The City of New York

Department of Environmental Protection

59-17 Junction Boulevard
Corona, New York
11368-5107

Joel A. Miele Sr., P.E.
Commissioner

Louis J. Tazzi
Deputy Commissioner

Bureau of Management and Budget

Tel (718) 595-3403
Fax (718) 595-3437

MEMORANDUM

To: List

From: Charmaine A. Richardson

Date: October 16, 2001

Re: World Trade Center Emergency Project
Staten Island Landfill

Comments on the attached draft "*Dust Control Evaluation Summary*" as well as the "*Debris Transfer, Staging, Sorting/Sifting and Disposal Operation*" are due by 5:00 PM today.

These are working drafts, with components, which may be currently in operation at the Staten Island Landfill. Pertinent comments and corrections will be incorporated into the final document.

Attachments: [2]

C: J. Miele Sr.
D. Chapin
L. Tazzi
M. Hochstadt
M. Gilsenan
G. Kelpin
M. Fawzy
P. Bennett
File

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION DEP
www.nyc.gov/dep
(718) DEP-HELP

Army Corps of Engineers

DRAFT
DUST CONTROL EVALUATION SUMMARY
STATEN ISLAND LANDFILL RECOVERY OPERATION
WTC DISASTER RELIEF
October 11, 2001

1.0 INTRODUCTION

Evans Environmental & Geosciences (EE&G) was tasked by the U.S. Army Corps of Engineers to develop and prepare a Dust Control Evaluation for the debris sorting activities being conducted at Units 1/9 at the Staten Island Landfill. The generation of fine-grained airborne particulates (dust) has become a potential nuisance on the project, and represents a potential health and safety concern as well. Based on samples of the WTC debris collected by the U.S. Environmental Protection Agency (EPA) at Ground Zero, over 30% of the granular debris reportedly contains greater than 1% asbestos. Furthermore, the prevailing wind direction appears to be towards the office trailers areas and/or decontamination areas, outside of the exclusion zone where workers are unprotected. Therefore, it is essential that the amount of airborne dust generated by site operations be minimized as much as technically practical so that worker exposure to potentially harmful substances, like asbestos, is minimized.

Dust is generated during site operations involving heavy equipment, grading, sorting, sifting, spreading, loading, dumping, excavation, covering, and general construction activities. Additionally, wind erosion of piles is another source of airborne dust. The winds at the site are frequently blowing, especially during the fall, winter, and spring months. This exasperates the generation of airborne dust in that each time the debris is handled, dust becomes airborne. The site is processing approximately 10,000 to 12,000 tons per 24-hour period. Work is conducted 24 hours a day, 7 days per week.

2.0 EVALUATION OBJECTIVES

The objective of this evaluation is to present an analysis of the various alternatives commercially available for large scale dust suppression. This plan includes an evaluation of the effectiveness and feasibility of implementation of the various alternatives. A recommendation for the preferred alternative also is provided. Due to time constraints, a cost-benefit analysis of the preferred alternatives was not included in this document, and will follow under separate cover.

The use of dust control systems will be a critical element throughout this project to meet the New York State Department of Environmental Conservation (NYSDEC) goals of "zero dust emissions" and to minimize the potential for unnecessary worker exposure to airborne substances.

3.0 DESCRIPTION OF CONSTRUCTION ACTIVITIES

Debris is transferred to the Staten Island Landfill via barge or over the road via trucks. This debris is unloaded at the dock via large hoes/grapplers and placed in a loading area. A front-end loader lifts this debris and places it into off road dump trucks for transfer to the debris staging area located at the top of the 1/9 landfill. The debris is

"scalped" to remove large items such as planters and structural steel/red iron. The red iron is loaded for transport to a specialized cutting operation for cutting and recycling.

