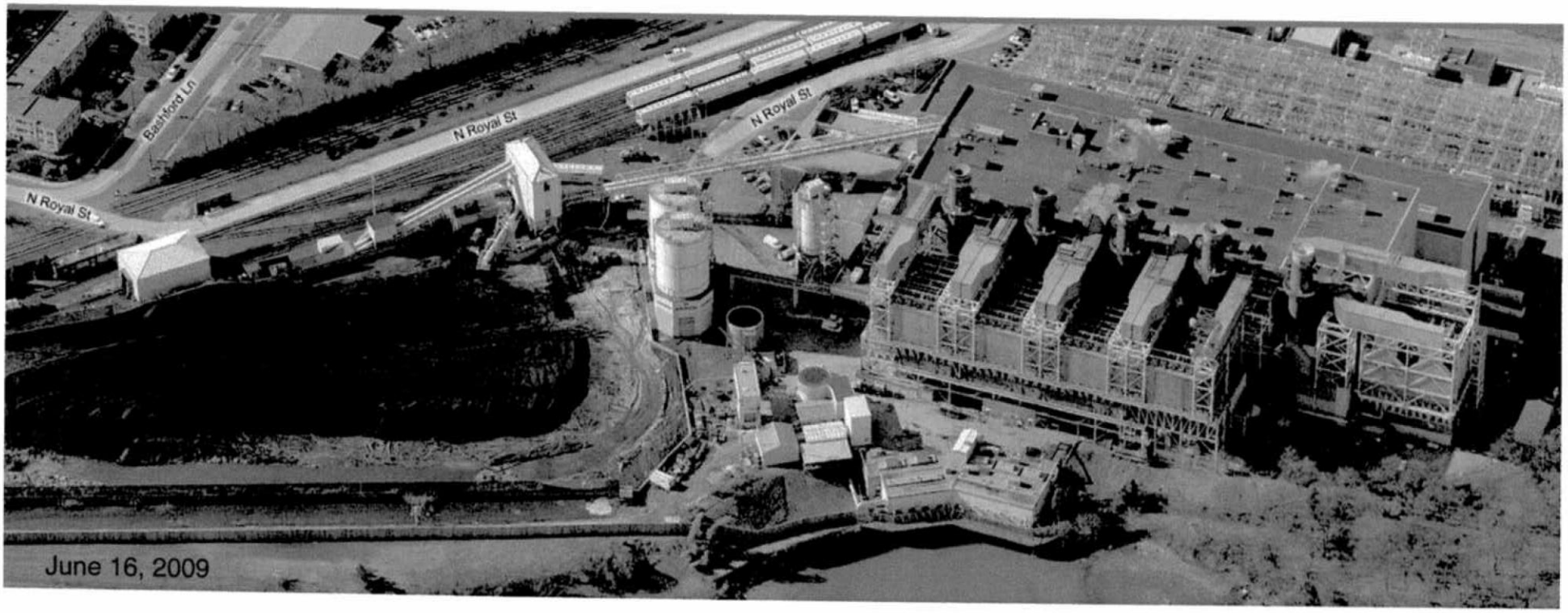
WorleyParsons

resources & energy

Prepared for

Mirant Potomac River Generating Station Fugitive Dust & Particulate Emissions Reduction Project



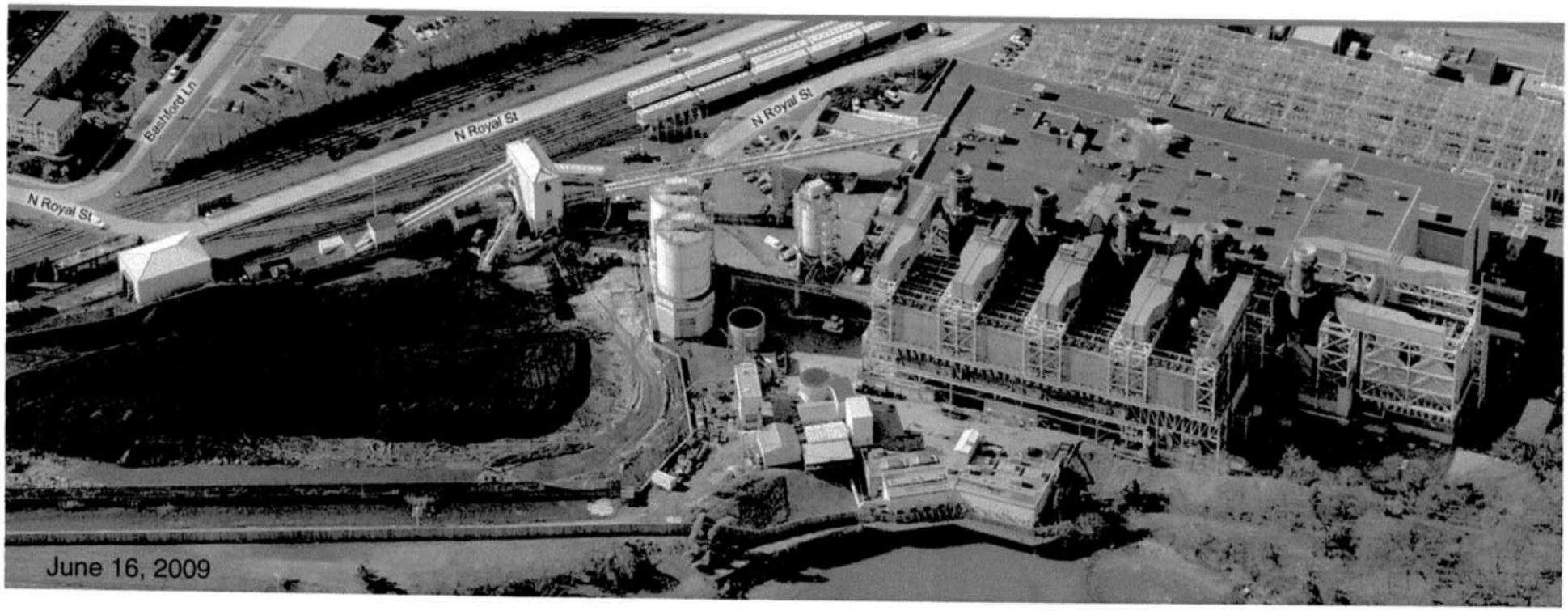
June 16, 2009

WorleyParsons

resources & energy

Prepared for

Project Highlights Recap



WorleyParsons

resources & energy

Project Highlights

- Parties Involved:
  - Mirant
  - City of Alexandria
  - The "Engineer" (WorleyParsons)
  - City Engineering Consultant (EPSCO)
- TIC (Total Installed Cost) Budget:
  - Phase I - $2,000,000
  - Phase II - $32,000,000
- Current Work:
  - Two Phase Engineering Study

