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Driving the Square Peg into the Round Hole: Redevelopment and Regulatory Closure of Former Agricultural Land and Golf Courses

Background Considerations and Site Assessment Challenges

Matthew Wissler, PG

25 April 2022

Objectives

- How do background conditions (natural and anthropogenic) fit into the assessment and redevelopment?
- What happens when levels of complexity are added?
- How can we address these challenges?

Per 62-780, FAC:

"Background concentrations" means concentrations of contaminants that are naturally occurring or resulting from anthropogenic impacts unrelated to the discharge of pollutants or hazardous substances at a contaminated site undergoing site rehabilitation, in the groundwater, surface water, soil, or sediment in the vicinity of the site.

Historical Land Use and Anthropogenic Background

- Demand for development driving redevelopment of non-typical land parcels
- Agricultural and Golf Courses land have history of historical application of herbicides/pesticides per label instructions (not a release)
- Redevelopment of Agricultural/Golf Course to Residential

Source: http://nysgolfbmp.cals.cornell.edu/pesticide-application/

Source: https://sfyl.ifas.ufl.edu/miami-dade/agriculture/pesticide-applicator-training/

Historical Land Use and Anthropogenic Background

What are the challenges/questions?

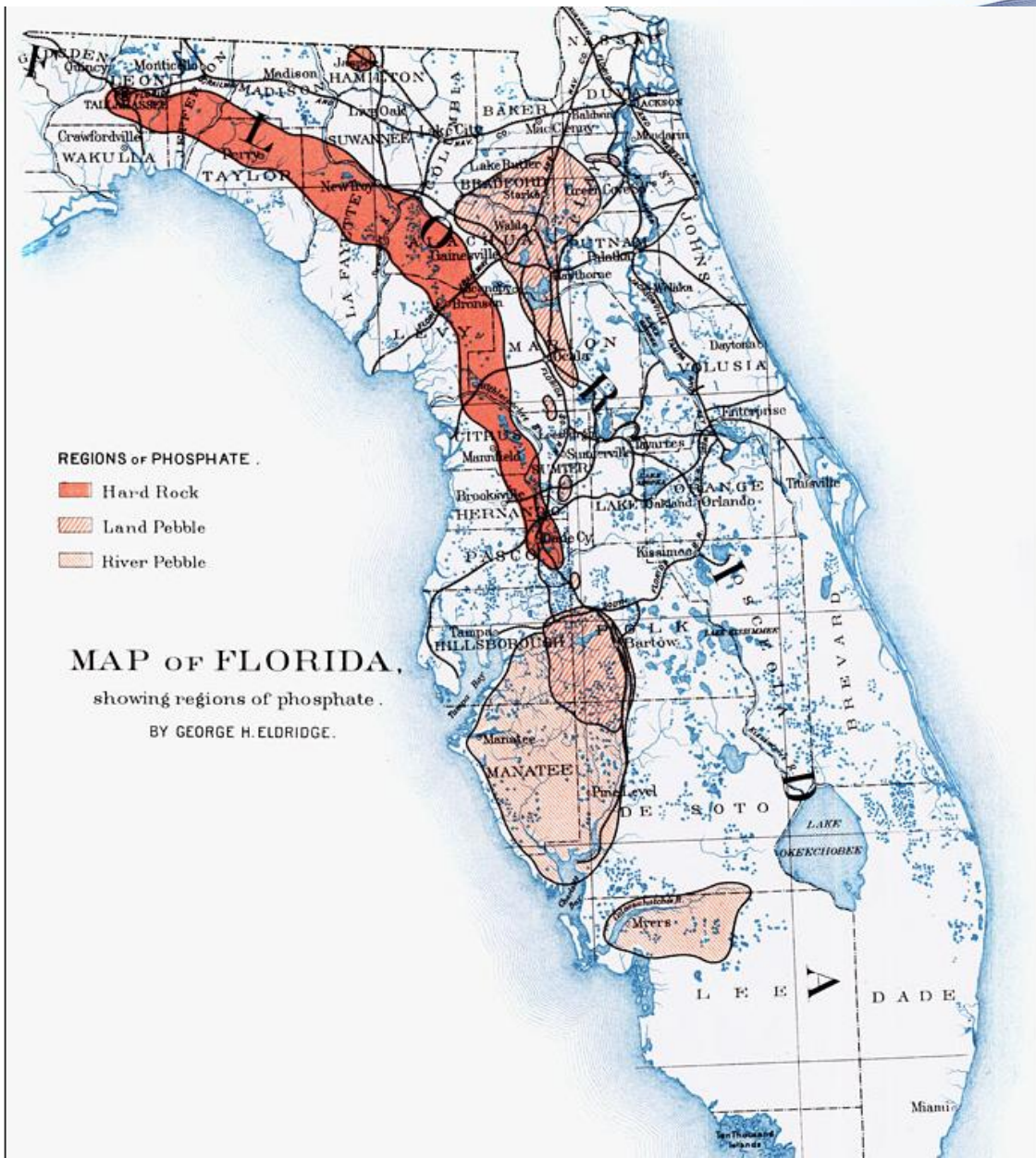
- Difficulty with the delineation of media within subject site to default cleanup target levels (If subject site is a portion of a larger parcel).
- Resolving other contributing sources
- Identification of areas where use of agro-chemicals were mixed and where a release of agro-chemicals may have occurred (release since not applied by label instructions)
- What topographical and/or drainage improvements have been made to the property? Were canals excavated to encourage drainage? Were areas built up for tees and greens?

