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85M102006D

Two Projects, One City, One Solution: S/S

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Stabilization/Solidification

- Protects human health and the environment by immobilizing hazardous constituents within treated material
- Accomplished by both chemical and physical changes to treated material
- Applicable to large variety of hazardous constituents in many different forms of waste and contaminated media

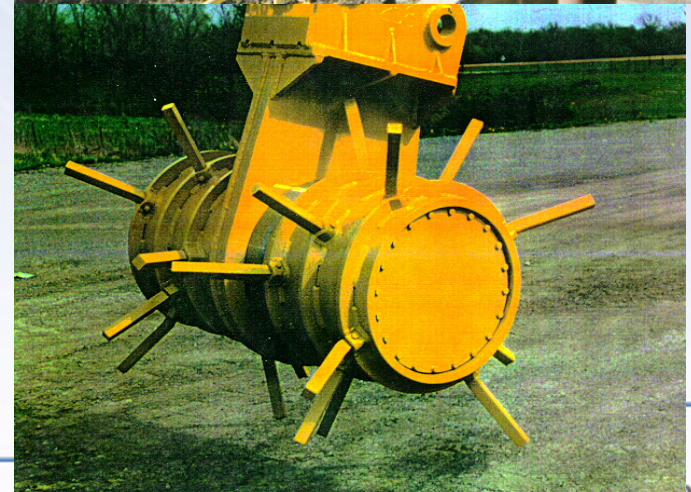
S/S of Metals

- Alkaline, phosphate, and sulfide-based reagents produce geologically stable, naturally occurring mineral phases of low solubility
- Can adjust the oxidation state of metals (especially arsenic and chromium) to assist in their immobilization



S/S of Organics

- S/S reactions which alter the organic contaminants
 - Hydrolysis
 - Oxidation
 - Reduction
 - Compound Formation
- S/S physical processes which immobilize the organic contaminants
 - Adsorption
 - Encapsulation



S/S Application

- Ex-situ or in-situ
- Large capacity, construction equipment



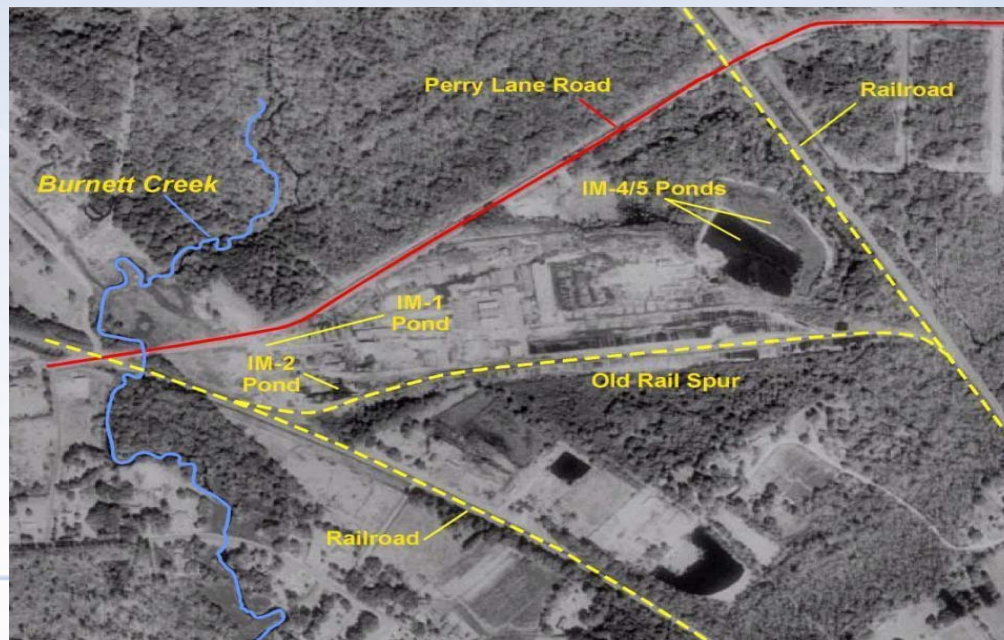
City of Brunswick, GA

- Two NPL sites
 - Brunswick Wood Preserving
 - Hercules 009 Landfill
- Differing contaminants, differing conditions
- One need, immobilize contaminants to minimize threat to human health and environment and redevelop site
- Solution = S/S



