

# REMEDIATION ROUNDTABLE

March 15, 2015



Connecticut Department of Energy and Environmental Protection

[www.ct.gov/deep/remediationroundtable](http://www.ct.gov/deep/remediationroundtable)

# Agenda

Volatilization Discussion Document

Verification Form Revisions

Background Workgroup Report Out: Current State RSR  
Guidance

Deputy Commissioner Michael J. Sullivan

RSR Wave 2 Concept Language Rollout Process



Connecticut Department of Energy and Environmental Protection

**CAMILLE FONTANELLA**

# Website Updates

- [Requesting APS/Alternative Criteria](#)
- [Cleanup Program Transformation pages](#)
- [Draft Verification forms](#)
- [State Superfund Priority List](#)
- [Remediation Division Contacts & District Map](#)



# Connecticut's Commitment to Brownfields

- Since FY2012, the State has invested \$138m in 100+ projects
- In FY2015, \$41.5m was contracted with cities, towns, non-profits and developers
- Next DECD funding round will open March 14. Applications due April 23.

[Office of Brownfield Remediation and Development](#)



*American Woolen Mills, Stafford*



Connecticut Department of Energy and Environmental Protection

**CAMILLE FONTANELLA**

# State Liability Relief – DECD & DEEP

- Abandoned Brownfield Cleanup Program
- Brownfield Remediation and Redevelopment Program
- Municipal Brownfields Liability Relief Program

[State Brownfield Programs,  
Liability Relief, and  
Financial Assistance webpage](#)



*Harbor Point, Stamford*



Connecticut Department of Energy and Environmental Protection

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# Brownfield Liability Relief Program Metrics

## Abandoned Brownfields Cleanup Program

Started 2009  
(P. A. 09-235)

**6 sites total**  
1 in 2015  
1 in 2016

## Brownfields Remediation & Revitalization Program

Started 2011  
(P. A. 11-80) aka  
Section 17

**21 sites total**  
5 in 2015  
1 pending 2016

## Municipal Brownfields Liability Relief Program

Started 2013  
(P. A. 13-308)

**5 sites total**  
2 in 2015  
1 in 2016

**Seeking more sites enrolled in these programs!!!**



Connecticut Department of Energy and Environmental Protection

CAMILLE FONTANELLA

# Brownfields DEEP Contact Info

Mark Lewis

Brownfield Coordinator

Department of Energy & Environmental Protection

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Hartford, CT 06106

(860) 424-3768

[Mark.Lewis@ct.gov](mailto:Mark.Lewis@ct.gov)



# Website Updates

- [USEPA Brownfields Grants](#)
- [Brownfields Inventory](#)
  - Excel Spreadsheet
- [Siting Clean Energy on Brownfields](#)
  - List of Landfills



*Remington Arms, Bridgeport*





## Registration Open!

Join us for the inaugural Connecticut Brownfields Conference

- What:** **Connecticut Brownfields Conference**  
**(featuring remarks by Gov. Dannel P. Malloy)**
- When:** 9:30am – 5pm  
May 17, 2016
- Where:** Connecticut Convention Center  
100 Columbus Boulevard  
Hartford, Connecticut
- Who:** Developers, Site Owners, Municipal Leaders, Attorneys,  
and Environmental Professionals should attend
- Register:** There is no fee for this event, but you must register  
by May 10, 2016 at <https://goo.gl/7eS7Da>

Full agenda coming soon

Event co-hosted by the Connecticut Department of Economic and Community Development and the Connecticut Department of Energy and Environmental Protection in partnership with the NJIT TAB Program.

# Questions / Comments

Please speak loudly.



[www.ct.gov/deep/remediationroundtable](http://www.ct.gov/deep/remediationroundtable)



Connecticut Department of Energy and Environmental Protection

# Volatilization Fate and Transport – Discussion Document

Robert Bell  
Assistant Director  
Remediation Division



Connecticut Department of Energy and Environmental Protection

# Volatilization Criteria

- Purpose: To ensure air we breathe indoors doesn't contain VOCs from groundwater
- Some contaminants – VOCs - easily volatilize
- Vapor from a groundwater plume can rise and accumulate in an overlying building
- RSRs Appendix E and F
- Will post a Discussion Document on updating transport component
  - We want feedback



# Why a Discussion Document

- Transport basis in criteria is wrong
  - Fix first proposed in 2003
  - Now - focus on transport, not toxicity
- Process
- Discussion Document to identify options
  - Want your feedback before deciding how to proceed



# Current Review

- Fate and transport mechanism update - long overdue – first proposed in 2003
- Lagging behind best science adopted in other states and EPA
- Johnson & Ettinger's 1998-1999 transport mechanism - best practice
- Recent information on *in utero* risks from very short-term exposure to TCE in indoor air
  - DEEP/DPH 2015 Guidance



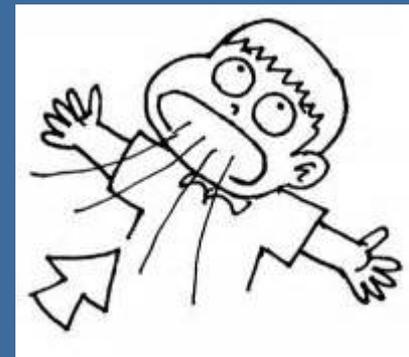
# EPA Guidance

- EPA 2015 Guidance Documents
  - Chlorinated
  - Petroleum
- Extensive public review/comment
- Confirms updated J&E transport mechanism
- EPA VI Screening Level (VISL) calculator
- RCRA CA sites – delegated state – need to review RSRs to remain consistent with EPA



# Volatilization

- Normal respiratory rates:
  - <1 year old: 30-40 breaths per minute
  - 2-5 years old: 25-30 breaths per minute
  - Adults: 12-20 breaths per minute
- Remedy option: vapor control system
  - lower cost remedy compared to groundwater cleanup



# Volatilization Criteria Factors

- Criteria derived from
  - Target Indoor Air Concentration (TAC)
    - Toxicity and exposure
  - Transport
    - Determines concentration in the air
    - How much will volatilize off groundwater and travel into indoor air
    - Sampling indoor air is an option but many disadvantages
- Discussion Document focuses on transport pathway



# Evolution of Vapor Transport Understanding

- 1991 Johnson & Ettinger transport model (ASTM ES 38-94)
  - Relied solely on diffusion
  - 1996 – RSRs adopted, VolC based on 1991 J&E model
- Revised J&E transport model developed in 1998 and 1999
  - Incorporated both diffusion and advection



# Diffusion and Advection

- Diffusion means . . . Vapor travels through soil from high concentration to low concentration areas
- Advection means . . . Vapor travels towards lower air pressure
  - Buildings present lower pressure and draws vapor in