Project Highlights

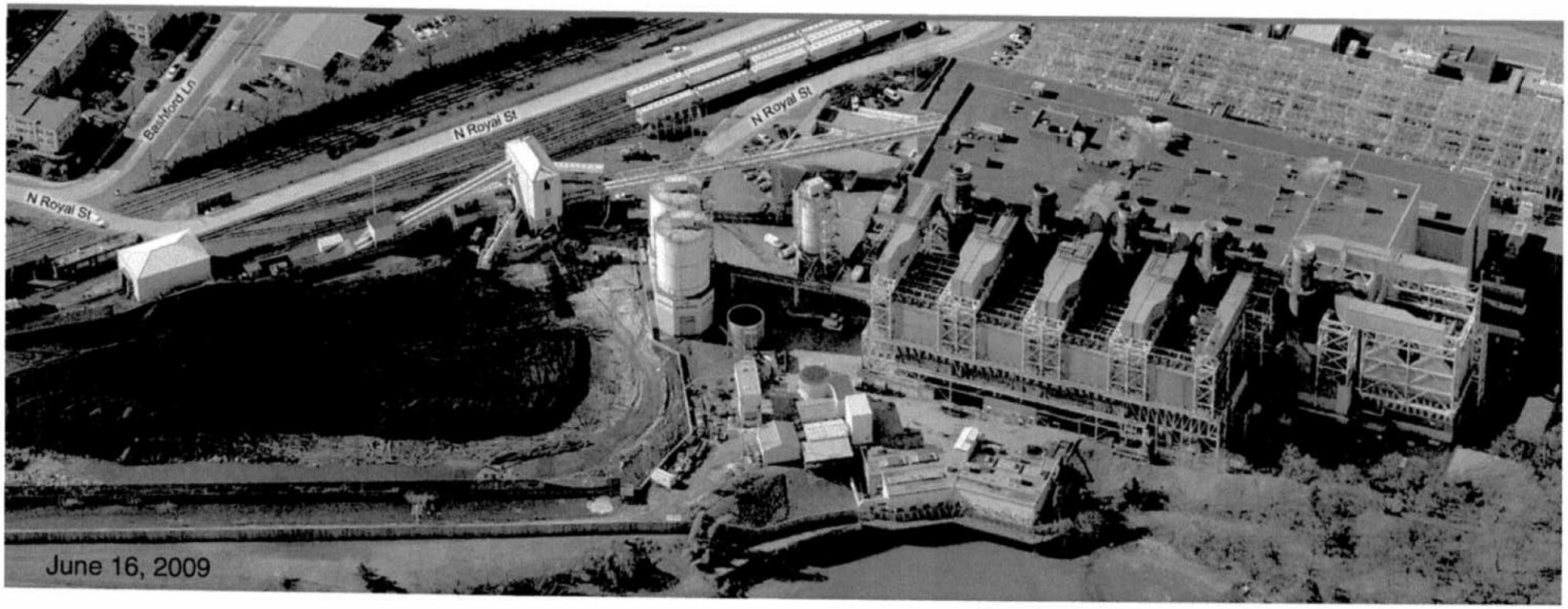
- Engineering Study Includes Evaluating:
  - PHASE I: Feasibility, cost and installation of fugitive dust controls for the Facility site.
  - PHASE II:
    - (a) Installing baghouse or other technologies in the current housings for the hot- and/or cold-side precipitators,
    - (b) Improving performance and reliability of existing hot- and/or cold-side precipitators, and
    - (c) Other commercially available technologies identified by the Engineer that may be applied in any location of the Facility.

WorleyParsons

resources & energy

Prepared for

Phase I Summary



Phase I – Fugitive Dust vs. Particulate Matter

- Fugitive Dust ……
  - Larger dust particles such as coal dust and some smaller particles such as fly ash
  - Sources such as material handling systems, roadways and storage pile
  - Addressed in Phase I
- Particulate Matter Emissions ……
  - Airborne stack emissions from the combustion of coal
  - Addressed in Phase II

WorleyParsons

resources & energy

Phase I – Goal and Approach

- Goal
  - Identify and select the most cost effective fugitive dust controls within the Phase I Budget (TIC of $2,000,000)

