Sustainable Choices Are Everywhere!

Todd Kafka, PG

Florida Environmental Permitting Conference

July 23, 2014

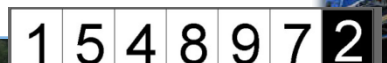
Geosyntec consultants

Outline

- Green and sustainable remediation background and considerations
- Opportunities for sustainable practices and examples
  - Site Assessment
  - Remedial Design and implementation
  - Remedy optimization

Geosyntec consultants

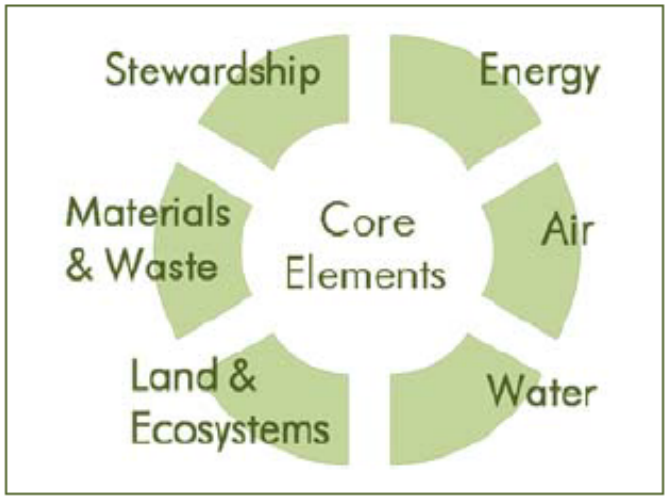
Remediation can be a Dirty Job!



Geosyntec consultants

EPA's "Green Remediation"

- EPA Green Remediation 2010
  - "The practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions"
- Examples
  - Conserve natural resources
  - Reduce, reuse and recycle material
  - Minimize energy use, waste generation
  - Use renewable energy
  - Reduce air emissions
  - Water re-use and minimize consumption
  - Minimize habitat disturbance
  - Insitu better than invasive



Geosyntec consultants

Background

Increased interest in sustainability in all aspects of business

- Many companies have appointed Chief Sustainability Officers – power sector, mfg, universities
- Common to see "sustainability", "green" in mission statements
- Advancement from "program" or "initiative" to core operation

Geosyntec consultants

Guidance Available

- EPA and CLU-IN (www.clu-in.org) under green remediation
- Webinars via ITRC and others

Geosyntec consultants

Considerations for Sustainable & Green Practices

- What is motivation?
- Who are stakeholders?
- Is there a desired or pre-ordained outcome?
- Can sustainable practices be implemented step-wise?
- Are there BMPs in place? Can they be optimized?

Geosyntec consultants

Opportunities During Project Progression

1. • Site Assessment
2. • Remedial Design/Implementation
3. • Optimization
   • Long-Term Monitoring

Geosyntec consultants

Site Assessment

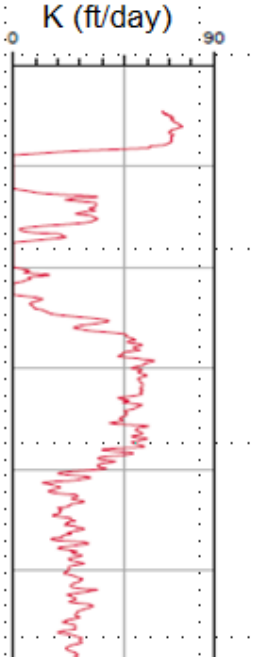
- ITRC's Triad Approach – incorporate sustainable practices in work strategies via
  - Systematic planning
  - Dynamic work strategies
  - Real-time data acquisition

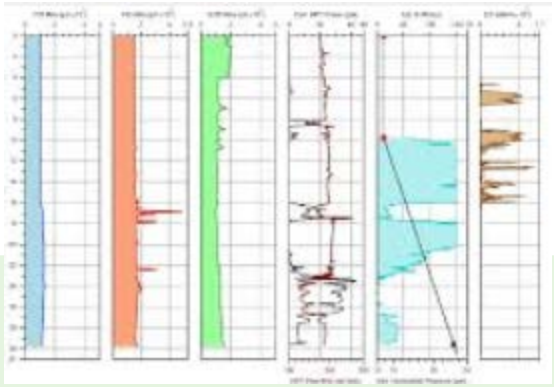
- 2008 EPA (OSWER, EPA 542-R-08-002)
  - Waste minimization & IDW mgmt
  - Incorporate practices that rely on re-use/recycling
  - Equipment with low environmental impacts
  - Geophysical tools to reduce invasive work