# Conceptual Model of Vapor Intrusion

Stack Effect

Wind Effect



Contaminant Advection & Diffusion Through Floor-Wall Cracks

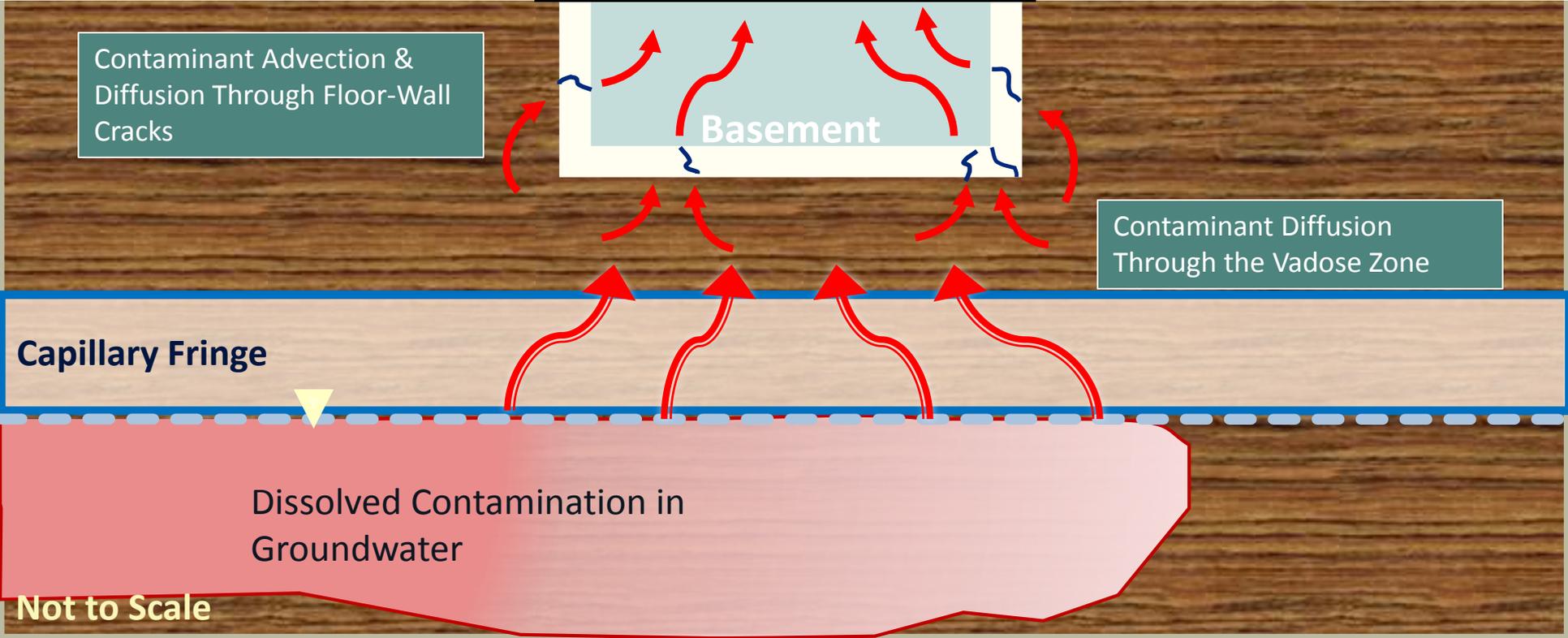
Basement

Contaminant Diffusion Through the Vadose Zone

Capillary Fringe

Dissolved Contamination in Groundwater

Not to Scale



# DEEP's 2003 Draft VolC

- DEEP published proposed revisions in 2003
- Incorporated the 1998-1999 J&E transport
- 2003 proposal also included:
  - New toxicity information
    - E.g., TCE more harmful, DCE less harmful
  - New exposure assumptions
  - Ceiling values
  - Updated quantification limits



# 2016 Discussion Document

- Update Volatilization Criteria based on updating the fate and transport mechanism
- Additional options:
  - Leave toxicity and exposure updates for future Science Advisory Panel review
  - Differentiate between chlorinated solvent and petroleum substances



# 2016 Discussion Document

- Discussion Document contains 2 general options
- Proposed updated numeric criteria based on each option
- Highlights differences



# 2016 Discussion Document

## Option 1

Only update the J&E transport mechanism as identified in DEEP's 2003 proposal

Stick with RSR (1996) TAC in Appendix G

## Option 2

DEEP's 2003 proposal

J&E updated transport mechanism;  
2003 TAC



EPA VISL calculator- Based on EPA's 2015 VI Guidance included for reference, not as an option



Connecticut Department of Energy and Environmental Protection

Robert Bell

# 2016 Discussion Document

- DEEP Recommends Option 2
  - DEEP's 2003 proposal
  - Updated J&E transport mechanism
  - Breathe less TCE in indoor air
  - Less regulation of DCE and vinyl chloride
  - Familiarity with 2003 Proposal, used at many sites
  - Alternative: leave VolC unchanged for petroleum volatiles
    - due to potential fate/transport differences



# Next Steps

DEEP to issue  
Discussion  
Document  
April 2016

30 days for  
public  
feedback

DEEP will  
review  
feedback

Decide how  
and when to  
proceed



# Questions / Comments

Please speak loudly.



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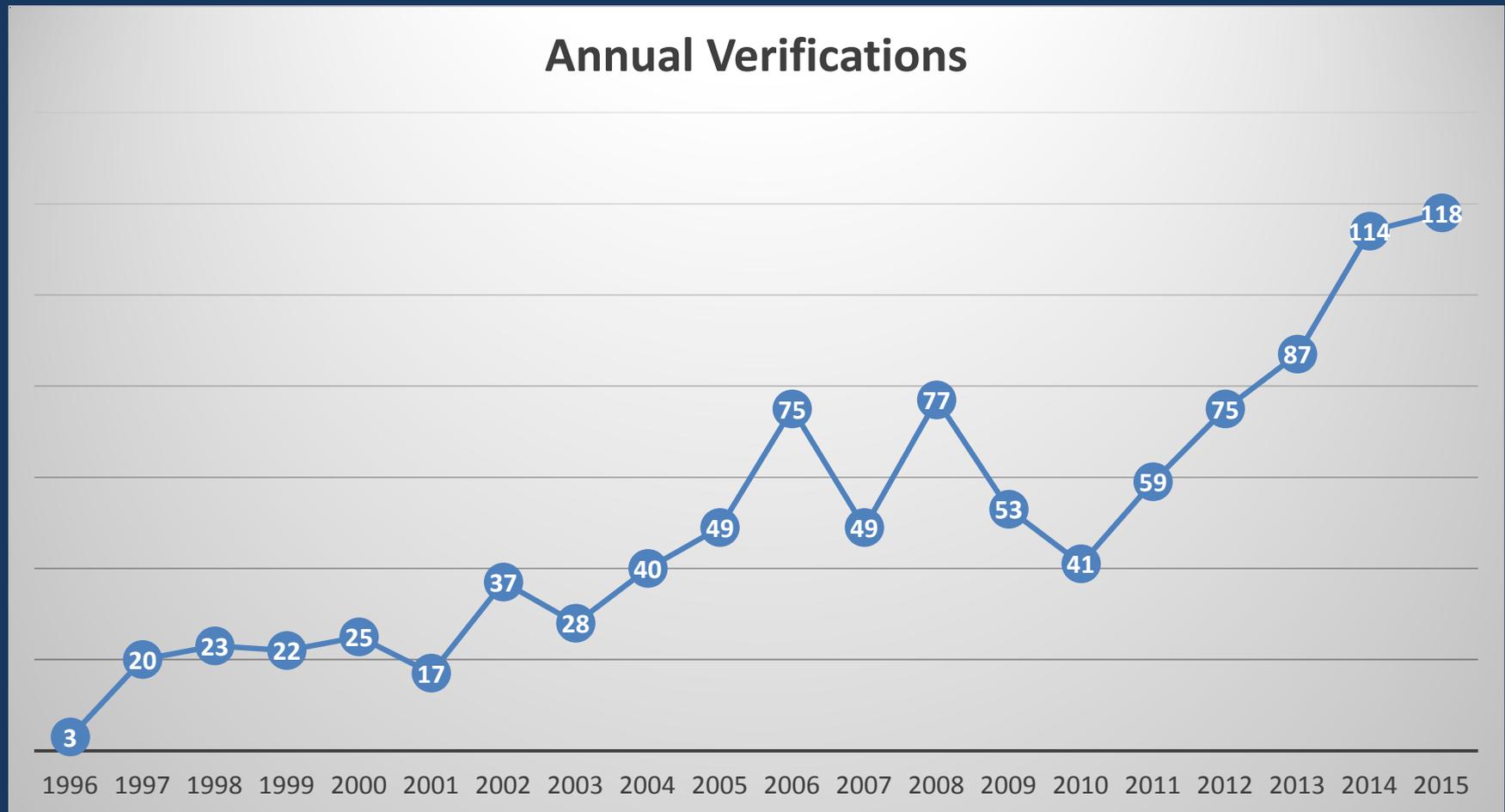
# New and Revised Draft Verification Forms

