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ITRC's Use of Risk Assessment in Management of Contaminated Sites (RISK-2, 2008)

ITRC Risk-2 Training Course Supplement: Use of Risk Assessment in Management of Contaminated Sites

Five Retrospective Case Studies

In this Module I will present the highlights of 5 case studies of actual remediation cases.

More details of all 5 cases in the Overview Document: Use of Risk Assessment in Management of Contaminated Sites Overview Document.

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Module 2 Learning Objectives

- **Risk assessment (RA) & Risk management (RM) is a balancing act** among:
  - "Players"
  - Communication
  - Data
  - Iteration
  - Variation

In this Module we will take a retrospective look at 3 actual case studies and I'd like you to look for the issues that Marty identified as important in Module #1.

RA/RM practices are a balancing act:
"Players" = Stakeholders
Communication
Data
Iteration
Variation

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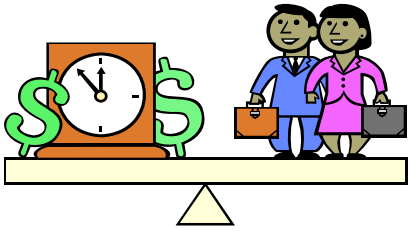
Module 2 Learning Objectives

Risk assessment (RA) & Risk management (RM) is a balancing act among:

Time
Money
Stakeholders
Cleanup



Data analysis
Certainty

Acceptable

Restating the Objectives:

RA/RM is a Balancing Act of what is acceptable among:
(Time Money Players Cleanup) vs. (Certainty Data analysis)
i.e. Want more certainty? Gotta take more time.
Want less data analysis? Gotta do more cleanup.

*Variation results from different balance of considerations
and interaction among the players
Thus, not two RA/RM approaches are the same.
Thus, as I stated in the introduction *We cannot train you in "which way to go" because it very much depends on where you want to "get to."

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Case Study Features

- Actual sites retrospectively evaluated
  - Site background
  - Sampling and data use
  - Risk-related information
- "Simple" sites selected to elucidate key variables
  - Soil ingestion
  - Shallow soil contamination
  - One to few chemicals of concern

- **NOT** reanalysis or effort to "fix" these cases

Risk Team retrospectively evaluated cleanups at actual sites with standardized data collection forms

- Allowed consistent means to assemble and compare data from each site

- Appendix B of the Risk Assessment Resource Team's Overview Document: Use of Risk Assessment in Management of Contaminated Sites.

has completed forms for each case study.

Information collected included:

1a) Site background:

1b) Sampling and data use

1c) Risk-related information:

2) Focus on simple sites to display differences in approaches, rather than complexities of sites

"Simple" sites allow more clearly seeing the 'principles of risk assessment' in action

Complicated sites often obscure the effect of RA on RM due to other uncertainties

"Simple" = mostly soil ingestion, one (or few) chemicals, only "shallow soil" contamination

Nonetheless, all sites were fully characterized to rule out exposure to groundwater contamination

3)The retrospective analysis was not an effort to 2nd guess or "fix" RA and RM done improperly

- I know many of you will think midway through this module

that you know how to fix or properly conduct the RA/RM at these sites.

- I encourage you to remain focused during this module, as we did in our study, on understanding the sources of variation

that affected these cases … and may affect yours.

1a) Site background:

- Site history, nature and extent of the contamination
- Type and size of exposure unit
- Regulatory entity involved.

1b) Sampling and data use

- Sampling design and methodology
- Determination of representative "site" concentration
- Comparison of data to numerical criteria
- Determination of exposure

1c) Risk-related information:

- Derivation of risk-based criteria
- Use of background concentration
- Application of guidance
- Risk management strategies
- Remedial criteria and remedial confirmation approaches.

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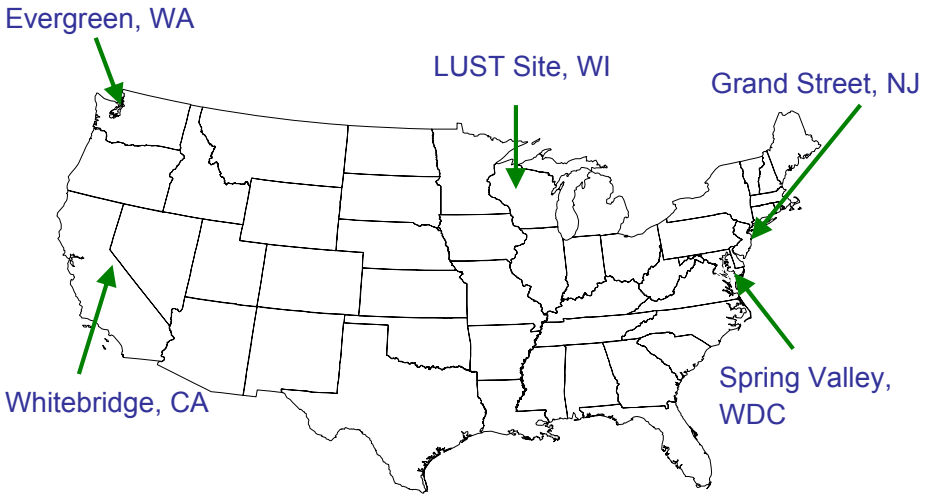
Five Case Study Sites