The debris is then moved to one of four existing "shakers" located at the site. Large debris, such as metal frames, is segregated from the smaller debris. The larger debris is lifted with a front-end loader and scattered on the ground for subsequent inspection by law enforcement personnel, who use rakes and shovels to manually sort through and inspect the debris. The smaller debris is forwarded to a sifter, which separates the debris into three separate conveyors for inspection by law enforcement personnel. Once the debris is inspected, it is scooped up with a front end loader, loaded onto trucks, and forwarded to the "active bank" for final landfill disposal.

4.0 CURRENT DUST CONTROL PRACTICES

Dust control is currently being addressed on the roads using water. Water trucks are continuously utilized to minimize the potential of dust emissions on the unpaved roads. Additionally, paved roads are periodically misted to limit the potential for dust emissions. Although effective, the effects are short lasting, as evaporation removes the water in a matter of hours, especially on windy days (which is most of the time). Additionally, water will become a problem when the ambient temperature remains below freezing for extended periods of time.

5.0 DISCUSSION OF ALTERNATIVES

A number of alternatives technologies may be used for dust suppression on and around roadways and work areas, including the following: Water and/or chemical dust suppressants may be applied to roadways, stock piles and sorting fields; geotextiles may be placed on unpaved roadways; unpaved roads may be paved and speed limits may be lowered; artificial or natural wind breaks or wind screens may be constructed as enclosures for specific dust sources; and, ventilation/filtration and misting may be used to capture and remove dust in areas under cover. Based on a preliminary evaluation of these various technologies with respect to operations at the landfill, the application of chemical dust suppressants appears to be the most cost effective.

The use of chemical dust suppressants can reduce the use of water, and thereby reduce the generation of surface water runoff and leachate. In addition, many chemical dust suppressants aid in road stabilization and erosion control, and provide residual dust control thereby reducing the frequency of application. The efficiency of chemical dust suppressants varies, depending on the same factors as water application, including activity levels, climate, initial surface conditions, and spray nozzle parameters. The efficiency of chemical dust suppressants generally falls between 60 and 90 percent reduction in fugitive dust emissions. The degree of control achieved is a function of the application intensity and frequency, and the dilution ratio.

A number of different types of chemical dust suppressants are commercially available for use on most types of emission sources. The different types of dust suppressants include the following:

- Salts, such as calcium chloride and magnesium chloride.
- Bitumens, tars and resins, such as fuel oil.

- Soybean oil.
- Adhesives, including lignin derivative, tree resin emulsions, and synthetic polymer emulsions, which bind particles together.
- Foams that encapsulate particles with minimum moisture addition.

Chemical dust suppressants are typically applied by mobile and/or stationary equipment, using spray nozzles. Chemical dust suppressants may be applied to roadways, existing debris stock piles, and other work areas. It is likely that different chemical dust suppressants may be appropriate for different application.

ALTERNATIVES COMPARISON

Water and alternative chemical dust suppressants are compared in the following table:

Type of Chemical Suppressant	Source	Functional Mechanism	Performance Advantages	Performance Limitations	Worker Exposure Considerations
Water	Surface or groundwater	Moisture wets particles, increasing mass and binding them together	Readily available, low cost, easy to apply	Frequent applications may be necessary; overapplication may result in loss of traction, or erosion; freezes below 32 deg F	Generation of surface water runoff
Salts	Produced from natural salt brine	Attracts and retains moisture at relative humidity equal to or greater than 29%	Reduces evaporation rate of surface moisture; lowers freezing point of water; increases compacted density of road material; good soil penetration; short curing times	Effectiveness in arid and semi-arid regions may be limited; corrosive to aluminum alloys; slightly corrosive to steel; solubility results in leaching during heavy precipitation; releases heat when mixed in water	Dermal and inhalation irritant; will degrade leather boots
Lignin Derivatives	Paper industry by-product	Acts as adhesive	Increases dry strength of soil; imparts some plasticity to road surfaces; lowers freezing point of road surface	High solubility may result in leaching during heavy precipitation; becomes slippery when wet, brittle when dry	Product-specific
Tree Resin Emulsions	Emulsions from pine tree resins	Acts as adhesive	Low solubility minimized leaching and provides degree of surface waterproofing; imparts some plasticity; high bonding strength; non-corrosive	Requires proper weather and time to cure; no residual effectiveness after reblading; equipment requires prompt cleanup to avoid curing of resin in hoses and pipes	Product-specific
Synthetic Polymer Emulsions	Synthetic formulations composed of polyvinyl acetates, vinyl acrylic copolymers, copolymer methacrylates,	Binds soil particles together by forming a polymerizing matrix, function similar to adhesives	Applicable to a range of dust emission sources; functions well in sandy soil; increases load-bearing strength of roadway	Requires proper weather conditions and time to cure; may be subject to UV degradation; application equipment requires timely cleaning; no residual	Product-specific

