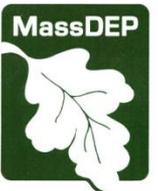


Similar Soils & Such

Paul W. Locke

Director of Response & Remediation
MassDEP Bureau of Waste Site Cleanup
One Winter Street
Boston, MA 02108

(617) 556-1160
Paul.Locke@state.ma.us
www.Mass.Gov/dep

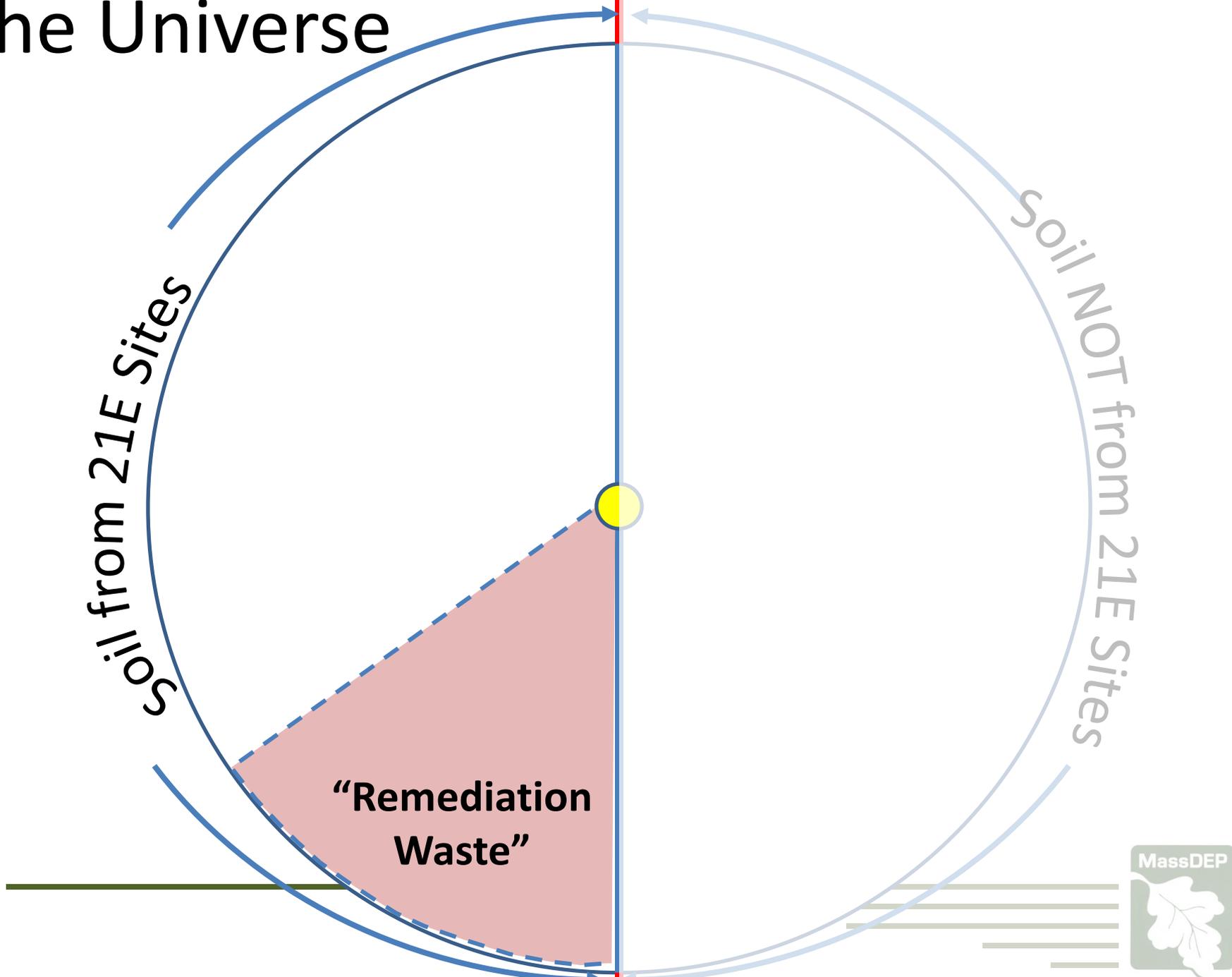


The Universe

ALL SOIL



The Universe



Remediation Waste Training

- *Been There, Done That* (2009, 2010)
- Covered Remediation Waste (21E), Hazardous Waste (21C) & TSCA
 - Remember: Hazardous Waste designation is NOT concentration dependent
 - Technical Update: Considerations for Managing Contaminated Soil: RCRA Land Disposal Restrictions and Contained-In Determinations
- BOL & HW Manifest used for shipping
- COMM 97-001: Re-Use of Remediation Waste at Landfills for Daily Cover/Grading/Shaping Under Cap



