier II Methods**

January 1, 2009

<u>Method</u>	<u>Description</u>	<u>Positive Aspects</u>	<u>Negative Aspects</u>	<u>Comments</u>
<i>Non Compensatory BMPs</i>				
6) Well Point Pumping <i>(Soil Filtration)</i>	Pit is dewatered by a series of shallow wells surrounding the pit at approximately 20' intervals	Water can be directly discharged to the environment without tox. testing	Runoff is a problem and can create turbid waters in the pit. Must be treated before being discharged to the environment usually with flocculant because drawdown of pit exceeds filtering capacity of soil.	If iron levels are high in pit water, discharge must pass through a stilling basin.
7) Impoundment <i>(Detention)</i>	Large detention basin used for storage, evaporation, and sedimentation of pumped water from the pit	There would be a slow release from this basin after material has settled out and discharged through an outflow pipe	In some areas, land for impoundment may be hard difficult to find due to the size and location of the basin. Very fine material will not settle in some cases.	Storm events often resuspend settled particles.
8) Cell Mining	The borrow pit is divided into cells and water is pumped out of one cell into another so a specific cell can be mined dry	There is no immediate discharge from the pit	Extra movement of discharged water from one cell to another within the pit. Wastewater from the pit will have to be discharged some time during the active life of the pit.	Limiting factor may be volume of water to be moved.
9) Sand -Media Filtration	Water from the pit is passed through a floc sock if needed and into multi-chamber sand media filter for treatment	Treated water can be discharged directly to the environment.	The rental rate for this equipment is very costly. May want to consider buying equipment and moving system around to different locations.	Proper pump rate and prefiltration must take place and monitored closely. Can be used after flocculants.
10) Wet Mining	Material from pit is removed wet and placed on higher ground to drain before being moved to job site	There is no discharge from the pit	Material from pit is handled twice, land needed for stockpiling material, and time needed for pile to dry.	No water quality impact (self contained)

NOTES:

* 1) An evaluation of the pit soil's cation exchange capacity should be considered as the contractor develops his bid.

** 2) Tier II Methods will be considered when 401 WQ Certification requires protection for rare or unique resources.

3) Many of these turbidity reduction techniques can be combined to provide further treatment.

APPENDIX B Division Preferences Table

Appendix B - Division Preferences	
Divisions 1 & 2	<ul style="list-style-type: none"> ▪ Prefer to use Wattles in ditch lines unless slope of ditch lines are greater than 2.5%, TRSC-B should be used in conjunction with Coir Fiber Wattles. ▪ Prefer to use Wattles as breaks in the Silt Fence. ▪ Prefer to use Coir Fiber Wattles over Excelsior Wattles. ▪ Prefer additional quantities of Slope Drains on all projects.
Divisions 3 & 6	<ul style="list-style-type: none"> ▪ Prefer Wattle breaks in silt fence instead of Special Sediment Control Fence.
Division 4	<ul style="list-style-type: none"> ▪ Special Sediment Control fence outlets are desired as primary silt fence outlet. Wattles may be an acceptable alternative to special sediment control fence outlets; however, consultation with Roadside Environmental Field Operations Engineer is required. Determining whether to use Coir Fiber Wattles or Excelsior Wattles should be based on application, location and life expectancy of project. Recommend contacting Roadside Environmental Field Operations Engineer for guidance. ▪ Wattles are acceptable as an alternative to rock ditch checks but consideration should be given to drainage area and ditch line grade when selecting coir fiber vs. excelsior.
Division 5	<ul style="list-style-type: none"> ▪ Special Sediment Control fence outlets are desired as primary silt fence outlet. Wattles may be an acceptable alternative to special sediment control fence outlets; however, consultation with Roadside Environmental Field Operations Engineer is required. Determining whether to use Coir Fiber Wattles or Excelsior Wattles should be based on application, location and life expectancy of project. Recommend contacting Roadside Environmental Field Operations Engineer for guidance. ▪ Ditch lines with grades > 4% should be lined with geotextile and Class B stone. Ditch lines >6% should be lined with geotextile and Class I stone. ▪ Wattles are acceptable as an alternative to rock ditch checks but consideration should be given to drainage area and ditch line grade when selecting coir fiber vs. excelsior.
Division 7 & 8	<ul style="list-style-type: none"> ▪ Use Special Sediment Control Fence to wrap fill slopes under bridges, especially if area is subject to flooding. ▪ In general, use rock measures (Silt Check Type A with or without Matting and PAM) on clearing and grubbing phase. ▪ In general, use wattles (Coir Fiber or Excelsior with or without PAM) on final phase.

Appendix B - Division Preferences	
Division 9 & 10	<ul style="list-style-type: none"> ▪ Prefer Coir Fiber Wattle over Excelsior Wattles. ▪ Prefer Coir Fiber Wattle breaks over Special Sediment Control Fence break near sensitive jurisdictional areas. ▪ Prefer Matting and Coir Fiber Matting to cover all erodible slopes on bridge project.
Division 11 & 12	<ul style="list-style-type: none"> ▪ Prefer to use Special Sediment Control Fence for breaks in Silt Fence instead of wattles.
Division 13 & 14	<ul style="list-style-type: none"> ▪ Wattles are acceptable as an alternative to rock ditch checks but consideration should be given to drainage area and ditch line grade. Rock checks should be used on grades steeper than 2.5%. ▪ Use Temporary Silt Fence with either Silt Check Type A outlets or Special Sediment Control Fence Section outlets to wrap up under bridges.
Division 14	<ul style="list-style-type: none"> ▪ Provide quantity of Matting to cover entire project.
All Divisions	<ul style="list-style-type: none"> ▪ Use Temporary Rock Silt Check Type A at outlet of ditches if sediment basins are not feasible. ▪ Place a flocculant measure at inlet of each sediment basin. ▪ Include a quantity of slope drains on all bridge projects. ▪ Include a quantity of Coir Fiber Mat for all projects. ▪ Hydraulic Mulch is not desired as a groundcover or as an emulsified asphalt tack alternative for binding wheat straw.

APPENDIX C REGIONAL SEED MIXES THAT PROVIDE STABILIZATION OF GRADED AREAS

STABILIZATION REQUIREMENTS:

Stabilization for this project shall comply with the time frame guidelines as specified by the NCG-010000 general construction permit effective August 3, 2011 issued by the North Carolina Department of Environment and Natural Resources Division of Water Quality. Temporary or permanent ground cover stabilization shall occur within 7 calendar days from the last land-disturbing activity, with the following exceptions in which temporary or permanent ground cover shall be provided in 14 calendar days from the last land-disturbing activity:

- Slopes between 2:1 and 3:1, with a slope length of 10 ft. or less
- Slopes 3:1 or flatter, with a slope of length of 50 ft. or less
- Slopes 4:1 or flatter

The stabilization timeframe for High Quality Water (HQW) Zones shall be 7 calendar days with no exceptions for slope grades or lengths. High Quality Water Zones (HQW) Zones are defined by North Carolina Administrative Code 15A NCAC 04A.0105 (25). Temporary and permanent ground cover stabilization shall be achieved in accordance with the provisions in this contract and as directed.

Note: These stabilization requirements apply to Seed Mixes East, West and WestEd.

SEED MIX, CRIMPING, AND GUARDRAIL SEED TO BE USED BY COUNTY						Native Seed Mix
	County	Seed Mix	Crimping	Guardrail Seed	Division	
1	Alamance	East	NO	Centipede	7	West
2	Alexander	West	NO	Hard Fescue/Bluegrass	12	West
3	Alleghany	West	NO	Hard Fescue/Bluegrass	11	West
4	Anson	East	NO	Centipede	10	West
5	Ashe	West	NO	Hard Fescue/Bluegrass	11	West
6	Avery	West	NO	Hard Fescue/Bluegrass	11	West
7	Beaufort	East	YES	Centipede	2	East
8	Bertie	East	YES	Centipede	1	East
9	Bladen	East	YES	Centipede	6	East
10	Brunswick	East	YES	Centipede	3	East
11	Buncombe	WestEd	NO	Hard Fescue/Bluegrass	13	West
12	Burke	WestEd	NO	Hard Fescue/Bluegrass	13	West
13	Cabarrus	West	NO	Hard Fescue/Bluegrass	10	West
14	Caldwell	West	NO	Hard Fescue/Bluegrass	11	West
15	Camden	East	YES	Centipede	1	East
16	Carteret	East	YES	Centipede	2	East
17	Caswell	West	NO	Hard Fescue/Bluegrass	7	West
18	Catawba	West	NO	Hard Fescue/Bluegrass	12	West
19	Chatham	East	YES	Centipede	8	West
20	Cherokee	WestEd	NO	Hard Fescue/Bluegrass	14	West
21	Chowan	East	YES	Centipede	1	East
22	Clay	WestEd	NO	Hard Fescue/Bluegrass	14	West
23	Cleveland	West	NO	Hard Fescue/Bluegrass	12	West
24	Columbus	East	YES	Centipede	6	East
25	Craven	East	YES	Centipede	2	East
26	Cumberland	East	YES	Centipede	6	East
27	Currituck	East	YES	Centipede	1	East
28	Dare	East	YES	Centipede	1	East
29	Davidson	West	NO	Hard Fescue/Bluegrass	9	West
30	Davie	West	NO	Hard Fescue/Bluegrass	9	West
31	Duplin	East	YES	Centipede	3	East
32	Durham	East	NO	Centipede	5	East
33	Edgecombe	East	YES	Centipede	4	East
34	Forsyth	West	NO	Hard Fescue/Bluegrass	9	West
35	Franklin	East	NO	Centipede	5	East
36	Gaston	West	NO	Hard Fescue/Bluegrass	12	West
37	Gates	East	YES	Centipede	1	East
38	Graham	WestEd	NO	Hard Fescue/Bluegrass	14	West
39	Granville	East	NO	Centipede	5	East
40	Greene	East	YES	Centipede	2	East
41	Guilford	East	NO	Centipede	7	West
42	Halifax	East	YES	Centipede	4	East
43	Harnett	East	YES	Centipede	6	East
44	Haywood	WestEd	NO	Hard Fescue/Bluegrass	14	West
45	Henderson	WestEd	NO	Hard Fescue/Bluegrass	14	West
46	Hertford	East	YES	Centipede	1	East
47	Hoke	East	YES	Centipede	8	West
48	Hyde	East	YES	Centipede	1	East
49	Iredell	West	NO	Hard Fescue/Bluegrass	12	West
50	Jackson	WestEd	NO	Hard Fescue/Bluegrass	14	West
51	Johnston	East	YES	Centipede	4	East

52	Jones	East	YES	Centipede	2	East
53	Lee	East	YES	Centipede	8	West
54	Lenoir	East	YES	Centipede	2	East
55	Lincoln	West	NO	Hard Fescue/Bluegrass	12	West
56	Macon	WestEd	NO	Hard Fescue/Bluegrass	14	West
57	Madison	WestEd	NO	Hard Fescue/Bluegrass	13	West
58	Martin	East	YES	Centipede	1	East
59	McDowell	WestEd	NO	Hard Fescue/Bluegrass	13	West
60	Mecklenburg	West	NO	Hard Fescue/Bluegrass	10	West
61	Mitchell	WestEd	NO	Hard Fescue/Bluegrass	13	West
62	Montgomery	East	YES	Centipede	8	West
63	Moore	East	YES	Centipede	8	West
64	Nash	East	YES	Centipede	4	East
65	New Hanover	East	YES	Centipede	3	East
66	Northampton	East	YES	Centipede	1	East
67	Onslow	East	YES	Centipede	3	East
68	Orange	East	NO	Centipede	7	West
69	Pamlico	East	YES	Centipede	2	East
70	Pasquotank	East	YES	Centipede	1	East
71	Pender	East	YES	Centipede	3	East
72	Perquimans	East	YES	Centipede	1	East
73	Person	East	NO	Centipede	5	East
74	Pitt	East	YES	Centipede	2	East
75	Polk	WestEd	NO	Hard Fescue/Bluegrass	14	West
76	Randolph	East	YES	Centipede	8	West
77	Richmond	East	YES	Centipede	8	West
78	Robeson	East	YES	Centipede	6	East
79	Rockingham	West	NO	Hard Fescue/Bluegrass	7	West
80	Rowan	West	NO	Hard Fescue/Bluegrass	9	West
81	Rutherford	WestEd	NO	Hard Fescue/Bluegrass	13	West
82	Sampson	East	YES	Centipede	3	East
83	Scotland	East	YES	Centipede	8	West
84	Stanly	West	NO	Hard Fescue/Bluegrass	10	West
85	Stokes	West	NO	Hard Fescue/Bluegrass	9	West
86	Surry	West	NO	Hard Fescue/Bluegrass	11	West
87	Swain	WestEd	NO	Hard Fescue/Bluegrass	14	West
88	Transylvania	WestEd	NO	Hard Fescue/Bluegrass	14	West
89	Tyrrell	East	YES	Centipede	1	East
90	Union	West	NO	Hard Fescue/Bluegrass	10	West
91	Vance	East	NO	Centipede	5	East
92	Wake	East	NO	Centipede	5	East
93	Warren	East	NO	Centipede	5	East
94	Washington	East	YES	Centipede	1	East
95	Watauga	West	NO	Hard Fescue/Bluegrass	11	West
96	Wayne	East	YES	Centipede	4	East
97	Wilkes	West	NO	Hard Fescue/Bluegrass	11	West
98	Wilson	East	YES	Centipede	4	East
99	Yadkin	West	NO	Hard Fescue/Bluegrass	11	West
100	Yancey	WestEd	NO	Hard Fescue/Bluegrass	13	West

SEEDING AND MULCHING:

(East)

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

All Roadway Areas

March 1 - August 31

50#	Tall Fescue
10#	Centipede
25#	Bermudagrass (hulled)
500#	Fertilizer
4000#	Limestone

September 1 - February 28

50#	Tall Fescue
10#	Centipede
35#	Bermudagrass (unhulled)
500#	Fertilizer
4000#	Limestone

Waste and Borrow Locations

March 1 – August 31

75#	Tall Fescue
25#	Bermudagrass (hulled)
500#	Fertilizer
4000#	Limestone

September 1 - February 28

75#	Tall Fescue
35#	Bermudagrass (unhulled)
500#	Fertilizer
4000#	Limestone

Note: 50# of Bahiagrass may be substituted for either Centipede or Bermudagrass only upon Engineer’s request.

Approved Tall Fescue Cultivars

2 nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

SEEDING AND MULCHING:

(East)

On cut and fill slopes 2:1 or steeper Centipede shall be applied at the rate of 5 pounds per acre and add 20# of Sericea Lespedeza from January 1 - December 31.

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

TEMPORARY SEEDING:

Fertilizer shall be the same analysis as specified for *Seeding and Mulching* and applied at the rate of 400 pounds and seeded at the rate of 50 pounds per acre. Sweet Sudan Grass, German Millet or Browntop Millet shall be used in summer months and Rye Grain during the remainder of the year. The Engineer will determine the exact dates for using each kind of seed.

FERTILIZER TOPDRESSING:

Fertilizer used for topdressing on all roadway areas except slopes 2:1 and steeper shall be 10-20-20 grade and shall be applied at the rate of 500 pounds per acre. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 10-20-20 analysis and as directed.

Fertilizer used for topdressing on slopes 2:1 and steeper and waste and borrow areas shall be 16-8-8 grade and shall be applied at the rate of 500 pounds per acre. A different analysis of fertilizer may be used provided the 2-1-1 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 16-8-8 analysis and as directed.

SUPPLEMENTAL SEEDING:

The kinds of seed and proportions shall be the same as specified for *Seeding and Mulching*, with the exception that no centipede seed will be used in the seed mix for supplemental seeding. The rate of application for supplemental seeding may vary from 25# to 75# per acre. The actual rate per acre will be determined prior to the time of topdressing and the Contractor will be notified in writing of the rate per acre, total quantity needed, and areas on which to apply the supplemental seed. Minimum tillage equipment, consisting of a sod seeder shall be used for incorporating seed into the soil as to prevent disturbance of existing vegetation. A clodbuster (ball and chain) may be used where degree of slope prevents the use of a sod seeder.