Geosyntec consultants

Site Assessment Tools

- Direct push technology
  - Less IDW
  - Low energy
  - Shorter field durations
- Innovative real-time sensor technology
  - laser induced fluorescence
  - cone penetrometer testing
  - membrane interface probe
  - hydraulic profiling tool





Geosyntec consultants

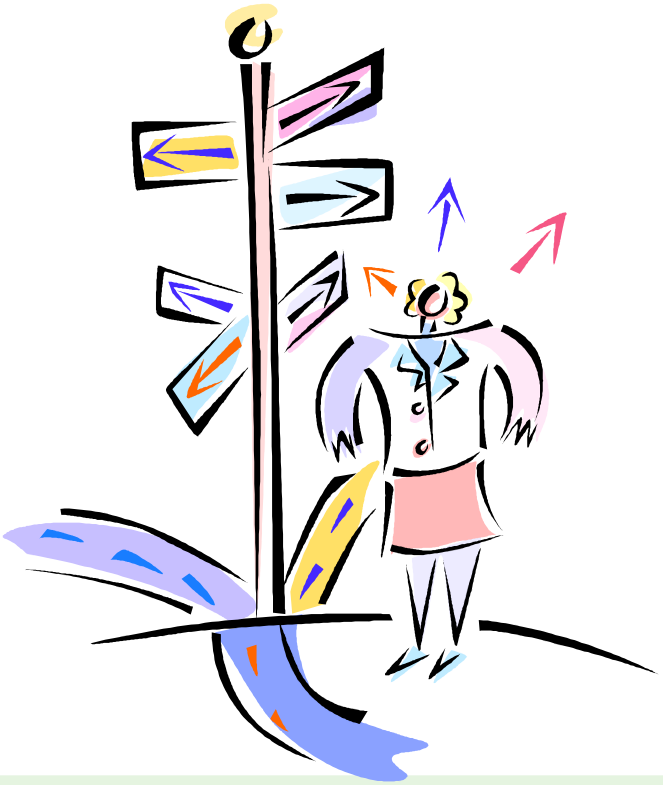
Site Assessment Tools

- Geophysics – GPR, EM, surface resistivity, seismic reflection & refraction
- Screening tools
  - XRF for metals in lieu of sample
  - Color-TEC groundwater sampler
  - Immunoassay kits
  - Organic vapor analyzers
- Passive sampling – PDBs, hydrasleeves, snap samplers, soil gas samplers

Geosyntec consultants

Site Assessment Take-Home

- **There are LOTS of opportunities for adopting sustainable practices!**



Geosyntec consultants

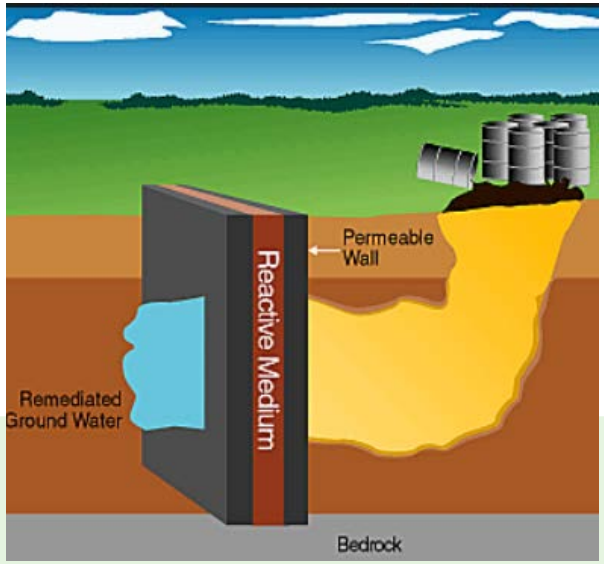
Remedial Design – Passive Remedies

- Less energy intensive and environmentally disruptive than active remedies
- Rely on groundwater moving to treatment zone.
  - Insitu bioremediation – microbial reactions to transform contaminants to benign products
  - Insitu chemical oxidation – mass destruction via chemical injection