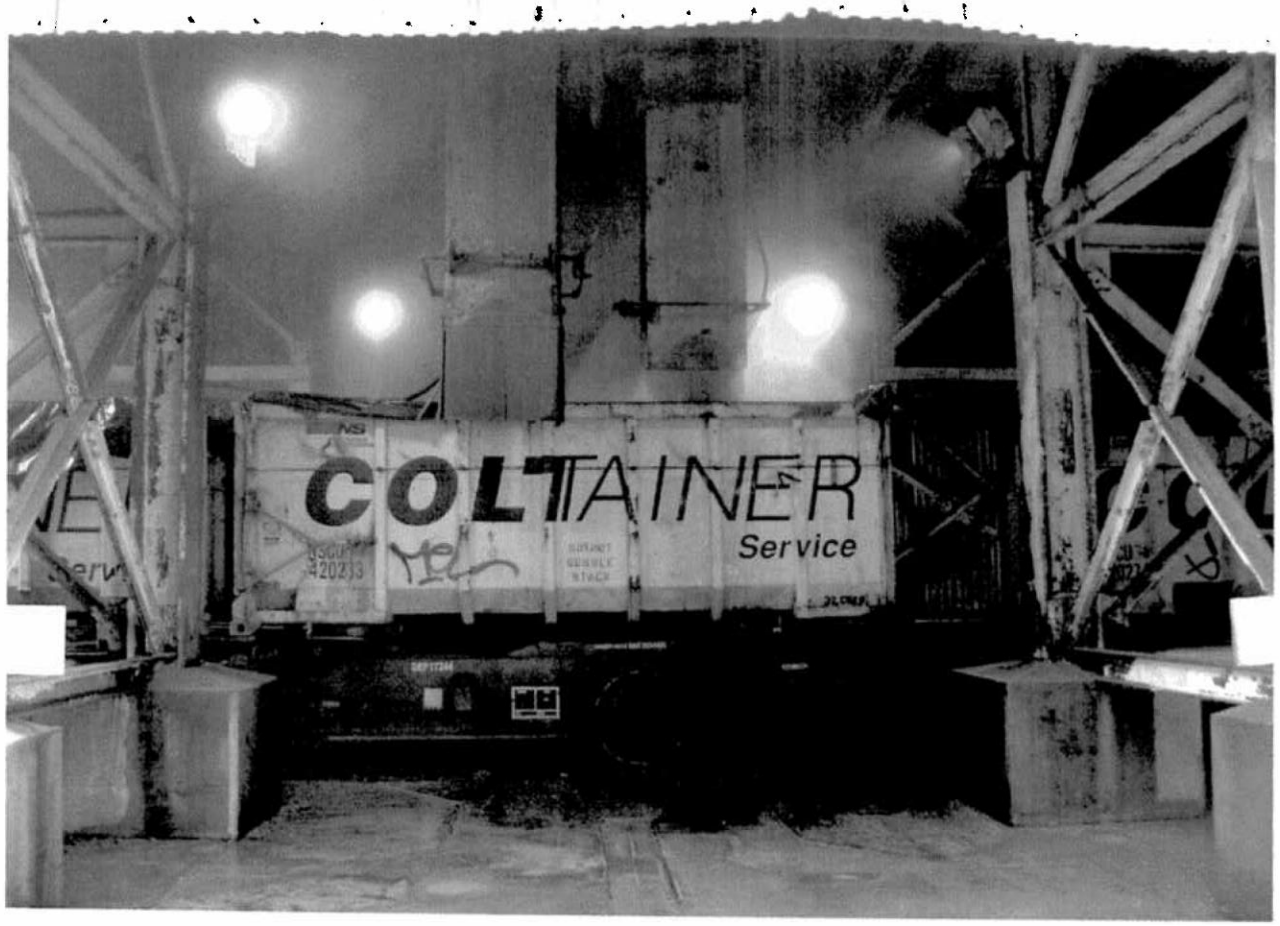
- Approach
  - Identify and observe all fugitive dust emission sources
  - Identify and observe all existing fugitive dust controls
  - Review past fugitive dust emission reports
  - Prepare screening matrix of all possible new controls
  - Prepare matrix of screened controls
    - Level of Dust Reduction (Low, Medium & High)
    - Control Cost
  - With the consensus of all parties, select and recommend most cost effective dust control within Phase I Budget

