



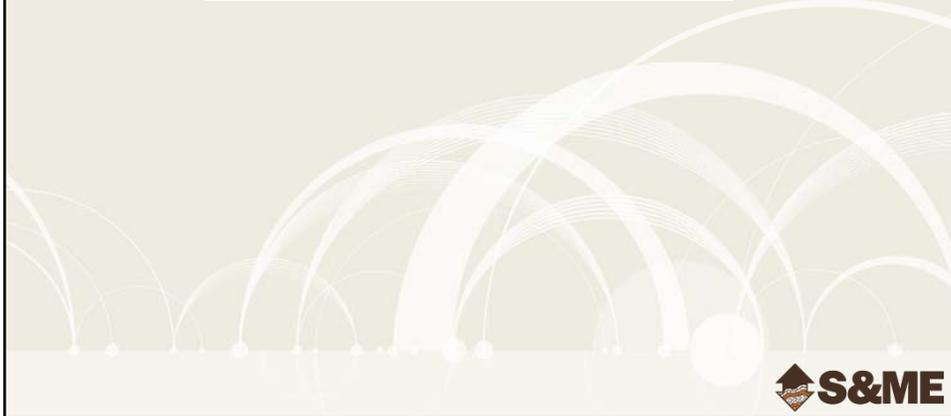
# Land Application of Concrete Byproducts Promotes Environmental Sustainability



## Presenters

Robin Maycock - NCDOT

Rob Willcox – S&ME



## Introduction and Overview

- Project Details
- Timelines
- Benefits
- Challenges
- Summary / Closing



## Project Details

- Since July, 2010 S&ME has assisted NCDOT with developing an environmentally sustainable approach to manage concrete byproducts from hydrodemolition and diamond grinding operations prevalent in bridge maintenance and concrete roadway projects.



## Project Details

- Historically, these industrial process wastewaters, generated during hydrodemolition or diamond grinding, were either disposed of at wastewater treatment facilities, sent to landfills, buried, or dewatered in pits or trenches.



## Project Details

- NCDOT and its Contractors are legally responsible for all industrial process wastes generated during construction, maintenance and preservation projects.
- NCDOT is required to minimize waste sent to landfills from it's projects.



## Project Details

- Some of the following Federal and State Regulations govern management of these byproducts:
  - ❖ Environmental Protection Agency (EPA)
  - ❖ Resource Conservation and Recovery Act (RCRA)
  - ❖ NC Dept. of Environment and Natural Resources (NCDENR), Division of Water Quality/Resources (DWR)
  - ❖ NCDENR, Division of Waste Management (DWM)



## Project Details

- Discharges of industrial process wastes (liquid or solid) to surface waters, to the ground surface or to the subsurface of the ground and/or in contact with groundwater require permit approval by DWR or DWM.



## Project Details

- Two primary products managed through land application:
  - Diamond Grinding Slurry (DGS)
  - Hydrodemolition Operation Slurry (HOS)



## Project Details – Diamond Grinding



Diamond Grinding Slurry



## Project Details – Diamond Grinding



Diamond Grinding New Concrete



## Project Details – Diamond Grinding



Diamond Grinding on New Bridge Deck



## Project Details – Diamond Grinding



Diamond Grinding of New Concrete on Bridge Deck



## Project Details – Diamond Grinding



Diamond Grinding of New Bridge Deck



## Project Details – Diamond Grinding



Diamond Grinding and Grooving



## Project Details – Hydrodemolition



Hydrodemolition Robot



## Project Details – Hydrodemolition



Hydrodemolition of Bridge Deck



## Project Details – Hydrodemolition



Hydrodemolition Storage



## Project Details – Hydrodemolition



Hydrodemolition Operation Slurry



## Project Details – Hydrodemolition



Hydrodemolition Storage



## Project Details – Hydrodemolition



Hydrodemolition of Deck



## Timelines

- In July 2010, S&ME began working with NCDOT to obtain a land application permit from the DWR. (at that time DWQ)
- In July 2011, NCDOT received the first permit for land application of HOS as reclaimed wastewater. (Conjunctive Reclaimed Water Utilization)





## Timelines



Filter System



## Timelines



pH Adjustment thru addition of Muriatic Acid



## Timelines

- Late in 2011, we switched gears and based on meetings with DWQ decided that a Land Application Permit (for Class A Residuals) would be a better fit for land application of DGS and HOS.
- In January 2012, we submitted an application for a Land Application Permit for Class A residuals.
- In June 2012, NCDOT received a Permit, issued only for land application associated with the Western Wake Expressway.



## Timelines

- In April 2013, NCDOT received a modified programmatic permit for land application **statewide**.
- In June 2014, NCDOT received the current permit for land application statewide with **reduced monitoring**. The required testing for metals was removed, leaving only pH, % total solids and Calcium Carbonate Equivalence (CCE).



## Timelines

**Current Land Application Permit**

## Timelines

**AgChem TerraGator Land Applying**

## Timelines



Pumper Truck Land Applying



## Timelines



Pumper Truck Land Applying



## Timelines

- In October 2014, NCDOT established “Guidelines on the Management and Disposal of Concrete Grinding Residuals” (CGR) and posted them on their website: <https://connect.ncdot.gov/resources/Environmental/Environmental%20Permits%20and%20Guidelines/Forms/AllItems.aspx>
- NCDOT contract special provisions reference the Guidelines and describe the permitted options for the disposal of concrete residual waste liquids, slurries and solids.