Soil from 21E Sites

“Similar Soils”



“Remediation Waste”

Soil NOT from 21E Sites



Similar Soils Policy

- Available online in

Site Cleanup Final Policies:

<http://www.mass.gov/eea/agencies/massdep/cleanup/regulations/site-cleanup-policies-guidance.html#1>

- Facilitates Implementation of
310 CMR 40.0032(3)
(Section Formerly Known As the “Anti-Degradation” provisions)



40.0032: Contaminated Media and Contaminated Debris

- (3) Soils containing oil or waste oil at concentrations less than an otherwise applicable Reportable Concentration and that are not otherwise a hazardous waste, and soils that contain one or more hazardous materials at concentrations less than an otherwise applicable Reportable Concentration and that are not a hazardous waste, may be transported from a disposal site without notice to or approval from the Department under the provisions of this Contingency Plan, provided that such soils:
- (a) are not disposed or reused at locations where the concentrations of oil or hazardous materials in the soil would be in excess of a release notification threshold applicable at the receiving site, as delineated in 310 CMR 40.0300 and 40.1600; and
 - (b) are not disposed or reused at locations where existing concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and/or hazardous materials present in the soil being disposed or reused.



40.0032: Contaminated Media and Contaminated Debris

- (3) Soils containing oil or waste oil at concentrations less than an otherwise applicable Reportable Concentration and that are not otherwise a hazardous waste, and soils that contain one or more hazardous materials at concentrations less than an otherwise applicable Reportable Concentration and that are not a hazardous waste, **may be transported from a disposal site without notice to or approval from the Department** under the provisions of this Contingency Plan, provided that such soils:
- (a) are not disposed or reused at locations where the concentrations of oil or hazardous materials in the soil would be in excess of a release notification threshold applicable at the receiving site, as delineated in 310 CMR 40.0300 and 40.1600; and
 - (b) are not disposed or reused at locations where existing concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and/or hazardous materials present in the soil being disposed or reused.



40.0032: Contaminated Media and Contaminated Debris

(3) Soils containing oil or waste oil at **concentrations less than an otherwise applicable Reportable Concentration** and that are not otherwise a

hazardous waste, and soils that contain one or more hazardous materials at concentrations less than an otherwise applicable Reportable Concentration and that are not a hazardous waste, may be transported from a disposal site without notice to or approval from the Department under the provisions of this Contingency Plan, provided that such soils:

- (a) are not disposed or reused at locations where the concentrations of oil or hazardous materials in the soil would be in excess of a release notification threshold applicable at the receiving site, as delineated in 310 CMR 40.0300 and 40.1600; and
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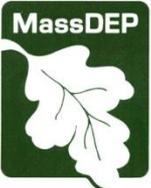
Less Than Notification Threshold at Original Location

- If Location is RCS-1, then Less Than RCS-1 values
- If Location is RCS-2, then Less Than RCS-2 values
- OR a Notification Exemption at 310 CMR 40.0317 applies



40.0032: Contaminated Media and Contaminated Debris

- (3) Soils containing oil or waste oil at concentrations less than an otherwise applicable Reportable Concentration **and that** **are not otherwise a hazardous waste,** and soils that contain one or more hazardous materials at concentrations less than an otherwise applicable Reportable Concentration and that are not a hazardous waste, may be transported from a disposal site without notice to or approval from the Department under the provisions of this Contingency Plan, **provided that** such soils:
- (a) are not disposed or reused at locations where the concentrations of oil or hazardous materials in the soil would be in excess of a release notification threshold applicable at the receiving site, as delineated in 310 CMR 40.0300 and 40.1600; and
 - (b) are not disposed or reused at locations where existing concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and/or hazardous materials present in the soil being disposed or reused.