MOWING:

The minimum mowing height on this project shall be 4 inches.

SEEDING AND MULCHING:

(West)

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

Shoulder and Median Areas

August 1 - June 1

20#	Kentucky Bluegrass
75#	Hard Fescue
25#	Rye Grain
500#	Fertilizer
4000#	Limestone

May 1 - September 1

20#	Kentucky Bluegrass
75#	Hard Fescue
10#	German or Browntop Millet
500#	Fertilizer
4000#	Limestone

Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

August 1 - June 1

100#	Tall Fescue
15#	Kentucky Bluegrass
30#	Hard Fescue
25#	Rye Grain
500#	Fertilizer
4000#	Limestone

May 1 - September 1

100#	Tall Fescue
15#	Kentucky Bluegrass
30#	Hard Fescue
10#	German or Browntop Millet
500#	Fertilizer
4000#	Limestone

Approved Tall Fescue Cultivars

2 nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

SEEDING AND MULCHING:

(West)

Approved Kentucky Bluegrass Cultivars:

Alpine	Bariris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

Approved Hard Fescue Cultivars:

Chariot	Nordic	Rhino	Warwick
Firefly	Oxford	Scaldis II	
Heron	Reliant II	Spartan II	
Minotaur	Reliant IV	Stonehenge	

On cut and fill slopes 2:1 or steeper add 20# Sericea Lespedeza January 1 - December 31.

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

TEMPORARY SEEDING:

Fertilizer shall be the same analysis as specified for *Seeding and Mulching* and applied at the rate of 400 pounds and seeded at the rate of 50 pounds per acre. German Millet, or Browntop Millet shall be used in summer months and rye grain during the remainder of the year. The Engineer will determine the exact dates for using each kind of seed.

FERTILIZER TOPDRESSING:

Fertilizer used for topdressing shall be 16-8-8 grade and shall be applied at the rate of 500 pounds per acre. A different analysis of fertilizer may be used provided the 2-1-1 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 16-8-8 analysis and as directed.

SUPPLEMENTAL SEEDING:

The kinds of seed and proportions shall be the same as specified for *Seeding and Mulching*, and the rate of application may vary from 25# to 75# per acre. The actual rate per acre will be determined prior to the time of topdressing and the Contractor will be notified in writing of the rate per acre, total quantity needed, and areas on which to apply the supplemental seed. Minimum tillage equipment, consisting of a sod seeder shall be used for incorporating seed into the soil as to prevent disturbance of existing vegetation. A clodbuster (ball and chain) may be used where degree of slope prevents the use of a sod seeder.

MOWING:

The minimum mowing height on this project shall be six inches.

SEEDING AND MULCHING:**(WestEd)**

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

Shoulder and Median Areas**August 1 - June 1**

20#	Kentucky Bluegrass
75#	Hard Fescue
25#	Rye Grain
500#	Fertilizer
4000#	Limestone

May 1 - September 1

20#	Kentucky Bluegrass
75#	Hard Fescue
10#	German or Browntop Millet
500#	Fertilizer
4000#	Limestone

Areas Beyond the Mowing Pattern, Waste and Borrow Areas:**August 1 - June 1**

100#	Tall Fescue
15#	Kentucky Bluegrass
30#	Hard Fescue
25#	Rye Grain
500#	Fertilizer
4000#	Limestone

May 1 - September 1

100#	Tall Fescue
15#	Kentucky Bluegrass
30#	Hard Fescue
10#	German or Browntop Millet
500#	Fertilizer
4000#	Limestone

Approved Tall Fescue Cultivars

2 nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

SEEDING AND MULCHING:

(WestEd)

Approved Kentucky Bluegrass Cultivars:

Alpine	Bariris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

Approved Hard Fescue Cultivars:

Chariot	Nordic	Rhino	Warwick
Firefly	Oxford	Scaldis II	
Heron	Reliant II	Spartan II	
Minotaur	Reliant IV	Stonehenge	

On cut and fill slopes 2:1 or steeper add 20# Sericea Lespedeza and 15# Crown Vetch January 1 - December 31.

The Crown Vetch Seed should be double inoculated if applied with a hand seeder. Four times the normal rate of inoculant should be used if applied with a hydroseeder. If a fertilizer-seed slurry is used, the required limestone should also be included to prevent fertilizer acidity from killing the inoculant bacteria. Caution should be used to keep the inoculant below 80° F to prevent harm to the bacteria. The rates and grades of fertilizer and limestone shall be the same as specified for *Seeding and Mulching*.

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

TEMPORARY SEEDING:

Fertilizer shall be the same analysis as specified for *Seeding and Mulching* and applied at the rate of 400 pounds and seeded at the rate of 50 pounds per acre. German Millet, or Browntop Millet shall be used in summer months and rye grain during the remainder of the year. The Engineer will determine the exact dates for using each kind of seed.

FERTILIZER TOPDRESSING:

Fertilizer used for topdressing shall be 16-8-8 grade and shall be applied at the rate of 500 pounds per acre. A different analysis of fertilizer may be used provided the 2-1-1 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 16-8-8 analysis and as directed.

SEEDING AND MULCHING:

(WestEd)

SUPPLEMENTAL SEEDING:

The kinds of seed and proportions shall be the same as specified for *Seeding and Mulching*, and the rate of application may vary from 25# to 75# per acre. The actual rate per acre will be determined prior to the time of topdressing and the Contractor will be notified in writing of the rate per acre, total quantity needed, and areas on which to apply the supplemental seed. Minimum tillage equipment, consisting of a sod seeder shall be used for incorporating seed into the soil as to prevent disturbance of existing vegetation. A clodbuster (ball and chain) may be used where degree of slope prevents the use of a sod seeder.

MOWING:

The minimum mowing height on this project shall be six inches.

Native Grass Seeding and Mulching

(East)

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands and riparian areas, and adjacent to Stream Relocation construction within a 50 foot zone on both sides of the stream or depression, measured from top of stream bank or center of depression. The stream bank of the stream relocation shall be seeded by a method that does not alter the typical cross section of the stream bank. Native Grass Seeding and Mulching shall also be performed in the permanent soil reinforcement mat section of preformed scour holes, and in other areas as directed.

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

March 1 - August 31		September 1 - February 28	
18#	Creeping Red Fescue	18#	Creeping Red Fescue
6#	Indiangrass	6#	Indiangrass
8#	Little Bluestem	8#	Little Bluestem
4#	Switchgrass	4#	Switchgrass
25#	Browntop Millet	35#	Rye Grain
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Creeping Red Fescue Cultivars:

Aberdeen Boreal Epic Cindy Lou

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

Native Grass Seeding and Mulching shall be performed in accordance with Section 1660 of the *Standard Specifications* and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Measurement and Payment

Native Grass *Seeding and Mulching* will be measured and paid for in accordance with Article 1660-8 of the *Standard Specifications*.

Native Grass Seeding And Mulching

(West)

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands and riparian areas, and adjacent to Stream Relocation and/or trout stream construction within a 50 foot zone on both sides of the stream or depression, measured from top of stream bank or center of depression. The stream bank of the stream relocation shall be seeded by a method that does not alter the typical cross section of the stream bank. Native Grass Seeding and Mulching shall also be performed in the permanent soil reinforcement mat section of preformed scour holes, and in other areas as directed.

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

August 1 - June 1

18#	Creeping Red Fescue
8#	Big Bluestem
6#	Indiangrass
4#	Switchgrass
35#	Rye Grain
500#	Fertilizer
4000#	Limestone

May 1 – September 1

18#	Creeping Red Fescue
8#	Big Bluestem
6#	Indiangrass
4#	Switchgrass
25#	German or Browntop Millet
500#	Fertilizer
4000#	Limestone

Approved Creeping Red Fescue Cultivars:

Aberdeen

Boreal

Epic

Cindy Lou

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

Native Grass Seeding and Mulching shall be performed in accordance with Section 1660 of the *Standard Specifications* and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Measurement and Payment

Native Grass *Seeding and Mulching* will be measured and paid for in accordance with Article 1660-8 of the *Standard Specifications*.

APPENDIX D DESIGN BUILD SUBMITTAL GUIDELINES

Erosion Control Design

All Erosion and Sedimentation Control Plans shall be reviewed and accepted by the Department for each distinct project section before **any** land disturbing activities, including clearing and grubbing, can commence on that project section. The RFC Final Grade Erosion Control Plans shall only be deemed final after the roadway drainage design has been finalized and accepted by the Department. Specifically, acceptance of all Erosion Control submittals, prior to and including the RFC Final Grade Erosion Control Plans, shall be contingent on acceptance of the roadway drainage design. Design modifications developed after acceptance of the RFC Final Grade Erosion Control Plans shall require the Design-Build Team to submit Intermediate Erosion Control Plans for review and acceptance as noted below. Each plan submittal shall include all pertinent design information required for review, such as design calculations, drainage areas, etc.

The NCDOT Roadside Environment Unit (REU) will provide a sample set of Erosion and Sedimentation Control plans and MicroStation Erosion Control workspace to the Design-Build Team upon request. The Design-Build Team shall coordinate a pre-design meeting between the NCDOT REU Soil and Water Engineering Section, the Design-Build Team and other pertinent NCDOT personnel before beginning the erosion control design. The Department shall only review Erosion and Sediment Control Plans after the aforementioned pre-design meeting. Release for Construction (RFC) Final Grade Erosion Control Plans shall be accepted by the NCDOT REU and submitted to all NCDOT personnel listed below before **any** land disturbing activities, including clearing and grubbing, shall commence.

75% Clearing & Grubbing Review Plans

Prerequisites:

- ❑ Accepted Roadway Line and Grade or Preliminary Roadway Plans and x-sections
- ❑ Pre-design meeting with the NCDOT REU Soil and Water Engineering Section, the Design-Build Team and any other pertinent NCDOT personnel
- ❑ Provide two sets of half-size Roadway Plans, that delineate the proposed slope / stake lines, and x-sections to Transportation Program Management concurrently with this submittal

- Provide one set of half-size Roadway Plans, that delineate the proposed slope / stake lines, and x-sections to the Roadside Environmental Field Operations Engineer concurrently with this submittal

Total Number Required: (3 Full-size and 2 Half-size)

- Resident Engineer (1 Full-size)
 - Sent directly by the DBT
- Transportation Program Management (1 Half-size)
- Roadside Environmental Unit (1 Full-size)
- Roadside Environmental Field Operations Engineer (1 Full-size)
 - Sent directly by the DBT
- Division Environmental Officer (1 Half-size)
 - Sent directly by the DBT

100% Clearing & Grubbing Review Plans

Prerequisites:

- Provide two sets of half-size Roadway Plans, that delineate the proposed slope / stake lines, and x-sections to Transportation Program Management concurrently with this submittal
- Provide one set of half-size Roadway Plans, that delineate the proposed slope / stake lines, and x-sections to the Roadside Environmental Field Operations Engineer concurrently with this submittal

Total Number Required: (3 Full-size and 2 Half-size)

- Resident Engineer (1 Full-size)
 - Sent directly by the DBT
- Transportation Program Management (1 Half-size)
- Roadside Environmental Unit (1 Full-size)
- Roadside Environmental Field Operations Engineer (1 Full-size)
 - Sent directly by the DBT
- Division Environmental Officer (1 Half-size)
 - Sent directly by the DBT

RFC Clearing & Grubbing Plans

Prerequisites:

- Provide two sets of half-size Roadway Plans, that delineate the proposed slope / stake lines and drainage, as well as x-sections to Transportation Program Management concurrently with this submittal
- Provide one set of half-size Roadway Plans, that delineate the proposed slope / stake lines and drainage, as well as x-sections to the Roadside Environmental Field Operations Engineer concurrently with this submittal

Total Number Required:

(2 Full-size and 6 Half-size)

- Resident Engineer (2 Full-size)
 - Sent directly by the DBT
- Transportation Program Management (1 Half-size)
- Roadside Environmental Unit (2 Half-size)
- Roadside Environmental Field Operations Engineer (1 Half-size)
 - Sent directly by the DBT
- Division Environmental Officer (1 Half-size)
 - Sent directly by the DBT
- Roadway Construction Engineer (1 Half-size)
 - Sent directly by the DBT

75% Final Grade Erosion Control Plans

Prerequisites:

- Provide two sets of half-size Roadway Plans, that delineate the proposed slope / stake lines and drainage, as well as x-sections to Transportation Program Management concurrently with this submittal
- Provide one set of half-size Roadway Plans, that delineate the proposed slope / stake lines and drainage, as well as x-sections to the Roadside Environmental Field Operations Engineer concurrently with this submittal

Total Number Required: (3 Full-size and 2 Half-size)

- Resident Engineer (1 Full-size)
 - Sent directly by the DBT
- Transportation Program Management (1 Half-size)
- Roadside Environmental Unit (1 Full-size)
- Roadside Environmental Field Operations Engineer (1 Full-size)
 - Sent directly by the DBT
- Division Environmental Officer (1 Half-size)
 - Sent directly by the DBT

100% Final Grade Erosion Control Plans

Prerequisites:

- Accepted Final Roadway Plans and x-sections when the Design-Build Team is acquiring the permit
- Accepted 100% Hydraulic Plans when the Design-Build Team is acquiring the permit
- Provide two sets of half-size Roadway Plans, that delineate the proposed slope / stake lines and drainage, as well as x-sections to Transportation Program Management concurrently with this submittal
- Provide one set of half-size Roadway Plans, that delineate the proposed slope / stake lines and drainage, as well as x-sections to the Roadside Environmental Field Operations Engineer concurrently with this submittal

Total Number Required: (3 Full-size and 2 Half-size)

- Resident Engineer (1 Full-size)
 - Sent directly by the DBT
- Transportation Program Management (1 Half-size)
- Roadside Environmental Unit (1 Full-size)
- Roadside Environmental Field Operations Engineer (1 Full-size)
 - Sent directly by the DBT
- Division Environmental Officer (1 Half-size)
 - Sent directly by the DBT

RFC Final Grade Erosion Control Plans

This submittal shall include seven sets of Project Special Provisions. Erosion Control Special Provisions are available through the Design-Build website.

Total Number Required: (2 Full-size, 7 Half-size and 8 sets of PSPs)

- Resident Engineer (2 Full-size and 2 sets of PSPs)
 - Sent directly by the DBT
- Transportation Program Management (1 Half-size and 1 set of PSPs)
- Roadside Environmental Unit (2 Half-size and 1 set of PSPs)
- Roadside Environmental Field Operations Engineer(1 Half-size and 1 set of PSPs)
 - Sent directly by the DBT
- Division Environmental Officer (1 Half-size and 1 set of PSPs)
 - Sent directly by the DBT
- Division Construction Engineer (1 Half-size and 1 set of PSPs)
 - Sent directly by the DBT
- Roadway Construction Engineer (1 Half-size and 1 set of PSPs)
 - Sent directly by the DBT

Intermediate Plans (if required)

This submittal shall be required if design modifications and / or site conditions require additional erosion control design or design revisions to the RFC Clearing and Grubbing and / or the RFC Final Grade Erosion Control Plans. This submittal shall also be required to review all basins requiring individual calculations. The NCDOT REU shall review and accept Intermediate Plans prior to construction of any aspect impacted by the revised erosion control design.

