

Compliance Options for Soil Contamination

Compliance averaging is allowed for soil for the direct contact and IGW pathways, during the Remedial Investigation (RI) and Remedial Action (RA) phases provided that delineation has been completed.

Methods include:

- Arithmetic mean
- 95% UCL
- 75%/10x
- Spatially Weighted Avg.



The Arithmetic Mean Compliance Averaging Procedure (CAP)

- The maximum number of samples that can be averaged must be equal to 9 or less. The arithmetic mean cannot be used for data sets that contain more than 9 samples.



The 95% UCL Compliance Averaging Procedure (CAP)

- To conduct the 95% CAP, a functional area must be first defined;
- A minimum of 10 distinct samples are required. Distinct means do not have the same values;
- ProUCL software version 5.0 or 5.1 is recommended;
- Sampling shall be biased towards the AOC and shall not include excessive sampling of clean areas. Excessive sampling is considered as more than the minimum needed to complete the delineation as defined by N.J.A.C. 7:26E-4.2.



The 95% UCL Compliance Averaging Procedure

- To estimate the 95% UCL of the mean, data distribution must be determined and the appropriate methods must be used. For the data sets that don't fit any of the distributions such as normal, gamma, and lognormal, non-parametric methods can be used;
- The maximum percentage of left censored (zero) samples must be equal to or less than 50%. The optimum number is 25%.



The 95% UCL Compliance Averaging Procedure

- The input data must be submitted with the ProUCL output to allow verification of the estimated 95% UCL of the mean;
- If outliers are claimed, graphical displays including the box or Q-Q plots must be provided to support this;
- The 95% UCL of the mean represents an estimate of population (data) mean. The upper tolerance limit (UTL) defines the range of data that fall within a specified percentage with a specific level of confidence and should not be used.



The 75%/10x Compliance Averaging Procedure (CAP)

- In order to use the 75%/10x compliance averaging procedure, the analytical data must be the post-remediation or post-excavation data;
- Concentrations of 75% of the samples must be below or equal to the applicable standards (DCSRS and/or IGWSRS) and concentrations of the remaining 25% of the samples must be equal to or less than 10 times (10x) the standards.



SWA submissions – common problems

- Delineation not complete on point x point basis
- Incorrect Functional Area size (horizontal) for RDCSRS:
 - Ingestion based = .25 acre
 - Inhalation based = .50 acre
- Incorrect Functional Area size (vertical):
 - surface zone = 0-2'
 - sub-surface zone = 2' to sample depth that establishes a clean zone