The 5 sites I will review from west to east, are:

- Evergreen, WA site - Fort Lewis Army base near Tacoma, WA.
- Whitebridge, CA site - Former fruit orchard
- LUST site in WI
- Spring Valley, WDC site - FUDS site located in Washington, D.C.
- Grand Street, NJ site - Former Hg-based manufacturer, Hoboken, NJ

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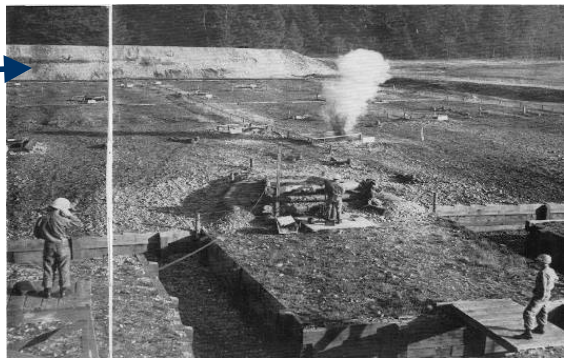
Case Study 1 – Evergreen, WA

- Army to redevelop firing range for military housing
- Active military base

Berm



The first case study is the Evergreen Firing Range remediation at Fort Lewis.
•Active military base located near Tacoma, Washington
•Used as a firing range at the Fort Lewis base for many years
•1990s the Army decided to close and cleanup the firing range
•Intent of building military housing

Photo in slide is actually from the firing range. Note the berm in the upper left portion of the photo (Will be focus of case … not known at the time …)

1) Machine gun **bullets** shot into earthen impact berm ~ 300 feet from machine gun firing site.
2) **Explosives** were detonated
to give soldiers experience moving under live machine gun bullets fire and explosives detonations.

Impact berm = 40 feet high, 400 feet long, and 100 feet wide at its base.

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Triad Approach Investigation

- Real time field data … for Risk Assessment(!)
- Portable X-Ray Fluorescence (XRF)
- Determined extent of area sampled
- Validated by 10% laboratory analyses

Sampling evaluated potential exposure pathways and possible remedies.

Innovative Features
- TRIAD approach used in risk-based investigation and remediation of the site.
- Real time field data

- Field data to determine extent of area sampled
- Portable X-Ray Fluorescence (XRF)
- Validated by 10% laboratory analyses
  (Demonstration of Method Applicability/Off-site validation procedure)

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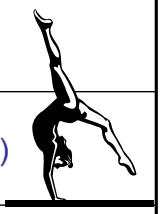
Lead Characterization Goals

50 mg/kg	XRF lead detection limit WA screening level for ecological assessment
250 mg/kg	WA human health screening level IEUBK output
400 mg/kg	USEPA Region 9 screening level (PRG)
1,000 mg/kg	Hazardous waste screening level



•Sample results confirmed that lead was the primary contaminant of concern

Background a nonissue. Background below Pb health-risk criteria.

Discounted cleaning up to background.

(Given a fed facility in WA State …)

What characterization criteria should be used for lead at the site?

•50 mg/kg XRF detection limit for lead; WA screening level for ecological assessment

•250 mg/kg WA's screening level for human health protection to for lead exposure for unrestricted land uses

Value obtained w/IEUBK-based analysis

•400 mg/kg USEPA R9

•1,000 mg/kg considered - hazardous waste screening level

250 mg/kg level, **Colored in red,** WA chose own cleanup level, rather than USEPA R9, for *federal* site.

- Common for Fed to use State criteria; however,

Fed under time crunch to redevelop, took lower screening level.