Prerequisites:

- Accepted Roadway and / or Hydraulic Plans of the design modifications
- Provide two sets of half-size Roadway Plans, that delineate the proposed slope / stake lines and drainage, as well as x-sections to Transportation Program Management concurrently with this submittal
- Provide one set of half-size Roadway Plans, that delineate the proposed slope / stake lines and drainage, as well as x-sections to the Roadside Environmental Field Operations Engineer concurrently with this submittal

- Provide one set of basin calculations to Transportation Program Management and the Roadside Field Operations Engineer concurrently with this submittal

Total Number Required:

(3 Full-size and 5 Half-size)

- Resident Engineer (2 Full-size)
 - Sent directly by the DBT
- Transportation Program Management (1 Half-size)
- Roadside Environmental Unit (2 Half-size)
- Roadside Environmental Field Operations Engineer (1 Full-size)
 - Sent directly by the DBT
- Division Environmental Officer (1 Half-size)
 - Sent directly by the DBT
- Roadway Construction Engineer (1 Half-size)
 - Sent directly by the DBT

EROSION CONTROL DESIGN – EXPRESS DESIGN-BUILD BRIDGE PROJECTS

All Erosion and Sedimentation Control Plans shall be reviewed and accepted by the Department for each bridge or culvert site before **any** land disturbing activities, including clearing and grubbing, can commence on that site. The RFC Erosion Control Plans shall only be deemed final after the roadway drainage design has been finalized and accepted by the Department. Specifically, acceptance of all Erosion Control submittals shall be contingent on acceptance of the roadway drainage design. Design modifications developed after acceptance of the RFC Erosion Control Plans shall require the Design-Build Team to submit Intermediate Erosion Control Plans for review and acceptance as noted below. Each plan submittal shall include all pertinent design information required for review, such as design calculations, drainage areas, etc.

The NCDOT Roadside Environment Unit (REU) will provide a sample set of Erosion and Sedimentation Control plans and Microstation Erosion Control workspace to the Design-Build Team upon request. The Design-Build Team shall coordinate a pre-design meeting between the NCDOT REU Soil and Water Engineering Section, the Design-Build Team and other pertinent NCDOT personnel before beginning the erosion control design. The Department shall only review Erosion and Sediment Control Plans after the aforementioned pre-design meeting. Release for Construction (RFC) Erosion Control Plans shall be accepted by the NCDOT REU and submitted to all NCDOT personnel listed below before **any** land disturbing activities, including clearing and grubbing, shall commence.

EROSION AND SEDIMENTATION CONTROL PLANS

Prerequisites:

- Provide Roadway and 100% Hydraulic Design Plans and x-sections

List of Recipients:

- Division Construction Engineer
- Division Bridge Program Manager
- Resident Engineer
- Transportation Program Management
- Roadside Environmental Unit
- Roadside Environmental Field Operations Engineer
- Division Environmental Officer

RFC EROSION CONTROL PLANS

This submittal includes the RFC Roadway Plans and x-sections, Project Special Provisions and Permit Drawings. Erosion Control Special Provisions are available through the Design-Build website.

List of Recipients:

- Resident Engineer
- Transportation Program Management
Roadside Environmental Unit
Roadside Environmental Field Operations Engineer
- Division Environmental Officer
- Division Construction Engineer
- Division Bridge Program Manager
- Area Bridge Construction Engineer

APPENDIX E SPILL RESPONSE PLAN

Chapter 1 Spill Prevention and Cleanup



Overview

DESCRIPTION

Each NCDOT industrial facility must establish spill prevention and response procedures to ensure that oil and other hazardous substances do not enter our waterways. A Spill Prevention and Response Plan can be found in the facilities site-specific Stormwater Pollution Prevention Plan (SPPP) and Spill Prevention Control and Countermeasure (SPCC) Plan, if applicable for the facility. NCDOT is required by law to follow the directives in that plan. For spills that occur on NCDOT right-of-way, NCDOT personnel should follow the guidelines in this chapter and refer to details in the SPPP/SPCC Plans if necessary.

Even spills that happen away from streams and lakes could affect our waterways if they are washed into a storm drain or ditch. Every NCDOT worker that handles oil and hazardous substances must be able to identify potential sources of stormwater pollution and must work to prevent these sources from entering our streams, rivers, and lakes.

GOALS

The goals of this chapter are to: 1) provide tools and information needed to prevent spills from occurring, and 2) provide tools to properly respond to a spill if one does occur. Each NCDOT worker needs to be aware of:

- The contaminants in the environment where they work and how those materials are contained,
- How to recognize a spill, and
- What to do in the event of a spill.

KEY DEFINITIONS

Oil: Oil is defined as oil of any kind or in any form, including, but not limited to: fats, oils, or greases of animal, fish, or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and, other oils and greases, including petroleum, fuel oil, sludge, synthetic oils, mineral oils, oil refuse, or oil mixed with wastes other than dredged spoil. This definition includes CRS-2.

Hazardous Materials/Hazardous Substances: Refer to Chapter 12 of this manual.

Spill: Any time a substance that could contaminate the surrounding environment escapes from the intended containment for that substance.

Note that some spills require regulatory reporting. This chapter provides guidance on the different types of spills and provides best management practices (BMPs) for spill prevention and cleanup of spills that occur at NCDOT industrial facilities and along NCDOT roadways.

Note that the forms referenced in this chapter are associated with the Stormwater Pollution Prevention Plans (SPPPs) that industrial facilities are required to maintain per NCDOT’s National Pollutant Discharge Elimination System (NPDES) Permit.

1.1 Potential Pollutants of Concerns

The following are a list of potential pollutants that could be spilled when performing various industrial and road maintenance activities:

- Storage and Handling of Materials
 - Petroleum products, including liquid asphalt
 - Roadway deicing materials, including salt, calcium chloride, and brine
 - Fertilizers
 - Pesticides
 - Other hazardous substances (such as paint, solvent, cleaners)
- Vehicle and Equipment Maintenance
 - Motor oil, transmission fluid, antifreeze, hydraulic oil, and other vehicle and equipment fluids
 - Fuel
 - Wastewater, detergents, and asphalt release agents from vehicle and equipment cleaning operations
- Illegal Connections or Dumping on NCDOT Property
 - Waste dumped at rest areas, on roadways, or other NCDOT property
 - Litter on roadways
 - Illegally piped connections from adjacent properties that discharge pollutants into NCDOT right-of-way



Hydraulic oil leak from NCDOT truck

- Road Maintenance
 - Road oil
 - Fuel
 - Paint and sealant
 - Other vehicle and equipment fluids
 - Concrete debris and construction waste
 - Pesticides
 - Deicing materials
 - Sediment



Antifreeze leak on pavement from NCDOT truck

SPILL PREVENTION PRACTICES

Equipment failures may result in discharges of oil or hazardous substances in varying amounts over varying periods of time. Structural, mechanical, or instrument failures may include tank rupture or piping and fitting failures associated with the use of various petroleum and non-petroleum products. These failures can occur as the result of structural deficiencies, material defects, unchecked corrosion, and extreme stresses resulting from unusual internal or external pressures or from external loads.

Preventing these types of releases will help keep our waterways clean. Spills can be prevented through routine inspections, good housekeeping, preventative maintenance, and employee training.

1.2 Inspections

Daily visual inspections of equipment and material storage areas or work areas are the key to preventing and minimizing spills. Having procedures in place to prevent and respond to spills is only part of the challenge. Making sure these procedures are properly implemented and effective must be an on-going effort. Periodic inspections help ensure that the procedures are doing the job. Visual monitoring of stormwater discharge outfalls is useful in evaluating the effectiveness of procedures in preventing stormwater contamination.

In order to comply with a facility SPPP or SPCC Plan, there are several forms required to be completed during site inspections. Those forms are referenced below, and can be found in your SPPP binder or on the SPPP website, <https://apps.dot.state.nc.us/hydro/sppp/>.

- General walk-throughs of NCDOT facility work areas should be conducted by facility personnel. The following items should be evaluated during the walk-through:
 - Tanks and drums: observe for leaks and corrosion
 - Secondary containment structures: make sure valves are closed and locked
 - Unusual stains on walls, floors, and grounds
 - Deterioration of equipment foundations and structural components
 - Debris present in stormwater drainage inlets, pipes, or ditches
 - Excessive noise, vibration, or exhaust associated with equipment

- Deteriorating gaskets, supports, and loose valve stems on valves and pipelines
- Torn bags of dry materials or bags exposed to rainwater
- Conditions of spill response kits and quantity of absorbent materials
- Each maintenance yard must perform an inspection of potential stormwater contamination and stormwater systems on a semi-annual basis. These inspections are required by NCDOT's NPDES stormwater permit. **SPPP Form 19** is used during each semi-annual inspection.
- Inspections should also evaluate the likelihood of non-stormwater discharges being directed to the stormwater system (for example, wastewater from outdoor equipment washing activities). If identified, unallowable non-stormwater discharges must be eliminated (refer to SPPP or **Non-Stormwater Discharges Chapter, IA-015** of this manual). SPPP **Forms 5** and **6** are used to track non-stormwater discharges identified at a facility.
- NCDOT's NPDES Permit requires that stormwater discharges from industrial outfalls be inspected at least twice per year during wet weather events for evidence of pollutants (**SPPP Form 17**). The discharges are observed using the following parameters:

- Color
- Odor
- Clarity
- Floating solids
- Suspended solids
- Foam
- Oil sheen
- Other indicators of pollution
- Erosion at or immediately below the outfall



Oil sheen on surface water

- If the facility has an SPCC Plan in place, monthly site inspection checklists (**SPCC Form 23**) and an annual site inspection (**SPCC Form 24**) must be completed for regulated oil containers at the facility (refer to facility SPCC Plan oil container inventory).
- Be aware that leaks and spills can occur during roadway maintenance activities. Clean up spilled material (fuel, paint, asphalt, fertilizer, etc.) immediately and dig up all contaminated soil, place into drums, and dispose of properly. Contact the Division Hazardous Materials Manager if there are questions concerning spill notification, cleanup, and disposal requirements.

1.3 Good Housekeeping

Good housekeeping is maintaining a clean and orderly work environment, whether within a facility or on the roadway. A good housekeeping program also includes materials management

practices such as proper storage of drums and other chemicals. There is a Good Housekeeping section on SPPP inspection **Form 19**. Good housekeeping includes the following BMPs:

- Dispose of dirty mop washwater from industrial shop floor cleaning by passing through an oil/water separator connected to sanitary system. Other bathroom or bullpen mop washwater can be drained directly to the sanitary sewer system.
- Sweep up contaminated dry granular absorbents after each use and place in designated containers.
- Check catch basins and other inlets to the stormwater drainage system regularly to make sure that they are free of debris and do not have any evidence of staining, which may indicate that a spill has occurred.
- Inspect the exterior grounds on a regular basis. Dispose of litter and other trash in designated containers.
- Make sure that scrap parts and empty drums are not accumulating on-site.
- Cover dumpsters and recycle bins to prevent rainfall from coming into contact with their contents.
- Store chemicals in approved containers indoors or under cover so that they will not contaminate rainwater.
- Recycle, reclaim, or reuse process materials to reduce the amount brought into the facility.
- Locate material storage areas away from storm ditch, ditches, or other access to surface waters.
- Cover storm drain inlets and manholes during paving operations.
- Use erosion and sediment control measures to manage runoff.
- Utilize pollution prevention equipment and materials such as drip pans and absorbent material for paving machines to capture leaks and spills of paving materials and fluids.
- Use only NCDOT-approved products. The approved product list is located on the NCDOT website at: <http://apps.dot.state.nc.us/vendor/approvedproducts>.



Sweep up dry absorbents

1.4 Preventative Maintenance

Preventative maintenance consists of inspections and tests of NCDOT equipment and operational systems to evaluate conditions such as cracks or slow leaks that could cause breakdowns or failures resulting in discharges of pollutants to the stormwater drainage system.

Preventative maintenance also applies to the storm drainage infrastructure itself and to stormwater controls such as infiltration devices, diversion structures, detention facilities, and other stormwater treatment systems that may be located at the NCDOT facility.

The following types of equipment and structures may require preventative maintenance (refer to the facility's SPPP for more guidance on their specific risk to stormwater runoff):

- Fuel pumps
- Oil pumps
- Other pumps
- Mobile equipment
- Secondary containment structures
- Pipes and supply lines

Preventative maintenance includes the following BMPs:

- Perform preventative maintenance daily during normal working hours and under normal operating conditions.
- Inspect, test, clean, and perform minor repairs on equipment and structures at regularly scheduled intervals.



Liquid asphalt spilled on ground near dispensing area



Hydraulic fluid spill on pavement from heavy equipment

1.5 Spill Response

Despite our best efforts to protect the environment, spills sometimes occur. Quick, effective responses to spills can minimize their impacts and prevent the spill from entering surface waterbodies. **WHEN IN DOUBT, REPORT A SPILL** to the proper authorities using the procedure below.

It is also important that proper follow-up procedures, such as reporting and recordkeeping, are followed after a spill.

1.5.1 Spill Response Process

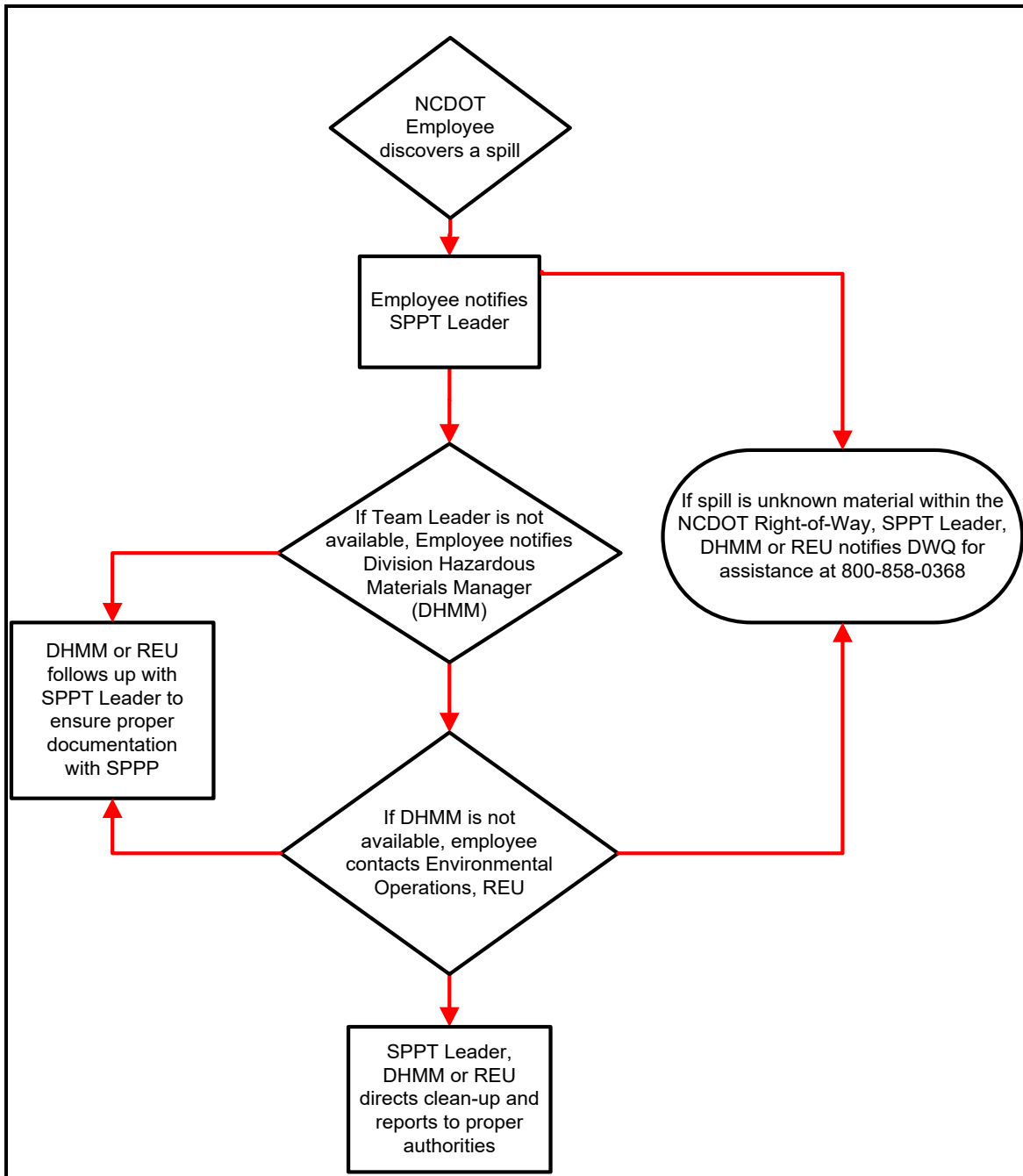
- For significant spills of oil or hazardous substances that cannot be controlled by personnel in the immediate area, contact emergency response units by dialing 911. It may also be necessary to contact emergency spill response contractors to assist with clean-up.
- Report all spills to the Stormwater Pollution Prevention Team (SPPT) Leader. The SPPT Leader coordinates with the Division Hazardous Materials Manager to direct all response, cleanup, notification, and disposal efforts for spills occurring at an industrial facility or for spills occurring on the roadway during maintenance activities, including any spill reporting to North Carolina Division of Water Quality (DWQ), National Response Center (NRC) or United States Coast Guard, United States Environmental Protection Agency (USEPA), or other appropriate agencies. Refer to the facility SPPP-SPCC Plan for specific spill response, cleanup, and notification procedures.