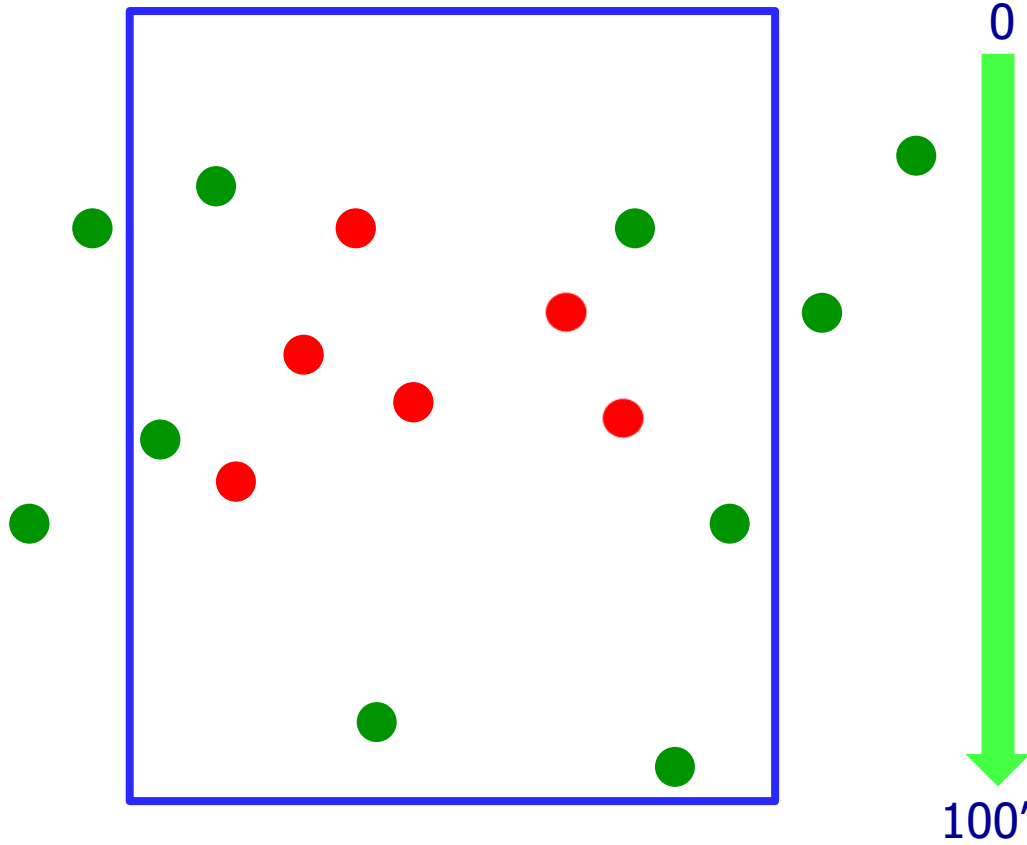
SWA submissions – common problems

- Incorrect Functional Areas for IGW
- Horizontal IGW Zone:
 - Length = 100' in direction parallel to GW flow
 - Width = determined by first set of samples to achieve delineation to IGW criteria
- Vertical Zones:
 - surface: surface to 2' AWT
 - sub-surface: 2' AWT to WT