Claire Foster  
Environmental Analyst III  
Audit Program Coordinator  
Remediation Division



Connecticut Department of Energy and Environmental Protection

# Verification Metrics 2005 through 2015

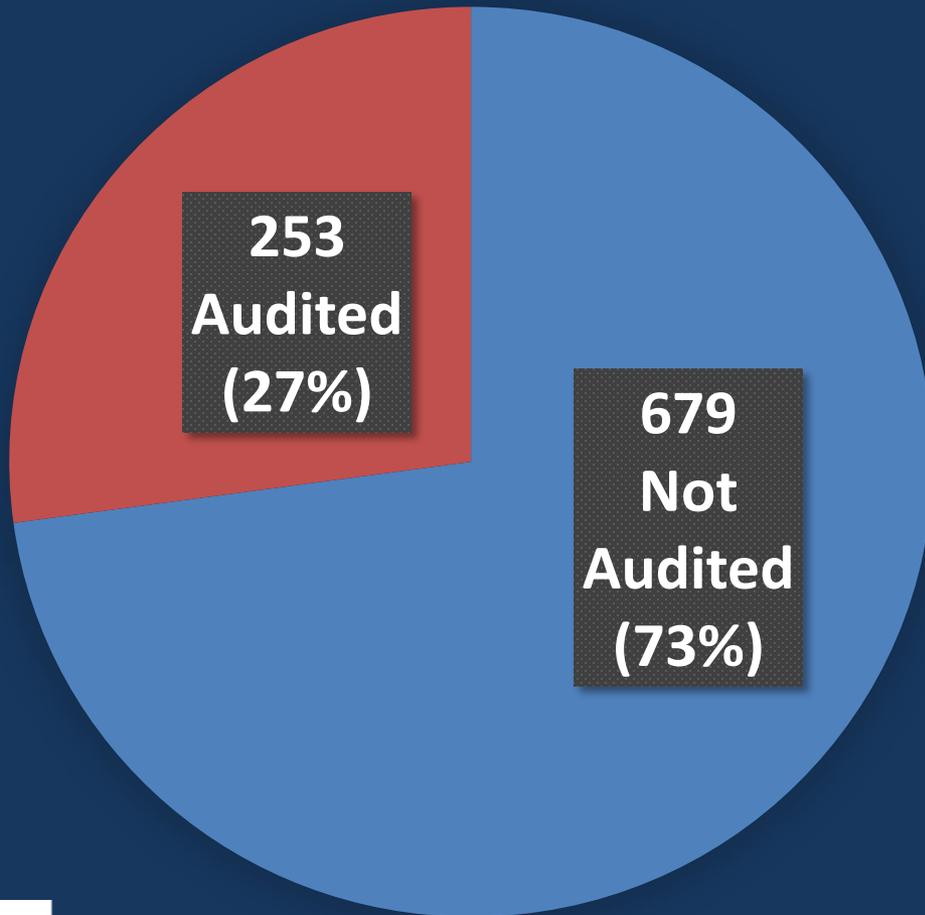


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# Verification Metrics 2005 through 2015

## Verifications Submitted 2005-2015



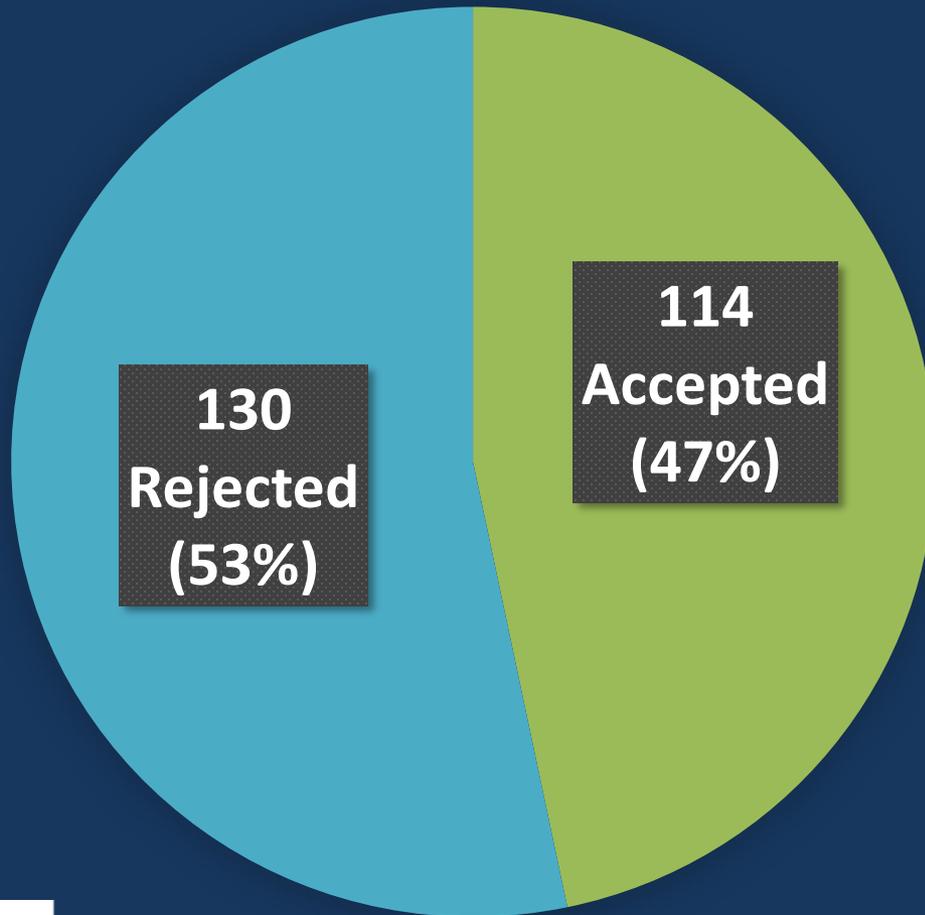
Verifications Submitted include:

