



Connecticut Department of Energy and Environmental Protection



Risk-Based Decision-Making Recommendation Report

April 28, 2015



Connecticut Department of Energy and Environmental Protection

Agenda

- Introduction
- What is Risk Assessment, Risk Management
- DEEP's Benchmarking
- CDM's Recommendations, and DEEP's Evaluation and Action Plan
- Conclusion
- Questions



Risk Evaluation process

- DEEP to evaluate risk-based decision-making
 - Use independent experts, broad national experience
- CDM Smith selected, competitive process
- Scope developed by DEEP, along with DPH and stakeholder representative
- CDM Report – August 29, 2014
- Public Comments – October 1, 2014
- DEEP Report – April 15, 2015



Risk Assessment, Risk Management and DEEP's Benchmarking



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Risk Assessment

- Risk Assessment is a structured scientific study to determine the potential for health impacts to human and ecological populations
- Provides information to assist in decision making





Risk Management

- Risk Management

- Determination of how best to protect human and ecological health
- Identifies actions to be taken

- CGS 22a-133k: Factors considered include

Fully protect health/env*	Permanent cleanup methods*
Distinguish indus/comm*	Risk assessment results
Technical Considerations	Technological Factors
Economic Factors	Laws/Legal decisions
Social Factors	

*indicates stated in statute





Risk Based Decision Making

Assessment

Management

Exposure + Effects



Risk



No Action

Action





DEEP State Benchmarking Efforts

- DEEP staff conducted direct comparisons of risk program with other States
- Same list as the CDM report (MA, RI, VT, NJ, NY, NH, ME, CA, TX, MT, MI, IL, and British Columbia)
- Utilized survey and found information and criteria via online search
- Results included as Appendix C in DEEP Report