Brunswick Wood Preserving (BWP) Site

- 34 hectare former wood treating facility operated from 1958 to 1991
- Creosote, pentachlorophenol, and chromium/copper/arsenate utilized
- COCs are PAHs, PCP, dioxins, Cu, Cr, As



Final BWP Remedy

- Prior site activities removed structures and disposed of heavily contaminated sludges off-site
- Significant contamination (sediment, soil, and groundwater) remains on-site
- Slurry walls around and caps over two former creosote pond areas
- Placement of 57,000 m³ of S/S-treated contaminated soils and sludges as part of the subcap
- Groundwater treatment with ISCO



Implementation of S/S at BWP

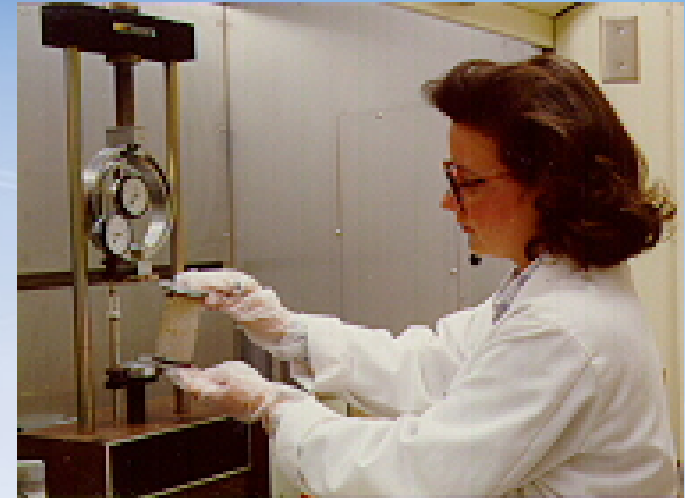
- Material excavated, and stockpiled
- Stockpiled material was blended and mixed with 10% fly ash
- Blended material fed into a pugmill and mixed with 10% Portland cement and water
- Treated material placed and compacted within slurry wall footprint



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Performance Verification at BWP

- Criteria
 - UCS >0.70 MPa
 - Hydraulic conductivities of <math><1 \times 10^{-6}</math> cm/sec
 - No increased leaching of contaminants in SPLP
- UCS tests on every 400 m³ treated and permeability and leachability tests on every 800 m³ treated
- Verification testing indicated S/S treatment was successful



BWP Site Redevelopment

- S/S treatment technology in the remedy contributes to the future redevelopment options of the property
 - The cement-treated subcaps will support the replacement of a former rail spur across the western wall/cap
 - The cement-treated subcaps of the eastern wall/cap will accommodate a potential concrete parking area



Hercules 009 Landfill

- Located on 6.7 hectares
- Property was used as a borrow pit during construction of Georgia State Highway 25
- Hercules Incorporated was issued a permit in 1975 to use the northern end of the site, known as the 009 Landfill, to dispose of toxaphene production wastes

Hercules 009 Landfill

- 009 Landfill was comprised of six cells divided by subsurface berms
 - reportedly lined with a soil-bentonite clay mixture across the bottom and along the bermed walls



Landfill 009 Remedy

- Content of the landfill cells were treated by S/S *in situ*.
- Contaminated soil taken from areas surrounding the landfill were treated on site and reused to form the landfill cap
- Site was regraded and revegetated



Implementation of S/S at 009 Landfill

- Cells were divided into 25 by 25-ft (7.6 by 7.6-m) subcells for treatment
- 15% Portland cement by weight was added to the subcell along with water and mixed
- Treatment depths extended below the bottom of the landfill into the regional groundwater table.