Geosyntec consultants

More Passive Remedies

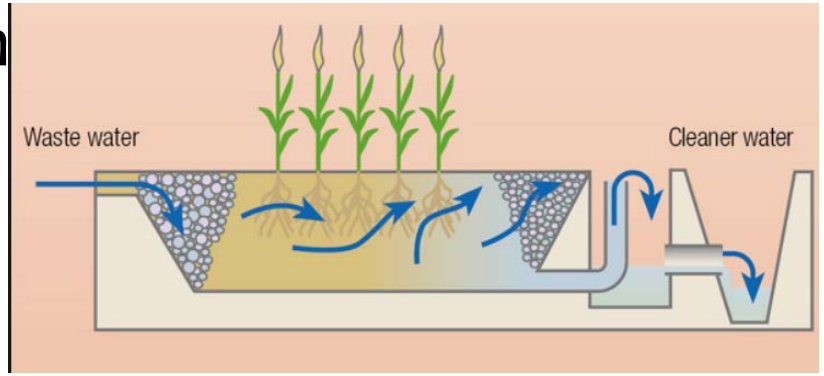
- Phytoremediation – root uptake, transpiration, biomass, minimal O&M
- Reactive barrier walls – groundwater flow through reactive treatment zone in subsurface
- Monitored natural attenuation
- Sub-slab venting or passive vapor mitigation



Geosyntec consultants

Constructed Wetlands

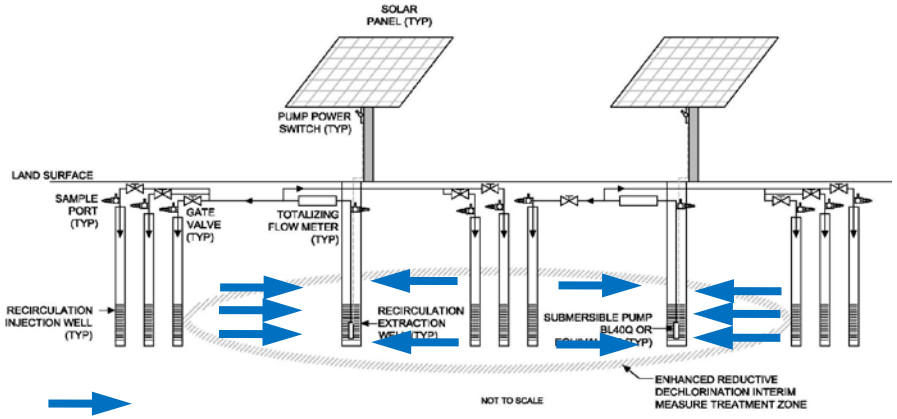
- Mimics natural wetland system - no chemical treatment
- Stormwater/wastewater flows through at low velocity
- Bioretention
  - Metals
  - BOD
- Viewshed & greenspace
- Biodiversity



Geosyntec consultants

Alternate Energy Sources

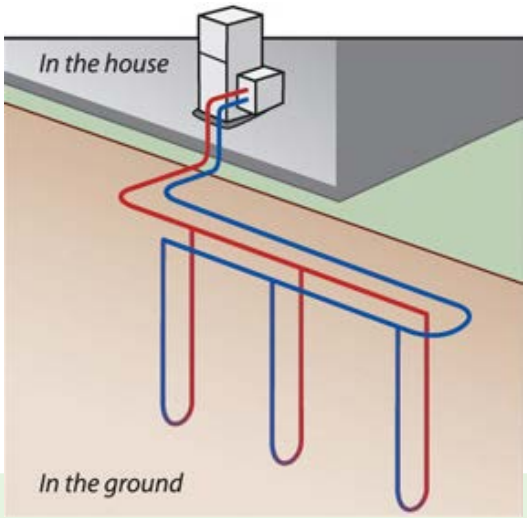
- Solar powered for low energy demands
  - free product recovery/belt skimmers
  - recirculation systems
- Wind - passive soil venting, sub-slab vapor mitigation