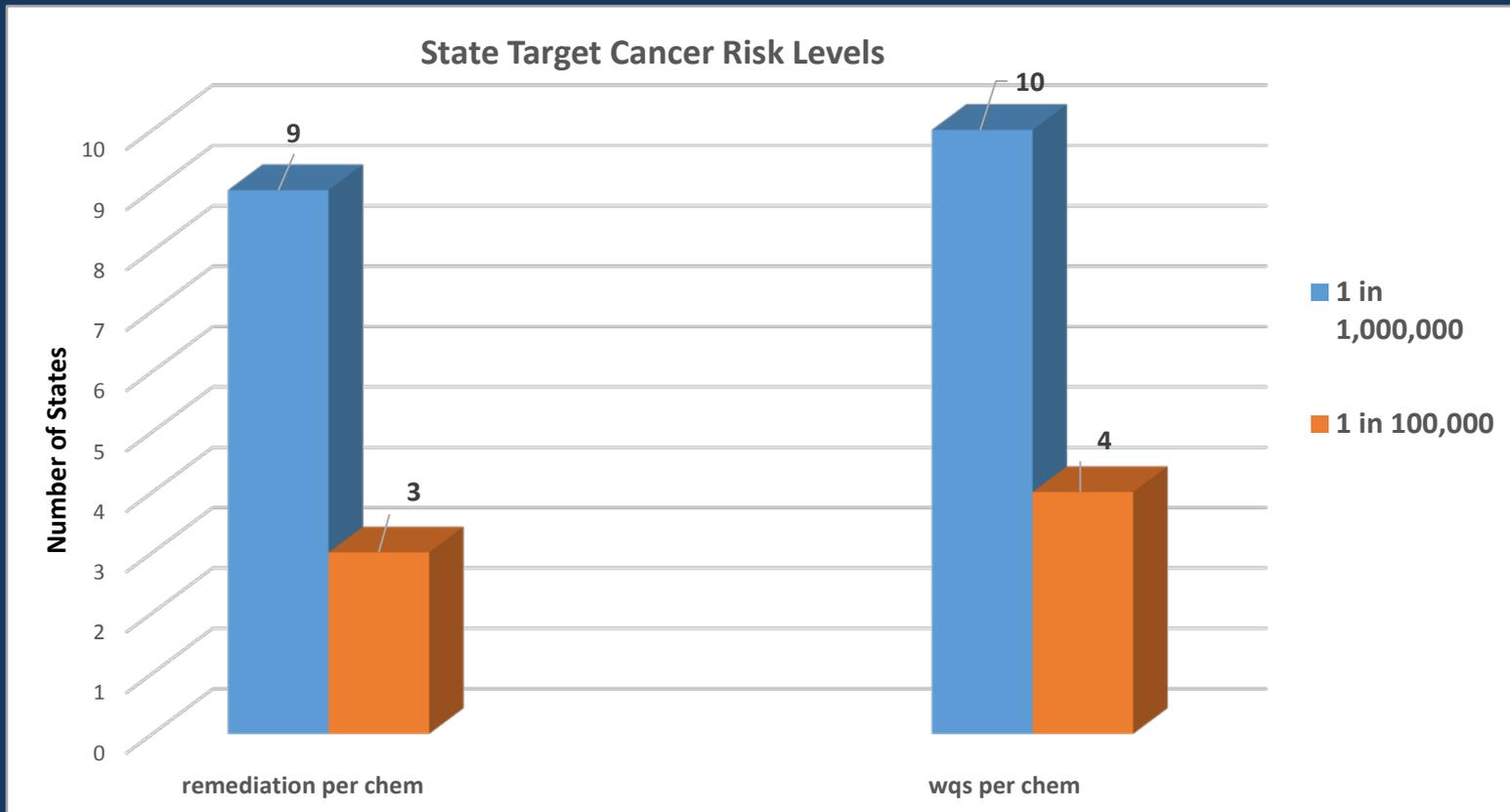
DEEP State Benchmarking Efforts

- Water Quality Standards(WQS) reviewed along with Risk Documents
 - Broad policy statement on acceptable risk
 - CT RSRs linked with WQS criteria (SWPC, GWPC, PMC)
- Example seen in GA waters defined as usable with no treatment when no carcinogen is present > 1 in 1 Million (WQS (22a-426-7 (a)(3)(B))