Phase I – Dust Suppression System at Fly Ash Loading .....Present System

Present Water Spray System .....For Trucks

Phase I – Dust Suppression System at Fly Ash Loading .....Present System

Present Water Spray System .....For Railcars

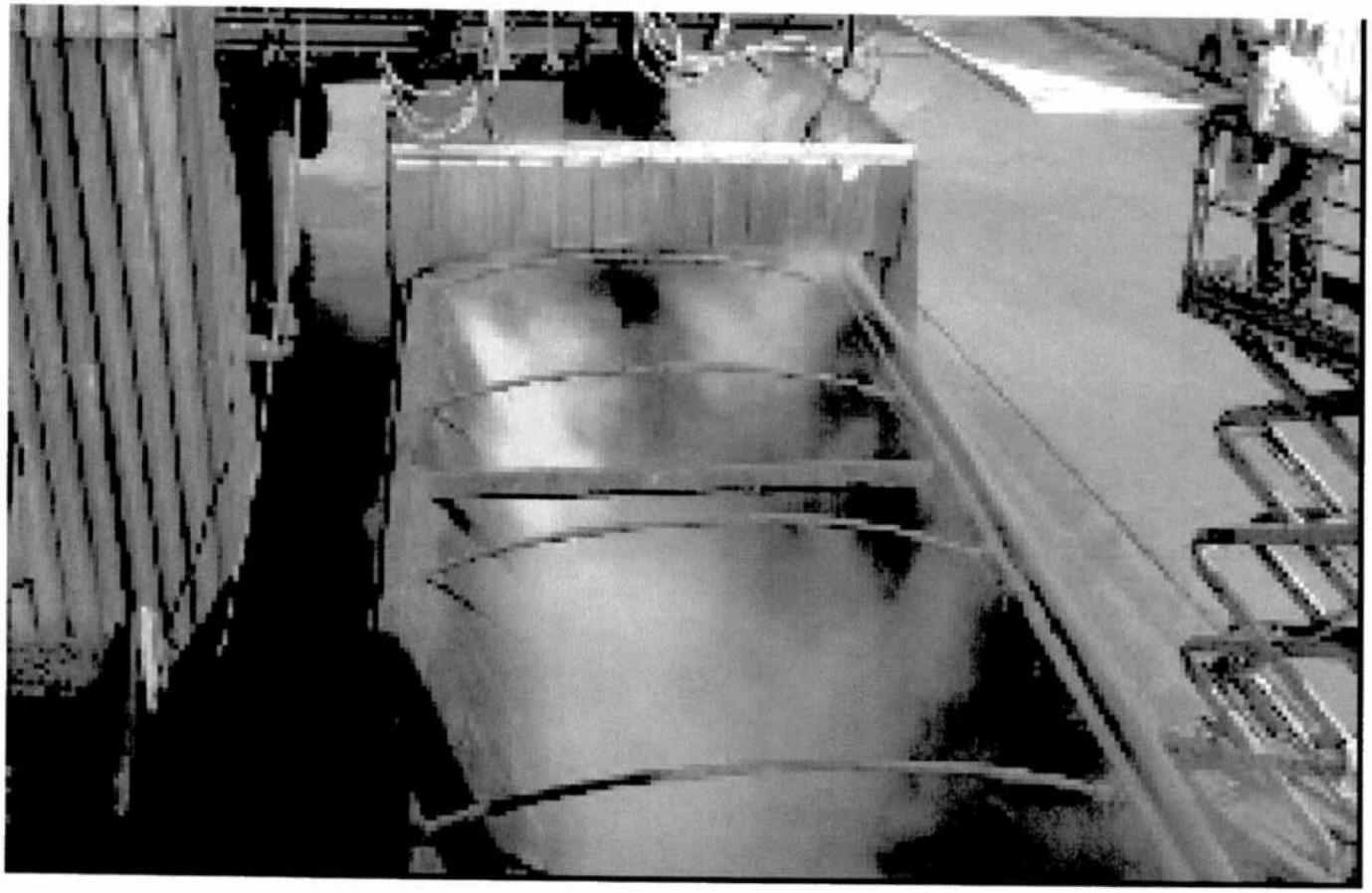


WorleyParsons

resources & energy

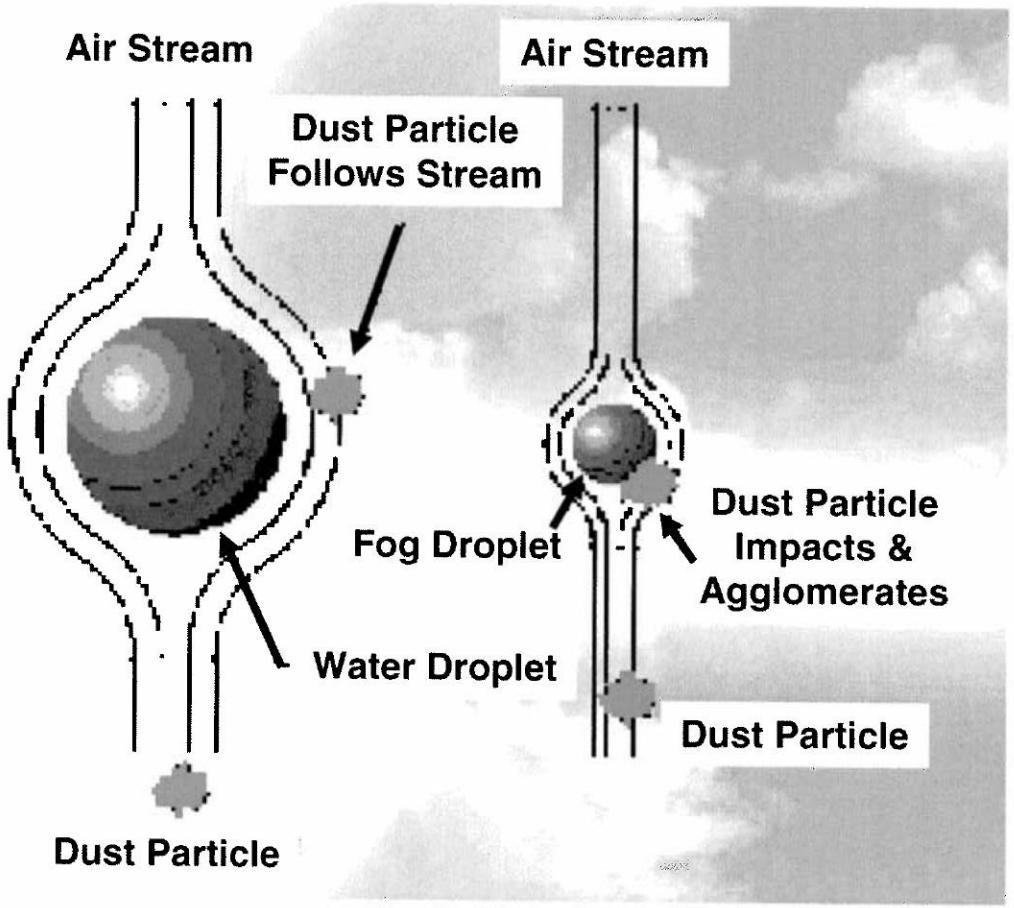
Phase I – Fog Type Dust Suppression at Fly Ash Loading .....What Is It?

Fog Type Dust Suppression System .....



Phase I – Fog Type Dust Suppression How Does It Work?