Could have gotten a higher number had they had more **site specific data** and **time.**

(Balancing Act)

Output from IEUBK (integrated exposure uptake biokinetic model) blood lead in children

IEUBK inherently conservative considering Pb from all routes

Human health screening level

Routine cleanup where numerator same, few substances to cleanup

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- IEUBK (integrated exposure uptake biokinetic model)
- Washington State Dept. of Ecology Model Toxics Control Act Guidance Method A

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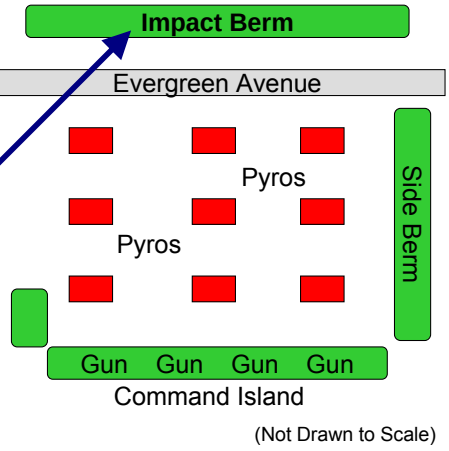
Cleanup Goal

- No site-specific risk assessment
- Screening level = Cleanup goal
- Impacted berm area only remedial action candidate



•A site-specific risk assessment was not conducted for the firing range.

•**Cleaned up using the screening level** of 250 mg/kg of lead in soil, as a RCRA "interim action"

•Impacted berm area only remedial action candidate

•Additional analysis for protection of ecological systems possible

•(USEPA PRG 400 mg/kg > Human health screening value)

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Statistical Criteria for Remedial Success

- No excavation area with Pb sample **>500 mg/kg**
- Entire site 95% UCL Pb **< 250 mg/kg**
- ≤ 10% of samples Pb **> 250 mg/kg**
- Entire site meet criteria for all contaminants

Elegant Statistical approach used to determine success

A ceiling concentration (**500 mg/kg**) identified.
Maximum percentage of samples exceeding the numerical cleanup criteria specified.

Entire site 95% upper confidence level (UCL) of mean of data for did not exceed **250 mg/kg**

<10% criterion assured 95% UCL was not skewed by a few [high] samples.

In addition, sampling results from the entire site had to successfully meet the remediation criteria for all contaminants
(Lead risk driver; however, Lead, antimony and copper COCs)

Washington State criteria were used to determine when to stop excavating.

Use of 95% UCL from Washington State Dept. of Ecology Model Toxics Control Act Guidance Method A (conservative assumptions)

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Summary 1 – Evergreen, WA

- Triad Approach + Field data in Risk Assessment
- Background [Pb] < Screening level
- RA/RM Balancing Act:
  Limited time/More remedial effort
  vs. higher screening and cleanup level

- Screening level = Cleanup Goal
- Statistical approach to remedial criteria

TRIAD Approach + Field data in Risk Assessment

Background [Pb] < Screening level

Balance between limited time coupled with the need for More remedial effort
Vs. higher screening and cleanup level

Screening level = Cleanup Goal

Statistical approach to remedial criteria

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Case Study 2 – Whitebridge, CA

- Former commercial orchard (1930's to 1980's) proposed for residential redevelopment
- Eight COPCs: Lead, arsenic, dieldrin, DDT, DDE, endosulfan, sulfate, and endrin aldehyde.
- Developer wanted minimal soil removal to meet septic system requirements

Former commercial orchard (1930's to 1980's)
Proposed for residential redevelopment

Eight COPCs:
(Lead, arsenic, dieldrin, DDT, DDE, endosulfan, sulfate, and endrin aldehyde.)

Developer proposed a management criterion with goal of minimal soil removal.
to comply with a local ordinance requiring 2 feet of topsoil above septic systems

No problem. However, will have to balance limited excavation/remediation
with high data quality/analysis/certainty.

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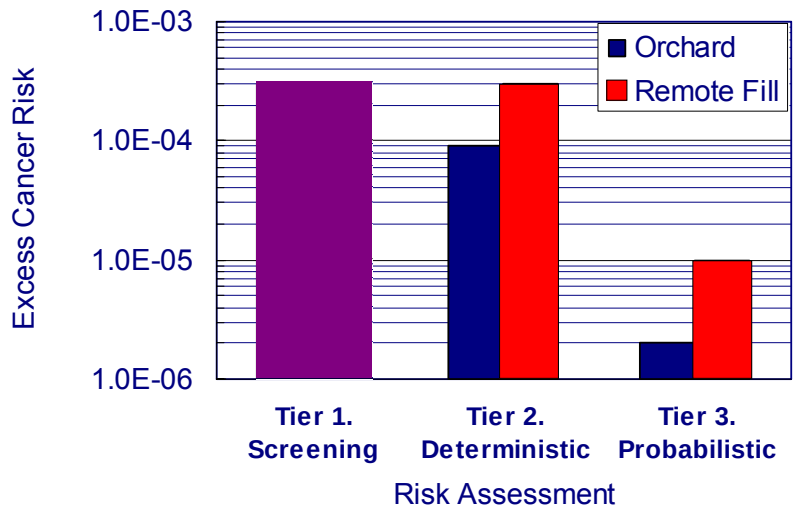
Risk Assessment – Three Tiers



- Three tiers of risk assessment were performed at Whitebridge.
- This slides summarizes the results of all 3 tiers … only for ILCR for a child resident
(Additional receptors (Adults and Construction Workers) and endpoints (HQ and blood lead).