Soil is Not a Hazardous Waste

- Not a Characteristic Waste
 - However, soil may be treated so that it is no longer characteristic...
- Not a Listed Waste
 - However, soil may be eligible for a Contained In Determination...
<http://www.mass.gov/eea/docs/dep/cleanup/laws/contain.pdf>
- Soil cannot be “Similar Soil” unless and until it is not a Hazardous Waste

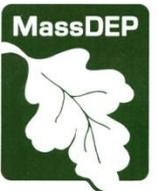


40.0032: Contaminated Media and Contaminated Debris

(3) Soils containing oil or waste oil at concentrations less than an otherwise applicable Reportable Concentration and that are not otherwise a hazardous waste, and soils that contain one or more hazardous materials at concentrations less than an otherwise applicable Reportable Concentration and that are not a hazardous waste, may be transported from a disposal site without notice to or approval from the Department under the provisions of this Contingency Plan, provided that such soils:

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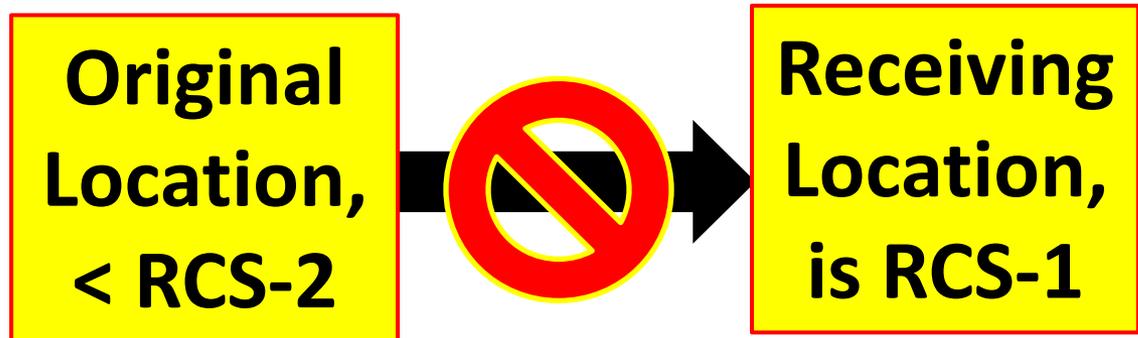
(b) are not disposed or reused at locations where existing concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and/or hazardous materials present in the soil being disposed or reused.



Don't Create a New Notifiable Release!

- Soil brought to the new location must:
 - Be less than the applicable RC, or
 - Meet a notification exemption (310 CMR 40.0317) that applies at the receiving location.
(Negative example: the lead paint exemption)

Watch Out For:

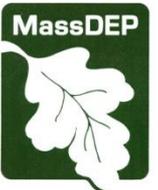


40.0032: Contaminated Media and Contaminated Debris

(3) Soils containing oil or waste oil at concentrations less than an otherwise applicable Reportable Concentration and that are not otherwise a hazardous waste, and soils that contain one or more hazardous materials at concentrations less than an otherwise applicable Reportable Concentration and that are not a hazardous waste, may be transported from a disposal site without notice to or approval from the Department under the provisions of this Contingency Plan, provided that such soils:

(a) are not disposed or reused at locations where the concentrations of oil or hazardous materials in the soil would be in excess of a release notification threshold applicable at the receiving site, as delineated in 310 CMR 40.0300 and 40.1600; **and**

(b) are **not** disposed or reused at locations **where existing concentrations of oil and/or hazardous material at the receiving site are significantly lower** than the levels of those oil and/or hazardous materials present in the soil being disposed or reused.



Bring Like-to-Like

- How do you know what's in the soil at the receiving location?
- How do you determine the new soil is “not significantly higher” than the existing soil at the receiving location?

You need to know – or assume – something about the receiving location soil.



Option 1 – Sample Receiving Location

- Include a sufficient number of samples taken at locations selected to provide an understanding of:
 - the concentrations of OHM present and
 - the distribution of OHM throughout the receiving location.
- Analyze for constituents that are likely to be present there (e.g., naturally occurring metals) as well as any OHM known or likely to be present in the soil brought from the disposal site.
- This data may be used for subsequent soil deliveries - additional sampling is not required.