- Form I
- Form II
- Form III (Final, Portion, Interim)
- Form IV (Supporting, Final)
- 133x (Property, Portion, Release Area, Interim)
- 133y
- ELUR
- RCRA



# Verification Metrics 2005 through 2015

## Verifications Audited 2005-2015



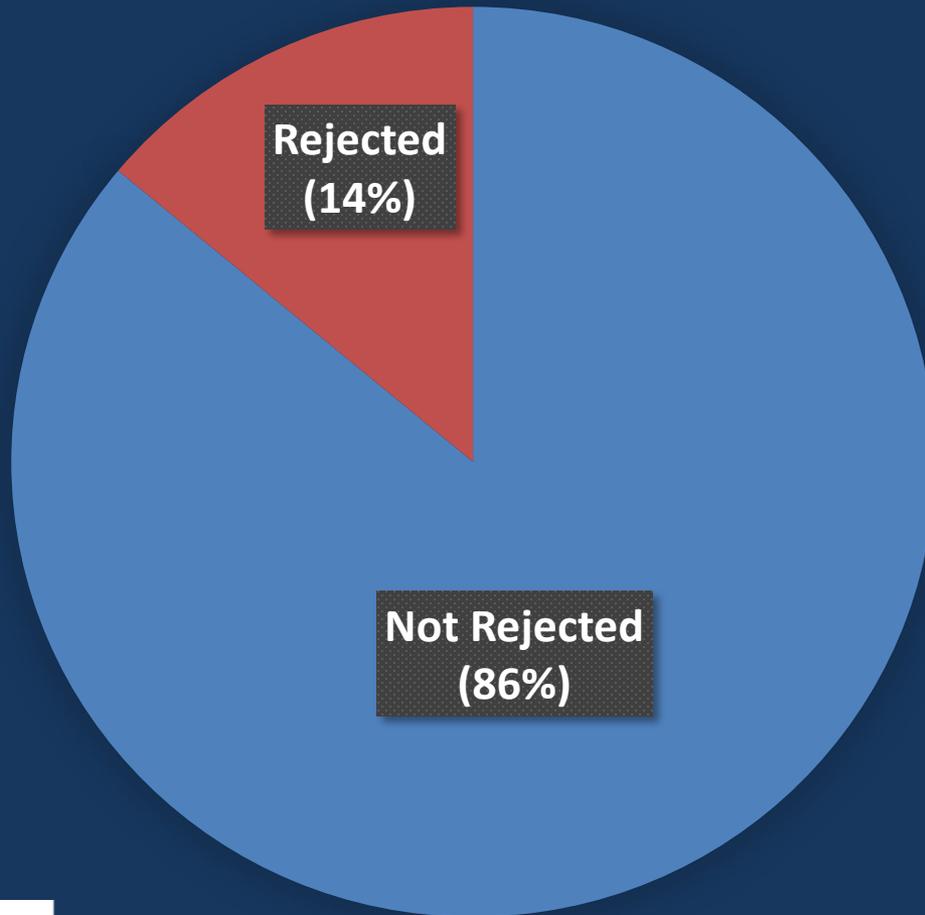
Verifications Audited include:

- Form I
- Form II
- Form III (Final, Portion, Interim)
- Form IV (Supporting, Final)
- 133x (Property, Release Area)
- 133y
- ELUR



# Verification Metrics 2005 through 2015

## Verifications Submitted 2005-2015



Verifications Submitted include:

- Form I
- Form II
- Form III  
(Final, Portion, Interim)
- Form IV  
(Supporting, Final)
- 133x  
(Property, Portion, Release Area, Interim)
- 133y
- ELUR
- RCRA



# Revised Verification Forms

- All Verification Forms have been revised
  - Posted for public comment shortly

Purpose:

to provide clarity

to provide a more user friendly layout

to provide more expeditious screen by DEEP



# Revised Verification Forms

- Minor tweaks:
  - Red instruction reminder text added throughout
  - Many minor wording clarifications based on LEP feedback



# Revised Verification Forms

- Form I (Property) – (Business)
- Form II (Property) – (Business)
- Form III (Property) – (Business)
- Form III Interim (Property) – (Business) for whole or Portion
- Form III Portion (Property) – (Business)
- Form IV – Supporting (Property) – (Business)
- Form IV – Final (Property) – (Business)
- 133x – (Parcel) – (Release Area) –  
NEW (Portion) – (Interim for either option)
- 133y



# Verification Form Outline

## Current Forms

Site Information

LEP Verification

Remediation

Soil Groundwater

Receptors

Certification

## New Forms

Site Information

LEP Verification

Compliance History

Remediation

Soil Groundwater

Receptors

Certification



# Verification Form Outline

## Remediation

### Soil

#### Current Forms

- Summary
- Application
- Background
- Direct Exposure Criteria
- Pollutant Mobility Criteria
- Other Provisions

#### New Forms

- Release Determination
- Compliance Measures
- Application
- Background
- Direct Exposure Criteria
- Pollutant Mobility Criteria
- Other Provisions
- LNAPL



# Verification Form Outline

## Current Forms

## Remediation Groundwater

## New Forms

- Summary
- Incidental Sources
- Application
- General Compliance
- Background
- GWPC
- SWPC
- Volatilization Criteria
- Other Provisions

- Impact Determination and Plume Investigation
- Application
- General Compliance
- Incidental Sources
- Background
- GWPC
- SWPC
- Volatilization Criteria
- Other Provisions



# Overview of changes



- First page



- Compliance History section



- Release/Impact Determination



- Soil Compliance Measures



# Changes to the first page



# 1<sup>st</sup> Page: Verification Info on Most Forms

- New section that allows for multiple REM IDs to be listed on one form
- Must identify one REM ID as the primary one for administrative purposes

## Part II: Verification Information

This verification pertains to the Form III filed with the Department on [REDACTED] and assigned **Rem#** [REDACTED].

If this Final Verification is being used to also close any previous Form III filing(s), list the applicable Rem #s:

[REDACTED] [REDACTED] [REDACTED] [REDACTED]

**Note →this verification will be rejected if erroneous entries are presented**

In accordance with §22a-134a(n), this verification may be applied to all releases existing at the parcel at the date the Form III was filed, or to all releases existing at the parcel at the time of a Phase II Investigation (as defined in the Site Characterization Guidance Document), whichever is later. This verification may also be applied to the environmental conditions of the property establishment as of the date this verification is signed and sealed.



# 1<sup>st</sup> Page: Verification Info on Most Forms

- New format to choose applicable date for verification
- Similar format used on specific forms for additional info

Enter **all** of the following dates, then mark the one date to which this verification applies (Primary Rem#).

	Date of Form III Filing:	Date of complete Phase II:	Date of this verification:
	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>This verification applies to this date:</b> (check only one)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

"I verify in accordance with Section 22a-134(19) of the Connecticut General Statutes and Section 22a-133v-1(z) of the Regulations of Connecticut State Agencies (RCSA), that an investigation has been performed at the parcel in accordance with prevailing standards and guidelines, and that...



# Part II: Verification Info for Form III

## Part II: Verification Information

This verification pertains to the Form III filed with the Department on [ ] and assigned Rem# [ ].