Tier 1 Screening (Entire site) (purple) ➔ 3E-04 (Child)
CALEPA's Preliminary Endangerment Assessment (PEA) guidance
(Screening with conservative default assumptions from RAGs equation)
- PEA conservative assumptions include **Max concentration** of each COPC **Uniformly distributed** across site
Conclusion: Certain COPCs may pose a risk to human health, and further evaluation (Tier 2 assessment) warranted

Tier 2 w/Site Specific data (Orchard & Remote Fill Area) assessment
Orchard (blue) (Pesticides Applied) **➔ 9E-05 (Child)**
Remote Fill (red) (Pesticides Mixed & Equipment cleaned) **➔ 3E-04 (Child)**
Conclusion: Less risk in Orchard; however, may pose a risk to human health in both areas
Thus, preliminary and site-specific risk assessment both showed potential for risk.
What now? RP previously communicated less desirable to remediate
… so further evaluation

Tier 3 Probabilistic (Orchard & Remote Fill Area) assessment
- Included bioavailability evaluation
Orchard **➔ 2E-06 (Child)** ➔ Ruled out/Manageable Risk
Remote Fill **➔ 1E-05 (Child)** ➔ Potentially unacceptable risk from As exposure
Conclusion:
1) Ruled out risk at part of site (i.e. Focuses CAP/remediation effort)
2) (Although not shown) Reduced number of COCs
Arsenic was risk driver w/RBCL = 36 mg/kg = **95th percentile** value)
Arsenic contributes to over 98% of the non-cancer risk. Therefore, development of a risk-based cleanup level (RBCL) for arsenic in the remote fill area is warranted.

90% = USEPA level of statistical significance
95% = CALEPA level of statistical significance
- Blood level data developed w/CALEPA Lead Spread model
IEUBK = absolute (all Pb sources), assumed bioavailability into bloodstream
Lead Spread = incremental (source only), different bioavailability equation
RAGs (Risk Assessment Guidance)
IEUBK (integrated exposure uptake biokinetic model)
Pb criterion = 10 µg/dL
CA using LEADSPREAD for residential exposure scenarios and
USEPA's Worker Model for Lead Exposures for the commercial/industrial, construction worker, maintenance worker, trench worker...
Sampling (Random + Biased within Grid)
- Pesticides were surficial
0-6"
2 ft if background exceeded (27 ppm As)
and deeper sampling

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Summary 2 – Whitebridge, CA

- RA/RM Balancing Act:
  Minimal soil removal vs. Risk analysis effort

- 3 Tiered Iterative approach:
  - Preliminary & Site-specific risk assessment ➔ Risk Potential
  - Probabilistic modeling ➔ Reduced areas of concern & COCs
- Clear communication of goals
- Contaminated soil ➔ Roadway fill
  Onsite deed-restricted containment cell

Balance between developer goal of
minimal soil removal and risk analysis

Illustrates Iterative approach noted in Introduction:

3 Tiers

Preliminary and site-specific risk assessment ➔ Potential for risk.

Probabilistic modeling ➔ Reduced areas of concern and COCs.

Clear Communication of Goals

Contaminated soil ➔ Innovative management

- Roadway fill
- Onsite deed-restricted containment cell

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Case Study 3 – LUST site, WI

- Operating gasoline station
- Release discovered during tank system replacement
- Benzene primary COC with 13 mg/kg soil

Leaking Underground Storage Tank system (LUST) site
Operating gasoline station w/release from tank system being replaced.

Release discovered during replacement of tank system.

Benzene primary COC with 13mg/kg.

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Case Study 3 – LUST Site, WI

- Benzene concentration exceeded
  Direct-contact (WI)
  [Inhalation & ingestion] (USEPA SSG calculator)
- "Hot spot" beneath dispenser ➔ Barrier cover
  (2 ft clean soil)
- Institutional control to prevent direct-contact exposure
  "Detailed closure letter"

In contrast to the previous case study, a single Tier used
To screen a single Benzene hotspot

That benzene concentration exceeded:
- (Wisconsin) Direct-contact Screening
- (USEPA SSG calculator) Inhalation (outdoor) & ingestion concentrations

Remedial Outcome:
"Hot spot" beneath existing dispenser closed in place w/barrier,
to prevent direct-contact human exposure.