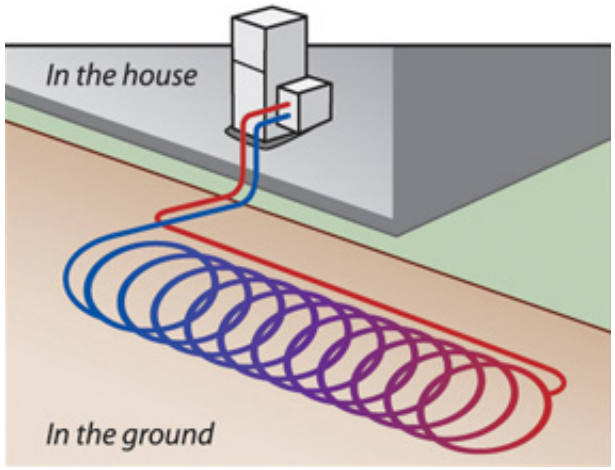


Geosyntec consultants

Alternate Energy Sources

- Geothermal
  - Provide alternative means of cooling for equipment
  - 150-200 ft per ton of cooling

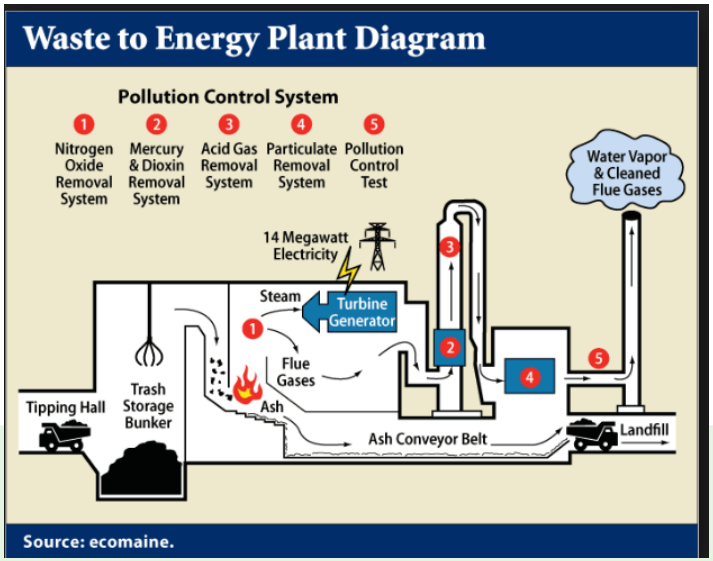




Geosyntec consultants

Effluent Considerations

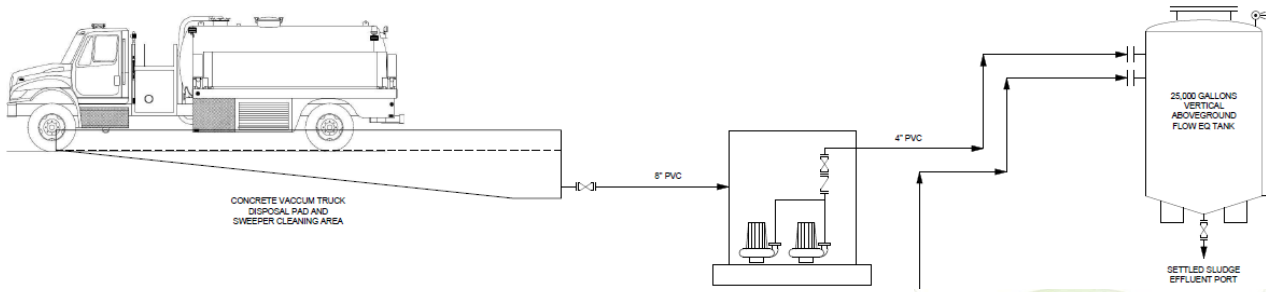
- Reuse of treatment effluent
  - Recirculation systems – liquid or vapor
  - Reclaimed water, irrigation
  - Process water
  - Waste to energy (landfill gas)



Geosyntec consultants

Solid Waste Considerations

- Reuse of solid waste
  - Recycled asphalt millings for temporary cover of contaminated soils
  - Street sweepings – asphalt and concrete, roadbase, medians
  - Re-use of concrete rubble for shore stabilization