DEEP State Benchmarking Efforts



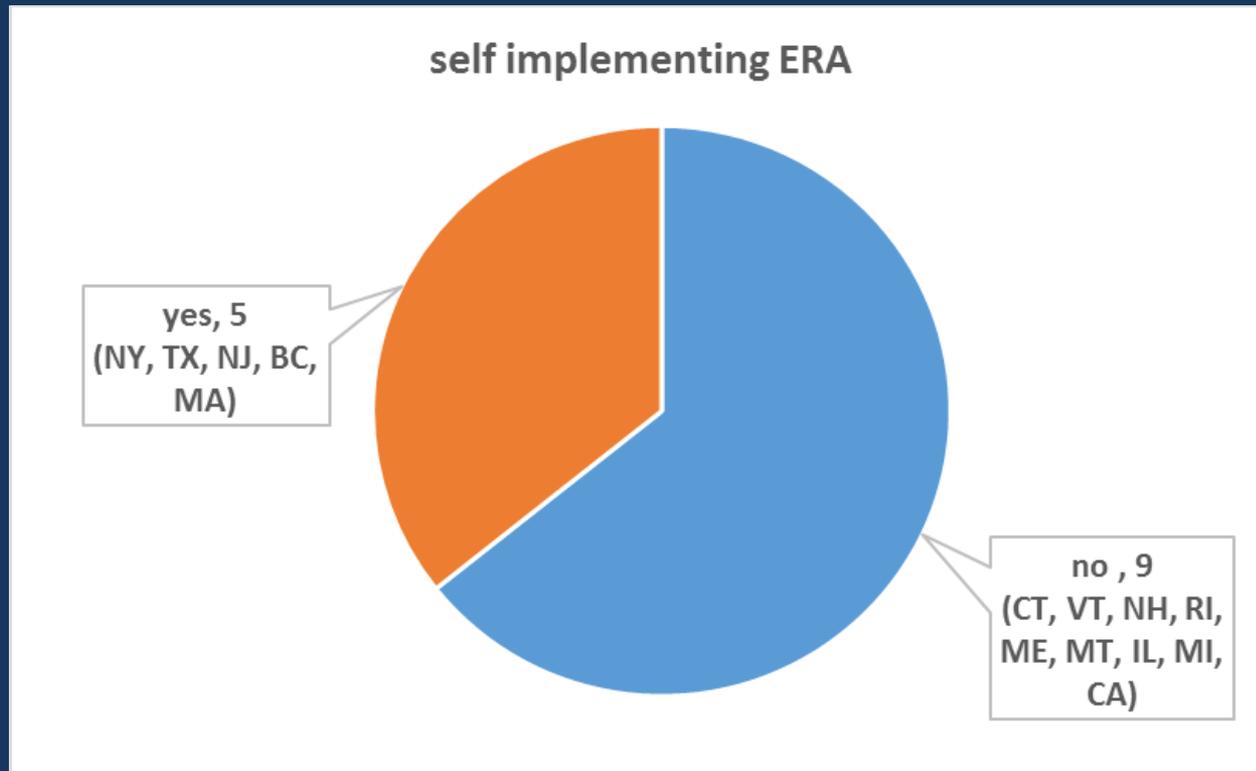
example of risk goal graph

- Data from survey into graphs





DEEP State Benchmarking Efforts



example of risk procedure graph

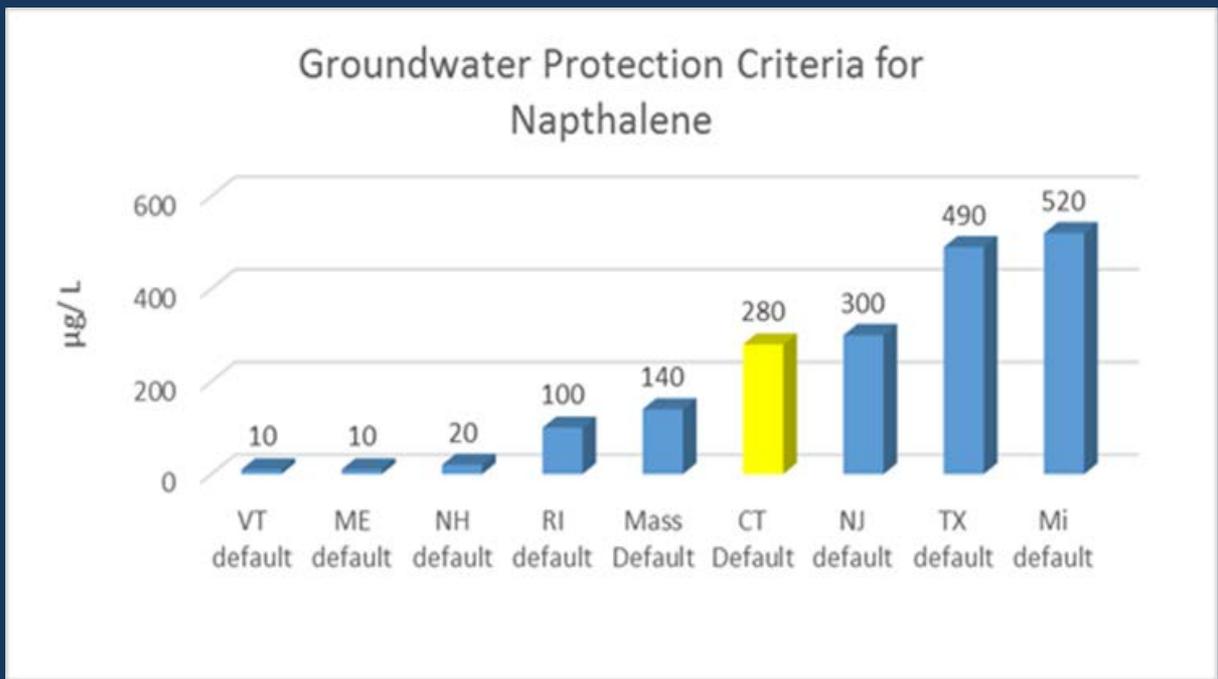
- Data from survey into graphs





DEEP State Benchmarking Efforts

- Direct Comparisons of criteria
- Soil (DEC) and Groundwater (GWPC)
- WQS



Example of criteria comparison graph



DEEP State Benchmarking Efforts

- Most of the questions reviewed, CT was in-line with the majority of States
- Criteria comparisons place CT in the middle of concentration range among other states
- Similar results to CDM Report when compared to “Best Practices”, CDM scored CT programs at median for ERA and above median for HHRA



CDM's Themes and Recommendations & DEEP's Conclusions and Plan



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CDM's Themes – where CT is

- CT's cleanup standards (RSRs) are similar to surrounding states
 - No bias in CT
- CT's risk assessment approach for polluted soil is generally valid, similar to EPA/many states
- CT's human health risk approaches are in top half of “best practices” of states CDM evaluated
- Opportunities for change
 - 6 recommendations



CDM Recommendation 1 - RA

1. move Human Health Risk Assessment function from DPH to DEEP

- Note: DPH performs human health Risk Assessment (RA) in CT as required pursuant to CGS 22a-1i



Recommendation 1: DEEP's Analysis

- DPH has human health risk assessment responsibilities for many other state programs
 - Moving HHRA for site cleanup to DEEP would
 - decrease HHRA consistency
 - require funding of additional positions
 - adding redundancy at DEEP would have costs with little to no value-added
- DEEP concludes that current structure works
 - DPH responsible for human health risk assessment
 - DEEP responsible for ecological risk assessment
 - good collaboration between agencies



CDM Recommendation 2

Brownfields



CDM Recommendation 2

Provide process for public/local government to propose non-standard solutions to promote public health in communities burdened with brownfield sites



Former US Baird
Machine Co., Stratford



Now Two Roads Brewing Company
Connecticut's largest brewery



DEEP Plan- Recommendation 2

- Continue to develop flexible remedy options for all sites including brownfields, match risk to remedy options
 - Won't develop different health based goals for different communities
 - Will continue to work/discuss ideas with municipalities



Before-April 2012



After- February 2015

Knowlton Street Park Bridgeport



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Increase Flexibility / Work With Municipalities

It's Already Happening

- \$125 M grants/ loans since 2012
- Targeted brownfield remedy
- RSR Wave 1 amendments (2013)
- Liability relief programs (ABC, BRRP, Municipal)
- Contaminated soil improvements: polluted fill urban soil, background conditions
- **PREPARED Municipal Workbook**

– New!

American Woolen Mills, Stafford
ABC Program, 2014



Increase Flexibility / Work With Municipalities

Work in Progress

- RSR “Wave 2” amendments
- Liability relief programs will continue
- DECD grants & loans will continue
 - Municipal grant round applications closed April 2015
- DECD legislative proposals include planning grants



Remington Shaver- Bridgeport



Increase Flexibility / Work With Municipalities

Future Ideas

- Food production/ farmer's markets
 - Especially in food deserts/ areas with little land for gardening
 - Remedy will be protective for selected land use
 - New brownfield presumptive remedy for food production if local interest