1.5.2 SIGNIFICANT SPILLS

Significant spills include, but are not limited to: releases of oil or hazardous substances in excess of reportable quantities under section 311 of the Clean Water Act (Ref: 40 CFR 110.10 and CFR 117.21) or section 102 of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Ref: 40 CFR 302.4) or spills that cannot be controlled with on-site resources, or cause a contamination to the environment, or cause injury to personnel.

- Refer to the following flow chart for NCDOT Spill Reporting protocol. A list of SPPT Leaders can be found on the SPPP website at <https://apps.dot.state.nc.us/hydro/sPPP/>.
- If the SPPT Leader needs assistance, he/she should contact the Division Hazardous Materials Manager or Roadside Environmental Unit (REU), Environmental Operations Section in Raleigh. If spill material is unknown on NCDOT right-of-way, immediately contact supervisor. Do not attempt to clean up the spill. If spilled material is suspected of being hazardous waste as defined by 15 NCAC 13A, immediately contact Division Hazardous Materials Manager.
- Use only trained personnel to respond to spills.
- Safety goggles, nitrile gloves, and tyvek coveralls and other appropriate personal protection equipment (PPE) should be used when responding to spills.
- Follow these four basic steps to control a spill:
 1. Stop the spill at the source.
 - Plug
 - Patch
 - Cover
 - Confine
 2. Contain the spill.
 - Protect storm drainage inlets

NCDOT Spill Reporting



- DHMM = Division Hazardous Material Manager
- DWQ = Division of Water Quality
- REU = Roadside Environmental Unit
- SPPT = Stormwater Pollution Prevention Team

3. Collect the spilled material.
 - Methods used to remove the spill will vary depending on material spilled (refer to MSDS)
 - All evidence of a spill will be completely removed
 - Absorbent pads, booms, and socks and dry granular absorbents can be used
4. Dispose of the spilled material and subsequent contaminated material properly.
 - Use appropriate containers to store used absorbents and contaminated cleanup materials. Refer to the **Waste Handling and Disposal Chapter, IA-013** of this manual for further guidance.
 - Contact your Division Hazardous Materials Manager if there are questions concerning the proper disposal of used absorbents and contaminated materials.
 - Follow the general guidelines in the Oil Spill Response, Reporting, and Cleanup table below for responding to and reporting an oil spill.

Oil Spill Response, Reporting, and Cleanup

Oil Spill Volume	Response	Reporting	Cleanup
< 25 gallons on-site	Facility Personnel	SPPT Leader	Sorbent Material, Pads
≥ 25 gallons, or causes sheen on water, or ≤ 100 feet from water	Facility Personnel	SPPT Leader, DWQ	Sorbent Material, Pads
Greater than 1,000 gallons or > 42 gallons in two spills within one year	Facility Personnel, Fire Dept/Contractor	SPPT Leader, USEPA, NRC, DWQ	Qualified Hazardous Waste Contractor
Any amount that reaches a navigable water	Facility Personnel, Fire Dept/Contractor	SPPT Leader, USEPA, NRC, DWQ	Qualified Hazardous Waste Contractor

Spill Cleanup Method for Oil Spill

- Use commercial non-biodegradable absorbent materials to remove oil from drainage system or water body.
- Granular absorbents or sand can be spread on paved surfaces to absorb oil and help eliminate slippery areas.
- Where oil exists in depth, a flameproof, well-grounded pump and motor can be used to remove oil. In this case, a truck may be required to transport the waste oil to an approved reclamation/ disposal area or waste oil tank.



Typical NCDOT spill kit

- If oil enters the storm drainage system, oil will be removed from the surface by skimming or pumping and will be placed in containers for proper disposal.
- Spark-producing shovels or other similar metallic tools (which may spark with surface) should not be used for cleaning.
- Contaminated absorbents will be collected by broom or shovel and transferred into approved containers for proper disposal.

Spill Cleanup Method for Hazardous Substance Spill

- Refer to the MSDS for particular hazard, precautionary measures, PPE, and cleanup procedures.
- Absorbents may be used where open water may be affected.
- If a hazardous substance enters the storm drainage system, the contaminated storm drainage effluent will be pumped into containers to be properly disposed.
- Restoration of areas damaged by oil or hazardous substance spill will return the



Paint spills on the ground from improper loading and mixing practices

- affected areas equal to their condition prior to the spill. Rehabilitation may include planting and seeding of the disturbed area, if necessary.
- Impervious areas (concrete or asphalt) that have been contacted by the spilled material will be decontaminated. If spilled material was an inorganic acid or alkali, a dilute solution of an appropriate neutralizing agent should be used as an initial rinse. If the spill material involved an organic material (oil or solvent), an aqueous surfactant solution should be used for the initial rinse. Spent decontamination solutions will be collected and transferred to DOT-approved containers for proper disposal. Steam cleaning or triple water rinse may be needed to follow-up this decontamination step.
 - If spilled material contacted soils, all obviously contaminated soil will be removed as directed by SPPT Leader and Division Hazardous Materials Manager. The contaminated soil will be transferred to DOT-approved containers unless disposed in bulk. During removal operations, soil samples should be collected, including at appropriate depths and locations beyond the immediately affected area as necessary.



Absorbent pads stored on-site for spill response

Contact the Division Hazardous Materials Manager for the current NCDOT hazardous waste contractor.

- If a Hazardous Spill Basin (HSB) captures a spill or a spill has just occurred up gradient of the HSB, NCDOT personnel should close the HSB sluice gate and contact the Division Hazardous Materials Manager. Call 911 and any other proper authorities if this has not already been done. At no time should NCDOT personnel attempt any hazardous material cleanup or enter a spill area unless he or she is properly trained.
- If unknown spills are encountered on the roadside, contact DWQ for assistance in having the spill evaluated and cleaned or removed.

1.6 Recordkeeping

Each SPPT Leader must maintain detailed spill records to demonstrate to DWQ that proper spill prevention and response procedures have been implemented at the facility. All significant spills that occur at the facility must be documented using **SPPP Form 9**. All non-compliance incidents that occur at the facility must be documented using **SPPP Form 10**.

A copy of **SPPP Form 10** shall also be provided to DWQ within five (5) days of the time NCDOT becomes aware of the circumstances.

The following are examples of non-compliance events:

- Failure of a stormwater control device
- Flow by-pass of stormwater control device
- Improper discharge or dumping
- Spill into stormwater drainage system
- Spill into waters of the state
- Illicit discharge/connection

It is important that completed forms are available for regulators to review upon their request.

- Keep copies of SPPP-SPCC Plan inspection records (including completed inspection **Forms 17, 19, 23, and 24** as applicable).
- Keep copies of any completed SPPP-SPCC Plan significant spill or non-compliance reports (including completed **Forms 9, 10, and 26**).



Paint spill discharged to the storm drainage system

Ensure that all current MSDSs are maintained onsite. In the event of a hazardous substance spill, contact your Division Hazardous Materials Manager for assistance with the determination of a Reportable Quantity (RQ).

An Illicit Discharge/ Connection is defined as:

- Any unauthorized dumping along roadway
- Any illegal drainage connection to the roadway’s drainage system
- Any illegal placement of a hazardous substance along the roadway

Pollutant types may include:

- Oil/grease
- Chemicals
- Sewage
- Fuels
- Wastewater
- Hazardous waste
- Barrels/drums



Drums abandoned onto NCDOT property are considered illegal dumping

1.7 Reporting

Certain types of spills must be reported to DWQ. Please keep in mind that the information presented here is to supplement the SPPP or SPCC Plan, and in the event of a spill at an industrial facility the procedures written in the SPPP or SPCC Plan must be followed. As a BMP, the SPPT Leader should post warning signs that contain emergency telephone numbers at fuel stations, bulk storage tanks, other refueling areas, and other hazardous substance storage areas.

Depending on the size of the spill, type of material spilled, and whether or not the spill has entered a waterway, it may be necessary to file a report with NCDENR. Any spill that endangers human health or the environment must be reported to DWQ’s Supervisor of Stormwater Management at (919) 733-5083. Refer to the table in the Spill Response section for reporting requirements related to oil spills. Note that “oil” includes all fuel products as well as CRS-2.

Information on a significant spill that has been documented on **SPPP Form 9** can be used in reporting the spill to the appropriate agencies. If a spill results in a non-compliance event, a copy of **SPPP Form 10** must also be submitted to DWQ within five business days of the time NCDOT becomes aware of the circumstances. The completed **SPPP Form 10** will contain a description of the non-compliance, and its causes; the period of non-compliance, including exact

dates and times, and if the non-compliance has not been corrected, the anticipated time compliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the non-compliance.

For NCDOT facilities covered by SPCC Plans, a written report must also be submitted to USEPA Region IV within 60 days if the facility has discharged to water:

- More than 1,000 gallons of oil in a single discharge, or
- More than 42 gallons of oil in each of two discharges, occurring within any consecutive twelve-month period.

SPCC Form 26 lists the required information that must be submitted to USEPA within 60 days if either of the above thresholds is reached. The SPPT Leader must also provide a copy of the completed **SPCC Form 26** provided to USEPA to DWQ and retain a copy with SPCC Plan at the facility.

Trained facility personnel provide initial response to spills. In the case of large-volume spills, this facility will request aid from the local Fire Department, and other appropriate emergency response agencies. The SPPT Leader should post emergency spill response contact numbers (completed **SPCC Form 25**) in his/her office and near appropriate telephones.

If an illicit discharge/connection is found, immediately report findings to supervisor or SPPT Leader using the Illicit Discharge Detection and Elimination Program (IDDEP) form at (<http://inside.ncdot.gov/sites/SearchCenter/Pages/Results.asp?k=iddep>), (<http://apps.dot.state.nc.us/quickfind/forms>). Forward the completed form to the REU, Environmental Operations Section in Raleigh.

The following table contains the telephone numbers for agencies and companies that the SPPT Leader may need to contact in the event of a spill. Call DWQ’s 24-hour number immediately if a spill occurs directly to a surface waterbody. The Regional DWQ office must also be contacted (see http://portal.ncdenr.org/web/quest/regional_offices).

State and Federal Spill Response Telephone Numbers

Spill Response Entity	Telephone Number
DWQ 24 Hour Emergency Response Spill Reporting	(800) 858-0368
National Response Center (NRC)	(800) 424-8802
United States Environmental Protection Agency, Region 4	(404) 562-9655

1.8 Training

Training is essential to keep NCDOT personnel and contractors that work on NCDOT property up to date on the proper techniques for effective spill prevention and response. NCDOT's NPDES permit requires facility personnel to receive annual SPPP-SPCC Plan training, which includes proper spill response, notification, cleanup procedures, and preventative maintenance activities.

Provide training to maintenance yard personnel at least annually. Document training using **SPPP Form 3** and the SPPP website. This training should enable personnel to identify and manage potential spills from equipment and containers of petroleum and other hazardous substances. Personnel should be trained on proper reporting and recordkeeping procedures for spills. In addition, the training should review spill prediction scenarios. Additional training topics include:

- Proper and safe cleanup of spilled materials;
- General facility operations;
- Operation and maintenance of equipment to prevent discharges;
- Securing drums and containers;
- Checking for leaks and spills;
- Proper handling and storage of hazardous substances;
- Identification of toxics and hazardous substances and wastes stored, handled, used, and produced on-site;
- Preventative maintenance of equipment and stormwater control measures;
- Preventing exposure of petroleum-based fuels, oil, and lubricants, hazardous substances, and waste materials to stormwater;
- Safe fuel handling procedures; and
- Past discharges or failures, malfunctioning components, recently developed precautionary measures, and lessons learned.



Stained pavement from spills outside drum storage/dispensing area

**APPENDIX F WASTE HANDLING AND DISPOSAL AND HAZARDOUS
MATERIALS MANAGEMENT**
[CHAPTERS FROM INDUSTRIAL AND ROADWAY MAINTENANCE ACTIVITIES MANUAL]

Chapter 12 Hazardous Materials Management



Overview

DESCRIPTION

This chapter provides best management practices (BMPs) for hazardous materials management including product purchasing, storage and handling, inspections, training requirements, and recycling.

There are numerous regulations that govern the management of hazardous materials. If the BMPs in this chapter are followed, along with manufacturer's guidelines, there should be minimal potential for these materials to contaminate stormwater runoff. Note that hazardous waste management and disposal is described in a separate chapter in this manual (**Waste Handling and Disposal Chapter, IA-013**).

Proper hazardous materials storage and management is necessary to prevent harmful pollutants from being released into the stormwater drainage system.

POTENTIAL POLLUTANTS

NCDOT uses a wide range of hazardous materials that, if exposed to stormwater, can pollute surface waters. These include, but are not limited to: adhesives, antifreeze, asphalt mix and liquid asphalt, asphalt releasing agent, batteries, cleaners, deicing materials, fertilizer, filters, fuel, oil, paint, pesticides, and solvents.

GOALS

The goals of this chapter are to help NCDOT personnel that manage or use hazardous materials understand what hazardous materials are, that they are properly storing and managing these materials, and that efforts are made to seek alternatives to some of the hazardous materials NCDOT uses, where applicable.

KEY DEFINITIONS

Hazardous Materials (HAZMATs) or Hazardous Substances are: (1) any substances designated under 40 Code of Federal Regulations (CFR) Part 116 pursuant to Section 311 of the Clean Water Act, and (2) any substances that pose a threat to human health and/or the environment. Hazardous substances can be toxic, corrosive, ignitable, explosive, or chemically reactive. [NCDOT SPPP; note (1) is NCDENR DWQ definition]

The Institute of Hazardous Materials Management (IHMM) provides the following explanation about hazardous materials (in italics):

Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the U.S. Environmental Protection Agency (USEPA), the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Department of Transportation (USDOT), and the U.S. Nuclear Regulatory Commission (US NRC). Each has its own definition of a hazardous material.

- *OSHA's definition includes any substance or chemical which is a "health hazard" or "physical hazard," including: chemicals which are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents which act on the hematopoietic system; agents which damage the lungs, skin, eyes, or mucous membranes; chemicals which are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive or water-reactive; and chemicals which in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists or smoke which may have any of the previously mentioned characteristics. (Full definitions can be found at 29 CFR 1910.1200.)*
- *USEPA incorporates the OSHA definition and adds any item or chemical which can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment. (40 CFR 355 contains a list of over 350 hazardous and extremely hazardous substances.)*
- *USDOT defines a hazardous material as any item or chemical which, when being transported or moved, is a risk to public safety or the environment, and is regulated as such under the: Hazardous Materials Regulations (49 CFR 100-180)*
- *US NRC regulates items or chemicals which are "special nuclear source" or by-product materials or radioactive substances. (See 10 CFR 20).*

NCDOT's NPDES Stormwater Discharge Permit defines a Hazardous Substance as any substance designated in 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act. 40 CFR Part 116 lists constituents and chemical abstract service (CAS) numbers so product Material Safety Data Sheets (MSDSs) must be referenced to determine if they contain hazardous constituents per this definition.

12.1 Hazardous Materials Product Purchasing

Efforts to procure more environmentally friendly products and raw materials will yield widespread benefits including reduced material handling costs, reduced inspection burdens, and reduced threat of harmful chemical releases.

NCDOT facilities should make an effort to reduce the variety of HAZMATs used and the quantity stored at NCDOT facilities. A short list of selected products that meet NCDOT performance standards can reduce purchase price, handling costs, disposal costs, and simplify

inventory. The use of non-toxic products will reduce disposal costs and minimize risks to the environment.