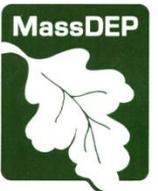
Option 2 – Assume Natural Background

- Sampling of the soil at the receiving location is not necessary if it is assumed that the concentrations of OHM there are consistent with natural background conditions.
- MassDEP published “natural background” levels are similarly used in several areas of the MCP as an acceptable endpoint, including site delineation and the development of the MCP cleanup standards.
- Routine *due diligence* about the receiving location may still reveal factors that would make the location inappropriate to receive the proposed fill material – you can’t ignore any such information.



What's “Not... Significantly Lower”?

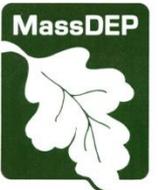
- How do you compare:
 - the known concentrations of OHM in the subject soil (from the original location), and
 - The known or assumed concentrations of OHM in the soil at the receiving location?
- Option 1 – Statistically
- Option 2 - Using the Simplified Approach



Option 1 - Statistics

- Apply statistical tests (e.g., Student's t-test) to evaluate whether data from the two locations are similar
- Must have sufficient statistical power and confidence
- Power and Confidence will depend on several factors, but most of all *the number of samples*.
- *Interested?*

<https://www.khanacademy.org/math/probability>



Option 2 – Simplified Approach

Compare Maximum Value-to-Maximum Value
(remember, *like-to-like*), because...

- 310 CMR 40.0032(3) include comparisons to Reportable Concentrations (any exceedance)
- soil is by its nature heterogeneous
- If used, the MassDEP published background concentrations are upper percentile levels that are only appropriately compared to similar (e.g., maximum) values of the soil data set

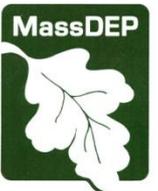


What is “Significantly Lower”?

Use MassDEP-determined Multiplying Factors (MF)

$$[\text{OHM}]_{\text{original location}} < [\text{OHM}]_{\text{receiving location}} \times \text{MF}_{\text{OHM}}$$

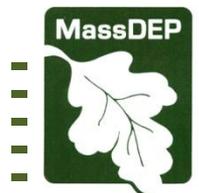
*The new soil is acceptable for reuse
if the concentrations of OHM in the new soil are
less than the concentrations at the receiving location
times the OHM-specific multiplying factors*



What is “Significantly Lower”?

Table 1. Receiving Soil Concentration Multiplying Factors

If the concentration in soil at the receiving location for a given OHM is:	Then use a multiplying factor of:
$< 10 \text{ mg/kg}$	10
$10 \text{ mg/kg} \leq x < 100 \text{ mg/kg}$	7.5
$100 \text{ mg/kg} \leq x < 1,000 \text{ mg/kg}$	5
$\geq 1,000 \text{ mg/kg}$	2.5



Example 1

The soil at a receiving location that is considered RCS-1 is appropriately sampled and the maximum concentration of silver is found to be 6 mg/kg. Using Table 1, the concentration of silver at the receiving location would not be considered “significantly lower” than $10 \times 6 \text{ mg/kg} = 60 \text{ mg/kg}$.

Since 60 mg/kg is less than the silver RCS-1 value of 100 mg/kg, soil containing a maximum concentration that is less than 60 mg/kg silver could be reused at this location.



Example 2

The soil at a receiving location that is considered RCS-1 is assumed to be consistent with natural background. The MassDEP published natural background level for arsenic is 20 mg/kg. Using Table 1, the concentration of arsenic at the receiving location would not be considered “significantly lower” than $7.5 \times 20 \text{ mg/kg} = 150 \text{ mg/kg}$.

However, since 150 mg/kg is greater than the arsenic RCS-1 value of 20 mg/kg, only soil containing a maximum concentration that is less than 20 mg/kg arsenic could be reused at this location.

[The managed soil must not create a notifiable condition at the receiving location.]



Example 3

The soil at a receiving location that is considered RCS-2 is assumed to be consistent with natural background. The MassDEP published natural background level for benzo[a]anthracene is 2 mg/kg. Using Table 1, the concentration of benzo[a]anthracene at the receiving location would not be considered “significantly lower” than $10 \times 2 \text{ mg/kg} = 20 \text{ mg/kg}$.