	et. Al.			effectiveness after reblading	
Foams and Surfactants	Detergents	Foam that encapsulates particles	Wets fines and penetrates more effectively than water; contains less than 2% water	May become slippery when wet	Product-specific. Significant slip hazard.
Soybean oil - Soapstock	Byproduct of Soybean Oil Distillation	Binds soil particles together	Forms a solid, long-lasting, non-dusting surface; very good soil surface particle binding properties	Limited soil surface permeability; should be applied at temperatures of 120 deg F; requires minimum of 2 days, and longer when temperatures below 65 deg F. for curing through "tacky" stage (site would need to be shut down for several days); salt neutralizes product and renders it ineffective	May have odor when first applied. Slip hazards when in tacky stage.
Beet Oil	Byproduct of Beets	Contains potassium chloride, physical characteristics similar to salts	See Salts, May be cheaper than salts.	See Salts	Vegetable byproduct. Minimal H&S concerns
Bitumens, Tars, Resins	Petroleum, coal and plastic industry by-products	Asphalt and resinous products are adhesive, binding soil particles. Petroleum oil products coat soil particles, increasing mass	Water insoluble when dry; provides a degree of surface waterproofing; good residual effectiveness	Surface crusting, fracturing and potholing may develop; long-term application may cause road to become too hard for reblading; won't lower freezing point; petroleum oil products lack adhesive characteristics	Use of used oils is prohibited; some petroleum-based products may contain carcinogenic PAHs. Slip hazards with petroleum oils.

Results of comparative studies indicate that for unpaved road sites the most consistently effective suppressant products are the lignin derivatives and salts, specifically calcium and magnesium chlorides. Both of these products are commonly used and are considered to be environmentally safe and economical.

Alternative chemical suppressants are likely to be recommended for dust control of stock piles and debris handling and sorting areas. Surfactants, highly purified bitumen products, and lignin derivatives appear to have qualities that may work well in these areas.

8.0 RECOMMENDATION

Pilot testing is recommended for further evaluation of select technologies. The objective of pilot testing include evaluating the cost-effectiveness of each of the chemical suppressants with respect to the following:

- Effectiveness for controlling dust.
- Difficulty of handling and application.
- Rate of curing.
- Application rate and frequency.
- Performance in cold temperatures.
- Worker exposure.
- Cost effectiveness.

Pilot testing with lignin derivatives, salts, and beet oil are recommended for the roadway. Pilot testing with surfactants, highly purified bitumen products, and lignin derivatives is recommended for the stock piles and debris handling and sorting areas. Pilot testing of 5 to 6 products can probably be conducted for $20,000 to $30,000.

Furthermore, EE&G recommends the following dust control activities continue to be implemented for dust control until alternative means are implemented:

- Periodic watering of all roads (paved and unpaved) in the landfill facility.
- Periodic watering segregation and inspection aras where manual debris sorting is conducted.
- Inspect and verify that debris scheduled for off-loading from the barges has been watered to minimize dust. If not, it should be watered before unloading from the barge.
- Water truck misting of dusty areas around the active debris sorting operation.
- Continue to enforce site speed limit of 5 miles per hour to minimize dust generation.
- Maintain pro-active management of all watering by conducting frequent inspections and watering before dust generation becomes significantly visible.