Shelton Farmer's Market
Former BF Goodrich Plant



CDM Recommendation 3

Numeric Criteria



CDM Recommendation 3

- i. *“DEEP fully and electronically document all of the underlying assumptions, models, exceptions, and other aspects of each default criterion in the RSRs;*
- ii. *DEEP consider updating these criteria, per British Columbia’s criteria, to account for risks to soil invertebrates and to plants as well as for risks to public health; and*
- iii. *to the extent that legislative involvement is currently required before criteria are updated, this requirement be modified to grant DEEP the requisite authority.”*



Need for Transparency

- Transparency identified as a component of best practices
- DEEP Concurrs
 - Since 1996, DEEP has published technical guidance on criteria recommendations
 - Will continue to do so
 - Developed supporting information on 1996 RSR Criteria

Petroleum Hydrocarbons Using the EPH/VPH/APH Analytical Methods and Criteria Development

TECHNICAL SUPPORT DOCUMENT

Connecticut Department of Energy and Environmental Protection
Connecticut Department of Public Health
July 2012



Recommendation 3i. RSR Documentation

- **Done**
 - Web page link provided on main Remediation Programs page
 - Helpful web links
 - Embedded documents
- Info on Calculating Risk-based Criteria
- Discussion of Types of Criteria
 - Equations
 - Assumptions
- Derivation of Final Criteria

The screenshot shows the website for the Connecticut Department of Energy & Environmental Protection. The main heading is "1996 Development of Connecticut's Risk-Based Remediation Standards (RSRs)". Below this, there is a paragraph explaining that on January 30, 1996, the department promulgated the Remediation Standard Regulations (RSRs) for soil, groundwater, and soil vapor. A pie chart titled "Chemicals Included in 1996 RSRs" shows the distribution of 88 chemicals: Inorganics (32), PCBs (1), Pesticides (13), Semivolatile Organics (20), and Volatile Organics (17). Below the chart, there is a section titled "Calculating Risk-Based Remediation Criteria" which describes the public process used to develop the RSRs. At the bottom, it mentions that EPA's Risk Assessment Guidance for Superfund (RAGS) was an important source of guidance.

Chemical Type	Count
Inorganics	32
PCB	1
Pesticides	13
Semivolatile Organics	20
Volatile Organics	17
Total	88



3ii. Updating Criteria to Include Eco Protection

- CDM
 - Addressing both Eco and Human Health protection is identified as a Best Practice
 - Identifies a gap in RSR criteria for ecological protection
 - Recommends integrating ecological protection into RSR soil criteria
- DEEP agrees:
 - Concurs with Best Practice recommendation
 - Concurs there is a gap
 - Agrees with need to protect both human and ecological health



3ii. Updating Criteria to Include Eco Protection

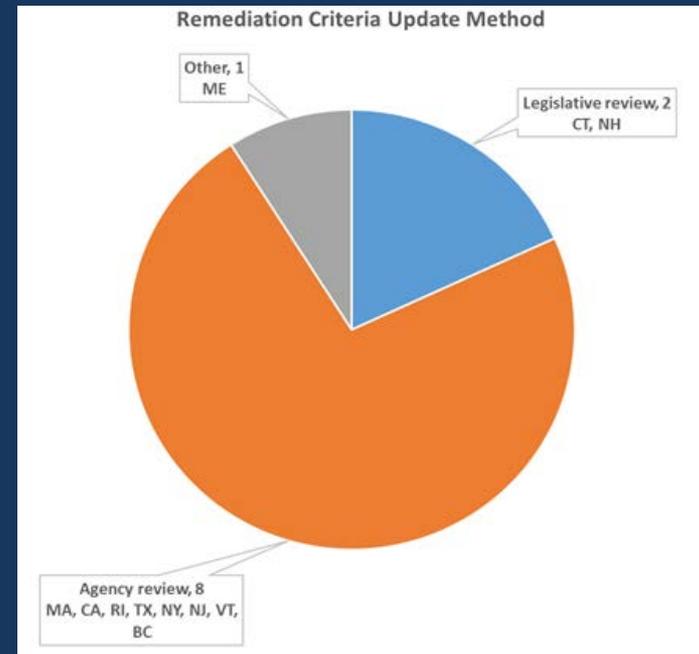
- DEEP recommends different approach
 - Publish ecologically based benchmarks as part of comprehensive ecological risk assessment guidance



3iii. Process to Update Criteria

- CDM recommends use of non-legislative procedures to adopt or modify risk-based criteria

DEEP Benchmarking Study Finding:



CDM & DEEP Benchmarking studies confirm that most states do not use a legislative process to update or adopt remediation criteria



3iii. Process to Update Criteria

- CT Legislature included legislative review in CT's regulatory adoption process
- DEEP not recommending changes to legal process for regulation promulgation



3iii. Process to Update Criteria

- DEEP proposes alternate approach for next criteria process

- Establish Independent Science Advisory Board

Fall 2015

- DEEP, DPH and SAB work to update criteria

2016

- After SAB process, seek public input

- Then proceed to a regulatory adoption process

Dependent on time needed to work with SAB



DEEP: Additional Criteria Topics

- Criteria review and update process to take time
- In interim, DEEP seeks to improve on-going criteria activities
 - Additional Polluting Substances (APS)



