Attainment & Compliance Training

Barry Frasco, NJDEP

Attainment & Compliance Training

The Department has standards or screening levels for several exposure pathways. These include

- Soil ingestion/dermal
- Soil inhalation
- Soil impact to Ground Water
- Vapor intrusion
- Ground water
- Ecological

Guidance Document

Previously only single point compliance was allowed

In 2012 the Technical Guidance for the Attainment of Remediation Standards and Site Specific Criteria was released

http://www.nj.gov/dep/srp/guidance/#attainment_comp

Once a remediation standard is established, compliance options may be used in certain situations to demonstrate compliance with the standard

Media & Pathways Addressed

Environmental media addressed in guidance document:

- Soil, ground water and surface water

Exposure pathways addressed in guidance document:

- Soil direct contact (ingestion/dermal & inhalation)
- Soil impact to ground water (IGW)
- Ground water direct contact (ingestion)
- Surface water direct contact (ingestion)

Media & Pathways Not Addressed

Guidance document does not address compliance for:

- Extractable petroleum hydrocarbons
- Vapor intrusion
- Ecological impact

However, compliance options may be used on a site-specific basis

Alternative Remediation Standards

Compliance options can be applied to alternative remediation standards

When alternate remediation standards are generated for one pathway, other pathways must still be addressed.

Example: Lead: IGW 90 ppm, Direct Contact Residential 400 ppm, non residential 800 ppm.

ARS for IGW results in 630 ppm. Direct contact Residential of 400 ppm must still be addressed.

Compliance Options for Soil Contamination

Prerequisite: Delineation, horizontal AND vertical, must be completed using single point compliance.

Compliance averaging is allowed for soil in direct contact pathway and IGW pathway, in the remedial investigation (RI) and Remedial Action (RA) providing delineation is complete.

Remedial Investigation/Remedial Action

Must Verify Compliance: Soil Direct Contact Pathway and Impact to Groundwater Compliance

- Single point compliance: contaminant concentration is below or equal to standard
- Arithmetic mean: mean contaminant concentration is below or equal to standard
- 95% UCL of the mean: 95% UCL of the mean contaminant concentration is below or equal to the standard

Remedial Investigation/Remedial Action

Must Verify Compliance: Soil Direct Contact Pathway and Impact to Groundwater Compliance

- Spatially weighted average (e.g., Thiessen polygons): contaminant spatially weighted average concentration is below or equal to the standard
- 75 percent 10x procedure: After excavation, contaminant concentration of at least 75% of samples is below or equal to the standard with no sample contaminant concentration in excess of 10x the standard

Remedial Investigation/Remedial Action

Verification: Soil Direct Contact Pathway / Impact to Groundwater Compliance

- Direct Contact Pathway:

If delineation shows contamination extends offsite, then contaminated offsite area must be addressed separately

- Impact to Groundwater Pathway:

If delineation shows contamination extends offsite, onsite and offsite areas are treated together

Arithmetic Mean Averaging Details

- 2 or fewer distinct samples. Distinct means the samples do not have the same value
- 9 or fewer total samples.
- Non detect enter “0”
- No excessive sampling

95% UCL of the Mean Averaging Details

- Minimum of 10 samples
- ProUCL software Version 5.0 recommended
- Non detects may not be more than 50% of the data points