Important resources to review before you begin your investigation:

- Review historical aerials and topographical maps
- Review lithologic logs (Geologic Survey)
- Review well completion logs (WMDs)
- Review regional water quality data (FDEP)

Background Phosphatic Soils and Natural Background

- Phosphatic soils are common in Florida
- Sourced from the Bone Valley and Peace River Formations
- Natural source of arsenic, other metals and low level rads



Background Phosphatic Soils and Natural Background

```
  0.   -   30.   090UDSC   UNDIFFERENTIATED SAND AND CLAY
 30.   -  470.   122ARCA   ARCADIA FM.
470.   -     .   123SWNN   SUWANNEE LIMESTONE

  0  -   10    SHELL HASH, PHOSPHORITE GRAVEL, VC SAND.

 10  -   20    SHELL HASH, PHOSPHORITE GRAVEL, VC SAND.

 20  -   30   LIMESTONE; MODERATE LIGHT GRAY
               1% POROSITY: MOLDIC, PIN POINT VUGS
              GRAIN TYPE: CALCILUTITE;  1% ALLOCHEMICAL CONSTITUENTS
              GOOD INDURATION
              CEMENT TYPE(S): CALCILUTITE MATRIX
              SEDIMENTARY STRUCTURES: BEDDED
              ACCESSORY MINERALS: QUARTZ SAND- 3%, PHOSPHATIC GRAVEL- 1%
              FOSSILS: CRUSTACEA, PLANT REMAINS
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  0  -   10   SAND; VERY LIGHT ORANGE TO LIGHT BROWN
              30% POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY
              GRAIN SIZE: FINE; RANGE: FINE TO COARSE
              ROUNDNESS: SUB-ANGULAR TO ROUNDED; LOW SPHERICITY