DEEP Additional Recommendation

Interim Tiered APS Process

1. Select from list of DEEP Recommended APS Criteria
2. Calculate APS criteria using RSR default assumptions
3. Calculate APS criteria using Site-specific assumptions or risk assessment

June 2015

Fall 2015

Fall 2015



CDM Recommendation 4

Ecological Risk Assessment & Management



CDM Recommendation 4

- *"Fourth, we suggest that DEEP adopt and, as needed, adapt the successful ecological risk assessment and ecological risk management programs already in place in Massachusetts and in British Columbia."*



Develop Risk Assessment Guidance

DEEP concurs with CDM recommendation to develop guidance for Ecological Risk Assessment

- DEEP Produce Draft ERA Guidance in 2016
- Provide draft guidance for public review and comment

Use Best Practices

Based on Current Science

Consider Other Programs

Tiered Approach

Incorporate Practical Considerations



Potential Tiered Approach to Eco Risk

Scoping Level Assessment

- Evaluate the potential for eco risks to occur due to site related activities
- Based on basic site information

Screening Level Assessment

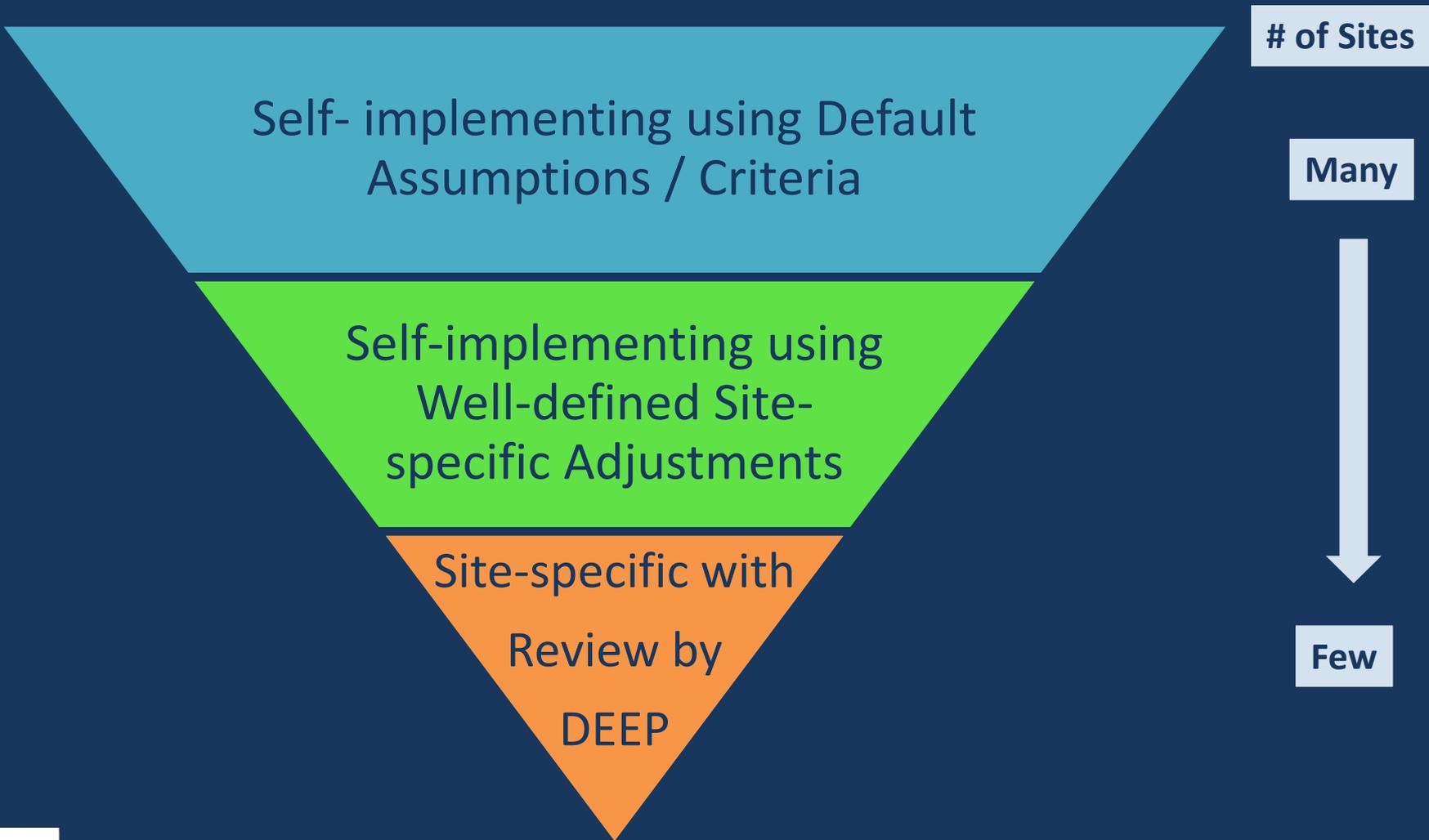
- Are ecological risks occurring or expected to occur due to site activities?
- Comparison to default ecological benchmarks or models
- Evaluate potential for site-specific adjustments

Site-Specific Assessment

- Are ecological risks occurring or expected to occur due to site activities?
- More detailed analysis, going beyond comparison to benchmarks and use of models