Since 20 mg/kg is less than the benzo[a]anthracene RCS-2 value of 40 mg/kg, soil containing a maximum concentration that is less than 20 mg/kg benzo[a]anthracene could be reused at this location.

[Note that due to the lower reportable concentration, RCS-1 receiving locations could only accept soil containing less than 7 mg/kg benzo[a]anthracene.]



Table 2 – List for RCS-1 Receiving Locations (assumes natural background)

WSC 13-500 – Similar Soils Provision (310 CMR 40.0032(3)) Guidance

October 2, 2013

Table 2.

Limits to the Concentration of OHM In Soil for Re-Use

Assuming Natural Background Conditions at an RCS-1 Receiving Location

NOTE: THIS TABLE WILL BE REVISED IN THE FALL OF 2013 TO REFLECT RCS-1 REVISIONS

OIL OR HAZARDOUS MATERIAL	Concentration	Rule-of- Thumb Multiplier	Multiplied Value mg/kg	RCS-1 mg/kg	Limiting ¹ Soil Concentration mg/kg	
	In "Natural" Soil mg/kg				<	
ACENAPHTHENE	0.5	10	5	4	<	4
ACENAPHTHYLENE	0.5	10	5	1	<	1
ALUMINUM	10,000	2.5	25000		<	25000
ANTHRACENE	1	10	10	1000	<	10
ANTIMONY	1	10	10	20	<	10
ARSENIC	20	7.5	150	20	<	20
BARIUM	50	7.5	375	1000	<	375

Table 3 – List for RCS-2 Receiving Locations (assumes natural background)

WSC 13-500 – Similar Soils Provision (310 CMR 40.0032(3)) Guidance

October 2, 2013

Table 3.

Limits to the Concentration of OHM In Soil for Re-Use

Assuming Natural Background Conditions at an RCS-2 Receiving Location

NOTE: THIS TABLE WILL BE REVISED IN THE FALL OF 2013 TO REFLECT RCS-2 REVISIONS

OIL OR HAZARDOUS MATERIAL	Concentration	Rule-of- Thumb Multiplier	Multiplied Value mg/kg	RCS-2 mg/kg	Limiting ¹ Soil Concentration mg/kg	
	In "Natural" Soil mg/kg				<	
ACENAPHTHENE	0.5	10	5	3000	<	5
ACENAPHTHYLENE	0.5	10	5	10	<	5
ALUMINUM	10,000	2.5	25000		<	25000
ANTHRACENE	1	10	10	3000	<	10
ANTIMONY	1	10	10	30	<	10
ARSENIC	20	7.5	150	20	<	20
BARIUM	50	7.5	375	3000	<	375

Sampling Considerations

The soil proposed for disposal/re-use should be sampled at sufficient and adequately distributed locations so that the concentrations of the contaminants of concern in the soil are adequately characterized.

Evaluation of release, source, and site specific conditions assist in developing the basis for the selection of field screening techniques, sampling methodologies, sampling frequencies, and the contaminants of concern (e.g., analytical parameters) used to characterize the soil.

Factors for consideration listed in the guidance.



Soil from 21E Sites

Soil NOT from 21E Sites

“Similar Soils”



“Gap Soils”

(Between Similar Soils and Remediation Waste)



“Remediation Waste”



“Gap Soils”

- Concentrations greater than Tables 2 or 3.
- Case-specific “Similar Soils” approach may be appropriate.

Otherwise...

- Cannot be moved without notice to or approval from MassDEP.
- Can be moved if managed as Remediation Waste



Soil from 21E Sites

Soil NOT from 21E Sites

“Similar Soils”

Similar to “Similar Soils”

“Gap Soils”

(Between Similar Soils and Remediation Waste)

Similar to “Gap Soils”

“Remediation Waste”

Similar to “Remediation Waste”



Thoughts on Soil NOT from a 21E Disposal Site

- MassDEP does NOT regulate the excavation and transport of these soils
- You definitely do NOT want to CREATE a new 21E disposal site.
- *Pouring, emitting, emptying, dumping & disposing* are all action verbs in the c.21E definition of “release.”
- Notifications exemptions may apply only at the original location... not a receiving location.