NCDOT is a large buyer and the prioritization of selecting alternative products made from recycled or reclaimed materials has several benefits including reducing risks to the environment, reduced disposal costs, and reduced liability for NCDOT.

Using alternative products instead of toxic or hazardous substances can reduce the presence of toxics in stormwater and receiving waters (WEF and ASCE, 1998). Common toxic substances include cleaners, automotive products, paints, fertilizers, pesticides, and fuels. Educating employees to work with purchasing managers to select safer, less-toxic alternatives is the first step in preventing toxic substances from entering stormwater runoff.

12.2 Hazardous Materials Storage and Handling

NCDOT industrial facilities should follow the general and material-specific hazardous materials storage and handling BMPs described below to minimize the potential for stormwater pollution.

12.2.1 GENERAL

The general BMPs listed below should be followed:

- Keep facility SPPP up-to-date regarding the location of each hazardous material storage area located at the facility.
- Keep an up-to-date inventory of hazardous materials and discard materials when their expiration dates have passed.
- Know the hazards associated with all materials stored and used at the facility by reviewing MSDSs and communicate hazards to employees.
- Always store hazardous materials based on compatibility (i.e., “like with like”) and store them in their original containers when possible.
 - If incompatible hazardous materials are allowed to mix, violent chemical reactions, toxic fumes, fire, or explosion could occur.
- Consolidate hazardous materials and plan to have one storage area per material.
- If hazardous materials must be transferred to another container, always follow manufacturer’s guidelines and use containers designed for the respective material.
- Consolidate like hazardous materials into designated storage areas throughout the facility to reduce excess inventory and unnecessary hazardous material storage locations.

- Label all hazardous material containers for contents and hazard, including any containers used to transfer or temporarily store hazardous materials.
- Use signs to designate each hazardous material storage area – this will aid in keeping “like materials” in one area.
- Store hazardous materials indoors (on impervious surfaces) within secondary containment. If a hazardous material container must be stored outdoors, refer to the **Outdoor Container Storage Chapter, IA-007** of this manual for additional guidance.
- Locate HAZMAT storage areas away from floor drains, storm drain inlets, drainage ditches, and surface waters.
- If available, store bulk hazardous materials in prefabricated HAZMAT storage building with integral secondary containment.
- Store small hazardous material containers in an approved flammables cabinet with integral secondary containment. Follow cabinet manufacturer’s guidelines and National Fire Protection Association (NFPA) requirements when storing materials in flammables cabinets.
- Make sure that any fabricated storage cabinet used to store hazardous material is properly constructed and approved for its designated use by the SPPP Leader or Division Hazardous Materials Manager.



Drums of oil and hazardous substances stored on secondary containment pallets inside an NCDOT Equipment Shop



NCDOT self-contained flammables cabinet used to store HAZMATs

12.2.2 BATTERIES

Regarding the management of batteries, note the following BMPs:

- Place batteries into a suitable non-conductive container (such as a polyethylene drum or tub) that is properly labeled.
- Store batteries securely and out of harm’s way to prevent damage or discharge of any stored electrical energy. Immediately contain leaking or cracked batteries.



NCDOT batteries stored under cover on secondary containment pallet

- Segregate different batteries into separate containers based on the proper recycling or disposal requirements for each type of battery.

12.2.3 ASPHALT PRODUCTS

Regarding the management of asphalt products, note the following BMPs:

- Label containers with product and hazard information.
- Store products in designated, secured areas, protected from the weather and extreme heat, cold, or moisture.
- Store products away from floor drains, storm drain inlets, drainage ditches, or surface waters.
- Store products on impervious surfaces with secondary containment, if feasible.
- Locate containers and tanks outside of high-traffic areas and in areas that are protected from inadvertent vehicle/equipment impacts.
- Close valves, lids, and caps when not in use. Place drip pans under valves, if needed.
- Consider the use of an “environmentally friendly” biodegradable asphalt release agent such as soy and corn oil-based products.
- Handle open containers and product transfers in a manner to prevent spills by using tarps, drip pans, or other containment devices. Asphalt product transfers should be performed over an impervious surface, if possible.
- Refer to **Waste Handling and Disposal Chapter, IA-013** of this manual for guidance on handling excess asphalt release/cleaning agent materials or waste generated during cleaning operations.

12.2.4 PAINT

Regarding the management of paint, note the following BMPs:

- Minimize the inventory of paints, as appropriate. Perform periodic evaluations of any excess paint left over from projects to verify if materials should be properly disposed.
- Designate paint storage areas. Store paints indoors or in covered areas with proper secondary containment. Storage areas should be secure to discourage theft and vandalism. Store flammable and combustible products in approved storage cabinets.



New paint drums stored indoors in NCDOT Traffic Services Shop

- Store paints in their original containers or in other compatible containers that are clearly labeled.
- Use refillable spray bottles such as metal bottles that use compressed air or plastic bottles with hand pumps for paint spraying whenever possible.
- Use the entire aerosol spray can before starting a new one.
- Attempt to use all the paint in cans and other containers and allow them to dry before disposal.
- Use funnels and pumps to minimize spills during refilling.
- Block all drains in the vicinity of paint loading or mixing activities.
- Immediately clean up any paint spill.
- Avoid overspraying in designated paint areas and manage any paint byproducts in such a way as to minimize their exposure to the stormwater drainage system.
- Check that parts are dry, clean, and free of rust prior to painting the parts.
- Contain waste from sanding and sand blasting and properly dispose of it.
- Always isolate paint waste and prevent contact with stormwater.
- Verify that paints, thinners, and solvents are recycled, reused, or disposed of properly.

12.2.5 FERTILIZER AND PESTICIDES

Regarding the management and fertilizer and pesticides, note the following:

- For more specific guidance on the handling and storage of fertilizer, refer to the **Fertilizer Use and Storage Chapter, IA-002** of this manual.
- For more specific guidance on the handling and storage of pesticides, refer to the **Pesticide Use and Storage Chapter, IA-003** of this manual.

12.3 Hazardous Material Spill Response

Provide a spill kit near or at locations where HAZMATs are stored. A spill kit will consist of absorbent pads, booms, and/or dry granular absorbents in sufficient quantity to contain a spill from the largest container at that storage location. Non-sparking shovels should be provided to aid in cleaning up the spill. Provide a container for disposing of the used absorbents. For certain hazardous materials, specialty spill kits (e.g., acid spill kits for battery storage areas) should be used at NCDOT facilities. Refer to the **Spill Prevention and Cleanup Chapter, IA-001** of this manual, Section 3.3.2 of your Stormwater Pollution Prevention Plan (SPPP), and/or NCDOT's Hazardous Material Spill Response Environmental Policy and Procedure (EPP 1910.1200 – January 2000 Update) for additional information on spill kits.

All hazardous material containers must be labeled properly. Labels will help the employee handle and use the material safely and respond to spills efficiently. The SPPP Team Leader should contact the NCDOT Division Hazardous Materials Manager for assistance with proper labeling requirements or for additional guidance on managing specific hazardous materials spills.

NCDOT bulk aboveground storage tanks containing hazardous materials should be labeled with the contents, capacity, hazard, and an emergency telephone number, as appropriate.



HAZMATs stored indoors on spill containment pallets with a spill response kit containing absorbents located nearby

12.4 Hazardous Material Storage Area Inspections

Regular inspections of HAZMAT storage and handling areas are critical to preventing the release of harmful chemicals. Employees should visually inspect HAZMAT storage areas daily and should perform written inspections twice per year, at a minimum, using **SPPP Form 19** to verify BMPs are in-place to prevent stormwater contamination. During daily rounds, NCDOT personnel should strive to incorporate the storage and handling BMPs described in this chapter and should also look carefully for the following¹:

- Is there adequate aisle space and organization in material storage areas?
- Are containers in generally good condition (free of leaks, spills, and corrosion) and stored away from direct traffic routes to prevent accidental spills?
- Are items in storage properly labeled to indicate contents?
- Are all containers closed?
- Are containers stored under cover and away from exposure to precipitation?
- Are containers stacked according to manufacturer's instructions on pallets and/or off the ground to avoid corrosion due to moisture buildup?
- Are loading/ unloading areas protected from rainfall, run-on, and runoff?



Drum storage areas should be visually inspected daily

¹ SPPP Form 19 Hazardous Materials Handling and Storage checklist items.

- Are leaks/ spills/ drips cleaned up promptly?
- Are excess hazardous materials removed from the facility promptly?
- Are current and correct MSDSs readily available to employees?

12.5 Hazardous Material Disposal

The **Waste Handling and Disposal Chapter, IA-013** of this manual address the disposal of waste materials and provides some guidance on recycling materials. For the purposes of this manual, waste materials includes hazardous waste, and certain unused or expired hazardous materials. The following general BMPs are required for the disposal of hazardous materials:

- Consult the waste product description to determine whether the waste product is hazardous or non-hazardous. If uncertain, contact the Division Hazardous Materials Manager for assistance. If the waste product is hazardous, contain the waste in a compatible container, label the container, and remove it to the hazardous waste containment area for disposal by a qualified NCDOT hazardous materials contractor (notify the SPPP Team Leader or a supervisor). The accumulation start date must also be clearly marked on the hazardous waste container.
- Consider reuse, recycling, evaporation of the free liquid, disposal as solid waste, or disposal to the sanitary sewer system if the waste product is non-hazardous and approved or otherwise permitted by the municipal sewer system. Contact the Division Hazardous Materials Manager for further guidance as necessary.
- Implement BMPs in the “Product Purchasing and Recycling” section of this chapter to minimize the use of hazardous chemicals and to substitute non-hazardous chemicals for hazardous chemicals.
- Reuse and recycle solvents, paints, antifreeze, motor oil, water, and lubricants whenever possible and practicable.



Solvent parts cleaner located in NCDOT Equipment Shop

12.6 Training

Periodic training should be provided so that NCDOT personnel continue to be mindful of the stormwater pollution prevention BMPs discussed in this chapter. Refer to the Introduction of this manual for further training guidance. Examples of training approaches for this chapter include:

- OSHA requires Hazard Communication (also known as HazCom) training for employees exposed to hazardous chemicals. USDOT requires Hazardous Material training for employees who ship, load, transport, unload, or package/label these materials.
- Provide training for NCDOT facility personnel that handle hazardous materials at least annually on the identification of hazardous materials, the proper storage and management of hazardous materials, and recycling and reuse techniques.
- Provide spill prevention and response training on a routine basis and at least annually. Spill prevention and response training should include hazardous substance spills in addition to petroleum spills. Employee awareness will improve a facility's preventative maintenance and spill prevention and response programs. Spill prevention training should highlight previous spill events, equipment failures, remedies taken, and newly developed prevention measures. NCDOT personnel should contact their Division Hazardous Materials Manager if potential spills or dumping is identified within NCDOT right-of-way. See **Spill Prevention and Response Chapter, IA-001** of this manual for additional details.
- Provide additional HAZMAT Management training for Equipment Shop supervisors and other NCDOT facility personnel that manage or procure large quantities of hazardous materials used at NCDOT facilities.

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Chapter 13 Waste Handling and Disposal



Overview

<p>DESCRIPTION</p> <p>This chapter focuses on the handling and disposal of hazardous and non-hazardous wastes generated during NCDOT work and collected at NCDOT facilities. Almost all NCDOT maintenance activities produce waste, whether on the roadway or at maintenance yards. Without proper waste handling, storage, and disposal procedures, the waste can quickly become a stormwater pollutant.</p>
<p>POTENTIAL POLLUTANTS</p> <p>NCDOT generates a wide range of waste materials that, if exposed to stormwater, can pollute surface waters. Waste petroleum products, used filters and rags, expired chemicals, paint related waste, land clearing waste, garbage/refuse, asphalt cleaning waste, construction and demolition debris, and inert debris are just a few types of waste handled by NCDOT.</p>
<p>GOALS</p> <p>The goal of this chapter is to provide guidance on the proper handling, storage, and disposal of NCDOT wastes and to minimize the potential of wastes to discharge to the stormwater drainage system.</p>
<p>KEY DEFINITIONS</p> <p><i>Please note that the regulations described herein are subject to change. Federal, state, and local regulations are updated or amended over time so always consult the most current version of each regulation.</i></p> <p>Code of Federal Regulations (CFR): A collection of all federal regulations codified and enforced by all federal agencies. It is divided into 50 titles that represent broad areas subject to Federal regulation, including Title 40 (Protection of Environment), which contains all of the regulations governing USEPA's programs, and Title 49 (Transportation), which contains regulations governing DOT's programs</p>

KEY DEFINITIONS, CONT.

Construction and Demolition (C&D) Waste: Solid waste (non-hazardous) from construction, remodeling, repair, or demolition of buildings, roads, bridges, or other structures. Examples include, but are not limited to, concrete, wood, metals, glass, and salvaged building components such as insulation, plywood, particle board, treated and painted wood, shingles, wire, and sheet rock. [NCDENR, “Prevent Illegal Dumping” Brochure, 2008 and <http://www.epa.gov/osw/conservation/rrr/imr/cdm/>]

Electronic Waste: Discarded electronics are often referred to as e-waste. E-waste has the potential to contain harmful metals such as lead, cadmium, and mercury. Mercury-containing e-waste can also be considered Universal Waste under Resource Conservation and Recovery Act (RCRA). <http://portal.ncdenr.org/web/deao/recycling/electronics>

Garbage/Trash/Refuse: Generally, any non-hazardous, non-recyclable waste that is considered a useless or discarded material and is not listed in the definitions contained in this chapter. Also, referred to as municipal solid waste.

Hazardous Waste: A solid waste that can pose a substantial or potential hazard to human health or the environment. It possesses at least one of four characteristics (characteristic waste), or appears on special United States Environmental Protection Agency (USEPA) lists (listed waste).

Characteristic Waste: Hazardous waste that does not appear on one of the hazardous waste lists, but is still considered hazardous because it demonstrates one or more of the following characteristics: ignitability, corrosivity, reactivity, or toxicity. [USEPA, Managing your Hazardous Waste: A Guide for Small Businesses, December 2001] <http://www.epa.gov/wastes/hazard/generation/sqg/handbook/k01005.pdf>

Listed Waste: Waste that is considered hazardous because it appears on one of four lists published in RCRA, 40 CFR Part 261. F list (non-specific source wastes) includes wastes from common industrial and manufacturing process, such as solvents used in cleaning or degreasing operations (40 CFR 261.31); K list (source-specific wastes) includes wastes from specific industries, such as petroleum refining or pesticide manufacturing (40 CFR 261.32); P list and U list (discarded commercial chemical products (40 CFR 261.33). <http://www.epa.gov/osw/hazard/wastetypes/listed.htm>.

Illegal Dumping: The deposition or placement of solids or fluids of any kind into the stormwater drainage system that will create litter or a nuisance, or that will pollute or cause an unsanitary condition on the system. [SPPP Appendix A]

Inert Debris: Unpainted concrete, brick, concrete block, uncontaminated soil, untreated and unpainted wood, rock, and gravel. Inert debris is considered non-hazardous waste. [NCDENR, “Prevent Illegal Dumping” Brochure, 2008]

Land Clearing and Inert Debris (LCID): These wastes are grouped and defined in 15A NCAC 13B.0101, <http://portal.ncdenr.org/web/wm/sw/rules/rulelist>, (see examples in land clearing waste and inert debris definitions).

Land Clearing Waste: Stumps, trees, limbs, brush, grass, and other naturally occurring vegetation generated solely from land clearing activities. Land clearing waste is considered non-hazardous. [NCDENR, “Prevent Illegal Dumping” Brochure, 2008]

Non-Hazardous Waste: Non-hazardous waste is any solid waste that does not meet the characteristics of hazardous waste previously defined. USEPA defines non-hazardous solid waste as “any garbage or refuse; sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility; and other discarded material including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.” **Note that many people and organizations refer to non-hazardous waste simply as “solid waste.”** [USEPA, “Wastes – Non-Hazardous Waste” Website. <http://www.epa.gov/wastes/nonhaz/index.htm>, July 2010]

KEY DEFINITIONS, CONT.