              UNCONSOLIDATED
              ACCESSORY MINERALS: SHELL-05%, IRON STAIN-%

 10  -   20   SHELL BED; WHITE TO MODERATE LIGHT GRAY
              25% POROSITY: POSSIBLY HIGH PERMEABILITY; UNCONSOLIDATED
              ACCESSORY MINERALS: CALCILUTITE-15%  PHOSPHATIC SAND-05%
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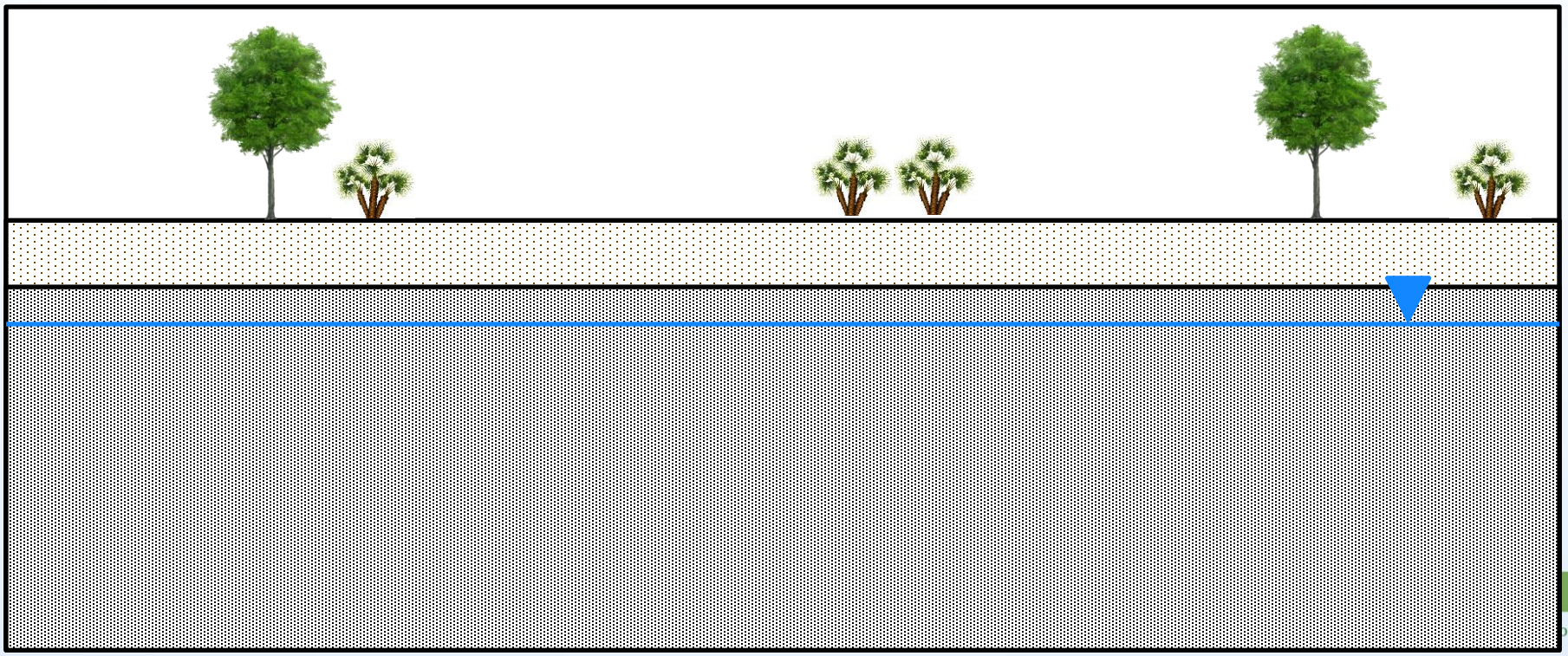

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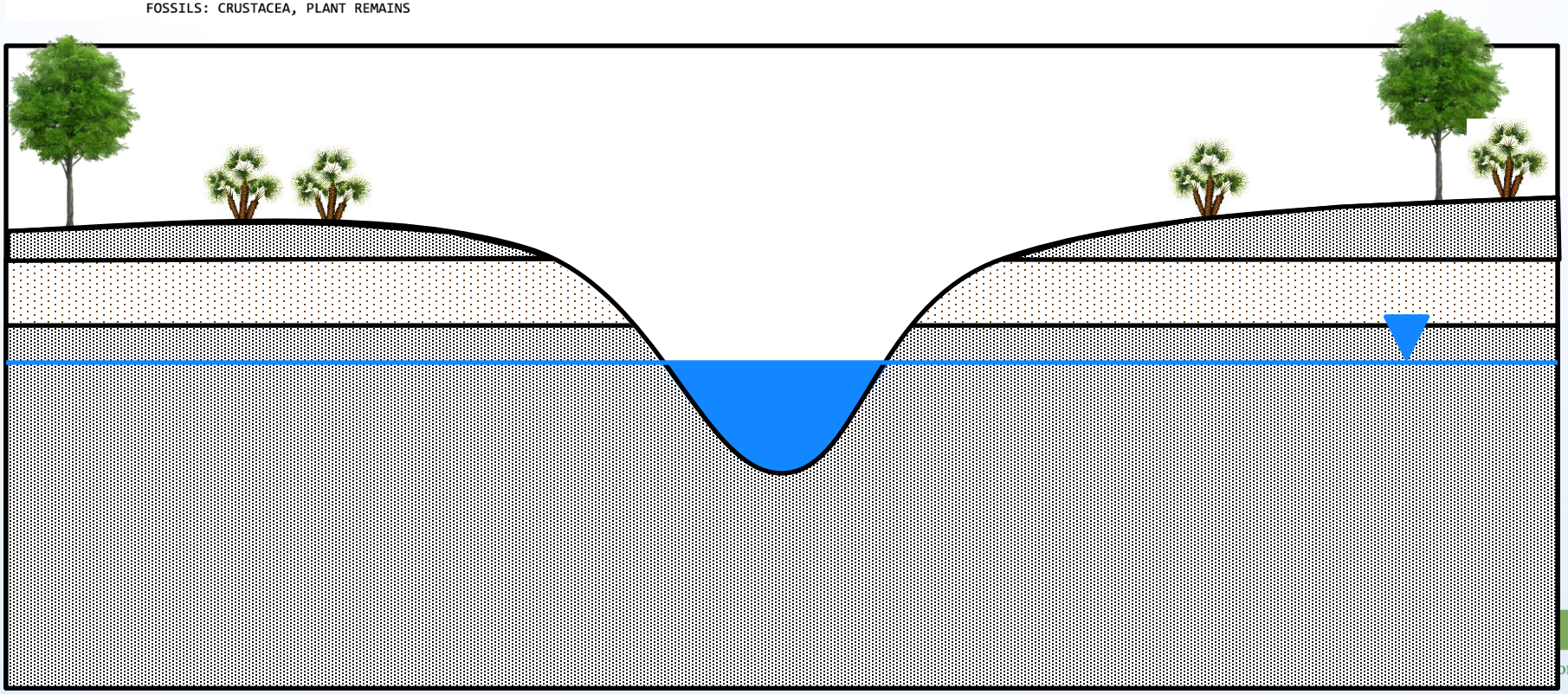

Innovative Site Assessment Techniques

- X-Ray Fluorescence (XRF) Meters
  - Approved for use by FDEP (62-780.600(5)(f))
  - Field screening for numerous metals and elements (As, Cr, Pb and others)
