The Shaw Group Inc. ®
Two Projects, One City, One Solution: S/S

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LEHP, QEP, LEED AP
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 m$^3$ 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
Performance Verification at BWP

• Criteria
  – UCS >0.70 MPa
  – Hydraulic conductivities of <1x10-6 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 $>0.25 \text{ mg/kg toxaphene}$ 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?