If this Final Verification is being used to also close any previous Form III filing(s), list the applicable Rem #s:

[ ] [ ] [ ] [ ]

**Note → this verification will be rejected if erroneous entries are presented**

In accordance with §22a-134a(n), this verification may be applied to all releases existing at the parcel at the date the Form III was filed, or to all releases existing at the parcel at the time of a Phase II Investigation (as defined in the Site Characterization Guidance Document), whichever is later. This verification may also be applied to the environmental conditions of the property establishment as of the date this verification is signed and sealed.

Enter **all** of the following dates, then mark the one date to which this verification applies **Primary Rem#**.

	Date of Form III Filing	Date of complete Phase II:	Date of this verification:
	[ ]	[ ]	[ ]
<b>This verification applies to this date:</b> (check only one)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

"I verify in accordance with Section 22a-134(19) of the Connecticut General Statutes and Section 22a-133v-1(z) of the Regulations of Connecticut State Agencies (RCSA), that an investigation has been performed at the parcel in accordance with prevailing standards and guidelines, and that...

(check one of the following)

**The establishment was in compliance with the remediation standards (RCSA Sections 22a-133k-1 through 22a-133k-3) at the date indicated above, without requiring remediation."**

**All releases existing at the establishment at the date indicated above, have been remediated in accordance with the remediation standards (RCSA Sections 22a-133k-1 through 22a-133k-3)."**

LEP Seal

Signature of Licensed Environmental Professional

License #: [ ]



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# Part II: Verification Info - Interim Form III

- Second box below allows form to be used for both a parcel or portion of a parcel verification

Enter all of the following dates, and then mark the box of the date this verification applies to.

	Date of Form III Filing:	Date of complete Phase II:	Date of this verification:
	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>This verification applies to this date: (check only one)</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Property	Portion of Property
<b>And this verification applies to: (check only one)</b>	<input type="checkbox"/>	<input type="checkbox"/>

"I verify in accordance with Section 22a-134(28) of the Connecticut General Statutes and Section 22a-133v-1(z) of the Regulations of Connecticut State Agencies (RCSA), that:



# Part II: Verification Info - 133x Interim

- Same box for applicability appears on Interim 133x verification

## Part II: Verification Information

This verification pertains to the Environmental Condition Assessment Form (ECAAF) filed with the Department on [ ] and assigned **Rem#** [ ] .

"I verify in pursuant to Section 22a-133x(b) of the Connecticut General Statutes and in accordance with Section 22a-133v-1(z) of the Regulations of Connecticut State Agencies (RCSA), that an investigation has been performed in accordance with prevailing standards and guidelines at:

	Parcel	Portion of the Parcel:	Release Area:
<b>This verification applies to:</b> (check only one)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

and that...

- the Standards for Soil Remediation have been achieved in accordance with the remediation standards (RCSA Sections 22a-133k-1 through 22a-133k-2); and
- compliance with the Groundwater Remediation Standards (RCSA Section 22a-133k-3) has not been achieved for some or all releases to groundwater, but a selected remedy for remediation of the groundwater is in operation."



# Part II: Verification Info, Supporting Form IV

## Part II: Verification

In accordance with §22a-134a(n), this verification may be applied to all releases existing at the parcel at the date the Form IV was filed, or to all releases existing at the parcel at the time of a Phase II Investigation (as defined in the Site Characterization Guidance Document), whichever is later. This verification may also be applied to the environmental conditions of the property establishment as of the date this verification is signed and sealed.

Enter all of the following dates, and then mark the one box to which this verification applies.

	Date of Form IV Filing:	Date of complete Phase II:	Date of this verification:
	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>This verification applies to this date:</b> (check only one)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

"I verify in accordance with Section 22a-134(13) of the Connecticut General Statutes and Section 22a-133v-1(z) of the Regulations of Connecticut State Agencies (RCSA), that an investigation has been performed at the parcel in accordance with prevailing standards and guidelines and that all actions to remediate any pollution caused by any release at the establishment have been taken in accordance with the remediation standards, RCSA Sections 22a-133k-1 through 22a-133k-3, *except*

(check appropriate scenario)

- groundwater compliance monitoring *New inclusion*
- natural attenuation groundwater monitoring
- the recording of an environmental land use restriction."



# New Compliance History Section



Connecticut Department of Energy and Environmental Protection

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# Form III, Part III: Compliance History

Primary Rem#:

## Part III: Compliance History

### A. Previous Verification Information

If this Form III Verification relies on a previous FINAL verification or Commissioner Approval, complete the box below:

Type of Verification	Date of Verification	Rem#	Ver#	No-Audit letter issued?	Verification Rejected?
Form II					
<input type="checkbox"/>	<input type="checkbox"/> Property	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
	<input type="checkbox"/> Business	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

### B. Significant Environmental Hazard

Was a significant hazard, as defined in §22a-6u identified?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Significant Hazard Notification filed?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A



# Changes to beginning of soil and groundwater sections



Connecticut Department of Energy and Environmental Protection

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# Part IV: Standards for Soil Remediation

- Section Name changed and headers added to options
- Part IV: Standards for Soil Remediation
  - A. Release Determination and Investigation
    1. No Releases to Soil
    2. Releases to soil – No remediation or other compliance measure required
    3. Release to soil – Remediation or other compliance measure required



# Part IV: Standards for Soil Remediation

*Check either #1, #2, or #3 below to indicate the final assessment of release determination and investigation completed at the subject property for all potential releases applicable to the pertinent date of this verification.*

## A. Release Determination and Investigation

1.  **No Releases to Soil.**

All potential releases to soil applicable to the pertinent date of this verification have been investigated ... and there were no detected concentrations of a substance in soil.

If #1 checked, skip to Part V [Groundwater Remediation Standards] below.

2.  **Releases to Soil – No Remediation or other Compliance Measure Required.**

Substances, applicable to the pertinent date of this verification, were detected in soil, but ... less than criteria before remediation or initiation of other compliance measure.

If #2 is checked, skip to Part IV. C [Application of Standards for Soil Remediation] below.

3.  **Releases to Soil – Remediation or other Compliance Measure Required**

Substances in soil at the site and associated with a release applicable to the pertinent date of this verification exceeded criteria at any time. Complete the information in the box below.

Criterion Exceeded	Category of COC	Compliance Measure
--------------------	-----------------	--------------------



# Part IV: Standards for Soil Remediation – Form III Business

## Part IV: Standards for Soil Remediation

*Check either #1, #2, or #3 below to indicate the final assessment of release determination and investigation completed at the subject property for all potential releases associated with business operations and applicable to the pertinent date of this verification.*

### A. Release Determination and Investigation

1.  **No Releases to Soil.**

All potential releases to soil associated with business operations and applicable to the pertinent date of this verification have been investigated in accordance with prevailing standards and guidelines, including the SCGD (Phase II ESA) or other equal alternative approach, and there were no detected concentrations of a substance in soil.

If #1 checked, skip to [Part V \[Groundwater Remediation Standards\]](#) below.

2.  **Releases to Soil – No Remediation or other Compliance Measure Required.**

Substances associated with business operations and applicable to the pertinent date of this verification were detected in soil, but all detected concentrations of substances in soil were less than criteria before remediation or initiation of other compliance measure.