Risk Based Processes: Tiered Approach



Integration of Eco Risk into Remediation Process

- CDM Recommends Relating Eco Risk Process with Site Characterization Process
 - Phased approach to defining environmental conditions at a site
 - Support decisions regarding the need to remediate
 - Conceptual Site Model Approach
- DEEP Concurs

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SITE CHARACTERIZATION GUIDANCE DOCUMENT



September 2007

Revised December 2010

Aimey Marrella, Commissioner

79 Elm Street, Hartford, CT 06106
www.ct.gov/dep/remediation
860-424-3705



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CDM Recommendation 5

Site-Specific Risk Assessment



CDM Recommendation 5

“Fifth, we suggest that DEEP encourage the use of advanced, site-specific risk assessment for sites where application of RSR default criteria may be inappropriate”



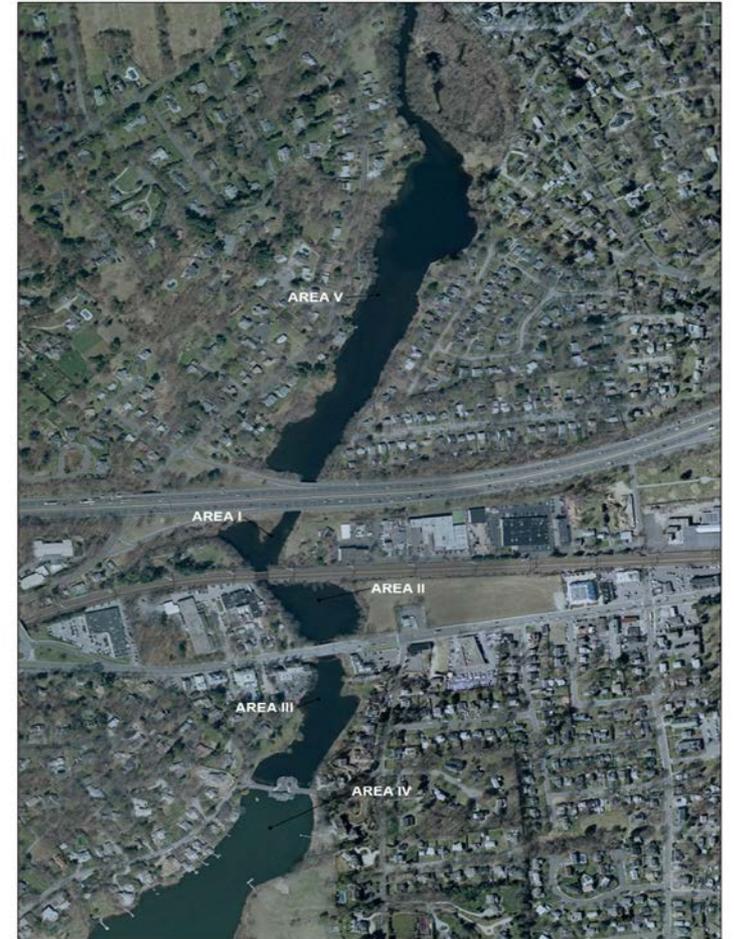
Site-Specific Human Health Risk Assessment