  - Allows for rapid screening during assessment and support of remediation activities
  - Laboratory samples collected to develop correlation with XRF data.

- Incremental Sampling Methodology (ISM)
  - Approved for use by FDEP
  - Composite sampling by pooling many soil increments from a designated volume of soil or decision unit (DU)
  - Designed to reduce data variability attributable to soil heterogeneity

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Assessment Challenges: Nugget Effect

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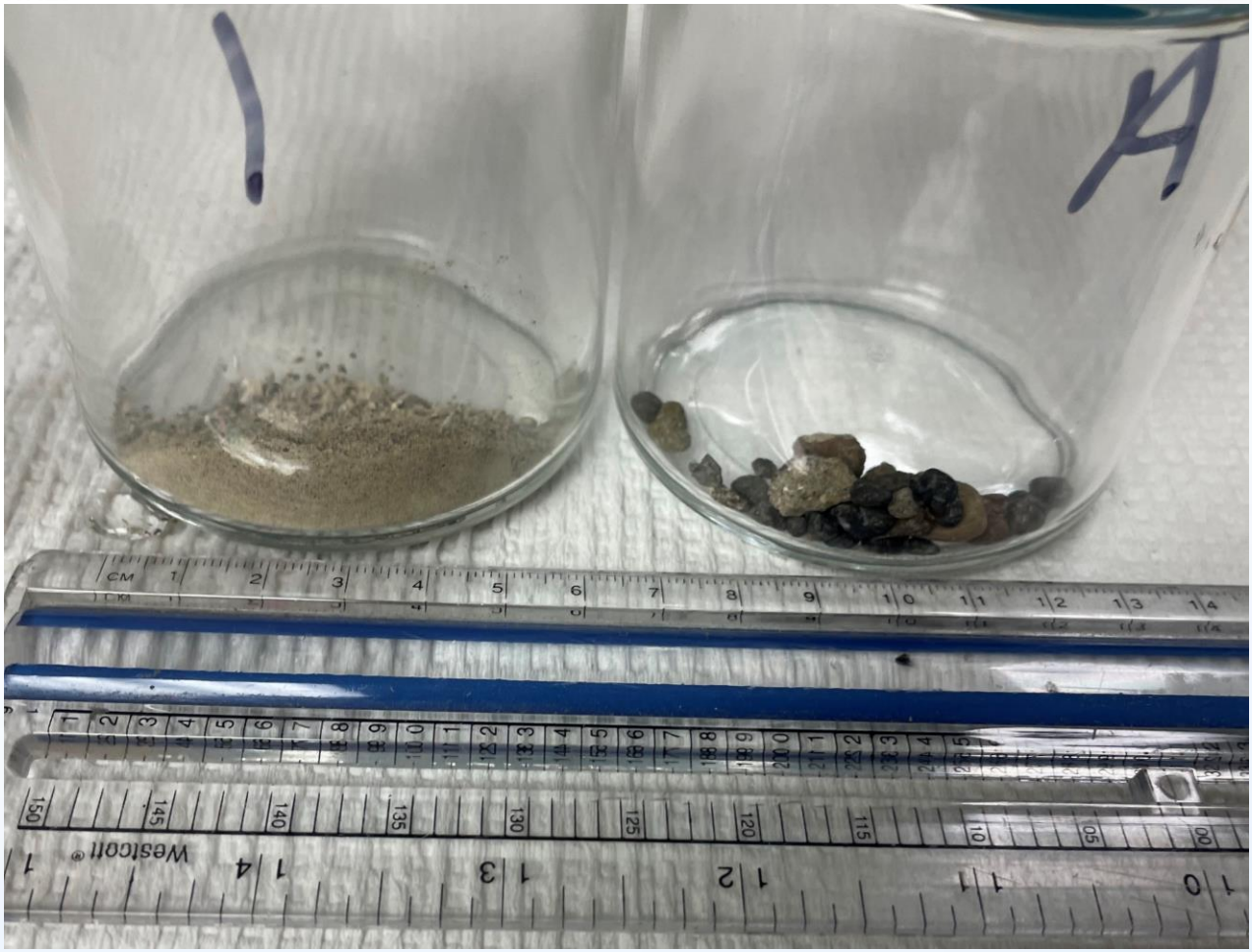
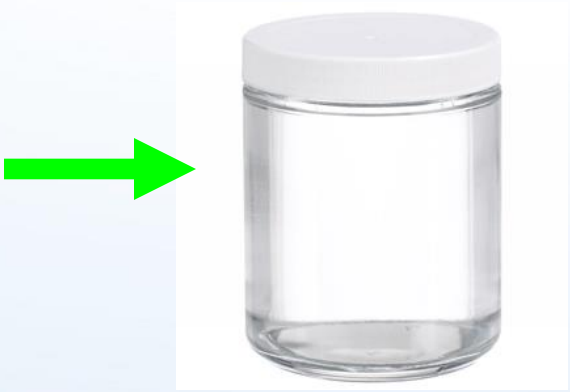
- XRF analysis of phosphatic pebbles show arsenic concentrations up to 30 ppm.



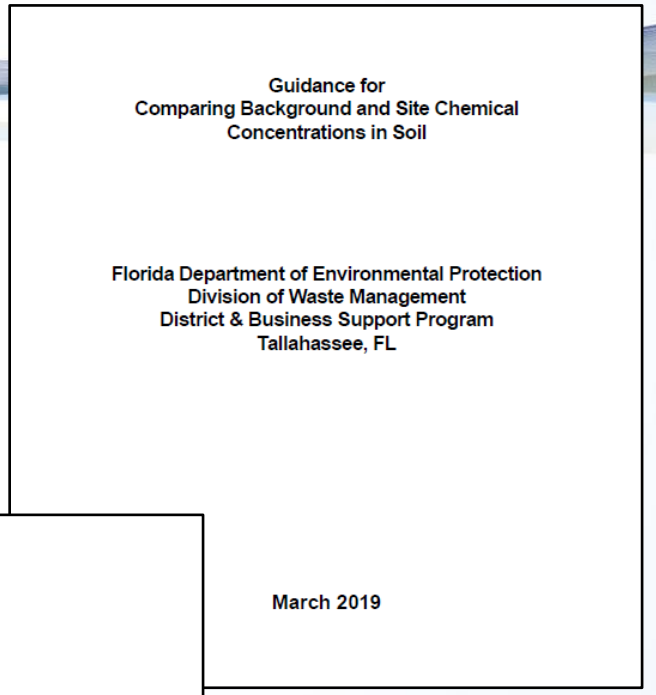