Resource Conservation and Recovery Act (RCRA): The U.S. law that regulates hazardous waste from “cradle-to-grave.” This includes the generation, transportation, treatment, storage, and disposal of hazardous waste, as well as the management of non-hazardous solid wastes. RCRA regulations are contained in Title 40 CFR Parts 239 through 299. <http://www.epa.gov/lawsregs/laws/rcra.html>; <http://www.epa.gov/epawaste/inforesources/pubs/orientat/index.htm>

In North Carolina, RCRA has been adopted as the North Carolina Hazardous Waste Management Rules and is enforced by the state instead of USEPA. The rules are available on the web at: <http://www.wastenotnc.org/HWHOME/WEBRules/NCHWRule.html>

Solid Waste: NCDENR defines solid waste as “any solid, liquid, or contained gaseous material that you no longer use, and either recycle, throw away or store until you have enough to treat or dispose.” Generally, any waste is considered solid waste except for domestic and industrial wastewater that is covered under the Clean Water Act. See RCRA, 40 CFR 261.4(a) for further details.

Universal Waste: Widely generated hazardous wastes for which USEPA has developed special hazardous waste management standards to streamline the processes for managing and disposing of these materials. Universal wastes include waste batteries, bulbs, mercury-containing equipment, and certain recalled, obsolete, or unused pesticide products. [USEPA, “Wastes – Hazardous Waste – Universal Wastes” Website. <http://www.epa.gov/wastes/hazard/wastetypes/universal/index.htm> November 2008] [NCDENR refers to RCRA, 40 CFR 273] http://portal.ncdenr.org/c/document_library/get_file?uuid=1b667ae9-b2ac-40c4-b99d-947877eae302&groupId=38361

White Goods: Refrigerators, ranges, water heaters, freezers, air conditioner units, washing machines, dishwashers, clothes dryers, and other similar domestic and commercial large appliances (typically white in color) that are no longer in use. [NCDENR, White Goods Special Report, October 2001]

13.1 Hazardous Waste Storage

Hazardous wastes pose a substantial hazard to human health and/or the environment. As such, special consideration must be given for the storage, transport, and disposal of hazardous waste.

NCDOT facilities that generate or handle hazardous waste should follow these hazardous waste best management practices (BMPs) to minimize the potential for stormwater pollution:

- Keep facility SPPP up-to-date so it describes the location of any hazardous waste accumulation area located at the facility.
- Any work area that generates hazardous waste is required to designate a satellite accumulation point that meets the requirements specified in RCRA, 40 CFR 262.34.
- Follow hazardous material (HAZMAT) storage guidelines for



Hazardous waste satellite accumulation point
[Note: Non-DOT facility]

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hazardous waste accumulation areas (see guidance in **Hazardous Materials Management Chapter, IA-012** of this manual).

- Locate hazardous waste accumulation areas indoors or under cover, where minimal impact to the environment would be realized if a release occurred. Do not locate accumulation sites within close proximity of storm drains, ditches, floor drains, open doorways exposed to weather, or near any surface waters.
- NCDOT facilities must provide for each hazardous waste accumulation site an impermeable base or containment system capable of preventing environmental contamination due to container overfilling or leakage. Concrete containment systems should be treated with a sealant to prevent spills from absorbing into or passing through the concrete. The base of the containment system should be sloped to a closed sump to allow liquids resulting from leaks or spills to be drained and removed. Options for providing secondary containment for hazardous waste accumulation areas to minimize or prevent stormwater pollution include:
 - Store hazardous waste indoors within secondary containment.
 - Store hazardous waste outdoors under cover and within secondary containment.
 - Store hazardous waste in prefabricated HAZMAT storage building with integral secondary containment.
 - Store small hazardous waste containers in a flammables cabinet with integral secondary containment.
- Different types of hazardous waste must be accumulated in separate containers. Non-hazardous waste must not be mixed with hazardous waste. For example, used oil, waste paint, and waste solvent should each be accumulated in separate labeled containers.
- For incompatible wastes, segregated containment must be provided by using separate containment areas, separately diked areas, or sloped containment to separate sumps. Hazardous chemical reactions which cause heat, fire, explosion, pressure, or the evolution of toxic or flammable decomposition products due to incompatible chemical reactions must be prevented. Incompatible wastes and materials must not be placed in the same container. In addition, hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.
- All hazardous waste containers must be labeled properly. Labels will help the employee handle the material safely and respond to spills efficiently. Labeling is regulated under other environmental laws (e.g., United States Department of Transportation (USDOT), Occupational Safety and Health Administration (OSHA), RCRA). A sign must also be posted designating the facility as a hazardous waste accumulation site and must provide a point of contact and telephone number to be notified in case of emergency. The SPPP Team Leader should contact the Division Hazardous Materials Manager for assistance with proper labeling and signage requirements or for additional guidance on managing specific hazardous waste.

- Complete and adequate spill kits should be positioned in easily accessible locations near the hazardous waste storage area(s) at the facility. Facility personnel should know the location of and have access to facility spill kits. The spill kit(s) should have sufficient materials to contain a spill from the largest container within the hazardous waste storage area. Following a spill cleanup, the items used from the spill kit must be replenished as soon as possible. Contact the Division Hazardous Materials Manager to verify that your spill kits are appropriate for the hazardous waste stored on site. In the event of a spill, follow guidance from **Spill Prevention and Cleanup Chapter, IA-001** of this manual.
- Refer to “NCDENR Hazardous Waste Compliance Manual for Generators of Hazardous Waste” for additional guidance on compliance with hazardous waste regulations. http://portal.ncdenr.org/c/document_library/get_file?uuid=afb78a5d-bf60-4996-8ad1-6a6b21bfb471&groupId=38361

13.2 Hazardous Waste Transport and Disposal

The following BMPs are provided for hazardous waste transport and disposal:

- A Hazardous Waste Manifest must be completed and signed before hazardous waste can be accepted by another party (e.g., disposal contractor). The form is designed to track the hazardous waste from where it was generated until it reaches the final facility that will store, treat, or dispose of the waste.
- Hazardous Waste Manifests also track the quantities generated which also determines the generator status of the facility (see NCDENR Hazardous Waste Compliance Manual for Generators of Hazardous Waste for guidance, http://portal.ncdenr.org/c/document_library/get_file?uuid=afb78a5d-bf60-4996-8ad1-6a6b21bfb471&groupId=38361).
- Contact the Division Hazardous Materials Manager for assistance in completing Hazardous Waste Manifests, and the Division Hazardous Materials Manager should keep copies to track the amount generated.
- USEPA’s website also contains useful information concerning Hazardous Waste Manifests. [USEPA, <http://www.epa.gov/osw/hazard/transportation/manifest/>, January 2010]
- USDOT, in conjunction with USEPA, requires special training, packaging, and labeling of hazardous waste during transport. NCDOT is exempt from some requirements because it is an agency of the state. However, hazardous waste should always be safely stored to prevent spills and clearly labeled so that any spills that occur can be safely contained and cleaned up.
- It is important to be aware that some materials that are not normally considered hazardous are designated as such when being shipped due to the specific risks associated with transporting these items on highways with the general public. See the



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USDOT Pipeline and Hazardous Material Safety Administration (PHMSA) website or contact PHMSA is Hazmat Information Center (phmsa.hm_infocenter@dot.gov) or 1-800-HMR-4922) for additional information. [USDOT, <http://www.phmsa.dot.gov/portal/site/PHMSA>]

- In the event of a spill of hazardous waste, notify the local emergency response agency and the operator of the incident (refer to **Spill Prevention Control and Countermeasure (SPCC) Form 25** for emergency contact information if spill occurs at an NCDOT industrial facility). Safety is the first priority. Tend to any life threatening issues and protect bystanders from the inherent hazards. Once the scene is secure, address the spill. Spill containment procedures may vary depending on the type of waste. Generally, try to prevent the spill from reaching waterways or storm drains or ditches. Use proper materials (e.g., absorbent booms and sand bags) to contain the spill, or use a shovel or other equipment to create an earthen berm. Absorbents are also effective at containing spills. The local fire department should arrive on scene a few minutes after the call is made. Fire departments are typically equipped to handle spills and will contact local emergency officials who will help coordinate cleanup efforts for certain hazardous substance spills.
- Hazardous waste disposal is regulated by RCRA as well as USDOT, USEPA, and OSHA. Typically, hazardous waste is sent to special treatment, storage, and disposal (TSD) facilities.
- Additional information is available on USEPA's website. [USEPA, <http://www.epa.gov/osw/hazard/tsd/index.htm>, August 2008]
- Contact the Division Hazardous Materials Manager for any questions or concerns regarding the proper disposal of hazardous waste.

13.3 Universal Waste Management

The following general guidelines apply to universal wastes:

- Universal wastes must be stored separately in containers with a clear label indicating the type of universal waste (e.g., mercury-containing equipment, pesticides, lamps, or batteries).
- Universal waste should not be stored for longer than one year unless it is being stored for the purpose of accumulating to quantities that are easier to treat or dispose.
- Employees that handle or manage universal waste must be trained on proper handling and emergency procedures. Refer to the Division Hazardous Materials Manager for additional details.
- See RCRA, 40 CFR 273 for additional information.
- For Recycling Services for Fluorescent Lamps, Ballasts and other Mercury Containing Devices, see: http://portal.ncdenr.org/c/document_library/get_file?uuid=f210c8f6-8dd5-4497-8c6a-872aaf15949e&groupId=38322

Additional BMPs are provided for the following universal wastes.

13.3.1 FLUORESCENT BULBS

- Fluorescent bulbs and mercury halide bulbs may contain a sufficient amount of mercury, or other RCRA regulated metals, that would require them to be disposed as universal waste.
- Collect all fluorescent bulbs for recycling. High level and low level mercury bulbs (green ends or green writing) can be collected in the same container.
- Place used fluorescent bulbs in designated storage area, which should be in a secure area out of the way of daily stocking and materials movement and out of the weather, so that the cardboard containers do not become wet.
- Used fluorescent bulbs should not be stored for more than one year.
- Used fluorescent bulbs must be kept in a container, preferably the original box that the lights came in or a storage box supplied by or approved by the Division Hazardous Materials Manager.
- All containers of fluorescent bulbs should be labeled at the start of filling each box with “Universal Waste – Lamps”, the date the used fluorescent bulbs were first placed in the container, and the Facility and Building name.
- Provide signage to inform employees that the area contains spent mercury-containing bulbs, as needed.
- If a fluorescent bulb breaks, all broken lights should be cleaned up immediately. Breakage of fluorescent bulbs could potentially expose employees to mercury. Use a broom and dustpan to gently sweep up the dust and broken glass. Use sticky tape (e.g., duct tape) to small glass fragments and powder. Place cleaned up material into an airtight container (e.g., ziplock bag), seal and label the container and place with the used lamps. **DO NOT VACUUM** broken bulb debris, as this could disperse mercury throughout the area or into the air.
- Coordinate disposal of used fluorescent bulbs with the Division Hazardous Materials Manager.



Universal Waste – used fluorescent bulbs stored in original containers

13.3.2 OTHER LIGHT BULBS

- All broken light bulbs should be cleaned up immediately.
- Coordinate disposal of other light bulbs with the Division Hazardous Materials Manager.
- Refer to USEPA guidance on cleaning up a broken compact fluorescent light (CFL) bulb at <http://www.epa.gov/cfl/cflcleaning.htm>.

13.3.3 BALLASTS

- Ballasts and starters from light fixtures may contain Polychlorinated Biphenyls (PCB)-containing material. The disposal of these materials is regulated. If the ballasts are not plainly marked as “Non-PCB”, the material must be treated as PCB-containing (or tested and proven to be non-PCB containing). If PCB-containing materials must be discarded, coordinate with the Division Hazardous Materials Manager for proper disposal.
- Ballasts from fluorescent light fixtures are to be removed and placed in an open-head metal drum with absorbent material that meets DOT specifications. The drums have specific labeling requirements (e.g., drums must be labeled with a hazardous waste label, marked with “This End Up” and “Ballasts containing PCBs”, etc.).

13.3.4 SWITCHES

- Thermal switches may contain mercury. Mercury is considered a hazardous waste and must be disposed as such. The Division Hazardous Materials Manager can help determine if the switches should be handled as a RCRA regulated hazardous waste.

13.3.5 BATTERIES

- Batteries used at NCDOT Facilities should be stored indoors unless they are being used to power equipment or vehicles stored outdoors.
- Batteries stored in stock at NCDOT facilities should be stored with proper secondary containment (e.g., lead acid batteries stored in an acid-resistant containment pan or within an acid storage cabinet).
- Lead acid batteries should be turned in for replacement batteries through local purchase. All batteries which are turned in for recycling should be noted on the receipt for the local purchase or on a hand receipt to the recycler. The number of batteries



Used batteries stored on spill containment pallet inside building

should match the number actually delivered. Copies of the receipts for batteries should be kept on-site for recordkeeping purposes. See State recycling contacts at: <http://www.doa.nc.gov/ssp/gen-recycontracts.htm>.

- Nickel-cadmium, magnesium, and mercury batteries must be managed as universal waste.
- Silver oxide batteries should be included in a precious metals recovery program through the Division Hazardous Materials Manager.
- Lithium batteries should have a determination made as to whether they are reactive (through material safety data sheet (MSDS) review or inquiry to the manufacturer). If reactive, lithium batteries must be managed as Universal Waste.

13.4 Non-Hazardous Solid Waste

If proper procedures for handling and disposing of hazardous wastes are followed, no contact with stormwater should occur. Hazardous waste should be stored under cover and with secondary containment measures in place as described previously.

No such guidelines exist for non-hazardous wastes, however. These wastes vary to such a degree that it is not practical to prescribe one management strategy for all non-hazardous wastes. Wherever possible, stored materials (including waste) should be kept inside or under cover and runoff should be diverted away from the area. Stockpiles of construction & demolition (C&D) waste or land clearing and inert debris (LCID) waste should be removed from the site for recycling or landfilling as soon as practical. Refer to **Outdoor Raw Materials Storage/Stockpiling Chapter, IA-006** of this manual for additional BMPs regarding these wastes. Other chapters with BMP guidance that can be applied to waste handling and disposal include: **Spill Prevention and Cleanup Chapter, IA-001**; **Good Housekeeping Chapter, IA-002**; **Stormwater Management Chapter, IA-004**; **Outdoor Loading and Unloading Chapter, IA-005**; **Outdoor Container Storage Chapter, IA-007**; and **Hazardous Materials Management Chapter, IA-012** of this manual.

There are several categories of non-hazardous solid waste, each of which may have unique management requirements.

13.4.1 GARBAGE/TRASH/REFUSE

Regarding the management of garbage/trash/refuse, note the following BMPs:

- Garbage/trash/refuse should generally be collected in garbage bags that, when full, are tied off and stored in a solid waste dumpster for pickup by a solid waste contractor.
- Recycling and garbage dumpsters should have working lids that are kept closed to prevent contact with stormwater.



Solid waste dumpsters with closed lids

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- Many dumpsters have drain holes that should be plugged to contain leachate within the dumpster.
- Dumpsters should have a label indicating the intended contents, banned substances, and contact information for the solid waste contractor.
- The solid waste contractor is typically responsible for the dumpster. Therefore, if a dumpster is in need of repair, contact the solid waste contractor. Request replacement dumpsters for damaged dumpsters located at the facility.
- Dumpster levels should be monitored so they do not overflow. Contact the solid waste contractor if a larger or additional dumpster is needed, or if more frequent pickup is required.
- It is important to locate dumpsters downstream or away from storm drains as the dumpsters can leak or spills may occur during pickup. Dumpsters should be located in designated areas and on flat or paved surfaces.

13.5 Typical Equipment Shop Wastes

BMPs are provided below for typical wastes generated at NCDOT Equipment Shops to minimize the potential for stormwater pollutants.

13.5.1 USED OIL

Used oil must be managed properly to protect the environment. It can be burned as a fuel, recycled, or discarded. If it is burned (e.g., as a fuel in an appropriate heater) or recycled and not mixed with other materials, it is NOT considered hazardous waste. However, if the used oil is disposed of/discarded then it must be managed like a hazardous waste. [Note: used oil is regulated as a non-hazardous waste in accordance with RCRA, 40 CFR 279]. For additional NCDENR Used Motor Oil Guidance see: <http://infohouse.p2ric.org/ref/01/00015.htm>.