Implementation of S/S at 009 Landfill

- Soils from surrounding areas and residences with >0.25 mg/kg toxaphene were placed on the landfill in 1-2 ft lifts
- 25 by 50-ft (7.6 by 15-m) subcells for treatment
- 15% Portland cement by weight was added to the subcell along with water and mixed



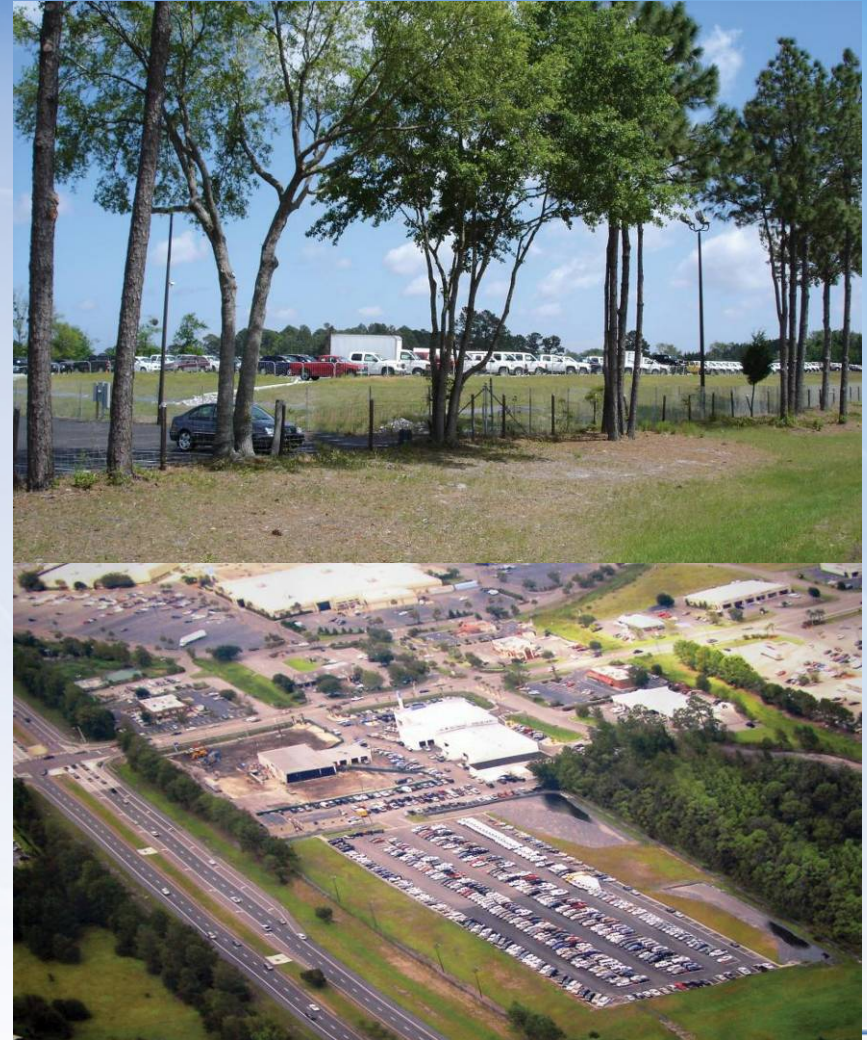
Performance Verification at 009 Landfill

- Criteria
 - UCS >0.34 MPa
 - TCLP <0.5 mg/L toxaphene
- Samples from 1/3 and 2/3 treatment depth obtained and tested from each subcell
 - Pocket penetrometer readings used in place of UCS
- Verification testing indicated all of the 67,000 m³ was successfully treated by S/S



Redevelopment of Hercules 009 Landfill

- Selected fill from a nearby borrow area was brought in and area rough graded and revegetated
- Site was redeveloped into a car dealership
- Former Landfill 009 area was paved over and serves as a car lot



Conclusions

- Two different sites
 - Different contaminants
 - Different site conditions
- Similar goal of containing contaminants and redeveloping the site
- S/S allows both goals to be met

Questions?

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