"Detailed closure letter" w/land-use limitation required.
- Previously required Deed restriction (superceded by legislative change)
  (a) a more burdensome and
  (b) encouraged overly conservative approach

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Summary 3 – LUST Site, WI

- Soil sampling
  - Contamination extent and magnitude
  - Not systematic
  - Not supportive of risk assessment
- RA/RM Balancing Act:

  Limited soil data vs. Desire for case closure
- Single "Hot spot" drove management
- LUST sites Risk Assessment

I's like summarize some points from this case. But

***Please don't focus on how you would have done this better,**

But on the lesson learned from this case.

This "negative control" case illustrates what happens when small LUST sites (e.g., corner gasoline stations),

uses soil sampling focused on extent and magnitude of contamination,

rather than systematic sampling to support risk assessment.

At LUST sites RP's desire to close a case is often the trigger for remediation and/or closure plans, risk assessments and associated data collection

(i.e. backwards investigation)

- Thus, LUST sites tend to be 'reactive' risk assessments

- Risk management decision made by case officer.

RA Balancing Act of LUST site w/soil data inappropriate for risk analysis

And remediation/closure plans presented at closure

In the end a single "hot spot" allowed to drive management of the site.

(USEPA calculator accepted data from the single hot spot and could not discounted in the Risk assessment.)

This outcome based on a single soil sample "hot spot" illustrates the need for further development of practical risk management/decision-making processes,

for petroleum contamination.

Although Risk Resource Team members split as to what to say about conducting RA at LUST sites.

- Some said LUST sites are unique

- A state rep from FL, said no, FL has resources and use RBCA

- WI regulator stated

  a) Not cost effective to perform full-blown risk assessment.

  b) Easier to place an institutional control on site rather than RA.

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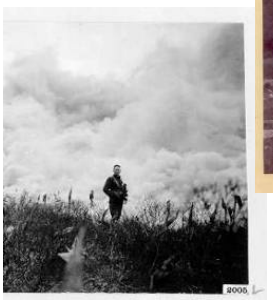
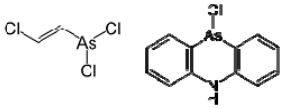
Case Study 4 – Spring Valley, DC

- Formerly Utilized Defense Site (FUDS), during World War I
- Chemical warfare research and testing:
  mustard, lewisite agents, adamsite, irritants, and smoke
- Long established residents





Spring Valley site:
• Former military site
• used during World War I.
•located in what was then the rural outskirts of Washington D. C.
•Conducted chemical warfare research and testing with:
mustard, lewisite agents, adamsite, irritants, and smoke
(Chemical structures pictured = lewisite agents, adamsite)

•Note historical photos w/ or
•w/o protective clothing (May be nontoxic obscurity test)

Northwest Washington, D.C.
Regulating entities
District of Columbia Department of Health
U.S. EPA Region 3

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Phase I Investigation

- **1921**: Area restored, owners reclaim property, redeveloped

- **1993:** Buried ordinance found

- **1993 to 1995**: Phase I: ID areas of concern
  - Biased grab samples
  - Background samples ➔ 12.6 mg/kg (95th percentile)
- Arsenic (As) contaminant of potential concern (COPC)

•**1921**: Area restored, property returned to owners and eventually redeveloped

•**1993** a utility contractor uncovered buried ordinance

•Remedial investigation conducted over what was then believed to be the entire area within the FUDS boundary.

•Sample locations based on historical photos and maps & projections of where ground surface was during WWI

Phase I (Delineate extent of FUD)

•*Sample density relatively low* to identify areas of concern for further assessment and possible remediation.

•42 background samples collected from unaffected native soils in Spring Valley Area.

•Arsenic only metal that exceeded [background].

•[Background arsenic] ranged from 0.9 to 18 mg/kg.

•[Background arsenic] chosen was 12.6 mg/kg which represents the 95th percentile of the background sample data.

•While other contaminants of concern were found throughout the site, arsenic is the focus of this case study.

•(i.e. Pb was below background)

•A site-wide risk assessment was done in 1995 that found arsenic concentrations exceeded health protective levels.

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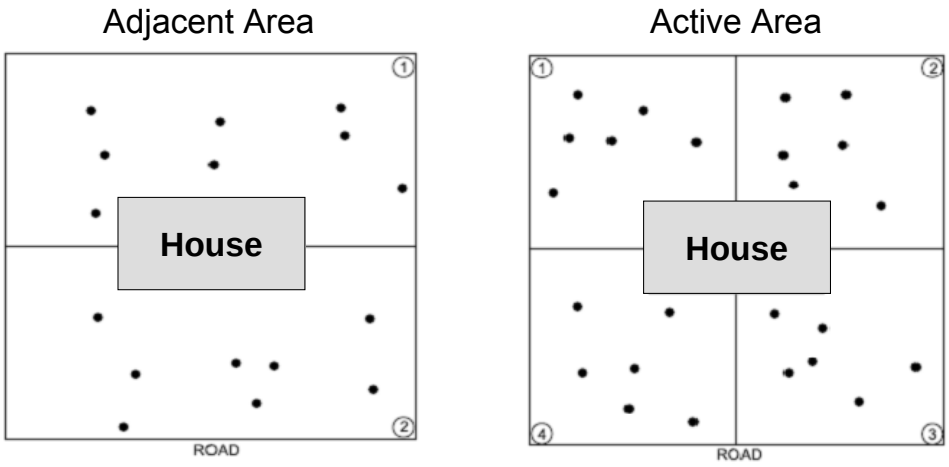
Phase II: Uncertainty Management with Different Sampling Strategies