75/10x Option Details

- Pre requisite: Excavation

- Meant to address low levels of contamination after remediation has taken place

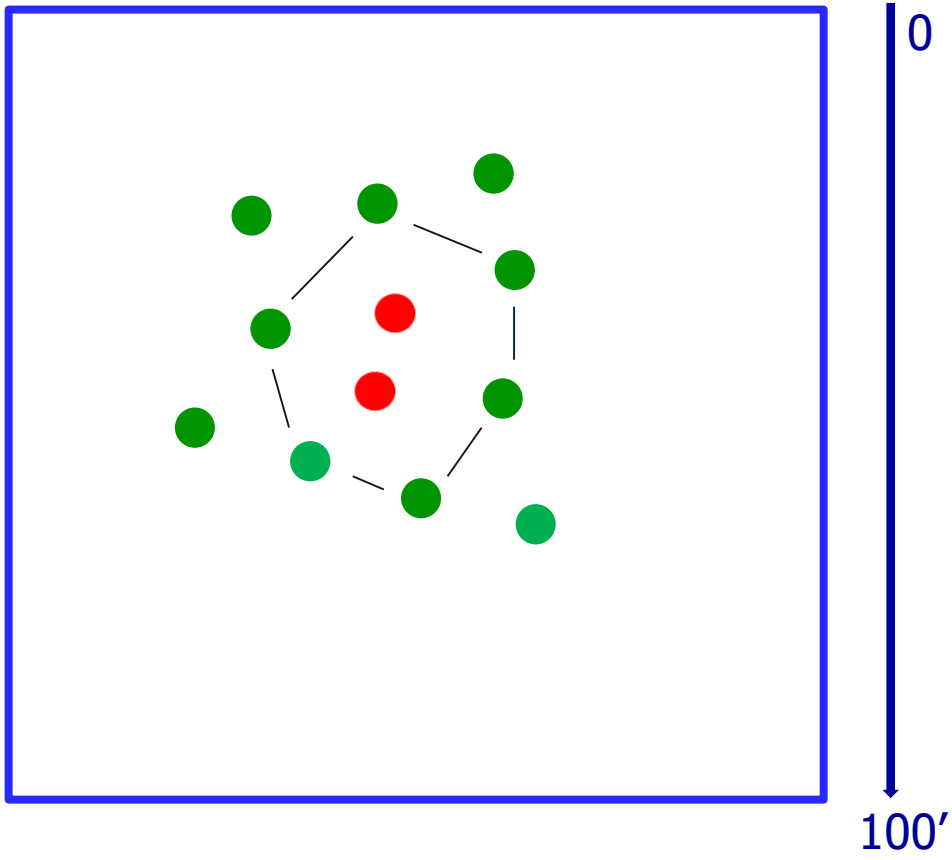
Soil Direct Contact Pathway Functional Areas

Compliance within a specified area known as a "functional area"

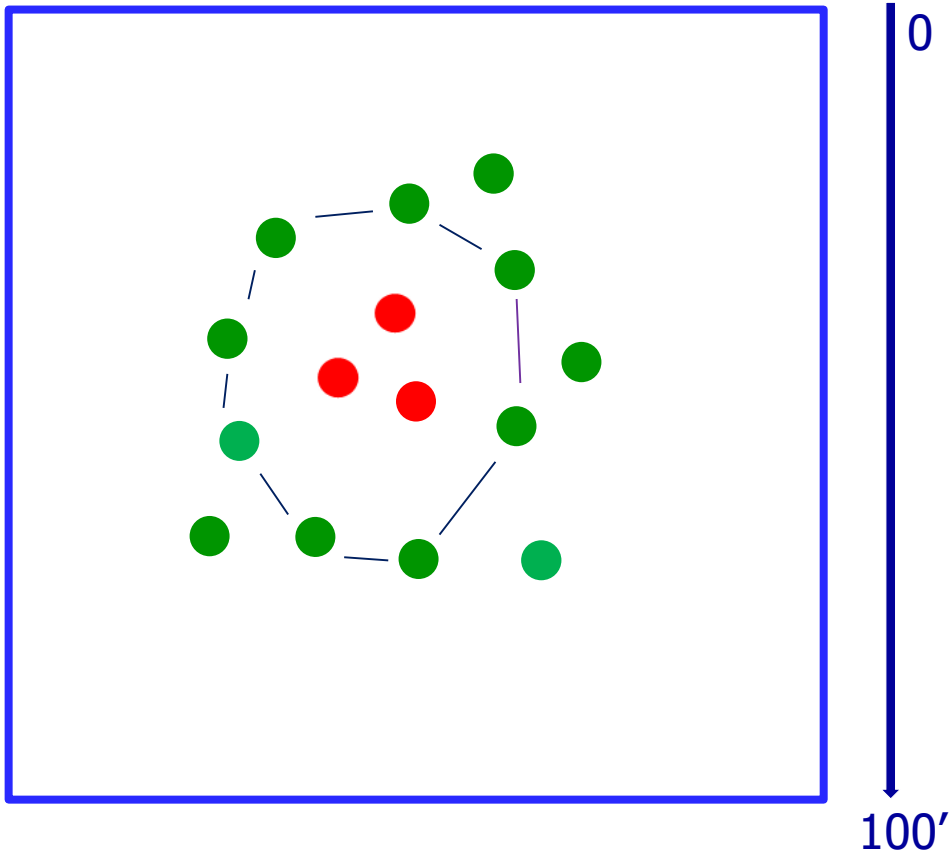
Functional areas vary depending on the exposure pathway