The nature and distribution of all releases associated with business operations and applicable to the pertinent date of this verification have been characterized in accordance with prevailing standards and guidelines, including the SCGD (Phase III Investigation) or equal alternative approach.

If #2, in its entirety, is checked, skip to [Part IV. C \[Application of Standards for Soil Remediation\]](#) below.

3.  **Releases to Soil – Remediation or other Compliance Measure Required**

Substances in soil at the site and associated with a release associated with business operations and applicable to the pertinent date of this verification exceeded criteria at any time, Complete the information in the box below.

Criterion Exceeded	Category of COC	Compliance Measure



# Part V: Groundwater Remediation Standards

- Similar changes to Soils section
- New forms clarify that compliance monitoring sections should be filled out for any PMC soil remediation

## Part V. Groundwater Remediation Standards

*Check either #1, #2, or #3 below to indicate the final assessment of release determination and investigation completed at the subject property for all potential releases applicable to the pertinent date of this verification.*

### A. Groundwater Impact Determination and Plume Investigation

1.  **No Releases to Groundwater**

All potential releases to groundwater applicable to the pertinent date of this verification have been investigated in accordance with prevailing standards and guidelines, including the SCGD or equal alternative approach, and groundwater has not been impacted.

And soil remediation for PMC was not required. Therefore groundwater compliance monitoring was not required. If checked, skip to [Part VI. \[Receptors\]](#) below.

However, soil remediation for PMC was required. Therefore groundwater compliance monitoring was required. If checked, skip to [Part V. B. \[Application of Groundwater Remediation Standards\]](#) below.

2.  **Releases to Groundwater –Remediation or other Compliance Measure was not Required**

Substances, applicable to the pertinent date of this verification, were detected in groundwater, but all detected substances in groundwater were less than criteria before remediation or initiation of other compliance measure.

The nature and distribution of all plumes associated with all releases applicable to the pertinent date of this verification have been characterized in accordance with prevailing standards and guidelines, including the SCGD (Phase III Investigation) or equal alternative approach.

If #2 is checked, skip to [Part V. B.](#) below.

3.  **Releases to Groundwater – Remediation or other Compliance Measure was Required**

Substances in groundwater, and associated with a release applicable to the pertinent date of this verification, exceeded criteria at any time.

The nature and distribution of all plumes associated with all releases applicable to the pertinent date of this verification have been characterized in accordance with prevailing standards and guidelines, including the SCGD (Phase III Investigation) or equal alternative approach.

If #3 is checked, complete the information in the box below.



# New Compliance Measures Section



Connecticut Department of Energy and Environmental Protection

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# Part IV: Soil Compliance Measures

- Added section facilitates review of verification package
- Consolidates some info from other sections

## B. Compliance Measures

1. Excavation
2. Engineered control
3. In-Situ Remediation
4. Institutional / Administrative Compliance Measures
5. Other



# Part IV: Standards for Soil Remediation

## B. Compliance Measures

### 1. Excavation

<input type="checkbox"/>	Remediation excavation of polluted soil was conducted to achieve compliance	Applicable Release Area (RA) ID #'s
	Details related to the remedial excavation of polluted soil are discussed at Page#/Section # in the VR: [REDACTED]	
<input type="checkbox"/>	Polluted soil meeting definition of <b>hazardous waste</b> per CGS 22a-449(c) was located on site and was treated, stored, disposed, and/or transported in conformance with RCRA section 22a-449(c)-101 through 110.	22a-133k-2(h)(1) [REDACTED]
<input type="checkbox"/>	The Commissioner authorized the disposal of polluted soil as <b>special waste</b> , as defined in RCRA section 22a-209-1	22a-133k-2(h)(2) [REDACTED]
	Approval date(s): [REDACTED] [REDACTED] [REDACTED]	→ Copy(s) of Approval(s) must be attached
<input type="checkbox"/>	Polluted soil reused on-site	22a-133k-2(h)(3) [REDACTED]
	Total volume excavated soil reused on site: [REDACTED]	
<input type="checkbox"/>	Polluted soil reused off-site (Commissioner approval)	22a-133k-2(h)(3) [REDACTED]
	Approval date(s): [REDACTED] [REDACTED] [REDACTED]	→ Copy(s) of Approval(s) must be attached
	Total volume of excavated soil removed from site: [REDACTED]	



# Part IV: Standards for Soil Remediation

## 2. Engineered Control

<input type="checkbox"/>	Engineered Control of Polluted Soil (Commissioner approval and ELUR has been recorded)	22a-133k-2(f)(2)	Applicable Release Area (RA) ID #'s
<input type="checkbox"/>	Use of Engineered Control for DEC	...(B)(i)(I)	<input type="checkbox"/>
	Approval date(s): <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	→Copy(s) of Approval(s) must be attached	
	Date Certificate of Title for recordation of ELUR submitted to Commissioner: <input type="checkbox"/>		
	→Copy of Certificate of Title page (with volume, page, and date recorded) must be attached		
<input type="checkbox"/>	Use of Engineered Control for PMC	...(B)(i)(II)	<input type="checkbox"/>
	Approval date(s): <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	→Copy(s) of Approval(s) must be attached	
	Date Certificate of Title for recordation of ELUR submitted to Commissioner: <input type="checkbox"/>		
	→Copy of Certificate of Title page (w/ volume, page, and date recorded) must be attached		
<input type="checkbox"/>	Financial Surety (Required for Commissioner-Approved EC or TI Variance)		
	Type of Financial Surety Mechanism established: <input type="checkbox"/>		
	Date Financial Surety Mechanism information submitted to Commissioner: <input type="checkbox"/>		
	→Copy of the Financial Surety Mechanism must be attached		
<input type="checkbox"/>	Financial Surety Mechanism was established for an EC covered under a previous verification.		
<input type="checkbox"/>	If yes, the financial surety mechanism has been confirmed to still be in place and remains valid.		



# New Verification Forms

- Draft forms have been posted on the Remediation Division website for public comment until **April 29, 2016**
- New forms will be finalized shortly after
- Let us know how these forms can work best for you!

[Claire.Foster@ct.gov](mailto:Claire.Foster@ct.gov) &  
[Robert.Robinson@ct.gov](mailto:Robert.Robinson@ct.gov)



# Questions / Comments

Please speak loudly.



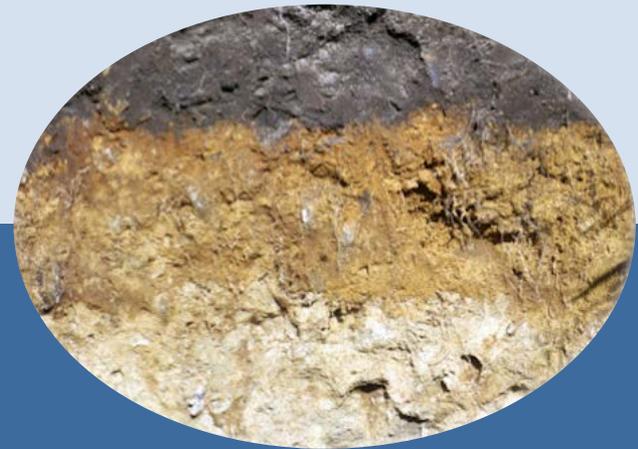
[www.ct.gov/deep/remediationroundtable](http://www.ct.gov/deep/remediationroundtable)



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# Background Workgroup Report Out: Current State RSR Guidance

Carl Gruszczak  
Environmental Analyst II  
Remediation Division



Connecticut Department of Energy and Environmental Protection

# External Workgroup Members

- Gail Batchelder – HRP Associates
- Brian Conte – GEI Consultants
- Christopher Frey – GZA GeoEnvironmental, Inc.
- Eric Henry – Kleinfelder
- Jamie Jarvis – Lender Consulting Services, Inc.
- Jim Morrison – Antea Group
- Brian Washburn – HRP Associates
- Tim Whiting – Ramboll Environ



# Workgroup Progress

Workgroup has been meeting since  
June 2014



Workgroup has provided input:

- Release Determination Considerations
- Wave 2 RSR Change Recommendations



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CARL GRUSZCZAK

# Workgroup Output

So, where does that leave us?