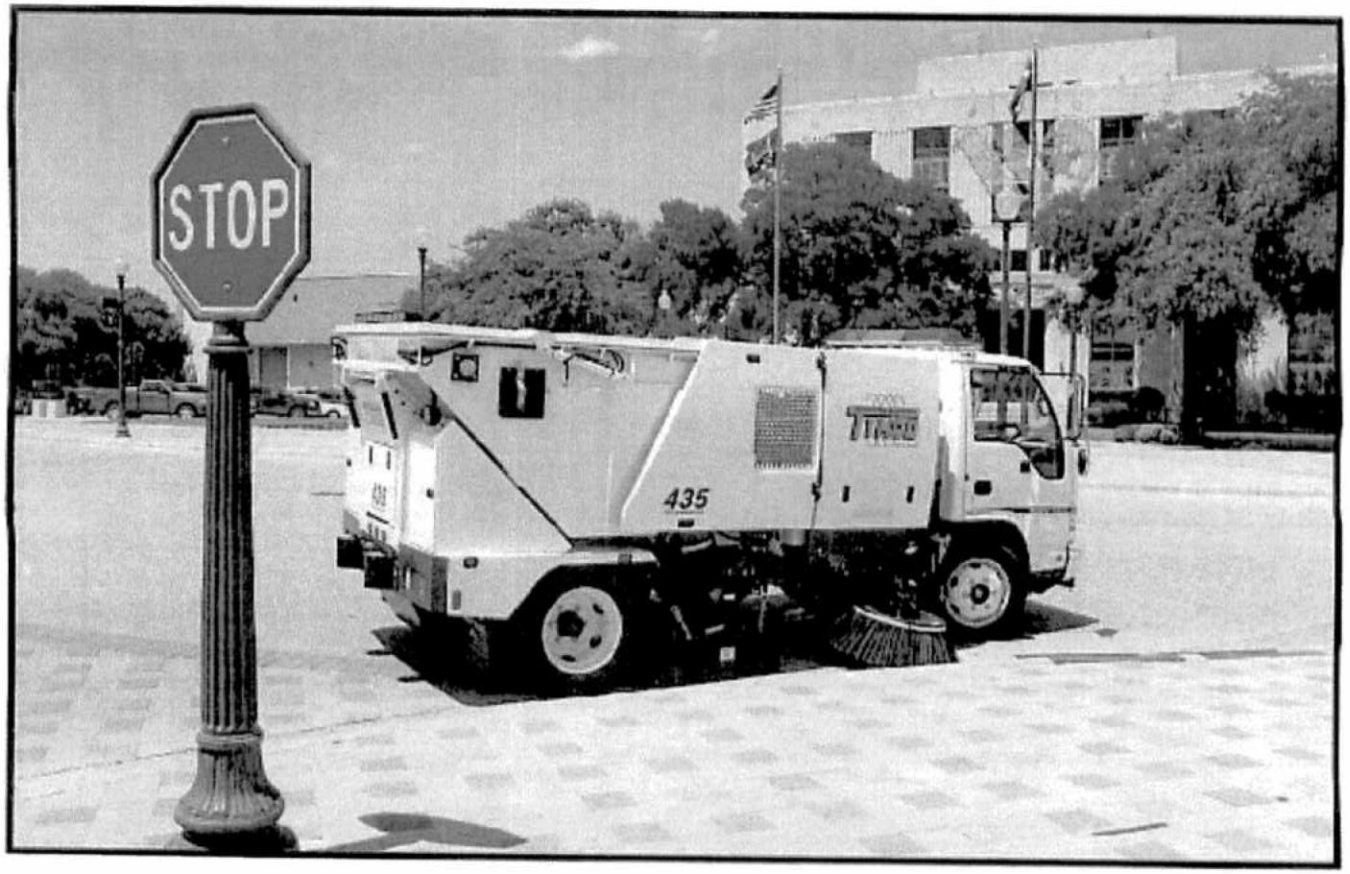
Water Droplet vs. Fog Droplet



Fog Type Dust Suppression at Fly Ash Loading

- Pros
  - Higher Dust Suppression Efficiency
  - Proven Technology
  - Decreased water usage
  - Cold Weather Operation
  - Does not require door enclosures
- Cons
  - Increased maintenance, i.e. - periodic cleaning of system water filters
  - Additional compressed air needed

Typical Regenerative Air Type Street Sweeper



Phase I – Street Sweeper How Does It Work?

- Regenerative Air System Process

1 - Blower

2 - Pick-up Head

3 - Hopper

4 - Dust Separator

Phase I – Street Sweeper Pros and Cons

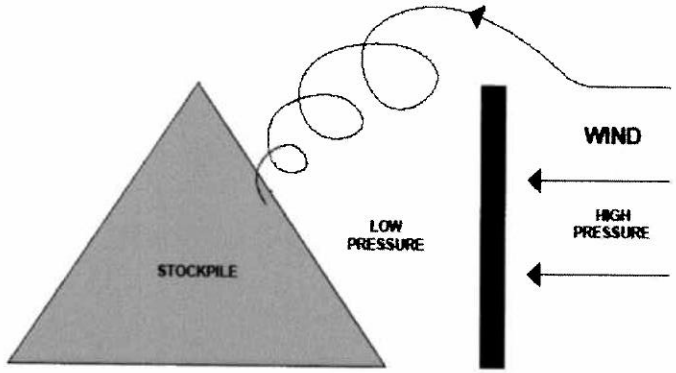
- Street Sweeper

- Pros
  - Closed loop regenerative air system
  - More efficient in cleaning area at ash silos
  - Can be used at any paved surface
  - Operation in wet and dry conditions
  - Added water spray dust control at gutter broom

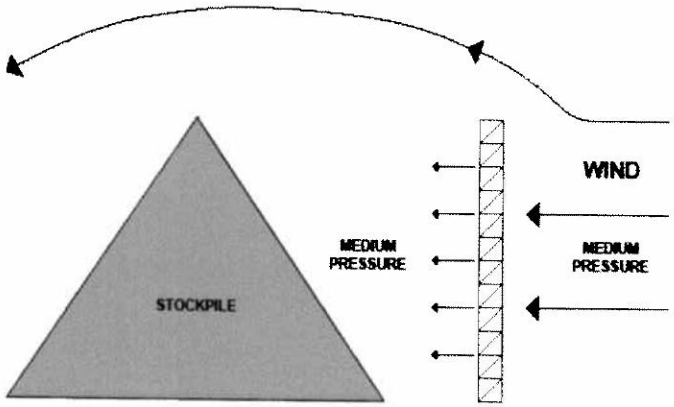
- Cons
  - Require routine maintenance
  - Requires additional operator
  - Sweeper hopper must be emptied on site

How Does It Work ....

- Windscreen 50% porous
- Equalizes pressures on both sides
- Reduces wind speed thus reduces particle uptake
- Windscreen height to be same as pile height to be most effective



