Risk-Based Remediation

History, Case Study and Legislative Update

Joe Starr, P.E., PMP® – Program Manager / Senior Engineer
Solutions-IES, Inc.

Session 6B-2 • Friday • April 10, 2015

Agenda

- Introduction of Risk-Based Remediation
  - Background
  - Eligibility
  - Application Process
- Case History
  - RCRA site with lots of data
- What about me?
  - Risk Based Corrective Action (RBCA) for other sites

Risk-Based Remediation | Background

Many years of Trial and Error…

- 2001/02 – HB 1009 (Consistent Risk-Based Remedial Actions)
  - Bill passed the House, but not the Senate
- 2005/06 – HB 1778 (Risk-Based Environmental Remediation/Fund)
  - Bill passed House Committees, but pulled from House floor
- 2007/08 – No bill introduced
  - However, session law required LUST program to establish pilot program to evaluate use of site-specific cleanup standards for petroleum releases from USTs [SL 2008-195, Section 7.(b)]
- 2009/10 – HB 1575 (Accelerate Remediation of Manufacturing Sites)
  - Bill did not move out of Committee
- 2011/12 – HB 45 (Accelerate Cleanup of Industrial Properties)
  - **Bill passed into law (SL 2011-186)**

Risk-Based Remediation | Background

The Law in a Nutshell…

- SL 2011-186 written "prescriptively" negating the need for rules.
- Authorized risk-based remediation in six Programs:
  - RCRA
  - CERCLA
  - IHSB
  - Solid Waste
  - Groundwater Protection Corrective Action Requirements
  - Oil Pollution & Hazardous Substance Control Act (not petroleum USTs)
- Request a site-specific risk-based remediation:
  - Based on a remedial investigation report (RI) and
  - Performed under an approved remedial action plan (RAP).
- Reach the risk-based standard, receive No Further Action (NFA).

Risk-Based Remediation | Eligibility

Who is eligible?

- *Industrial sites* used to produce commercial product (including electricity).
- Groundwater contamination regulated by any of the six programs.
- Groundwater contamination *reported prior to March 1, 2011*.
- *No off-site contamination* at the time the RAP is submitted.
- *No continuing source of contamination* associated with the property.
- Contaminant *won't migrate to adjacent properties* above unrestricted use standards.
- Industries that pay the application *fee* and establish *financial assurance*.

Risk-Based Remediation

What It Means for You…

- You can develop site-specific risk-based cleanup standards
  - consistent with current and anticipated future use of land and groundwater.
- Can be used in combination with existing standards

Risk-Based Remediation | Application

Multi-step Eligibility Application Process

1) Complete Remedial Investigation (RI)
2) Prepare eligibility demonstration
   - Limited, but detailed enough for DENR review
   - Submit with fee and get approval that site is eligible for consideration
3) Prepare Remedial Action Plan (RAP)
   - Technical presentation
   - Solicit special local government/public comment
   - DENR review/approval

Case History – The Long and Winding Road

Former Square D Co.