Still a need for “Current State”  
guidance

Workgroup has prepared this  
Guidance Document to serve this need



# Introduction

- Purpose & Scope
  - Companion to the SCGD
- RSR Definitions
  - Based on current 1996/2013 definitions
  - Incorporates both soil and groundwater



# Background Component of CSM

- Builds on the SCGD concepts
- Understanding Site History / Environmental Setting
  - Geologic setting, fill placement, cultural setting, and operational history
  - Spatial and temporal variability



# Background Component of CSM cont'd

- COCs
- Natural or Anthropogenic Origin
  - Natural is the “classic” concept
  - Anthropogenic acknowledges human influences:
    - Polluted fill, Upgradient plumes, atmospheric deposition examples



# Purpose and Scope of Background Demonstration

- Discuss differences between three uses for background:
  - Release Determination
  - Release Area Delineation
  - Remedial Objective



# Purpose and Scope of Background Demonstration cont'd

- Release Determination
  - Multiple lines of evidence
  - Naturally occurring substances
  - Non-naturally occurring substances
    - Not an expected background concentration
    - More robust demonstration



# Purpose and Scope of Background Demonstration cont'd

- Release Area Delineation
  - Multiple lines of evidence
  - Data Quality Objectives
  - Overlapping releases
    - Differentiate & handle separately



# Purpose and Scope of Background Demonstration cont'd

- Remedial Objective
  - Meet current RSR requirements
    - Either criteria or single background value as cleanup goal
  - Soil
  - Groundwater
    - May be a concentration or non-detect



# Data Evaluation

- Single value (compliance & delineation)
- Range of values (release determination)
  - Statistical Evaluation
  - Graphical Comparison (histograms, whisker diagrams, etc.)
  - Outliers



# Data Evaluation cont'd

- Reporting Limits
- Multiple Lines of Evidence
  - Examples provided
  - Some require careful evaluation
  - Site specific sampling given more weight
    - Required for cleanup goal



# Data Evaluation cont'd

- Documentation
  - Extremely important (common issue)
  - Examples of pertinent information
  - Communicate in a way that unfamiliar reader can follow chain of logic
    - Relationship between the components



# Additional Considerations

- Discusses some common “not so straightforward” scenarios:
  - Polluted Fill
  - Plume Interactions
  - Mobilization Due to a Release



# Status of Document

## Current Status:

- Internal DEEP review- **completed**
- Adjustment based comments

## Future Status:

- Finalize and distribute
- Timeframe dependent on other tasks



# Workgroup Next Steps

TBD (currently on hiatus) - Envision need for revised Guidance after Wave 2 RSR changes implemented



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**CARL GRUSZCZAK**

# Questions / Comments

Please speak loudly.



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# Deputy Commissioner Michael J. Sullivan



Connecticut Department of Energy and Environmental Protection

# RSR Wave 2 Conceptual Language Roll Out Process with Q and A

Jan Czczotka, Remediation Division Assistant Director

Robert Bell, Remediation Division Assistant Director

Maurice Hamel, Remediation Division Environmental Analyst 3

Kevin Neary, Remediation Division Environmental Analyst 3

Carl Gruszczak, Remediation Division Environmental Analyst 2

Camille Fontanella, Remediation Division Environmental Analyst 3



# Steps Prior to Formal Process

- Discussion Documents (August 2013 - April 2016)
- **RSR Wave 2 Conceptual Language (April 6, 2016) 100± pages**
- Question and Answer Sessions (April 2016)
- Public Feedback (through May 6, 2016)
- Evaluation/incorporation of public feedback and Final Draft to Commissioner (May 2016)
- Begin formal regulation adoption process (Anticipated July/August 2016)



# Formal Regulation Adoption Process

1. Public Notice of Intent to Secretary of State
2. Public Hearing
3. Hearing Officer's Report
4. Final proposed regulations to the Commissioner
5. DEEP notification to all interested parties of availability of final wording



# Formal Regulation Adoption Process

6. Final proposed regulations to Attorney General for Legal Sufficiency approval
7. Final proposed regulations to Office of Fiscal Analysis and Environment Committee
8. LRRC hold meeting on regulatory amendments per CGS section 4-170
9. Regulations filed with Secretary of State per CGS section 4-172 (Regulations final upon filing)
10. Publication of Regulations in the CT Law Journal



# Dates to Remember

- **April 26** ( 1:30-3:30 pm)  
Gina McCarthy Auditorium  
DEEP Headquarters, Hartford
- **April 28** (1:30-3:30 pm)  
Kellogg Environmental Center  
500 Hawthorne Avenue, Derby
- **At any time** you may send your feedback and questions to [DEEP.cleanup.transform@ct.gov](mailto:DEEP.cleanup.transform@ct.gov)



# Question and Answer Session Topics

Alternative SWPC	Alternative PMC	Self-Implementing EC
Volatilization 15ft/30ft	Public Notice	Financial Assurance
Widespread Polluted Fill	Historically Impacted Materials	Background
APS	SWPC 95% UCL Provision	VolC Mitigation EUR
Definitions	<b>ANY OTHER RSR CONCEPT YOU WANT TO DISCUSS</b>	



# Questions / Comments

Please speak loudly.



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# Structure of Conceptual Document

- Contains only sections with proposed changes
- Each section has:
  - Concept – outlining change
  - Current language
  - Proposed language
- Breakdown of conceptual language:
  - Red underlined is added language
  - [Blue bracketed is deleted language]



# Structure of Conceptual Document

**22a-133k-3(d)(2)**

**(Applicable Criteria)**

(CONCEPT)

*If a site has groundwater data prior to conducting soil or groundwater remediation and that data indicates the concentration is below the GWPC, active groundwater remediation should not be required to reach background. After both soil and groundwater remediation compliance monitoring must be conducted to demonstrate compliance with the GWPC.*

(CURRENT LANGUAGE)

**(d) Applicability of Ground-water Protection Criteria.**

(1) Ground water in a GA area may be remediated to a concentration...

(2) If prior to any ground-water remediation the maximum concentration of a substance in a ground-water plume in a GA area is equal to or less than the ground-water protection criteria, remediation of ground water to achieve background ground-water concentration is not required, provided that the extent of the ground-water plume is not increasing over time and, except for seasonal variations, the concentration of the subject substance in such ground-water plume is not increasing at any point over time.