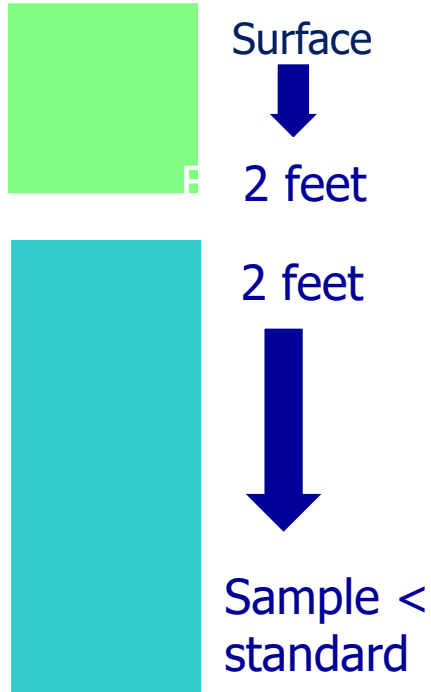
IGW Boundary - Horizontal

GW Flow

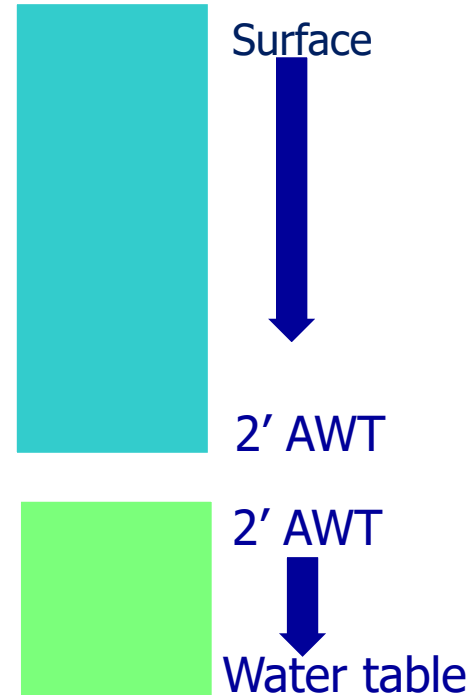


Vertical Zones

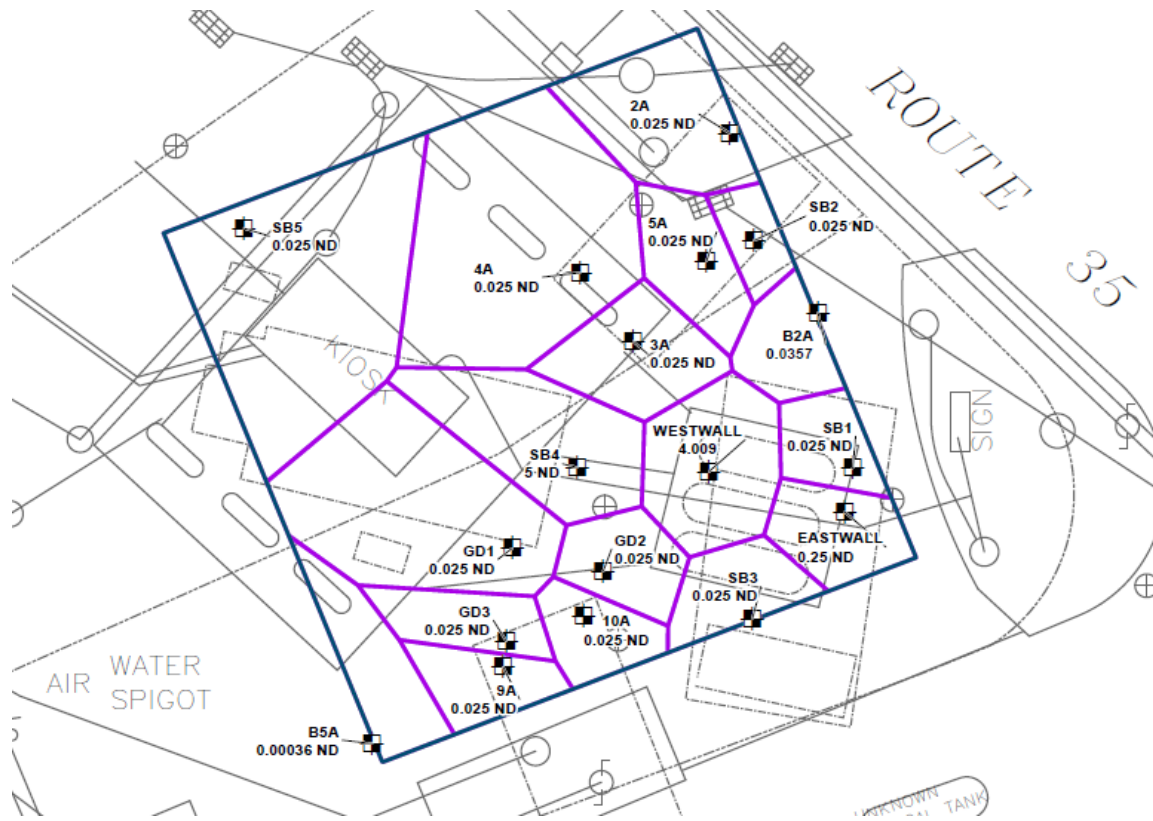
RDCSRS/NRDCSRS



IGW



SWA— Figures



SWA - Tables

	Area_sqft	Percent Total	Benzene	Replace	X Coordinate	Y Coordinate
GD3	433.04	2.88%	0.025	N	613973.91	537087.9598
SB3	462.86	3.08%	0.025	N	614026.6301	537092.91
5A	543.52	3.62%	0.025	N	614016.737	537169.3166
SB5	2382.73	15.87%	0.025	N	613917.689	537176.4423
2A	930.90	6.20%	0.025	N	614021.7249	537196.8694
GD1	1806.48	12.03%	0.025	N	613975.1699	537107.95
B5A	581.60	3.87%	0.00036	N	613945.08	537066.1
9A	406.27	2.71%	0.025	N	613973.1699	537082.49
WESTWALL	902.46	6.01%	4.009	N	614017.26	537124.3298
SB4	1071.00	7.13%	5	N	613989.0399	537125.26
SB1	373.12	2.49%	0.025	N	614048.11	537125.0999
GD2	468.35	3.12%	0.025	N	613994.6101	537102.9601
EASTWALL	511.40	3.41%	0.25	N	614046.4099	537115.6599
10A	401.35	2.67%	0.025	N	613990.4799	537093.3201
SB2	267.33	1.78%	0.025	N	614026.9506	537173.8294
4A	2351.20	15.66%	0.025	N	613989.659	537166.9413
3A	704.06	4.69%	0.025	N	614001.0602	537152.2146
B2A	415.51	2.77%	0.0357	N	614040.6599	537158.36

Spatially Weighted Average 0.6264

RDCSRS = 2ppm



Questions?