Knightdale, NC

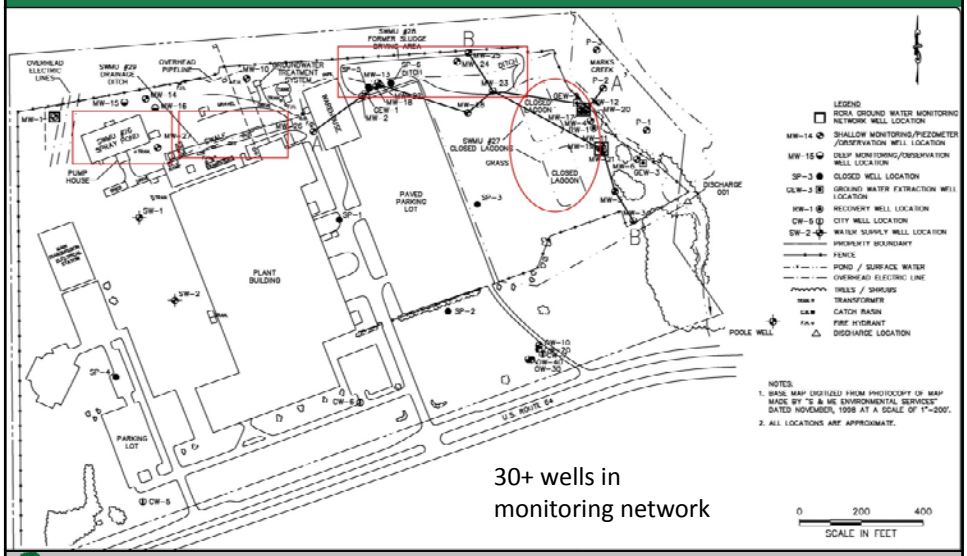
SQUARE D

- 1973 - Began manufacturing
- 60 acre site

RCRA Facility Assessment (RFA; 1980s)

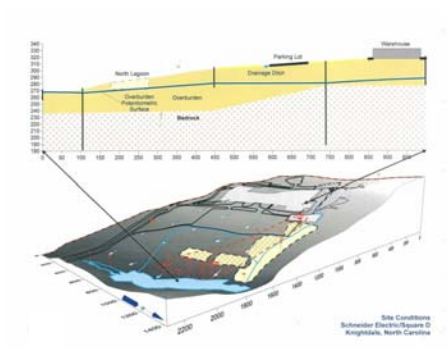
- 29 Solid Waste Management Units (SWMUs)
- Potential sources of contamination
  - Two wastewater lagoons
  - Spray pond
  - Sludge drying area
  - Drainage ditch area
- 1984 GW monitoring begins
- 1988 Post-Closure Facility under RCRA

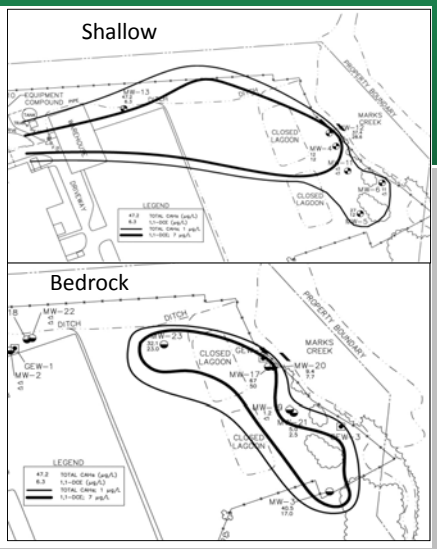
Site Layout



30+ wells in monitoring network

Plume Map- 1989





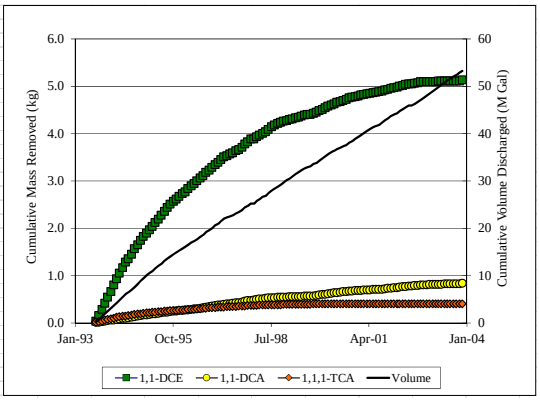
1,1- Dichloroethene
(NC 2L Std = 7 µg/L)

RCRA Facility Investigation (RFI)

- 1991 – RCRA Part B Hazardous Waste Permit
- 1992 – Begin pump & treat (P&T)
  - Quarterly monitoring of full network – 30 wells
- 1999 – Submitted RFI
  - *No Further Action* for SWMUs 26, 28 & 29
  - Continue groundwater pump and treat (P&T).
  - 1,1-Dichloroethene of primary concern, but still monitor other VOCs

P & T Performance

- Groundwater remediation system showing asymptotic conditions. Continued use will have limited benefits.