Regarding the management of used oil, note the following BMPs:

- Used oil and oil-contaminated products are managed by a single contractor, statewide (see <http://www.doa.nc.gov/ssp/gen-recycontracts.htm>). These items should be stored/discarded in properly labeled containers prior to being picked up by the contractor. The containers should prevent the materials from coming in contact with precipitation. Place used oil into designated, labeled “Used Oil”, non-leaking, rust-resistant, containers (e.g., tanks/drums) for accumulation. Used oil containers must be in good condition.



Used oil heater located in an NCDOT Equipment Shop

- Do not contaminate used oil with small amounts of gasoline, brake cleaner, carburetor cleaner, or other solvents; even small amounts of solvents turn recyclable oil into a hazardous waste.
- Keep storage containers closed when not actively adding or removing material.
- When storing drums keep an aisle space between drums to allow inspection for leaks and damage.
- Provide secondary containment for used oil and any liquid oil-contaminated products. Store used oil in secure areas safely away from workers and the environment.
- Refer to the facility’s SPCC Plan and SPPP for additional details on spill prevention and response. Refer to NCDENR Hazardous Waste Compliance Manual for Generators of Hazardous Waste for additional guidance on managing used oil, including information on mixtures of used oil and determining if the oil mixture is actually a hazardous waste.
- Practice safe management of oily wastes. Wear protective equipment such as safety glasses and gloves.
- Locate used oil storage and transfer areas indoors or under cover and away from floor drains, open doorways, storm drains, and watercourses. Double-walled aboveground storage tanks (ASTs) containing used oil can be located outdoors, but should be positioned away from storm drains or ditches. Place spill kit near any outdoor AST containing used oil.
- Require that the oil transfer area be on an impervious surface or that a tarp or drip pan be placed on the ground to catch any spills prior to any oil transfer.
- Minimize the amount of used oil produced. Consider filtering, separating, and reconditioning used oil to prolong its usable life.
- Purchase refined used oil products instead of virgin oil products.
- Recycle or reclaim the free-flowing used oil when changing equipment oil or recovering oil from spills such as hydraulic line leaks.
- Keep containers closed, except when adding or emptying. Use self-closing funnels to add material to waste containers.



Used oil AST is double-walled

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- Remove all free-flowing oil to the used oil container. Rags and absorbents, including wash rack filters that are used to wipe up oil from equipment leaks or spills, are not subject to used oil and hazardous waste regulation if there is no visible free-flowing oil or hazardous substances present. Store used rags and absorbents in a container that is properly labeled.
- Other restrictions of used oil disposal/management include:
 - Do not discharge used oil to sewers, drainage ditches, septic tanks, the ground surface, or open water bodies.
 - Do not dispose of used oil in landfills or mix used oil with wastes that will be disposed of in landfills.
 - Do not mix used oil with gasoline or cleaning solvents. The resulting mixture may be a hazardous waste.
 - Do not utilize used oil for road oiling, dust control, weed control, or for similar purposes.

13.5.2 SOLVENT-CONTAMINATED RAGS

Regarding the management of solvent-contaminated rags, note the following BMPs:

- Rags contaminated with solvents will be segregated from other rags. If the spent solvent is a listed hazardous waste, using it on a rag results in the rag becoming a listed hazardous waste. Examples of listed hazardous waste solvents are Methyl Ethyl Ketone (MEK) and 1,1,1-trichloroethane. Chemical mixtures which include these chemicals, such as carburetor cleaner or brake cleaner, should also be treated as hazardous waste when used on rags or absorbent pads.
- Refer to the specific MSDS or contact the Division Hazardous Materials Manager to help determine which solvents are considered as listed hazardous waste.
- Coordinate with your Division Hazardous Materials Manager to determine if any of the solvent-contaminated rags can be sent to a laundry service for cleaning. Rags which can be laundered should be handled according to the operating instructions based on the appropriate contract. Rags which cannot be laundered should be accumulated as hazardous waste at the appropriate labeled accumulation point.
- Additional NCDENR guidance on contaminated wipes/rags is found at: <http://portal.ncdenr.org/web/wm/hw/technical/guidance/wipes>.

13.5.3 OIL-CONTAMINATED RAGS

Regarding the management of oil-contaminated rags, note the following BMPs:

- Rags contaminated with oil and hydraulic fluids should be laundered. If no laundry contract is in place for work rags, those which are soaked in oil or hydraulic fluids should be wrung either mechanically or manually to remove free product (which

should be placed in an appropriate used oil container). After free product is removed, the rags may be disposed in a labeled solid waste container.

- Contact the Division Hazardous Materials Manager for additional guidance.

13.5.4 FUEL-CONTAMINATED RAGS AND ABSORBENT PADS

Regarding the management of fuel-contaminated rags, note the following BMPs:

- Fuel-contaminated rags and absorbent pads should be accumulated at a satellite accumulation point until they no longer contain free liquid. At this point, in accordance with the State of North Carolina, the materials may be handled as a used oil product. These materials may be disposed in a municipal solid waste (MSW) landfill if the landfill operator grants permission.
- Contact the Division Hazardous Materials Manager for additional guidance.

13.5.5 ANTIFREEZE

Used (diluted) antifreeze (ethylene glycol) is not currently regulated as a hazardous waste. However, because of its potential toxicity to wildlife, it must be handled as follows:

- Used antifreeze may not be drained to the ground or into storm sewers or septic tanks.
- Antifreeze should be collected and placed in approved containers. Reuse of the plastic container in which the antifreeze was shipped is preferred.
- Recycling of antifreeze is mandatory.

13.5.6 OIL FILTERS

For a facility to properly dispose of used oil filters, the facility needs to drain out the used oil thoroughly first. The oil can then be handled with the rest of the facility's used oil. If correct management procedures are followed, used oil filters should be either recycled or disposed.

Additionally, the State of North Carolina does not consider used oil filters to be a hazardous waste IF the filters are non terne-plated and the used oil is removed from the filter by gravity draining, crushing, disassembly, or air pressure. If one of these methods is performed, the used oil filters can be disposed of as non-hazardous solid waste, subject to local requirements. Used oil filters that are not drained by one of the above methods and/or are terne-plated must be managed as hazardous waste. Terne is an alloy of lead and tin, and the lead in terne plating can make a used oil filter hazardous. Terne-plated filters are used more commonly with heavy-duty vehicles and trucks.



Used oil filter dumpster stored outside an NCDOT Equipment Shop

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In summary, the following general BMPs apply to oil filters:

- Oil filters should be crushed, or punctured, and hot-drained for 24 hours.
- Collect oil from filter crushing and manage it the same way as engine waste oil.
- Store drained and crushed filters in a leak-proof container until recycled or disposed.
- Recycle drained or crushed filters with your scrap metals.
- Maintain disposal/recycling receipts for at least three years.
- Free product captured by drained oil filters should be placed in a used oil container at the facility. After draining, the non terne-plated oil filters may be disposed of as solid waste. Terne-plated oil filters should be disposed of as hazardous waste. Oil filters can be recycled if a metal recycling program is in place. Do not throw away any undrained or terne-plated oil filters into solid waste dumpsters or trash containers unless the Division has evaluated the filters first and found them to be non-hazardous. Consult the Division Hazardous Materials Manager for further information on recycling and disposing of oil filters. See Section 13.5.7 below for additional guidance.

13.5.7 USED OIL FILTERS

Regarding the management of used oil filters, note the following BMPs:

- Drain used oil filters of oil before disposing in on-site waste filter container.
- Coordinate disposal of used oil filters with the Division Hazardous Materials Manager.
- Additional NCDENR guidance on management of used oil filters is found at: <http://portal.ncdenr.org/web/wm/hw/technical/guidance/wipes>.

13.5.8 FUEL FILTERS

Regarding the management of fuel filters, note the following BMPs:

- Fuel filters should be drained in a covered container to capture the free product. After draining, the filters should be dried and crushed. Some filters may be recycled for their metal content. The State of North Carolina allows for a drained, crushed diesel fuel filter to be recycled for its metal content or disposed in a MSW landfill.



Scrap tires stored indoors
at an NCDOT Equipment Shop

13.5.9 SCRAP TIRES

Regarding the management of scrap tires, note the following BMPs:

- Tires should be re-treaded when possible.
- Tires should be stored in a manner that prevents rainwater from accumulating because water collected in tires is ideal mosquito breeding habitat.
- Store tires in one location at the facility, preferably indoors. If you must store tires outdoors, store them under cover and protected from the weather.
- A maximum of 500 scrap tires may be stored on site at any one time.
- Train employees in emergency response operations in case of a fire involving the scrap tires, paying particular attention to where firefighting runoff water will go.
- Install perimeter runoff controls if the storage area is located near the facility perimeter or adjacent to surface water.
- Scrap tires are banned from North Carolina landfills and each county in North Carolina is required to have at least one scrap tire collection site that accepts scrap tires free of charge.
- For additional guidance, contact the Division Hazardous Materials Manager or refer to NCDENR Scrap Tire Fact Sheet at: http://portal.ncdenr.org/c/document_library/get_file?uuid=2fb36865-d186-44c0-9744-27517d90d05a&groupId=38361.

13.6 Typical Highway Maintenance Wastes

For typical wastes generated by Highway Maintenance activities, BMPs are provided below to minimize the potential for stormwater pollution.

13.6.1 ASPHALT CLEANING WASTE

Regarding the management of asphalt cleaning waste, note the following BMPs:

- When cleaning equipment and tools, any excess asphalt release/cleaning agent or agent contaminated with asphalt material should be containerized for reuse.
- Any excess asphalt cleaning product should be used or containerized for evaluation and proper disposal. Proper disposal may include recycling material back into



Asphalt release agent drums used to clean equipment [Note: excess cleaning product should be revised or properly disposed]

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distributors, mixing with inert material for future road maintenance, mixing with inert materials for landfill disposal (only solids are allowed in landfills and no 55 gallon containers/drums), or disposal through a NCDOT waste disposal contractor.

- Waste material from spray bar cleaning should not be allowed to contact soil and/or water.
- Waste material from spray bar cleaning must be collected in proper container and transferred back to the NCDOT maintenance yard for evaluation and disposal.
- Properly label and store waste containers and contact the Division Hazardous Materials Manager for evaluation and disposal.

13.6.2 CONSTRUCTION AND DEMOLITION WASTE

Regarding the management of construction and demolition waste, note the following BMPs:

- Remove and properly dispose of C&D waste from the facility as soon as practicable.
- C&D waste should be separated into recyclable and non-recyclable materials, and salvageable items should be removed for reuse. Materials that cannot be reused or recycled must be disposed of in a permitted C&D, LCID, or MSW landfill.
- Recyclable materials should be sorted and stored separately for pickup. Prevent paint, soil, garbage, and other non-recyclable materials from mixing with recyclable materials.
- Recyclable C&D materials include, but are not limited to:
 - Concrete/brick/block
 - Corrugated cardboard
 - Carpet and carpet padding
 - Asphalt shingles
 - Ceiling and floor tiles
 - Gypsum/drywall
 - Wood – unpainted and untreated
 - Some plastics
 - Metals
- The facility or associated construction project’s site-specific Stormwater Pollution Prevention Plan may have additional guidance for protecting stormwater from C&D waste located at the facility or project site.



Construction & Demolition waste stockpile located at an NCDOT facility

13.6.3 INERT DEBRIS

Regarding the management of inert debris (which includes unpainted concrete, brick, concrete block, uncontaminated soil, untreated and unpainted wood, rock, and gravel), note the following BMPs:

- Inert debris should be separated from other materials and recycled if possible. Recycled inert debris can be used as “clean fill” if the fill activity involves no digging and its purpose is to improve land use potential.
- Inert debris may also be disposed of in a permitted solid waste facility (e.g., LCID or MSW landfill).
- Coordinate with the Division Hazardous Materials Manager to evaluate the potential for recycling inert debris.
- The facility or project-specific SPPP may have additional guidance for protecting stormwater from the inert debris generated at the site.

13.6.4 LAND CLEARING WASTE

Regarding the management of land cleaning waste (which includes stumps, trees, limbs, brush, grass, and other naturally occurring vegetative material generated solely from land clearing activities), note the following BMPs:

- Land clearing waste should be kept free of soil, litter, and other materials.
- Land clearing waste should be taken to a permitted composting, chipping, or mulching facility for recycling. If the material cannot be recycled, it may be disposed of in a permitted LCID or MSW landfill.
- If the land clearing activities are being conducted for a construction project, the facility or project-specific SPPP may have additional guidance for protecting stormwater from the land clearing waste generated at the site.



Land Clearing Waste stockpile located at an NCDOT facility

13.6.5 ANIMAL CARCASSES

Regarding the management of animal carcasses, note the following BMPs:

- Animal carcasses collected by NCDOT facility personnel from NCDOT roadways should be promptly disposed using one of the following methods:
 - Composting
 - Burying on NCDOT right-of-way

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- Incinerating
- Landfilling

13.6.6 USED RAILROAD TIES/CREOSOTE TREATED TIMBERS

Regarding the management of used railroad ties/ creosote treated timbers, note the following BMPs:

- NCDOT Bridge Maintenance Yards, Highway Maintenance Yards, and the Rail Division may have used railroad ties or creosote treated timbers from old bridges stored onsite that were acquired from various rail, bridge, or roadway projects. Frequently, NCDOT receives requests for these materials. People often think that railroad crossties or creosote treated timbers can easily be recycled and used for landscaping purposes. Unfortunately, the ties and timbers are coated in creosote, which USEPA has declared a *restricted use pesticide*. While safe for railroad use, they are actually regulated with conditions on their use. In short, NCDOT does not sell or give away used railroad ties or creosote treated timbers.
- The railroad or contractor is responsible for the proper disposal of crossties in North Carolina. Contact the Division Hazardous Materials Manager for additional guidance on proper disposal of used railroad ties or other timbers coated in creosote located at a facility or along NCDOT roadways.

13.6.7 WHITE GOODS

White goods consist of refrigerators, ranges, water heaters, freezers, air conditioner units, washing machines, dishwashers, clothes dryers, and other similar domestic and commercial large appliances (typically white in color) that are no longer in use. Regarding the management of white goods, note the following BMPs:

- White goods are typically not accepted by solid waste collectors during weekly trash and recycling pickup and as a result are often abandoned on the side of the road.
- NCDOT has contracted a private company to pick up and haul white goods. Contact the Division Hazardous Materials Manager for additional details including proper disposal of white goods.
- The following information may be useful if the private company is unavailable. A special program has been adopted in the state of North Carolina to encourage proper management of white goods in order to recover scrap metal and refrigerants and other potential stormwater pollutants. White goods can be disposed of in MSW landfills free of charge. Contact the Division Hazardous Materials Manager for assistance.

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13.7 Other NCDOT Wastes

BMPs are provided below for these additional wastes to minimize the potential for stormwater pollution.

13.7.1 EMPTY DRUMS

Regarding the management of empty drums, note the following BMPs:



Empty drums stored horizontally on ground
[Note: No cover or signage is provided]

- Remove waste materials from containers to the maximum extent practicable using standard practices (e.g., pouring, pumping, scraping) so that no more than 1 inch of residue remains on the bottom of container or inner liner.
- Empty drums that cannot be reused or are no longer needed should be disposed of properly with assistance from the Division Hazardous Materials Manager.
- Empty drums stored on-site must have all previous markings removed.
- Empty drums stored on-site must be stenciled or labeled with the word “EMPTY” or otherwise unlabeled and stored in a designed and labeled “EMPTY DRUM STORAGE” area.
- Empty drums should be stored horizontally on the ground or on racks. They should also be stored under a covered roof to minimize exposure to precipitation.
- Refer to NCDENR Hazardous Waste Compliance Manual for Generators of Hazardous Waste or RCRA, 40 CFR 261.7 for the specific definition of a RCRA “empty container” and additional requirements for an empty container that previously held hazardous materials or an acutely hazardous waste.