AFFECT OF WIND WITH SOLID WALL

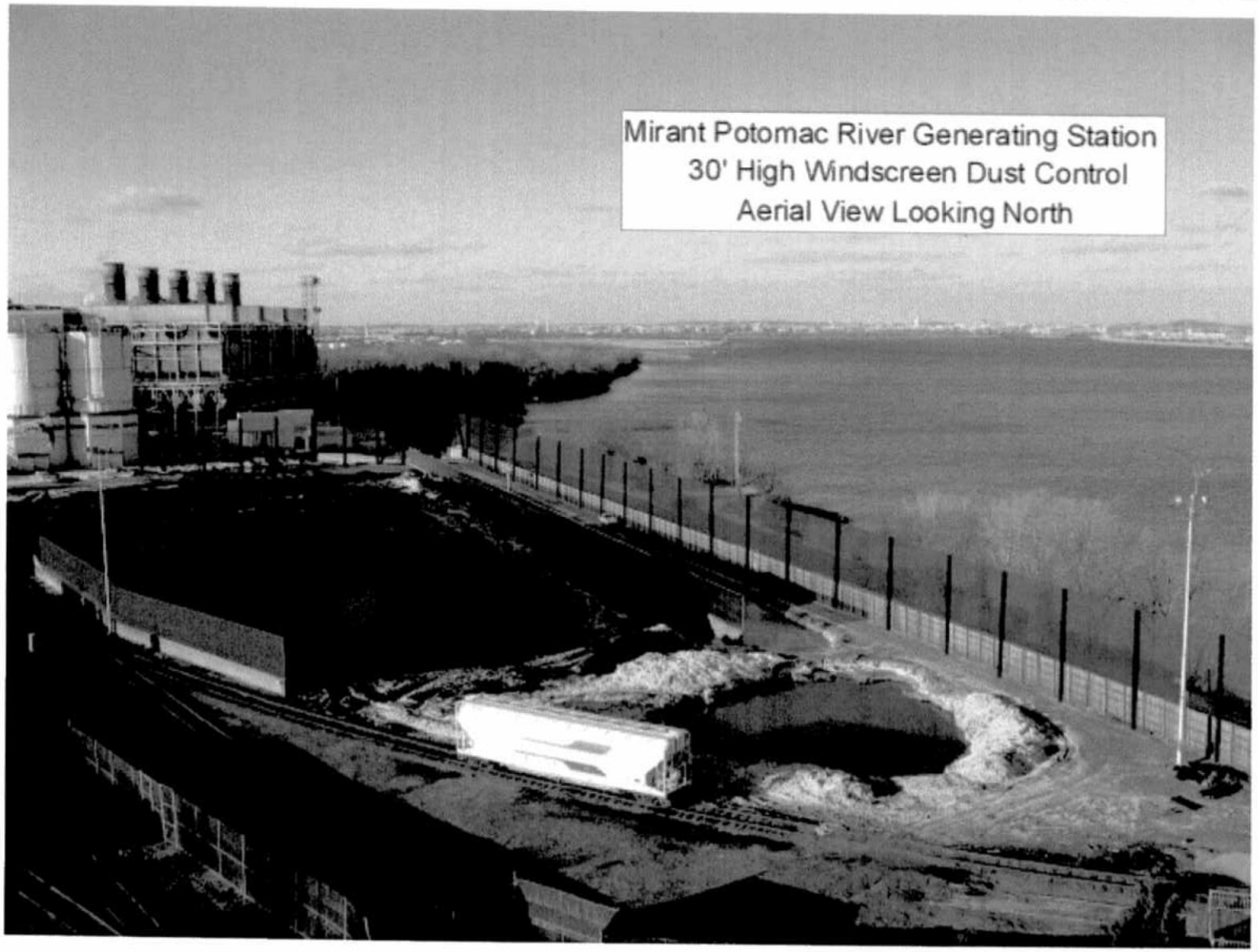


AFFECT OF WIND WITH DSI WIND FENCE

WorleyParsons

resources & energy

Phase I – Windscreen What Is It?



Phase I – Windscreen Pros and Cons

- 30' High Windscreen (North, East and South Sides of Coal Pile)

- Pros
  - Tested Technology around for Years
  - Installations with 20+ years
  - No operation costs
  - Minimal Maintenance

- Cons
  - Should be as high as pile to be most effective
  - Windscreen height remains the same even if pile height is reduced during lower operating months
  - Reduces particle uptake, doesn't eliminate it
  - Visual impacts

WorleyParsons

resources & energy

Phase I – Conveyor Belt Drip Pans What Is It?

Coal Belt Conveyors

- Addition of Drip Pans to Four (4) Conveyors C1, C2, G1 and G2

WorleyParsons

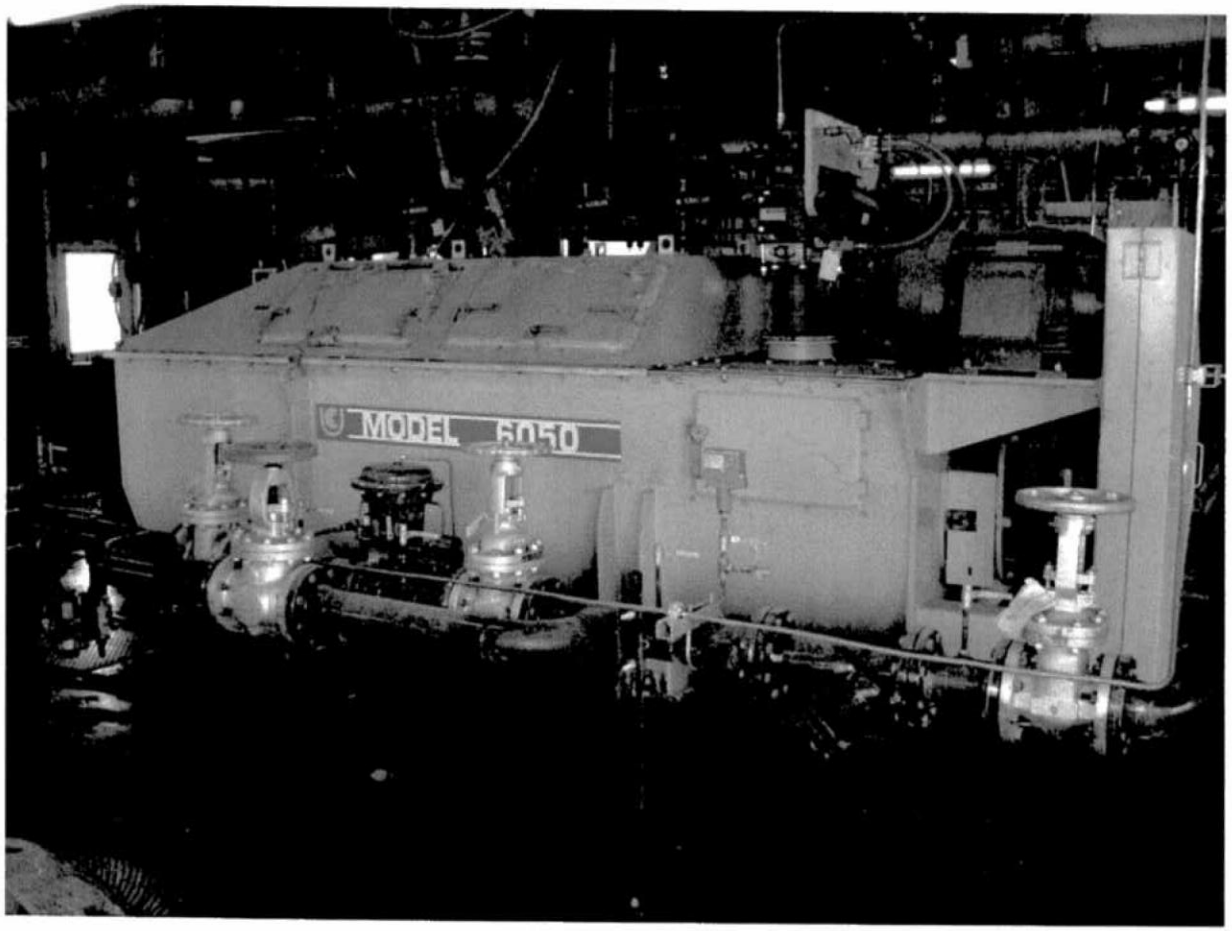
resources & energy

Phase I – Conveyor Belt Drip Pans How Does It Work?