(PROPOSED LANGUAGE)

**(d) Applicability of Ground-water Protection Criteria.**

(2) If prior to any **soil or** ground-water remediation the maximum concentration of a substance in a ground-water plume in a GA area is **and has been** equal to or less than the ground-water protection criteria, remediation of ground water to achieve background ground-water concentration is not required **for a diminishing state groundwater plume, [provided that the extent of the ground-water plume is not increasing over time and, except for seasonal variations, the concentration of the subject substance in such ground-water plume is not increasing at any point over time.]**



# Alternative SWPC

- Add distinction for tidal vs non-tidal surface water bodies
- Add aquifer dilution for surface water bodies > 500 feet
- Alternatives not to be stacked
- Commissioner option still available
- Provide guidance for options



# Alternative SWPC

- Non-tidal surface water bodies – continue to use 7Q10 until such time WQS are updated to Q99:

$$DF = (0.25 \times Q99) / Q_{\text{plume}}$$

- Still self-implementing
- Capping of Dilution Factor



# Alternative SWPC

- Previously, discharge to tidal surface water bodies would require Commissioner approval

- Adding New Tidal Calculation:

$$DF = ((W \times 0.25) \times L \times D) / (0.5 \times Q_{\text{plume}})$$

- Self-implementing
- Capping of Dilution Factor



# Alternative SWPC

Aquifer dilution for surface water bodies greater than 500 feet from source – addition

- Based on USGS Natural Attenuation Modeling software
- Used conservative input values
- Sensitivity analysis showed importance of
  - On-site concentration decrease
- Developed simple calculation
- Must be Diminishing State Groundwater Plume
- Self-implementing



# Alternative SWPC

- Need to show onsite decrease in concentration
  - Within 50 feet of source area, concentration must decrease by factor of 5
- If have onsite decrease and surface water discharge point is at least 500 ft. away
  - Multiply SWPC by dilution factor of 5
- Dilution factor may increase by a factor of 1 for every additional 100 ft. from surface water discharge point
  - Max dilution factor of 10



# Questions / Comments

Please speak loudly.



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# Pollutant Mobility Criteria

- Metals mass result divided by 20 for comparison with SPLP criteria - added
- Site-specific dilution factor calculation in GB areas revised from 15 ft. to use of aquifer mixing zone formula
  - a default value of 5 ft. can still be used
- Alternative PMC calculation - added



# Pollutant Mobility Criteria

## 22a-133k-2(c)(1)(B)(ii)

## (Mass analysis)

### (CONCEPT)

*Modify language to allow use of mass metals analyses for PMC compliance because the 20:1 diluting for the SPLP analysis is built in not to exceed criteria.*

### (CURRENT LANGUAGE)

(B) An inorganic substance or PCB in soil above the seasonal low water table, or above the seasonal high water table if (i) remediation to the seasonal low water table is not technically practicable or would not result in the permanent elimination of a source of pollution or (ii) the subject soil is located in a GB area, shall be remediated to at least that concentration at which the results of a TCLP or SPLP analysis of such soil for such substance does not exceed the pollutant mobility criterion applicable to the ground-water classification of the area at which such soil is located, except that in the circumstances identified in subdivision (2) of this subsection, remediation to achieve compliance with the pollutant mobility criteria may be conducted in accordance with the requirements established in said subdivision (2).

### (PROPOSED LANGUAGE)

- (B) (i) An inorganic substance or PCB shall be remediated to at least [that] the concentration at which the results of a TCLP or SPLP analysis, or the results of the mass analysis in mg/kg divided by 20 for such substance does not exceed the applicable pollutant mobility criterion in mg/L [such soil] for such substance [does not exceed the pollutant mobility criterion applicable to the ground-water classification of the area] at which such soil is located in soil above the seasonal low water table, or above the seasonal high water table if (i)
- (i)(aa) remediation to the seasonal low water table is not technically practicable or would not result in the permanent elimination of a source of pollution (i) or
  - (i)(bb) the subject soil is located in a GB area,
- (ii) except that in the circumstances identified in subdivision (2) of this subsection, remediation to achieve compliance with the pollutant mobility criteria may be conducted in accordance with the requirements established in said subdivision (2).



# Alternative PMC

- Self-implementing
  - 4Q representative GW sampling
  - GW in GA (or in GB, if a source of drinking water):  
< GWPC, < SPWC/Aquatic life, <VolC
  - GW in GB: < SPWC/Aquatic life, <VolC
  - Diminishing State Plume
  - Cannot be used in conjunction with other  
Alternative criteria options for the same substance
- Site-specific fate and transport evaluation



# Questions / Comments

Please speak loudly.



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# Wave 2 Changes to Engineered Controls

- Self-implementing engineered control (EC)
  - Default designs to address DEC
- Expand EC to include concept of Immobilization
  - Below the water table - low permeability alternative to a cap
  - Stabilization - chemically or physically reduce leachability
- Change the way that financial assurance is handled



# Self-Implementing Engineered Controls

## Types:

- Non-paved surfaces with vegetation, mulch, gravel
- Non-paved surfaces with shrubbery
- Non-paved surfaces made of hardscape
- Surfaces paved with bituminous or concrete
- Solar array – large block ballast



# Self-Implementing ECs

- "Hardscape" means durable materials in landscape features
  - Concrete or asphalt sidewalks
  - Pavers
  - Gravel parking areas and driveways
  - Paved or gravel storm water features
  - Rip-rap
  - Non-vegetated retaining walls
  - Lined water features



# Self-Implementing ECs

- (iii) for non-paved surfaces, consisting of hardscape:
  - (aa) a minimum nine inches as a combined thickness of hardscape and suitably engineered sub-base, consisting of material not exceeding applicable criteria and a demarcation layer;
  - (bb) Inspections accompanied by appropriate repair shall be conducted each spring and after significant storm events, and annual reports shall be submitted to the Commissioner;
  - (cc) a areas with existing hardscapes are exempt from the need to install a demarcation layer, but shall be inspected and repaired semi-annually;
  
- (iv) for paved surfaces:
  - (aa) a minimum of two and one-half (2.5) inches of bituminous concrete or three inches of reinforced concrete, and six inches of suitably engineered sub-base consisting of material not exceeding applicable criteria or is in compliance with section 1(a)(32)(C) and a demarcation layer;
  - (bb) Inspections accompanied by appropriate repair shall be conducted each spring, (and) annual reports to the Commissioner;
  - (cc) areas with existing paved surfaces are exempt from the need to install a demarcation layer;



# Self-Implementing ECs

- Default designs provided:
  - Soil/Mulch/Gravel:
    - Layer of clean material, demarcation layer, inspection, and annual reports for non-paved areas
  - Hardscape/Bituminous/Concrete Surface:
    - Sub-base, demarcation, inspection, and annual reports
  - Solar Array
    - Demarcation, inspection, and annual reports



# Self-Implementing ECs - Process

## Requirements:

- Public Notice
- Financial Assurance
- PE stamp and seal
  - Pavement and hardscapes as-builts



# Questions / Comments

Please speak loudly.



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# Remediation Roundtable



E-mail: [DEEP.remediationroundtable@ct.gov](mailto:DEEP.remediationroundtable@ct.gov)

Web: [www.ct.gov/deep/remediationroundtable](http://www.ct.gov/deep/remediationroundtable)



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# REMEDIATION ROUNDTABLE

Next meeting: June 21, 2016



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