13.7.2 PAINT CANS, PAINT BRUSHES, AND PAINT RELATED MATERIALS

Regarding the management of paint cans, paint brushes, and paint related materials, note the following BMPs:

- The Division Hazardous Materials Manager should conduct an evaluation of the types of paints used at the facility to determine if associated wastes should be characterized. If the paint contains a high concentration of metals, it is advised that Toxicity Characteristic Leaching Procedure (TCLP) testing be conducted for metals. Representative samples of spent paint brushes, masking paper and tape, dry filters, sand or plastic media from mechanical paint removal operation, and cans that contain more than 3 percent dried paint residue in them should be tested.

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13.7.3 AEROSOL CANS

Regarding the management of aerosol cans, note the following BMPs:

- Empty aerosol cans may be disposed of as non-hazardous waste.
- Any aerosol containers that are partially full, but are not dispensing product, should be managed as hazardous waste.
- Coordinate any puncturing, draining, or disposal of aerosol cans with the Division Hazardous Materials Manager.

13.7.4 ASBESTOS

Regarding the management of asbestos, note the following BMPs:

- In general, asbestos containing material that has been determined to be in good condition by an experienced licensed professional should be left alone.
- Asbestos fibers, generated from brake lining operations or building maintenance operations, require special handling for disposal. Disposal requirements are specified in 40 CFR Part 61, Subpart M (National Emission Standard for Asbestos).
- All waste asbestos containing material must be placed in two plastic bags, one inside the other. The bags must be securely closed. The outer bag must be labeled appropriately [Refer to 40 CFR, part 61].
- Coordinate with the Division Hazardous Materials Manager regarding the need to prepare appropriate documentation for the turn in of asbestos containing material.
- Removal of asbestos containing materials from buildings must be performed by approved contractors in accordance with 29 CFR 1926.1101.



Asbestos Containing Material placed in plastic bags



Electronic Waste labeled as Univesal Waste

13.7.5 ELECTRONIC WASTE

Discarded electronics are often referred to as e-waste. Regarding the management of electronic waste, note the following BMPs:

- Coordinate with the Division Hazardous Materials Manager regarding reuse or recycling of the raw materials from electronic waste (also known as e-waste), which may include harmful metals, such as lead, cadmium, mercury, or other valuable substances.
- Refer to Section 13.3 (Universal Waste Management) of this chapter for additional guidance.
- Electronic waste should be covered or stored indoors at all times to prevent contact with stormwater.
- See State Recycling contacts at:
<http://www.doa.state.nc.us/PandC/926a.pdf>

13.7.6 SCRAP METALS

Oil and metals that can leach into stormwater runoff from scrap equipment piles are potential sources of pollution if they are exposed to precipitation and stormwater runoff. Regarding the management of scrap metals, note the following BMPs:

- Minimize the quantities of scrap metals, scrap parts, and unused vehicles and equipment stored on-site; utilize salvage/bid process to remove scrap materials from the facility.
- Remove scrap materials promptly.
- Scrap materials must be free of lubricants and loose paint to the extent practical. Salvage vehicle and equipment fuel tanks must be emptied and drained prior to being stored as scrap materials on-site. Scrap or abandoned storage tanks must be properly drained and labeled as empty/scrap.
- Scrap metal dumpsters and bins should be covered with lids or tarps to prevent contact with precipitation.
- Scrap metal containers should have a label indicating the intended contents, banned substances, and contact information for recycling contractor as appropriate.



Scrap metal container covered with tarpaulin



13.8 Unique Wastes Generated by other NCDOT Divisions

NCDOT Rail and Ferry Divisions have unique facilities and operations for which specific waste handling and disposal guidance has been developed. Refer to the future **Ferry Maintenance Waste Handling and Disposal Chapter, FD-008** and **Rail Maintenance Waste Handling and Disposal Chapter, RD-004** of this manual for additional information. Coordinate directly with the appropriate division (e.g., Aviation Division) for specific waste handling and disposal guidance on any other unique wastes generated by those NCDOT divisions.

13.9 Recycling

The International Scan Tour Report (AASHTO/FHWA, 2003) generated a number of recommendations for American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on the Environment and Subcommittee on Materials that are pertinent to recommended practices for state DOTs. These recommendations are described below:

- Include a recycling strategy in the sustainability aspect of strategic plans and long range research priorities.
- Create a framework to consider the use of recycled materials in project planning, alternatives analysis, and mitigation analysis.
- Encourage long term materials supply plans and recycled materials availability plans.
- Develop clear engineering and environmental guidelines at the State and Federal level that are available for suppliers and decision-makers.
- Develop courses on recycling.
- Evaluate contractors with respect to use of recycled materials or environmental protection during contract performance reviews.
- Develop and implement the use of warranty and performance based specifications.

The following BMPs are also recommended to facilitate environmental stewardship in materials management:

- Materials should be used in the most effective way possible.
- Structures should have long lives.
- Materials should be recyclable.
- Consumption of energy in the construction development should be optimized.
- Alternatives for conventional resources should be considered. (See References: Rees and Wackernagel, 1994)

Recycled road construction materials are typically used in such applications as bituminous pavements, concrete pavements, road base, embankments and fills, flowable fills, landscaping, bicycle paths, parking lots, and appurtenances such as signs, fencing, barriers, traffic delineators, etc. Some of the most notable uses of recycled materials in the highway environment in recent years have included recycled asphalt pavement (RAP), reclaimed concrete pavement, coal fly ash, and blast furnace slag. RCRA is a federal regulation that emphasizes waste minimization, reuse and recycling. State and local governments have also passed legislation to promote recycling in road construction. (NCHRP, 2004)

NCDOT policy is to aid in reduction of materials that become a part of our solid waste stream. To that extent NCDOT encourages contractors to initiate, develop, and utilize products and/or construction methods that incorporate the use of recycled or solid waste products in this project. Recycled products or waste materials will be those products or materials which would otherwise become solid waste and are collected, separated, or processed and reused or returned to reuse in the form of raw materials or products that are incorporated into a beneficial reuse on the project. Targeted materials include, but are not limited to, the following: plastic, glass, paper, cardboard, shingles, tires, fly ash, bottom ash, sludge, and C&D debris. (NCDOT, 1996) Additional information on recycling can be found at:

<http://www.ncdot.gov/programs/environment/3R/download/FAQRecycling.pdf>.

Section 610-3 of NCDOT's Standard Specifications for Roads and Structures provides guidelines for the allowable percentages of RAP and reclaimed asphalt shingle material in any given asphalt mix. NCDOT's Resource Conservation Program under Technical Services also has guidelines that detail how to incorporate recycled products within NCDOT.

13.10 Waste Handling and Disposal Matrix

The following matrix provides general guidance for different types of wastes, the categories under which they typically fall, and BMPs or management strategies for each waste type. Contact the Division Hazardous Materials Manager for more specific guidance and classification of potential waste items.

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NCDOT Waste Handling and Disposal Matrix

WASTE	HAZARDOUS WASTE	UNIVERSAL WASTE	NON-HAZARDOUS WASTE	BEST MANAGEMENT PRACTICES/ REQUIREMENTS
Ballasts	X (PCBs)	X		C, SC, ST, L, I, D
Switches	X (MERCURY)	X		C, SC, ST, L, I, D
Fluorescent Bulbs	X (MERCURY)	X		C, SC, ST, L, I, D
Other Light Bulbs		X		C, SC, ST, L, I, D
Batteries		X		C, SC, R, ST, L, I, D
Garbage/Trash/Refuse			X	C, ST, L, I, D
Used Oil			X	C, SC, R, ST, L, I, D
Solvent-Contaminated Rags	X		X	C, ST, L, I, D
Oil-Contaminated Rags			X	C, ST, L, I, D
Fuel-Contaminated Rags/Absorbent Pads	X			C, ST, L, I, D
Antifreeze			X	C, SC, R, ST, L, I, D
Oil Filters			X	C, R, ST, L, I, D
Fuel Filters			X	C, R, ST, L, I, D
Used Oil Filters			X	C, R, ST, L, I, D
Scrap Tires			X	R, ST, D
Asphalt Cleaning Waste	X			C, SC, R, ST, L, I, D
Construction and Demolition Waste			X	ST, R, D (C&D OR MSW)
Inert Debris			X	ST, R, D (C&D OR MSW)
Land Clearing Waste			X	ST, R, D
Animal Carcasses			X	D
Used Railroad Ties/Creosote Treated Timbers	X		X	C, R, ST, I, D
White Goods			X	D (MSW)
Empty Drums			X	C, R, ST, L, I, D
Paint Cans, Brushes, and Related Materials	X (METALS)		X	C, SC, R, ST, L, I, D
Aerosol Cans			X	C, R, ST, L, I, D
Asbestos	X			C, SC, ST, L, D
Electronic Waste	X (METALS)	X		C, R, ST, L
Scrap Metal			X	C, R, ST, L

C = Provide Cover; SC = Provide Secondary Containment; R = Recycle; Requirements: ST = Storage; L = Labeling; I = Inspect; D= Disposal

13.11 Training

Periodic training should be provided so that NCDOT personnel continue to be mindful of the stormwater pollution prevention BMPs discussed in this chapter. Refer to the Introduction of this manual for further training guidance. Examples of training approaches for this chapter include:

- OSHA 1910.1200 requires Hazard Communication (also known as HazCom) training for employees exposed to hazardous chemicals. USDOT requires Hazardous Material training for employees who ship, load, transport, unload, or package/label these materials.
- Provide RCRA training for NCDOT facility personnel working directly at a hazardous waste accumulation site at least on an annual basis. Training should include the identification, proper storage and management, spill response, and disposal of hazardous waste. RCRA and hazardous waste management training requirements depend on hazardous waste site classifications of each facility.
- Provide awareness training for NCDOT facility personnel who handle or manage universal waste.
- Provide spill prevention and response training on a routine basis and at least annually. Spill prevention and response training should include hazardous substance spills in addition to oil spills. Employee awareness will improve a facility's preventative maintenance and spill prevention and response programs. Spill prevention training should highlight previous spill events, equipment failures, remedies taken, and newly developed prevention measures. Refer to the **Spill Prevention and Response Chapter, IA-001** of this manual for additional details.
- Provide additional hazardous waste management training for shop supervisors or other NCDOT facility personnel that manage large quantities of hazardous waste at NCDOT facilities.

APPENDIX G BMP Selection Tables

BMP Selection Table

BMP	Location	Catchment	Structure	Sed. Ctl. Stone	Surface Area	Volume	Function
T. Rock Sed. Dam A	Swale/large ditch	< 1 ac.	Class I	Yes	435Q _{10 (25)}	3600 ft ³ /ac	Remove sand
T. Rock Sed. Dam B	Drainage outlet	< 1 ac.	Class B	Yes	435Q _{10 (25)}	3600 ft ³ /ac	Remove sand
Silt Basin B	Drainage outlet/ Adjacent to inlet	< 3 ac.	Earth	No	435Q _{10 (25)} (325Q ₁₀₍₂₅₎ @ inlets)	3600 ft ³ /ac (1800 ft ³ /ac @ inlets)	Remove sand
Skimmer Basin	Drainage outlet	< 10 ac.	Earth	No	325Q _{10 (25)}	1800 ft ³ /ac	Remove sand
Infiltration Basin	Drainage outlet	< 10 ac.	Earth	No	325Q _{10 (25)}	1800 ft ³ /ac	Remove sand
Riser Basin(non-perforated riser w/ skimmer)	Drainage outlet	< 100 ac.	Earth	No	435Q _{10 (25)}	1800 ft ³ /ac	Remove silt, clay
Stilling Basin/Pumped	Near Borrow Pit/Culvert	N/A	Earth and Stone	No	2:1 L:W ratio	Based on dewatering	Remove silt, clay
Sp. Stilling Basin(Silt Bag)	Near stream	N/A	Geotextile	Yes	N/A	Variable	Remove sand
Rock Pipe Inlet Sed. Trap A	Pipe inlet	< 1 ac.	Class B	Yes	N/A	3600 ft ³ /ac	Remove sand
Rock Pipe Inlet Sed. Trap B	Pipe inlet	< 1 ac.	Class A	Yes	N/A	3600 ft ³ /ac	Remove sand
Slope Drain w/ Berm	Fill Slopes	< ½ ac.	12-inch pipe	No	N/A	N/A	Carry concentrated runoff
Rock Inlet Sed. Trap A	Stormwater Inlet	< 1 ac.	Class B	Yes	N/A	3600 ft ³ /ac	Remove sand
Rock Inlet Sed. Trap B	Stormwater Inlet	< 1 ac.	Class A	Yes	N/A	3600 ft ³ /ac	Remove sand
Rock Inlet Sed. Trap C	Stormwater Inlet	< 1 ac.	¼" wire mesh	Yes	N/A	N/A	Remove sand
T. Rock Silt Check A	Drainage outlet	< 1 ac.	Class B	Yes	435Q _{10 (25)}	3600 ft ³ /ac	Remove sand
T. Rock Silt Check B	Channel	< ½ ac.	Class B	No	N/A	N/A	Reduce flow velocity
Temporary Earth Berm	Project perimeter	< 5 ac.	Earth	No	N/A	N/A	Divert offsite runoff
Temporary Silt Fence	Bottom of slope	< ¼ acre per 100 feet*	Silt fence	No	N/A	N/A	Create small basin; Remove sand, silt
Special Sediment Control Fence	Bottom of slope	< ½ ac.	¼" wire mesh	Yes	N/A	N/A	Remove sand
Temporary Silt Ditch	Bottom of slope	< 5 ac.	Earth	No	N/A	N/A	Carry sediment/water
Temporary Diversion	Project & Stream perimeter	< 10 ac.	Earth	No	N/A	N/A	Divert turbid water
Earth Berm	Project perimeter	< 5 ac.	Earth	No	N/A	N/A	Divert clean or turbid water
Clean Water Diversion	Project perimeter	<5 ac.	Earth/Geotextile	No	N/A	N/A	Divert clean water
Construction Entrance	Exit to road	N/A	Class A	No	N/A	N/A	Clean truck tires
Safety Fence	Permitted Areas	N/A	Orange fence	No	N/A	N/A	Define permitted boundary
Borrow Pit Dewatering Basin	Adjacent to Borrow Pits	N/A	Earth	No	N/A	8.02xQxT	Remove Sand and reduce turbidity
Wattle/Coir Fiber Wattle	Channel	< ½ ac.	Natural Fibers	No	N/A	N/A	Incorporate PAM
Silt Check A with Matting and PAM	Channel	< ½ ac.	Class B	Yes	N/A	N/A	Reduce flow velocity and incorporate PAM

* - Contributing land slope must be <2%

Allowed BMP's for Permitted Areas

BMP	HQW	Trout	Riparian Buffers	303d for Sediment	Wetlands	Endangered Species
T. Rock Sed. Dam A	√	√	√	√	√	√
T. Rock Sed. Dam B	√	√	X*	√	X	√
Silt Basin B	√	√	X*	√	X	√
Skimmer Basin	√	√	X*	√	X	√
Riser Basin	√	√	X*	√	X	√
Stilling Basin/Pumped	√	√	√	√	√	√
Special Stilling Basin (Silt Bag)	√	√	√	√	√	√
Rock Pipe Inlet Sed. Trap A	√	√	√	√	√	√
Rock Pipe Inlet Sed. Trap B	√	√	√	√	√	√
Slope Drain	√	√	√	√	√	√
Rock Inlet Sed. Trap A	√	√	√	√	√	√
Rock Inlet Sed. Trap B	√	√	√	√	√	√
Rock Inlet Sed. Trap C	√	√	√	√	√	√
T. Rock Silt Check A	√	√	√	√	√	√
T. Rock Silt Check B	√	√	√	√	√	√
Temporary Earth Berm	√	√	√	√	√	√
Temporary Silt Fence	√	√	√	√	√	√
Special Sediment Control Fence	√	√	√	√	√	√
Temporary Silt Ditch	√	√	X*	√	X	√
Temporary Diversion	√	√	X*	√	X	√

√ – BMP is allowed in this Permitted Area

X – BMP is not allowed in this Permitted Area

X* – BMP may be allowed in Riparian Buffer if permitted by Environmental Regulatory Agencies