Assessment Challenges: Nugget Effect

- Analytical samples consist of composite of sampling interval in 6-ounce glass jar.
- Laboratory selects 1 gram (volume of a penny) from 6-ounce jar for analysis
- Method for sample preparation (EPA 3050) indicate particles larger than 2 millimeters (no. 10 sieve) be removed prior to digestion (many labs do not)



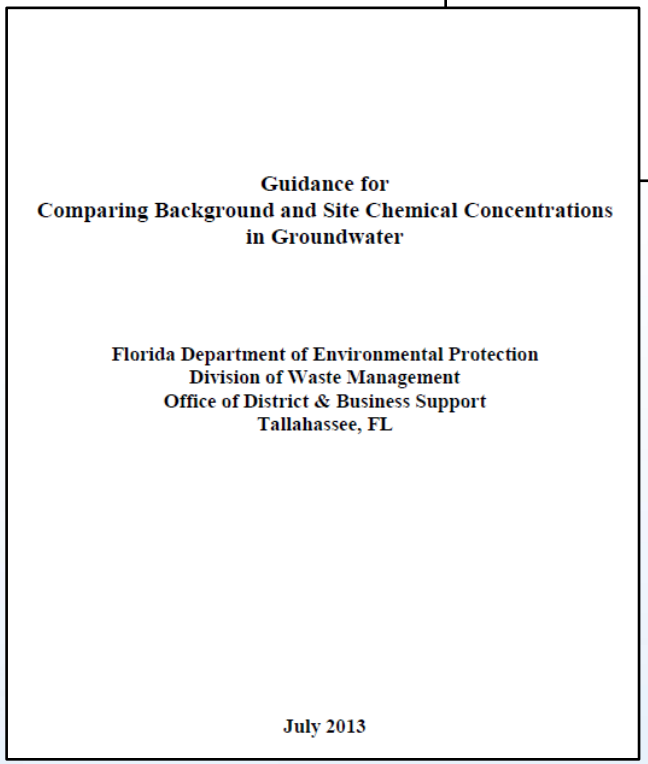
Background Studies

- Identification of existing background studies
- Scoping and Implementation of Defensible Background Studies
- Background Studies for Soil:
  - FDEP, 2019 Guidance
- Background Studies for Groundwater:
  - FDEP, 2013 Guidance


Guidance for
Comparing Background and Site Chemical
Concentrations in Soil