1997: **Phase II** Investigation area shifted from the general site characterization to identifying areas needing remediation on individual lots.

Focused on Two types of lots:

- Active Test Area
- Adjacent to the Active Test Area

•*Sample density relatively higher and focused* to identify areas of concern for further assessment and possible remediation.

$[As_{Background}]$ = 12.6 mg/kg ➔ Potential remediation boundary

In slide you can see entirely different sampling strategies were used in

- *Adjacent to Active Area* and
- *Active Area*

to manage uncertainty

•Lots in the *Adjacent to the Active Area* were divided into 2 equal areas and random samples collected and composited.

•Lots in the *Active Area* divided into 4 equal parts with random samples collected and composited within each of the 4 parts yielding 4 sample results per lot. ➔ Tighter sampling

•Using this sampling method, a circular hot spot with a contamination radius of 10 feet would likely be detected.

•Any sample result exceeding 12.6 mg/kg, triggered additional discrete sampling to define potential removal areas.

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Numerical Criteria

Arsenic Concentration	Source and Use
0.43 mg/kg	EPA Region 3 residential risk-based concentration; Initial site screening; ; 10^{-6} cancer risk
12.6 mg/kg	Site-specific statistical 'background.' Screening level triggering additional sampling
20 mg/kg	Risk-informed management goal ➔Soil removal
43 mg/kg	Remedial goal with home owner approval to preserve landscape features; 10^{-4} cancer risk

This slide illustrates the progression of different numerical criteria used at the site.

•0.43 mg/kg = Calculated risk-based screening level for a 10^{-6} incremental potential cancer risk

EPA Region 3 residential risk-based concentration (RBC);

Initial site screening

•12.6 mg/kg = 95th percentile of 42 background sample results

(Note that "background" exceeds USEPA R3 RBC)

•20 mg/kg = Exposed soils that could be excavated (Not pure RA because would be below background)

~ Hazard Quotient of 1 for arsenic

•43 mg/kg = Areas where removal was difficult (e.g. under trees) with land owners' consent

Estimated 10^{-4} incremental potential cancer risk

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Summary 4 – Spring Valley, DC

- Existing residents 
- Background [As] ➔ Screening level
- Different sampling strategies for management of different levels of uncertainty
- RA/RM Balancing Act:
  Among "Players", Communication, Risk assessment, and Risk management

Existing residents ➔ Stakeholders

•20 mg/kg = Hazard Quotient of 1 for arsenic — **Consensus value** for exposed soils that could be excavated ~

•43 mg/kg = owners' consent — Areas where removal was difficult (e.g. under trees) with land

Estimated 10^{-4} incremental potential cancer risk

Balance of existing residents, communication with them

Risk assessment and Risk management

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Case Study 5 – Grand Street, NJ

- > 50 years Mercury gas-lamp & connector-switch production

Peter Cooper-Hewitt, 1902

" the economy of operation [of a mercury gas light in contrast to an ordinary incandescent lamp] will much more than compensate for the somewhat unnatural colour given to illuminated objects. "

Mercury gas-lamp & connector-switch manufacturer for > 50 years
Cooper-Hewitt Company

The case study describes on-site efforts only
There were also additional off-site cleanup concerns

(critics said it made people look like "bloodless corpses")
Peter Cooper-Hewitt, 1902

" the economy of operation will much more than compensate for the somewhat unnatural colour
given to illuminated objects. "

"… this [mercury gas] light …has an efficiency
at least eight times as great as that obtained by an ordinary incandescent lamp, "

Lack of light from the red end of the spectrum.