Cumulative Mass Removal for Groundwater Remediation System

Optimization (2001 – 2007)

- 2005 – RCRA Part B – Class 3 Permit Mod
  - Hazardous and Solid Waste Amendment – only Permit
  - Changes groundwater remedy to Monitored Natural Attenuation (MNA)
  - Allow shutdown of P&T
  - Continue long term monitoring (LTM) to evaluate rebound
- 2007 – First Approved Abiotic MNA

MNA Implementation – August 2007

- Shutdown P & T system.
- Semiannual monitoring for 3 yrs. (thru Aug. 2010).
- Perform statistics on concentration changes in compliance wells.
- Monitor Marks Creek
- If no adverse changes, decommission P&T system.
  - **Feb 2011 data confirmed no rebound, continued attenuation, and improving groundwater quality!**

Estimate of Long Term Monitoring

STATUS OF TARGET CONTAMINANTS IN COMPLIANCE WELLS

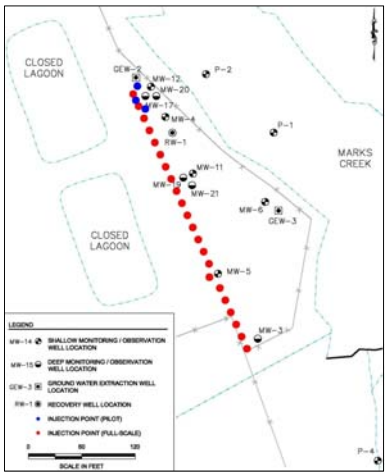
Compliance Well ID	Target Contaminants Exceeding NC 2L Standard	Estimated Year to Reach NC 2L Standard	Possible Number of Additional Years of Monitoring
MW-3	1,1-DCA	2015	4 years
MW-5	1,1-DCA	2012	1 year
MW-11	1,1-DCA	2012	1 year
	1,4-Dioxane	2026	15 years
MW-12	1,4-Dioxane	2015	4 years
MW-17	1,1-DCA	>100 yrs	>20 years
	1,4-Dioxane	2029	18 years

Proactive Thinking - Another Class 3 Mod!

Apply for Class 3 Permit Mod.
(submitted *before* HB 45 came into law)

1) Permit decommissioning and removal of the treatment system.
2) Description of a possible alternate technology that Square D might consider in the future to attempt to expedite closure (e.g., ISCO).

Approved November 2011
(*after* HB 45 became law)



HB 45 (Risk-Based No Further Action)

The New Alternative (2011 – 2015)

- Cost Evaluation
  - Projections to reach NC 2L Stds
    - 1 to 2 years for some parameters in some wells (good!)
    - 10 to >20 years for some parameters in some wells (not so good!)
  - LTM cost average ~$12,000 per year
    - Potential expenditure of >$200,000 for LTM compliance.
- Benefit of Pursuing Risk-Based Closure
  - Reduce future costs
  - Certainty vs. uncertainty
  - Precedent (may apply to other sites)

Hurdles & Challenges – Basic Eligibility

Eligibility requirements (130a-310.65 to 310.77)