## Timelines

DRAFT SPECIAL PROVISIONS/GUIDELINES FOR DIAMOND GRINDING AND HYDRODEMOLITION OPERATION SLURRY DISPOSAL, BENEFICIAL USE OR SOLID DISPOSAL AS BENEFICIAL FILL 9-23-14

**NCDOT GUIDELINES ON THE MANAGEMENT AND DISPOSAL OF CONCRETE GRINDING RESIDUALS**

October 14, 2014

The North Carolina Department of Transportation (NCDOT) has prepared this guidance in order to describe the permitted options for the disposal of concrete residual waste liquids, slurries and solids generated by concrete milling, hydrodemolition, grinding, grinding and sawing of new or old concrete. This guidance will list and explain the alternate disposal options available to NCDOT contractors and subcontractors for disposal of concrete grinding residuals (CGR), including diamond grinding slurry (DGS) and hydrodemolition operation slurry (HOS). The programmatic permits available for reclaimed water use and land application, as well as the requirements from the Division of Waste Management for the burial of waste solids on NCDOT fill sections.

The NCDOT and its contractors are legally responsible for all industrial process wastes generated during construction, maintenance and preservation projects. The federal regulations from the Environmental Protection Agency (EPA) and the Resource Conservation and Recovery Act (RCRA) and corresponding state disposal regulations from the North Carolina Department of Natural Resources (NCDNR) Division of Water Resources (DWR) (formerly Division of Water Quality (DWQ)) and the Division of Waste Management (DWM) allow hazardous wastes generated “from cradle to grave”, requiring NCDOT to perform waste determinations, document, manage and dispose of wastes according to state and federal regulations. (See NC Hazardous Waste Management Rules <http://portal.southern.com/ncdot/contracts/>.)

Discharges of industrial process wastes (liquid or solid) to surface waters, to the ground surface or to the subsurface of the ground and/or in contact with groundwater require permit approval by NCDNR, DWR, and/or DWM. In 2011, NCDOT obtained a programmatic reclaimed water permit which allows the use of HOS/DGS waste water removed and treated to meet permit requirements to be used for irrigation or dust control on NCDOT projects. In 2013, NCDOT received a programmatic statewide permit for land application of the HOS/DGS as a Class A residual. NCDOT has developed this guidance to assist Contractors in maintaining compliance with state and federal environmental regulations when working on NCDOT projects. This document addresses the collection, containment, management, handling, transportation and disposal or reuse options for both hydrodemolition and diamond grinding waste water, slurry and solids. This guidance sets forth the minimum steps required to maintain compliance with environmental regulations. It remains the responsibility of the Contractor/Subcontractor to determine whether more than these minimum steps are required and to perform whatever work is necessary to comply with all applicable laws and regulations.

**HOS/DGS Management Plan**

The Contractor is required to submit a written HOS/DGS Management Plan at least thirty days prior to starting work. The Contractor shall submit the Plan to the NCDOT Resident Engineer for review and approval prior to starting work. The Management Plan will include the Sampling

1

NCDOT Guidelines



## Timelines

- A Special Provision is included in each NCDOT contract for a project, references the Guidelines for management, and is critical towards getting the Contractor prepared to manage the waste products being generated from their project.
- The Contractor is required to submit a written waste disposal management plan at least 30 days prior to starting work.



## Benefits

- Agronomic, Economic and Environmental Benefits
  - Soil pH adjustment
  - Replaces need for agricultural lime
  - Potential reduction in disposal cost for contractors and NCDOT
  - Reduction of materials that are being landfilled
  - Reduction of carbon “footprint”



## Benefits

- NCDOT is currently evaluating the potential cost savings of land application versus traditional disposal methods. (UNC-Charlotte is currently conducting research associated with this.)
- NCSU has coordinated research studies to evaluate soil pH reactions and to help determine liming values of DGS and HOS.



## Challenges

- NCDOT, S&ME and NCSU were challenged to demonstrate that land application of concrete byproducts could be implemented beneficially to be protective of human health and the environment.



## Challenges

- Determining the best fit for permitting through DWQ/DWR took time and many different permit modifications.
- Developing guidelines on management and disposal of CGR and including them in the NCDOT Special Provisions requires NCDOT Contractors to plan out their options.



## Challenges

- An Operations Checklist which highlights conditions required for permit compliance is currently under development.
- Different hydrodemolition contractors have different equipment which in turn produce variability in the percentage of solids in the hydrodemolition slurry.
- DGS and HOS have different physical and chemical parameters.



## Challenges

- DGS and HOS solids separate quickly from the liquids, which can make management of the material challenging.
- pH management of the DGS/HOS has also been challenging.



## Challenges



Sample where solids have separated from liquids



## Challenges

- Each project has unique challenges associated with determining the most suitable disposal or beneficial reuse options.
- Use of the dewatered solids can also be used as “beneficial fill” and buried, per guidance from DWM.



## Challenges



Mechanical Dewatering via filter press



## Challenges



Mechanical Dewatering set up at I-485 / I-85 Interchange



## Challenges



I-485 / I-85 Interchange - Dewatering



## Challenges

- The regulations in other states vary widely and Contractors are often unfamiliar with available reuse options.
- Education on the options available in NC is important, and has been achieved by putting guidelines and other information in the contract language and on the internet.
- Internal and external education efforts have been helpful.



## Challenges



Example of what is not allowed!



## Challenges



This is considered land application in other States!  
Not allowed in NC!



## Summary

- Land application is one of many options for the management of DGS and HOS.
- The current land application permit is well suited to be utilized for most projects.
- The NCDOT Guidelines for land application and other approved disposal options (burial of solids), as referenced in contract special provisions, provide information for NCDOT Contractors.



## Summary

- Each project has been unique with regards to determining the most suitable disposal options in order to maintain compliance with all applicable regulations.
- Land application continues to be one of the most sustainable environmental reuse options.



## Closing