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Exposure to Building Residents

- 5-story former industrial building ➔ 16 residences/studios (1993-1995)
- 15/16 conversions completed prior to ID of site-wide Hg contamination in flooring, porous wood, and brick.
- Residents relocated (1996)
- Urine analysis found 20 residents (inc. 5 children) with Hg levels of concern for neuro- and hepatotoxicity
- Superfund site

5-story former ➔ 16 residences/studios
industrial building (1993-1995)

15/16 conversions completed prior to ID of site-wide
Hg contamination in flooring, porous wood, brick, and tar.
(Resident was cooking and Hg dripping onto stove)

Residents relocated (1996)

Urine analysis found 20 residents (inc. 5 children) with Hg levels of concern for neuro- and hepatotoxicity

Balancing consideration is that site was Superfund Site

➔ USEPA lead rather than NJDEP

Standard risk assessment

The circus was in the NY-NJ area October 2008 and you can see Nik Wallenda, seventh generation of the Flying Wallendas circus family, walks on a wire 12 stories above the street in Newark, N.J.

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Different Criteria

Criteria	EPA Region II	NJDEP Site Remediation
Baseline HH RA Required (Human Health Risk Assessment)	Yes	No
Risk Range - Carcinogen	$1x10^{-4}$ - $1x10^{-6}$	$1x10^{-6}$
Hazard Index - Noncarcinogen	1	1
Surface vs. Subsurface Distinction	Yes	No
Depth of Delineation (RDC)	Typically 0-2' for residential	"to a clean zone" regardless of depth
Discrete vs. Composite Surficial Sampling	Both	Discrete only
Grid or Biased Sampling	Either (Gridded)	Biased only

In this slide you can see the results of having two regulatory agencies.
Otherwise a conventional risk assessment.

USEPA Region II lead because Superfund site (true of all Superfund sites in NJ)
(NJ conservative due to large number of industrial sites)

- Colored boxes with red text indicate decisions used in this cleanup.
- As you can see a mixture of two cleanup criteria
Thus, explaining the variation between criteria at this site and
A) others in NJ or
B) states in USEPA R2

HHRA Human Health Risk Assessment

– Not required by NJ statute. NJ Would require comparison screening.
Done because superfund site w/EPA lead

Carcinogen Risk – Nonissue for elemental Hg (would be for methyl-Hg)
NJ does not accept a range

Hazard Index - Same

Surface vs. Subsurface
-Typically NJ = 0-2' for residential **direct exposure**
-However, NJ required delineation to lower number, 23 mg/kg, throughout site
Drove development of risk-based 520 mg/kg

RDC NJ always required delineation, not always remediation.
NJ has "deed notice"

Sampling NJ discrete sampling rather than gridded because proscriptive due to industrial sites.
Gridded vs, Biased – NJ uses Biased because proscriptive
(Although in this case gridded due to diffuse nature of a contaminated building)
NJ concurred w/ approach.
- Although extensive (minimum) technical sampling guidance,
variance route allows other approaches
i.e. large industrial site "back 40")

Additional Questions? Contact Frank Camera , NJDEP
(End)

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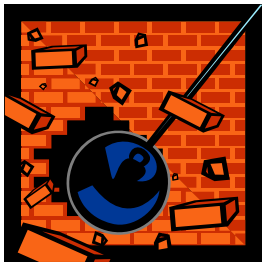
Sampling, Goals, and Remediation

- Surficial soil cleanup goal = 23 mg/kg Hg (2003)
  Soil ingestion + protective of inhalation
- Subsurface soil cleanup goal = 520 mg/kg Hg (2004)
  Protective of utility workers
- Remediation = demolition, excavation, and off-site disposal of contaminated soil and building debris



Iterative approach (Balancing theme)

Surficial soil cleanup goal = 23 mg/kg Hg (2003)

Level is protective of exposure from both inhalation and Soil ingestion

Subsurface saturated soil cleanup goal = 520 mg/kg Hg (2004)

Protective of utility workers

Shallow GW table

(ESD – Explanation of Significant Difference)

Remediation = Building torn down. Indoor air objective could not be achieved.

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Summary 5 – Grand Street, NJ

- RA/RM Balancing Act:
  Two regulatory authorities (USEPA and NJDEP)
  Two set of criteria

- Acute hazard
- Remediation = demolition
- Redevelopment

Balance between two regulatory authorities

Superfund Site ➔ EPA lead

Two sets of cleanup criteria

Acute hazard to Existing residents made screening moot

Remediation = demolition

because indoor air objective could not be achieved.

Epilogue – Redevelopment is planned

You can see the real reason Nik Wallenda walked the high wire in NJ,

So he could pedal back & set a Guinness World Record for the longest distance and greatest height ever traveled by a bike on the wire.