- Section Shown Without Drip Pans

- Drip Pans
  - Catch spillage from falling to ground & being caught by wind
  - Allows spillage to be washed to grade

New Fly Ash Loader



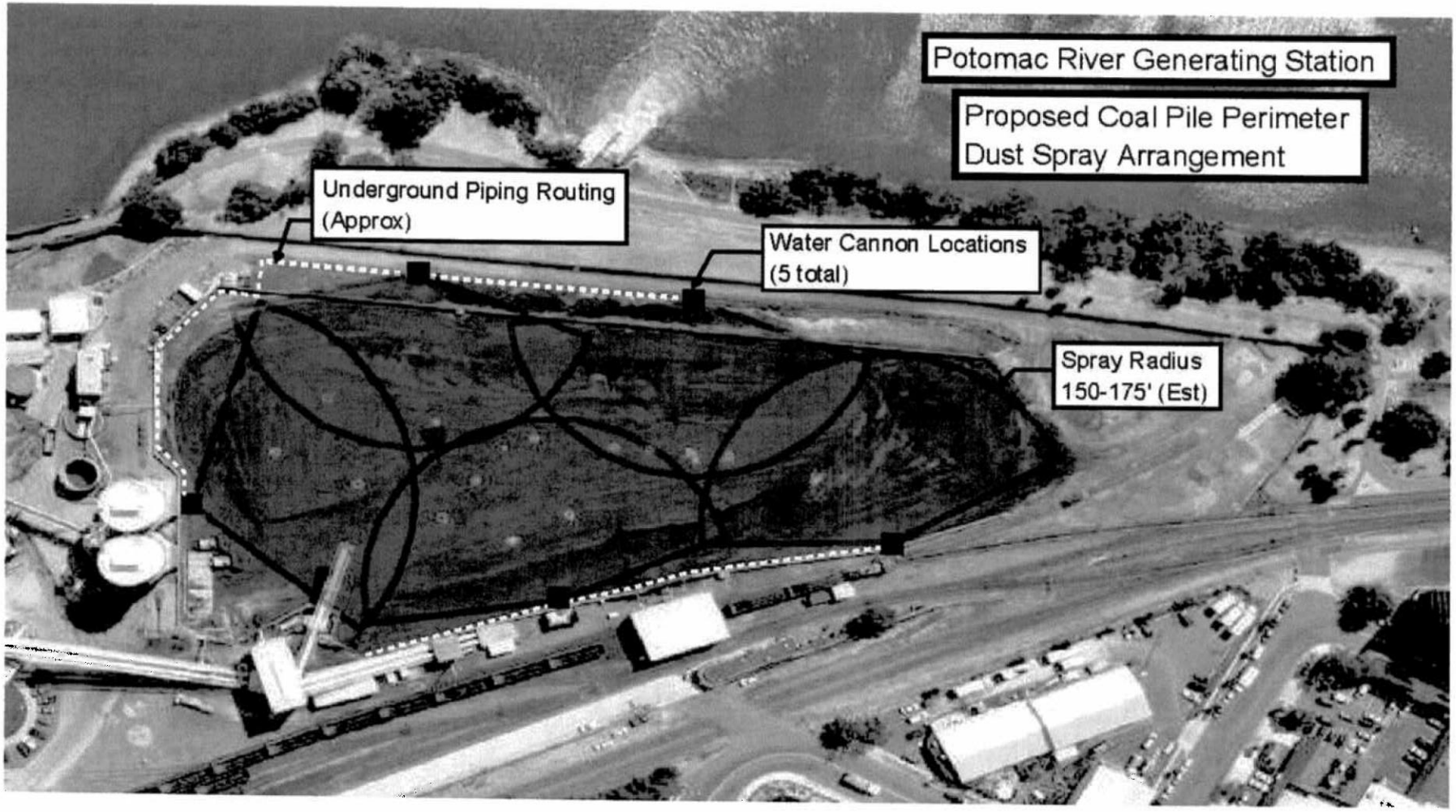
Phase I – New Fly Ash Loader How Does It Work?

- New Fly Ash Loader
  - Two loaders located under each of the two fly ash silos
  - Original three have been replaced; replace fourth with new, more efficient model
  - Loader conditions fly ash with water to form a mixture suitable for transport off-site
  - Inconsistent mixture results in additional fugitive dust emissions during loading

WorleyParsons

resources & energy

Phase I – Coal Pile Perimeter Spray What Is It?



WorleyParsons

resources & energy

Phase I – Coal Pile Perimeter Spray How Does It Work?

- Similar System Water Spray Cannon

WorleyParsons
resources & energy

Phase I – Coal Pile Perimeter Spray How Does It Work?

- Similar Water Spray System in Operation

Phase I – Coal Pile Perimeter Spray Pros and Cons

- Coal Pile Perimeter Dust Spray System
- Pros
  - Similar systems in operation
  - Proven technology
  - Automated to adjust to weather
  - Medium-High Level of Dust Reduction
- Cons
  - Lower Cost Effectiveness (High Cost for Medium-High Dust Reduction)
  - Seasonal usage (freezing spray)
  - Concern with drift from wind
  - High Water Usage (7500+ gallons/day depending on rainfall)
- NOTE: This is not a WorleyParsons recommended option.