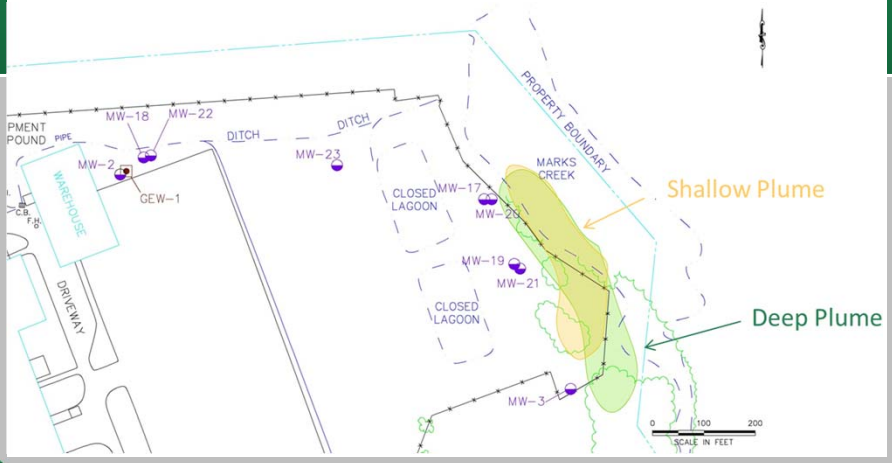
1) Groundwater is contaminated.
   - ✓ **YES**
2) Regulated by one of the specified programs.
   - ✓ **YES. RCRA**
3) Industrial site used to produce commercial product.
   - ✓ **YES. Formerly produced electronic components and parts.**
4) Reported contamination prior to March 1, 2011
   - ✓ **YES. 1980s**
5) No ongoing source of contamination at the property
   - ✓ **YES. RFI led to NFA on SWMUs**

Hurdles and Challenges – Plume Definition

6) Contaminant won't migrate off site – ever.
   - ✓ **YES. Catch-22: Need to provide enough technical information for DENR to make eligibility determination; principally use RFI information.**
7) No off-site contamination when RAP is submitted.
   - ✓ **YES. No detections in surface water or downgradient WSW**
8) Pay application fee and establish or show financial assurance
   - ✓ **Need to delineate plume; $4500 per acre of contamination**
9) RI, remediation standards, RAP, & public notice meet Eligibility Requirements
   - ✓ **YES**

Remedial Action Plan – Supplement (May 2012)

Total Plume Area ~ 1 Acre (2011)



New Risk-Based Targets

- Demonstrate no complete contaminant migration pathways
- NC 2L Groundwater Std. vs. Cancer Risk vs. Hazard Index

Contaminant of Concern	Basis of Risk	Maximum Residual Concentration (Nov. 2011)	NC 2L Groundwater Standard [b]	1 in 100,000 Total Risk (10^{-5})	1 in 10,000 Total Risk (10^{-4})
1,1- DCA	Carcinogenic	16.6 µg/L	6 µg/L	12 µg/L	120 µg/L
1,1-DCE [a]	Systemic Toxicant	11.4 µg/L	7 µg/L	87 µg/L[b]	87 µg/L[b]
1,4-Dioxane	Carcinogenic	9.4 µg/L	3 µg/L	3.3 µg/L	33 µg/L

[a] - 1,1-DCE total risk based on 33% of Hazard Index or 1.
[b] - NC 2L Groundwater Standard for 1,1- DCE was revised to 350 µg/L on April 1, 2013

Approval of Risk-Based Groundwater Remedy

- Approved RAP
- Land Use Restriction (LUR)
  - Still needed because of residual groundwater contamination, even though below Risk-Based Targets.
  - 1-acre plume covered by primary restrictions.
  - Negotiated with DENR to establish a buffer around the primary contamination that would not be contravened by realistic pumping.
  - Survey 1-acre and buffer for plat with restrictions identified.
  - Record LUR with deed.
- Another Public Meeting

Outcome

Square D's benefits from HB45:

- Gained future certainty
- Stopped potential future costs
- Left with 57 acres with unrestricted use

Summary

- Large complex site
- >25 years of data
- Active remediation until asymptote
- Passive MNA – BUT decades before NFA at 2L
- Active "boost" to polish GW?
- RBCA – another tool for closure

HOWEVER…

What about the rest of us?

- Small farm with petroleum AST
- Non-manufacturing (DOT easement)
- Purchased site after March 2011
- Low concentration plume off-site

Why can't we use RBCA too?

Questions?

Solutions-IES, Inc.

Joe Starr, P.E., PMP®

Program Manager / Senior Engineer

JStarr@Solutions-IES.com

919-873-1060

www.Solutions-IES.com

Solutions-IES
Industrial & Environmental Services

Where **Innovative** Technologies meets Traditional **Environmental Solutions**

27