(Seventh generation of the Flying Wallendas circus family, 12 stories above the street in Newark, N.J., Wednesday, Oct. 15, 2008)

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Summary Table 1 – Site Information

Site	COC	Acres	Former Land Use	Future Land Use
Whitebridge, CA	Pesticides	184	Commercial orchard	Residential (future)
LUST Site, WI	Benzene	0.70	Gasoline station (currently operating)	Industrial (ongoing)
Grand Street, NJ	Mercury	0.34	Hg gas-lamp + switch manufacture	Residential (current)
Evergreen, WA	Lead	4	US Army firing range	Residential (future)
Spring Valley, DC	Arsenic	0.25	USDOD chemical warfare testing	Residential (current)

I'd like to summarize the information from this Module

I'm going to include some information about all 5 sites in

A) The Overview Document: Use of Risk Assessment in Management of Contaminated Sites

B) They also are compiled into one Powerpoint presentation which you can access from the Clu-in website "Links" page.

Look for "ITRC Risk-2 Training Course Supplement ", Five Retrospective Case Studies

Looking down the columns of information you can see the variation among the sites:

- COCs

Background an issue/high (As) to nonissue/low (others)

- Size

Small to Large

- Former land use

Private or Fed (jurisdiction)

- Future land use/Exposure scenario

Note lower two sites were currently occupied by residents

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Summary Table 2 – Risk Assessment

Site	Risk Assessment
Whitebridge, CA	• 3 Tiers (Preliminary, Deterministic, and Probabilistic)
LUST Site, WI	• 1 Tier (No site-specific RA. Screening Level = Cleanup Level) • State & USEPA risk-based screening values.
Grand Street, NJ	• 2 Tiers • Both USEPA R2 and NJDEP criteria
Evergreen, WA	• 1 Tier (No site-specific RA. Screening Level = Cleanup Level.) • Triad. Statistical criteria.
Spring Valley, DC	• 2 Tiers • Integrated into risk management. Community participation.

Think back to Marty's slides and her discussion of Tiers in Module 1.

Different number of Risk Assessment (RA) Tiers

LUST Site, WI - Voluntarily used State and USEPA risk-based screening values were used (USEPA Soil Screening Guidance (SSG) Calculator

Gand Street St – Superfund status compelled use of USEPA criteria; however hybrid of USEPA & NJDEP values and approaches

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Summary Table 3 – Risk Management

Site	Risk Management
Whitebridge, CA	Developer + PRA ➔ Limited soil excavation (and costs)
LUST Site, WI	Hot spot beneath dispenser closed in place with barrier. Detailed closure letter with land-use limitation
Grand Street, NJ	Demolition, excavation and off-site disposal . New residential development planned.
Evergreen, WA	Quick reuse desire balanced with soil management. Soil excavation balanced by RA
Spring Valley, DC	Integrated into risk assessment. Community participation

Preliminary Risk Assessment (PRA)

Risk Assessment (RA)

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Conclusions

- Risk assessment and risk management balancing act
  - Players
  - Iteration
  - Data
  - Communication
  - Variation
- Programmatic and Technical rationale ➔ Variation
- Transparency is important

"Everyone is on board!!"

Risk assessment and risk management balancing act:

"Players"		(Whitebridge)
Iteration	(Grand Street)	
Data	(LUST and Whitebridge)	
Communication	(Whitebridge)	
Variations		(All)

Important to make sure **"Everyone is on board!!"**

Variation in risk assessment practices due to programmatic preferences or in technical differences of opinion.
- Grand St (EPA vs. NJ)

- Thus transparency important

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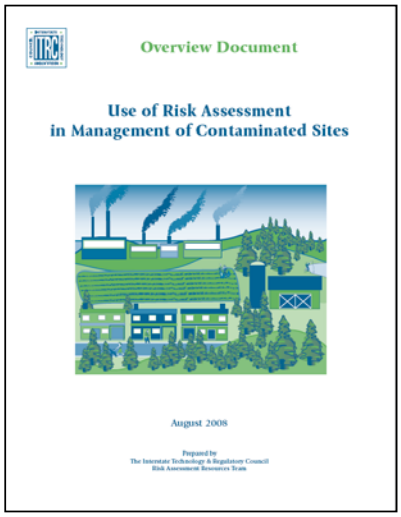
Thank You

- Links to Additional Resources at
  - http://www.clu-in.org/conf/itrc/risk2/resource.cfm
- ITRC Risk Team's Website
  - http://www.itrcweb.org/Risk
- ITRC Risk Team's Documents
  - http://www.itrcweb.org/guidancedocument.asp?TID=44



Links to additional resources:
http://www.clu-in.org/conf/itrc/risk2/resource.cfm

Your feedback is important – please fill out the form at:
http://www.clu-in.org/conf/itrc/risk2

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✓Helping regulators save time and money when evaluating environmental technologies

✓Guiding technology developers in the collection of performance data to satisfy the requirements of multiple states

✓Helping technology vendors avoid the time and expense of conducting duplicative and costly demonstrations

✓Providing a reliable network among members of the environmental community to focus on innovative environmental technologies

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✓Use ITRC products and attend training courses

✓Submit proposals for new technical teams and projects

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