- Soil ingestion/dermal: Residential ¼ acre; Non residential 2.0 acres
- Soil inhalation: Residential ½ acre; Non residential 2.0 acres

Soil Direct Contact Functional Area Boundary Horizontal



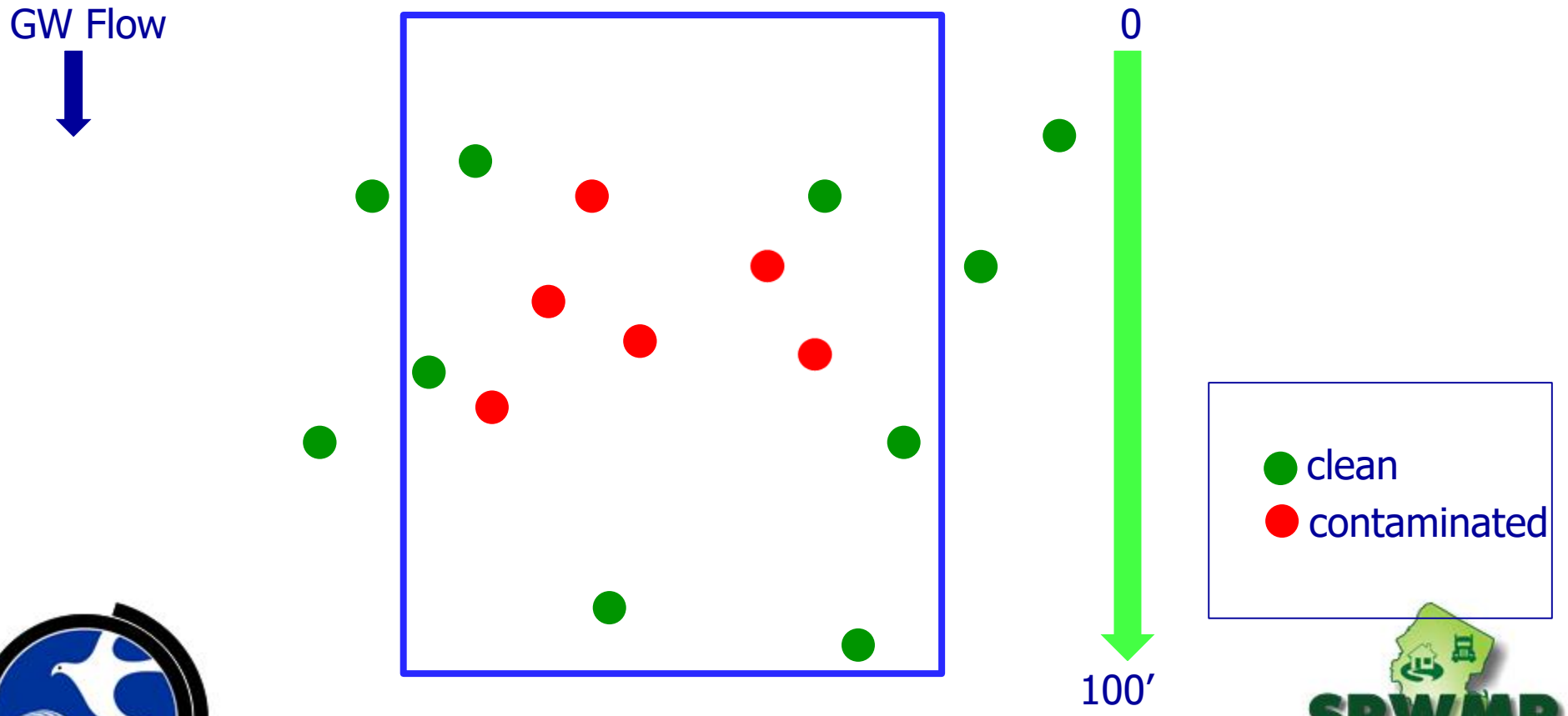
Soil Direct Contact Functional Area Boundary Horizontal



Soil Impact to Ground Water Pathway Functional Areas

- Soil Impact to Ground Water: Dependent on AOC size
  - Length of AOC in direction parallel to GW flow
  - Width is determined by first set of samples that achieve delineation to IGW criteria
  - 100’ is default length.
    - AOCs greater than 100’ may be broken into 100’ AOCs, with multiple functional areas or
    - large AOC & 1 functional area. Site specific DAF and IGWSRS need to be calculated.