- Allowed under current RSRs
- Used at sites in CT

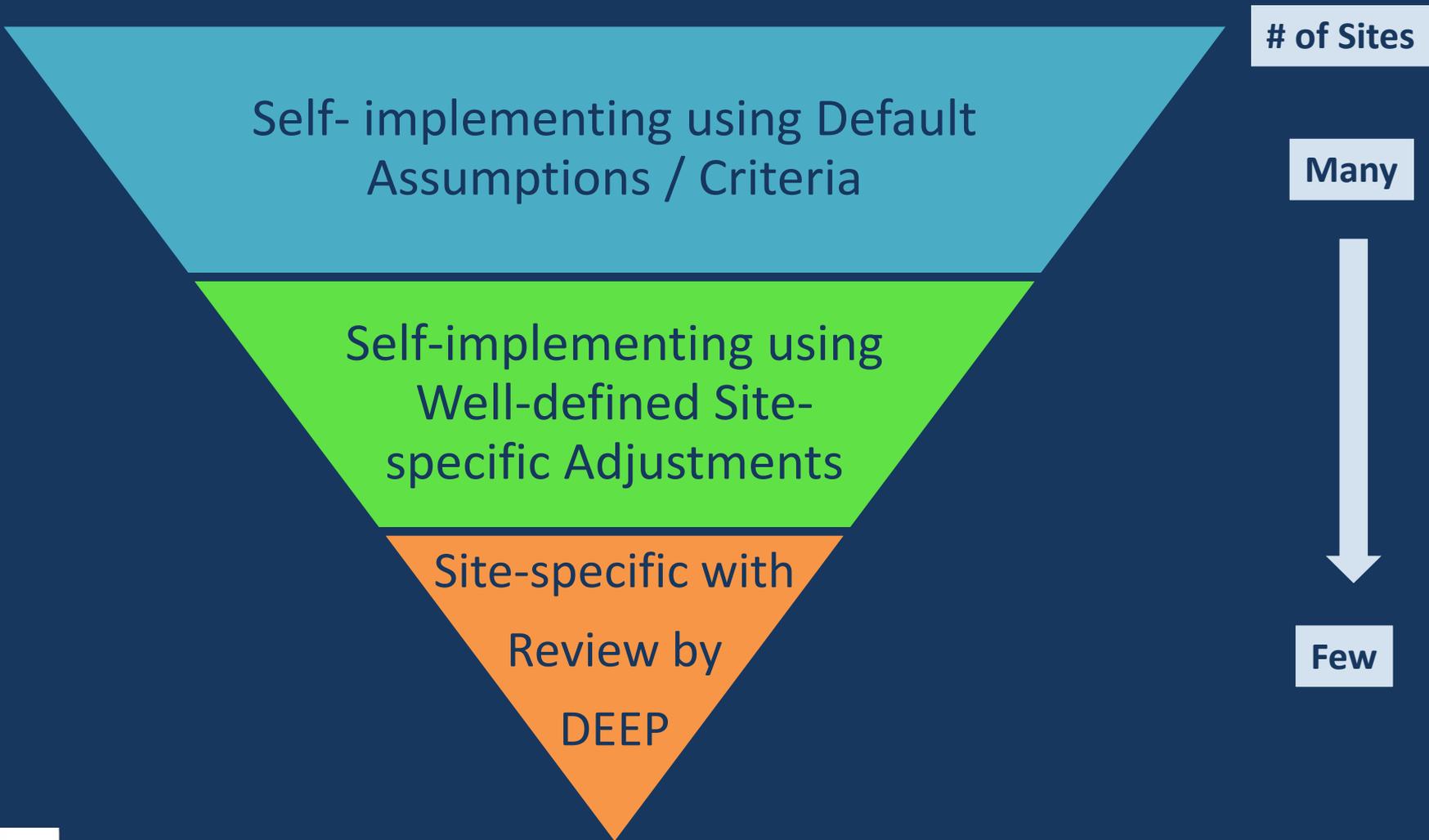


Former UpJohn Site, North Haven
Photo from Pfizer project website

Mill River Fairfield



Risk Based Processes: Tiered Approach



Site-Specific Human Health Risk Assessment

- DEEP Concurrs with CDM Recommendation to facilitate site-specific risk assessments
 - With DPH, develop Human Health Risk Assessment Guidance **2016**
 - Provide for public review of draft guidance
 - Update guidance from time to time as needed



Recommendation 5: DEEP's Plan

- DEEP's Plan to promote site-specific RA
 - Guidance for site-specific human health RA
 - Pollutant Mobility Criteria (PMC): RSR proposal for self-implementing, site-specific alt criteria
 - Adjust fate and transport inputs to reflect actual site conditions
 - more efficient, less expensive endpoints for some sites
 - “Lean” the Alternative Criteria application, review and approval process



CDM Recommendation 6

Cancer Risk Goal



CDM Recommendation 6

- CDM recommended: *change human health cancer risk goal for polluted soil to*
 - *10 cancers in 1M people per chemical, and*
 - *100 cancers in 1M for cumulative chemicals at a site*
- CT's cancer risk goal for soil criteria is
 - 1 cancer in 1M, per chemical, and
 - 10 in 1M for cumulative chemicals at a site



de minimis non curat lex

“The Law Does Not Concern
Itself With Trifles”

- Cancer serious outcome – important to prevent
- Goal is zero risk (USEPA MCLGs) or as low as poss
- FDA application of Delaney – de min = 1 in 1M
- USEPA – 1 in 1M – de minimis Superfund POD
 - May tolerate risks as high as 100 in 1M when adding across pathways and chemicals
 - no adopted criteria; considers risk goal relative to menu of options



FDA, FR 50:45530 , 1985

“FDA cannot, with assurance, state that the 1 in 100,000 level would pose an insignificant level of risk of cancer to most people. FDA can state, and comments agree, that the 1 in 1 million level presents an insignificant level of risk of cancer to most people. Furthermore, FDA has developed confidence in the merit of the 1 in 1 million level because in recent years the agency has considered that level as its benchmark in evaluating the safety of carcinogenic compounds administered to food-producing animals. Under these circumstances, the agency believes that the most reasonable level of risk to apply in these regulations is the 1 in 1 million level ”



RSR Definition of 1 in a Million

- RSRs consider only the oral ingestion pathway
 - DECAs: don't include dermal, inhalation, gardening
 - GWPCs don't include dermal, inhalation
- RSRs look at each chemical separately, not cumulative
- RSRs definition of de minimis cumulative risk
 - Allows adding across chemicals, for 10 in 1M goal
 - Not “aggregating” across pathways
 - Not adding background risk from arsenic, PAHs



RSRs and Site-Wide Cancer Risk

Risk Approach	What is Considered	Risk Target
RSRs, single chem	One chem at a time	1 in 1 M
RSRs, cumulative	Risk across chems	10 in 1 M
Superfund, cum + aggregate	Risk across chems + pathways	10-100 in 1 M
Total sitewide risk (not in RSRs or Superfund)	Site-related + Background	100 in 1M or more



CDM Smith Recommendation 6

- Recommendation 6 would apply to 32 of 88 substances in soil (Appendix B of DEEP report)
- 4 Carcinogens set higher than the de minimis cancer risk level
 - Semi-Volatiles
 - Benzo(a)anthracene-set to B/LR
 - Benzo(a)flouranthene-set to B/LR
 - Benzo(a)pyrene-set to B/LR
 - Metals
 - Arsenic-set to background



Current Risk Level is Appropriate

- DEEP recommends staying with current de minimis risk target for cancer of 1 in 1 million for an individual chemical and 10 in 1 million for cumulative risk
 - Benefits of increasing de minimis cancer risks are not clear
 - Release responses are triggered by concentrations far above the de minimis risk levels
 - Maybe a desire for quicker compliance?