Florida Department of Environmental Protection
Division of Waste Management
District & Business Support Program
Tallahassee, FL

March 2019


Guidance for
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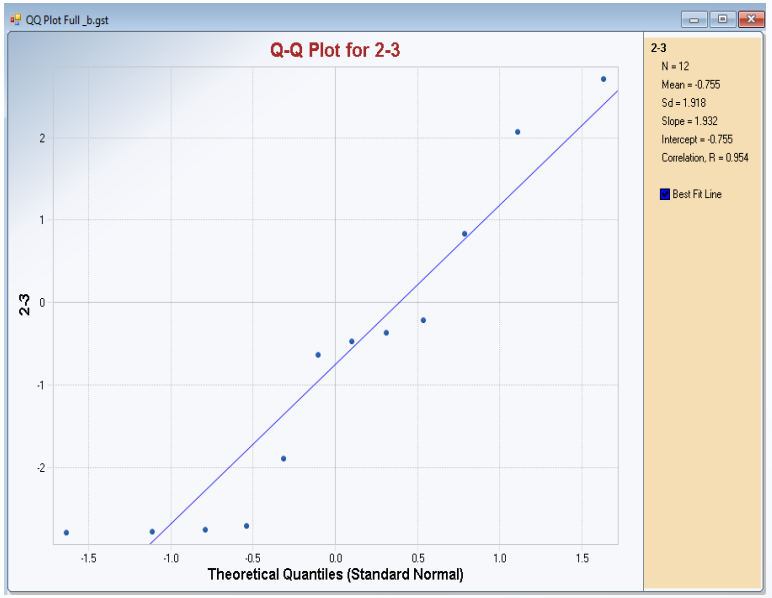
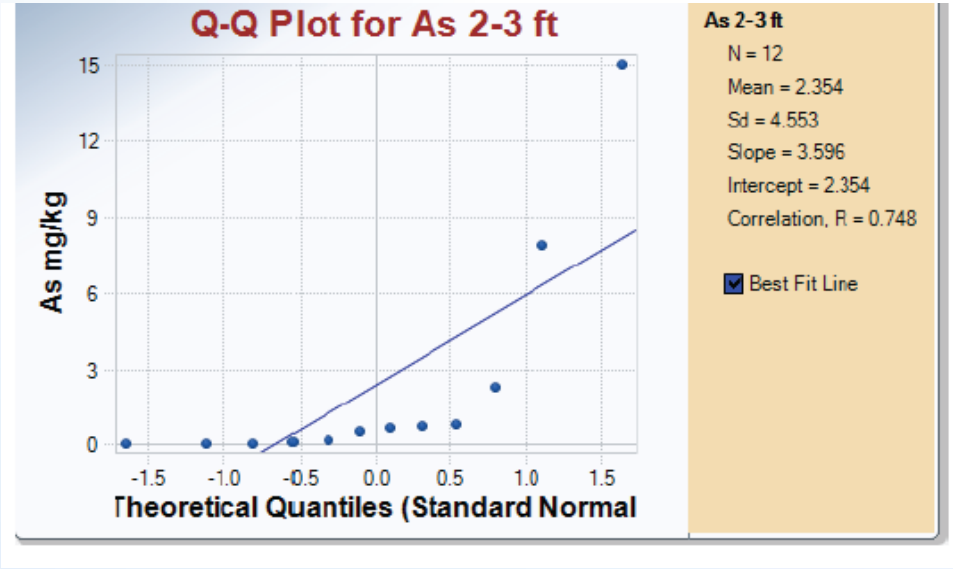
Florida Department of Environmental Protection
Division of Waste Management
Office of District & Business Support
Tallahassee, FL

July 2013

Background Studies

- Outlier Analysis and the Nugget Effect
- Elevated results from phosphatic granular material appear as outliers
- “Weight of evidence” approach needs to be applied to retain the elevated results.





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Discussion