Soil IGW Functional Area Boundary Horizontal



Shape of Functional Areas

Soil Direct Contact Pathways

- Square preferred
- Rectangle – length should be no more than 4 times width

Soil Impact to Ground Water

- Based on AOC shape as determined by length of AOC and delineation determined width

Vertical Definition of Soil Direct Contact Functional Areas

Vertical dimensions – Soil direct contact exposure pathway (Residential and Non-Residential):

- Surface zone = 0 to 2’
- Subsurface zone = 2’ to depth of samples providing delineation to relevant standard

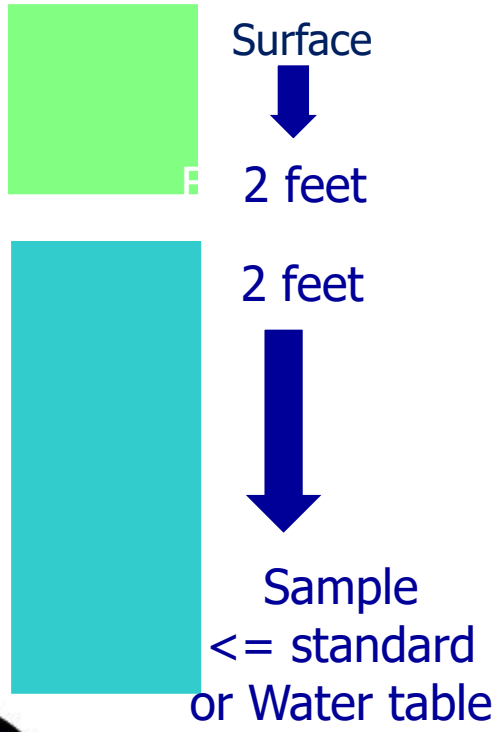
Vertical Definition of Soil Impact to Ground Water Functional Areas

Vertical dimensions – Soil impact to ground water exposure pathway:

- Surface zone = Ground surface to 2’ above the water table
- Subsurface zone = Water table to 2’ above the water table

Functional Areas
Vertical Zones

Soil Direct Contact



Soil IGW

Number of Functional Areas

- First functional area should be placed over "worst case" contaminant levels
- Additional functional areas may be required if:
  - Aerial extent of soil contamination exceeds functional area (50% allowance provision)
  - Soil contamination extends on to another property