Risk Targets in Neighboring States

	Pop Density (people/mi ²)	State Area (mi ²)	Target Cancer Risk single chem (remediation default criteria, or “point of departure” if no default criteria)	Target Risk WQS (single chem)
NJ	1210	8,722	10 ⁻⁶	10 ⁻⁶
RI	1017	1,544	10 ⁻⁶	10 ⁻⁶
MA	858	10,554	10 ⁻⁶	10 ⁻⁶
CT	742	5,543	10 ⁻⁶	10 ⁻⁶
NY	417	54,554	10 ⁻⁶	10 ⁻⁶
CA	246	163,694	10 ⁻⁶	10 ⁻⁶
IL	232	57,913	10 ⁻⁶	10 ⁻⁵
MI	175	96,713	10 ⁻⁵	10 ⁻⁵
NH	147	9,349	n/a	10 ⁻⁶
TX	101	268,596	10 ⁻⁵	10 ⁻⁵
VT	68	9,616	10 ⁻⁶	10 ⁻⁶
ME	43	35,379	10 ⁻⁶	10 ⁻⁶
BC	12	364,764	10 ⁻⁵	n/a
MT	7	147,039	n/a	10 ⁻⁵

= 1 in 100,000 States
 = 1 in 1,000,000 States

CA uses 10⁻⁶ as its “point of departure”, and has not adopted default criteria.



Wave 1 RSR Amendments

- Adopted in 2013
 - Additional compliance options
 - PMC
 - DEC
 - Streamlined groundwater monitoring
 - Exemptions
 - Significant increase in site closures in 2014



New Proposed Compliance Tools

- Wave 2 RSR options (Discussion Drafts) more options for compliance but maintain protection
 - Urban Soils
 - Notice of Activity and Use Limitation Regs & ELUR Regulations
 - Alternative PMC Options
 - Alternative Groundwater Protection Criteria
 - Monitored Natural Attenuation
 - Self-Implementing Concept for Engineered Controls
- Other options
 - Statewide groundwater reclassification



Significant Environmental Hazard Notification



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Significant Env Hazard Notification

- CGS 22a-6u
- Notification and short-term measures to eliminate exposure to sensitive receptors
- CDM Report:
 - Baseline RSR criteria is sound, similar to other states
 - CT ranked in top half for HHRA best practices
 - CDM's cancer risk goal recommendation for soil is inapplicable to metals
 - RSR soil criteria for metals based on non-cancer health risks



SEHN

- Benchmarking, example (using 2013 amendments):
 - Threshold for short-term measures due to metals in surface soil near a school/playground/home
 - CT typically > order of magnitude higher than MA
- Manageable program:
 - Based on data from past 3 years, manageable level of notifications expected from 2013 amendments
- DEEP does not recommend add'l changes to SEHN statute at this time



Conclusion



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Summary

- Good things are happening in CT for cleanup of polluted sites
- CT's risk-based decision-making is on a strong foundation
- Risk management (remedy options) is a strong driver for getting sites cleaned up efficiently
- DEEP is pursuing more opportunities to improve site cleanup



Action Plan - highlights

Ecological risk

- Develop guidance for 3-tiered eco risk assessment
- Include adapting approaches used in MA and BC
- Drafts available for public input in 2016



Action Plan - highlights

Update Numeric Criteria

- Convene Science Advisory Panel
 - Input and feedback on methodologies for deriving criteria. 2016
 - After recommendations from SAP, draft criteria proposals for RSR adoption process
- Post on web Additional Polluting Substance recommended numeric values. June 2015
- Post on web info on derivation of 1996 RSR criteria. Completed - April 2015



Action Plan - highlights

Risk-based flexible risk management approaches

- RSR Wave 2, public hearing draft – early 2016.
Examples:
 - Alt GWPC: self-implementing formulas
 - Alt PMC: self-implementing, site-specific
- Deed Notice regs public hearing draft – 2016
- Groundwater Reclassification – 2015/2016



Action Plan - highlights

Risk-based flexible approaches (cont.)

- Site-specific risk assessment guidance - 2016
- Lean the Alternative Criteria approval process – 2015
- Brownfield reuse to promote public health, obtain feedback from municipalities - 2015



Conclusion

- Moving ahead and making progress
 - Significant investments in brownfields
 - Pace of cleanup increasing all around
- DEEP targeting many action items for risk-based, efficient site cleanup



Questions?

Please state your name and question



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