WorleyParsons

resources & energy

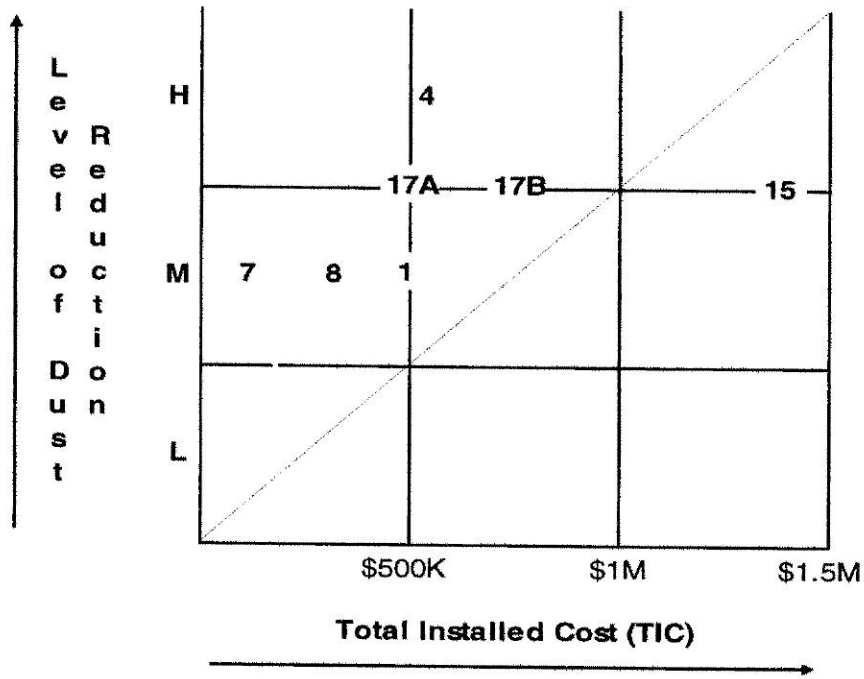
Phase I – Costs vs. Expected Dust Reduction

Dust Control		Total Installed Cost (TIC) +/- 30%	Level of Dust Emissions Reduction
#4	Fog Dust Suppression System	$533,000	High
#7	Street Sweeper	$154,000	Medium
#17A	30' High Windscreen	$541,000	Medium-High
#8	Conveyor Drip Pans	$326,000	Medium
#1	New Fly Ash Loader	$497,000	Medium
#15	Coal Pile Perimeter Spray	$1,400,000	Medium-High

WorleyParsons

resources & energy

Phase I – Matrix of Expected Dust Reduction vs. Costs



Note: The closer the dust control is to the upper left hand corner of the matrix; the more cost effective the control.

WorleyParsons

resources & energy

Phase I – Next Steps

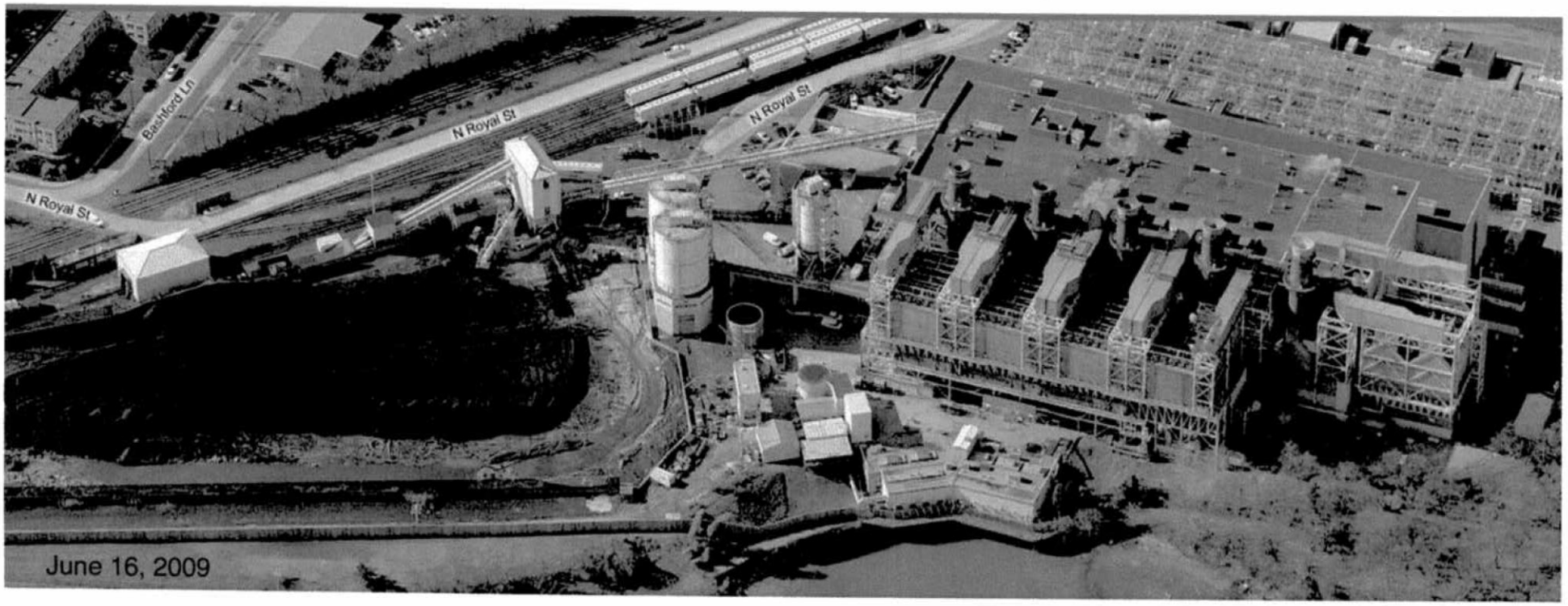
- City to select the options for implementation in consultation with the project team
- Preparation of bid packages
- Selection of supplier(s)
- Implementation

WorleyParsons

resources & energy

Prepared for

Phase II Summary



WorleyParsons

resources & energy

Phase II - Objectives

- Engineering Study to evaluate:
  - (a) Installing baghouse or other technologies in the current housings for the hot- and/or cold-side precipitators,
  - (b) Improving performance and reliability of existing hot- and/or cold-side precipitators, and
  - (c) Other commercially available technologies identified by the Engineer that may be applied in any location of the Facility

- To result in:

  Capital improvements at the Facility intended to lessen the Facility's impact on ambient air quality consistent with and fully protective of the NAAQS by reducing the PM2.5 emissions from each of the five (5) units (C1, C2, C3, C4 and C5) at the Facility.

WorleyParsons

resources & energy

Phase II - Schedule

- Phase II Preliminary Report - July 2009
- Phase II Preliminary Report Reviews by the City, Mirant, and DEQ – Up to 45 days
- Phase II Report Finalization – Up to 60 days
- Phase II Preferred Technology Selection
- Phase II Board and DEQ Approval
- Bid Package Preparation for firm, fixed price EPC bid with emission rate guarantees
- EPC Contractor Selection
- Contract Execution Phase