Spatially Weighted Averaging Details

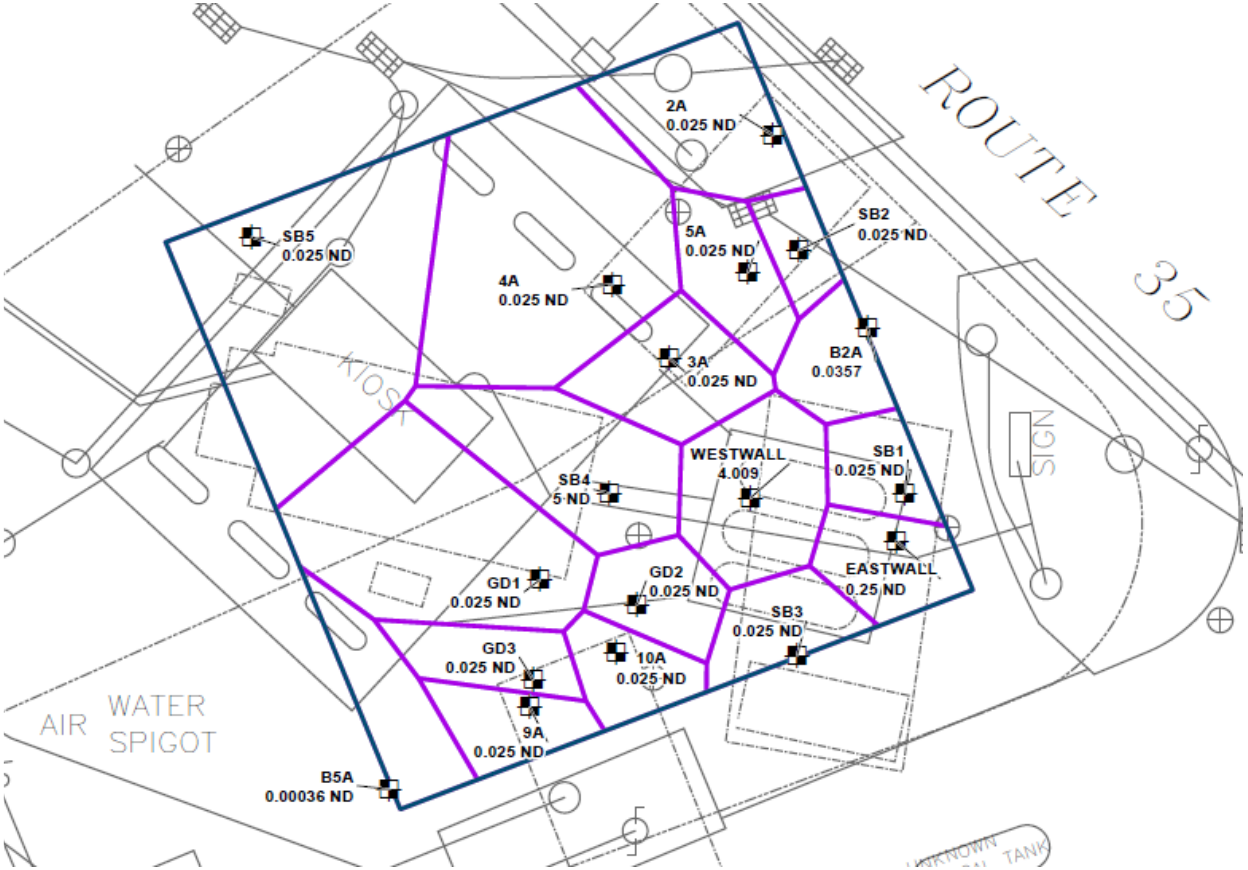
- Functional areas are established over existing sample points
- Midpoints between adjacent sample locations are determined and lines connecting these points are drawn resulting in a polygon around each sample location
- Computer applications are available (e.g., ArcView) that construct such polygons
- The contaminant concentration of the sample within each polygon is assumed to be the contaminant concentration of the entire polygon

Spatially Weighted Averaging Details

- The concentration within each polygon is "weighted" based on size of polygon

- Spatially weighted average is the sum of all "weighted" polygon contaminant concentrations within the functional area

Spatially Weighted Average Benzene – RDCSRS compliance



Spatially Weighted Average Compliance

No additional action is required

- When Spatially Weighted Average for functional area < or equal to relevant remediation standard

Remediation is required

- When Spatially Weighted Average for functional area > relevant remediation standard

Spatially Weighted Average Compliance

Remedial approach:

- Remediation of the polygon with the highest concentration
- Placing soil with background or backfill concentrations
- Re-calculating the Spatially Weighted Average

Numerous polygons may require remediation to achieve compliance

Spatially Weighted Average Compliance

To achieve compliance with **residential** soil remediation standards using an engineering control requires

- Deed Notice and
- Soil remedial action permit

To achieve compliance with **non-residential** soil remediation standards requires

- Deed Notice
- possibly an engineering control, and
- Soil remedial action permit

Attainment of Ground Water Remediation Standards

Compliance averaging over spatial areas not allowed for ground water (unlike soil)

Temporal averaging is allowed under specific conditions

Attainment of Ground Water Remediation Standards

If ground water remediation standard is exceeded temporal averaging may be used:

- May take two confirmation samples, equally spaced within 60 days of initial sampling date, and calculate the average of the three sample concentrations
- Compliance is met if contaminant concentration average is less than or equal to the ground water remediation standard

Questions?