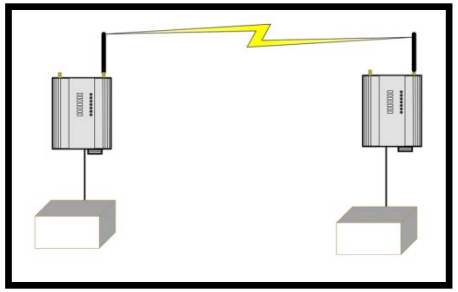
Geosyntec consultants

Excavation -Transportation

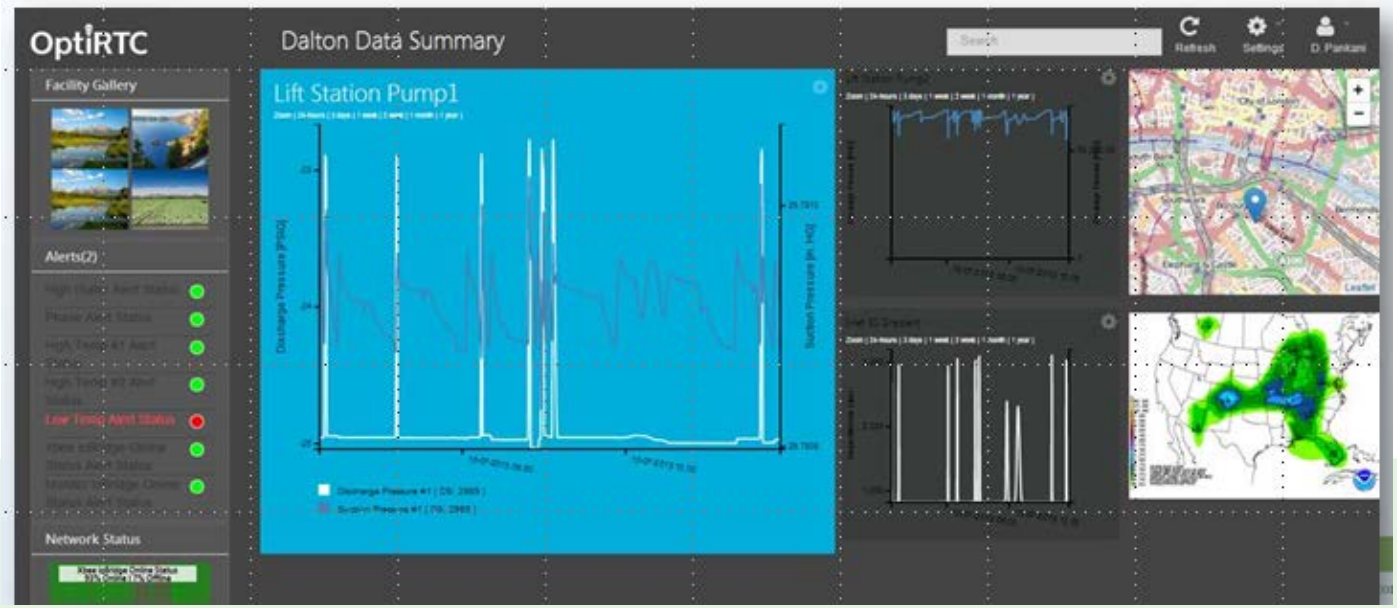
- Onsite landfill and treatment
- No idling of trucks
- Efficient route-planning
- Stockpiling and sequencing of backfill delivery – fewer round trips

Geosyntec consultants

Remote Monitoring



- Reduces man power
- Varying degrees of data collection
- Improves reaction time → performance
- Low energy demands (solar)



Geosyntec consultants

O&M/Long-Term Monitoring

- Preventive maintenance
- Retrofit with more efficient components (submersible pumps, transfer pumps, variable frequency drives, cycling opportunities, blowers, etc.)
- Passive sampling techniques
- Waste minimization

Geosyntec consultants

Remedy Optimization

- Reasonable vs. expected performance
- Means to reduce energy & environmental footprints?
- Focused feasibility studies or remedial system evaluation for aging or poorly performing remedies
  - Re-visit CSM - unresolved sources/source areas?
  - New technologies
  - Updated objectives (time & $ spent)
  - Adjust ARARs
  - Employ GSR Metrics – tip the balance?

Geosyntec consultants

Remedy Optimization

- Updated risk assessment and institutional controls
- Optimization tools – MAROS, non-parametric statistics
  - Reduce monitoring frequency but preserve integrity
  - Remove redundancies in locations
  - Reduce parameters
  - Preserve site management objectives

Geosyntec consultants

Conclusions

- Sustainable and green practices can be made at multiple junctures throughout a project.
- Continued evaluation of remedy objectives, performance, and optimization are critical processes that can lead to sustainable choices, cost savings over the long run, and more site cleanups.

Geosyntec consultants

Thank You!

Questions/Comments?

Todd Kafka, PG

Geosyntec Consultants - Tampa

813-379-4396 (office)

tkafka@geosyntec.com

Geosyntec consultants