

BENEFICIAL USE OF COAL-COMBUSTION BYPRODUCTS

Presented by:

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**WORKSHOP ON GREEN CONSTRUCTION MATERIALS USING COAL-
COMBUSTION PRODUCTS
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MILWAUKEE, WISCONSIN**



LAWS AND REGULATIONS

- **WISCONSIN STATE STATUTES - ENVIRONMENTAL PROTECTION**
- **WISCONSIN ADMINISTRATIVE RULE - SOLID WASTE MANAGEMENT REQUIREMENTS**
- **NR 538 – BENEFICIAL USE OF INDUSTRIAL BYPRODUCTS**

NR 538 CODE SUMMARY

- **NR 538.01 PURPOSE**
- **NR 538.02 APPLICABILITY**
- **NR 538.03 DEFINITIONS**
- **NR 538.04 PERFORMANCE AND STANDARDS**
- **NR 538.05 SOLID WASTE RULE EXEMPTION**
- **NR 538.06 INDUSTRIAL BYPRODUCT CHARACTERIZATION**
- **NR 538.08 INDUSTRIAL BYPRODUCT CATEGORIES**
- **NR 538.10 BENEFICIAL USES**
- **NR 538.12 BENEFICIAL USES FOR SPECIFIC CATEGORIES**
- **NR 538.14 REPORTING**
- **NR 538.16 STORAGE AND TRANSPORTATION**
- **NR 538.18 PUBLIC PARTICIPATION**
- **NR 538.20 ENVIRONMENTAL MONITORING**
- **NR 538.22 PROPERTY OWNER NOTIFICATION**

PERFORMANCE STANDARDS

- 1- A significant adverse impact on wetlands.
- 2- A take of an endangered or threatened species or other activity prohibited under s. [29.604](#), Stats.
- 3- A detrimental effect on any surface water.
- 4- A detrimental effect on groundwater quality.
- 5- The migration and concentration of explosive gases.
- 6- The emissions of any hazardous air contaminant exceeding the limitations for those substances contained in [s. NR 445.03](#).

NR 538 PROGRAM ELEMENTS

- **Initial characterization - Recharacterization**
- **Mostly self implementing**
- **Five categories of industrial byproducts**
- **Beneficial uses allowed for each category**
- **Notification of WDNR for larger projects**
- **Annual reports on use to the WDNR**
- **Property owner notification for geotechnical fill projects**

BYPRODUCT TYPES

INDUSTRY	BYPRODUCT	BYPRODUCT STREAMS
ELECTRIC UTILITY	COAL ASH	FLY ASH BOTTOM ASH FGD-GYPSUM
FOUNDRY	FERROUS FOUNDRY PROCESS WASTE	EXCESS SYSTEM SAND SLAG
PAPER MILLS	SLUDGE	
OTHERS	INDUSTRIAL BYPRODUCTS	SLAG LIME KILN DUST

BOTTOM ASH USES

- **CONFINED GEOTECHNICAL FILL- non-residential**
 - **BASE COURSE, SUBBASE OR SUBGRADE FILL FOR :**
 - **COMMERCIAL AND INDUSTRIAL BUILDINGS**
 - **CONCRETE OR ASPHALT PAVED LOT**
 - **PAVED FEDERAL, STATE, MUNICIPAL ROADWAY**
 - **UTILITY TRENCH BACKFILL**
 - **BRIDGE ABUTMENT BACKFILL**
- **FULLY ENCAPSULATED WDOT EMBANKMENTS**
- **CLAY CAPPED WDOT EMBANKMENTS**
- **UNCONFINED GEOTECHNICAL FILL**
- **UNBOUNDED SURFACE COURSE**
- **BONDED SURFACE COURSE**
- **COLD WEATHER ROAD ABRASIVE**

FLY ASH USES

- **RAW MATERIALS FOR MANUFACTURING OF PRODUCT**
- **AGENTS FOR PHYSICAL OR CHEMICAL STABILIZATION OR SOLIDIFICATION**
- **CONFINED GEOTECHNICAL FILL**
 - **FLOWABLE FILL**
 - **ABANDONMENT OF TANKS, VAULTS, TUNNELS**
 - **SLABJACKING MATERIAL**

FLUE GAS DESULFURIZATION GYPSUM

- **WET SYSTEMS**
 - **WALL BOARD**
 - **AGRICULTURAL-** MARCH 20, 2008

- **SEMI-DRY SYSTEMS**

- **DRY SYSTEMS**

GEOTECHNICAL FILL RESTRICTIONS

- **RESIDENTIAL BUILDINGS**
- **COVER BYPRODUCTS AS SOON AS PRACTICAL**
- **WRITTEN NOTIFICATION FOR >5000 CUBIC YARDS**
- **EXTEND < 4 FEET FROM THE FROST WALL OR PAVED AREAS**
- **BELOW THE WATER TABLE**
- **PERMANENT STANDING WATER**
- **DEWATERING**
- **200 FEET FROM PRIVATE AND PUBLIC WATER WELL**
- **GENERALLY ACCEPTED ENGINEERING PRACTICES**
- **WINDBLOWN DUST, ODOR, COLOR, TRACKING AND SPILLAGE**

BENEFITS

- **SAVE VIRGIN MATERIAL**
- **PRESERVE NATURAL LANDSCAPE**
- **SAVE ENERGY**
- **SAVE MONEY**
- **REDUCE GLOBAL WARMING**
- **MINIMIZE ENVIRONMENTAL IMPACT**
 - **CEMENT MANUFACTURING**
 - **VIRGIN MATERIAL EXCAVATION**
 - **MATERIAL HANDLING**
- **SAVE LANDFILL SPACE**

BENEFICIAL USE RATE

- **COAL ASH** 72%----92%
- **FOUNDRY SAND AND SLAG** 40%----95%
- **PAPERMILL SLUDGE** 63%----66%

COAL COMBUSTION BYPRODUCTS RECYCLING RATE - ESTIMATED

- CLASS C FLY ASH 80 - 90%**
- CLASS F FLY ASH 10 - 20%**
- OFF SPEC. CLASS C 50 - 60%**
- BOTTOM ASH 80-110%**
- CYCLONE BOILER BA 80-100%**
- FGD-GYPSUM 100%**
- FGD-DRY 0%**

GUIDANCE AND CASE BY CASE APPROVALS

- **GUIDANCE:**

- BENEFICIAL USE OF FORMER LANDFILLED MATERIAL**

- EXCAVATION GUIDELINES FOR PROJECTS CONDUCTED UNDER NR 538 APPROVALS**

- SUBGRADE STABILIZATION USING FLY ASH**

- **CASE-BY-CASE APPROVALS**

- FLOWABLE FILL**

- AGRICULTURAL USE OF GYPSUM**

- SOIL STABILIZATION IN RESIDENTIAL AREAS**

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