

# **The Development of U.S. Clean Up Programs: Response, Remediation, and Redevelopment**

**Contaminated Land:  
Achievements and Aspirations**

**October 4, 2005**

**ConSoil 2005**

**Bordeaux, France**

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## Outline

### Cleanup program experience in U.S.

- Three phases -- 1980 to present
- Dimensions
  - Policy development
  - Risk assessment and management
  - Enforcement
  - Citizen involvement
- Future directions

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Superfund, as proposed by President Carter in June, 1979, would provide funds to help clean up thousands of abandoned hazardous waste dump sites across the country, many of which pose a threat to nearby populations. In addition, it would fund immediate clean-up of the nearly 14,000 spills of oil and hazardous substances into our waterways and on land which occur each year.

"The situation concerning hazardous waste disposal sites is grim," said Costle. "The past few years have brought to public attention an unforgettable series of incidents resulting from improper hazardous waste management--the continuing tragedy of Love Canal, the pollution of the water supply of over 300,000 people in Iowa, and the discovery of up to 20,000 to 30,000 discarded and leaking barrels of chemical wastes in the "Valley of the Drums" in Kentucky. In 1979, EPA estimated the number of hazardous waste sites to range between 32,000 and 50,000, and the number of sites posing a significant health or environmental problem to be between 1,200 and 2,000.

"A recent and incomplete EPA survey of 250 hazardous waste disposal sites found 32 sites where 452 drinking water wells had to be closed because of chemical contamination, 130 sites where water supplies and groundwaters had been contaminated but wells have not been closed, 27 sites with actual damages to human health (kidneys, cancer, mutations, aborted pregnancies, etc.), 41 sites where soil contamination made the land unfit for livestock or human uses, and at least 36 sites where income loss could be expected as a result of loss of livestock, fish kills, crop damage and similar losses," said Costle.

"Of some 1,000 sites investigated to date, we have found more than 250 that need remedial action. We still have more than 6,000 candidate sites to investigate, and we are becoming aware of about 200 more every month. In July alone, we learned of 671 more. This legacy of many years of uncontrolled hazardous waste disposal may well be the most serious environmental problem facing the nation today.

"Existing legal authorities are inadequate to deal with these problems in many ways."

## Timeline: Early Years

- 1980-86 and preceding
  - Major U.S. incidents at Love Canal, NY and Times Beach, Mo.; many cases of industrial mismanagement turning up
  - “Buy out” of Love Canal homeowners
  - Massive effort to “bag” PCB-oil contaminated soil in Mo.
  - Legislative reaction: Comprehensive Environmental Response Compensation and Liability Act 1980

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April 4 1980

The Environmental Protection Agency has been designated by the White House as the lead Federal agency responsible for the monitoring of off-site radiation levels around Three Mile Island, and for the implementation of a comprehensive program to keep the local elected officials and the public fully informed of near- and long-term clean-up activities.

The Agency, as the independent environmental regulatory arm of the Federal government, will be kept informed of the status of the disabled reactor #2 and proposed on-site clean-up actions by the Nuclear Regulatory Commission. The Commission will work with EPA to provide the public and state and local officials with all the necessary information on clean-up operations in a manner that will allow full and open discussions prior to any final action.

May 20, 1980. President Carter today declared an emergency to permit the Federal government and the State of New York to undertake the temporary relocation of approximately 700 families in the Love Canal area of Niagara Falls, New York, who have been exposed to toxic wastes deposited there by Hooker Chemical company.

Barbara Blum, Deputy Administrator of the U.S. Environmental Protection Agency, in announcing the President's action -- taken at the request of Governor Carey of New York -- said that the Federal government and the State will jointly fund the relocation effort.

"This action is being taken," said Blum, "in recognition of the cumulative evidence of exposure by the Love Canal residents to toxic wastes from Hooker Chemical company and mounting evidence of resulting health effects.

"Health effects studies performed by others so far are preliminary. Taken together, they suggest significant health risks. Ordinarily, we would not subject the public and affected families to the disruption of temporary relocation unless conclusions on adverse health have been fully documented and confirmed after independent review," she said.

The acceptance of man-made chemicals--to the extent that they are hardly recognized as such anymore--has become a fact of daily life in the United States. We are dependent on synthetic chemicals for health, livelihood, housing, transportation, food, and for our funerals.

But within recent years, there has been a realization that what is our meat may also be our poison. Here are some examples:

In a report dated March 1980, the Library of Congress concluded that damages to natural resources of the United States because of toxic chemicals were "substantial and enduring." The report identified damaged resources ranging from all five of the Great Lakes to the aquifer underlying the San Joaquin Valley, possibly the richest agricultural area in the United States.

In a report to the President of the United States, the Toxic Substances Strategy Committee concluded that the cancer death rate in the United States had increased sharply and that "occupational exposure to carcinogens is believed to be a factor in more than 20 percent of all cases of cancer."

In a report released in the spring of 1980 by the Congressional Office of Technology Assessment, agricultural losses because of chemical contamination were placed at \$283 million. The report said the value was based on economic data from only six of the 50 States and was therefore "likely to be a gross underestimation of the actual costs."

In 1979, the total production of chemicals in the United States was 565 billion pounds. Of this amount, 347 billion pounds was of chemicals officially classified by the United States Government as hazardous. Production growth was increasing at a rate of 7.6 percent in 1979. At that rate, production will double in 10 years.

This is not to say that chemicals are necessarily bad. On the contrary, they have contributed mightily to American prosperity. We rely increasingly on them because of this contribution which they made to American life in a changing and sometimes hostile world. In fact, most chemicals are benign. Only a small number of them cause cancer, birth defects, or other illnesses. But the fact remains that, small though the relative number of these dangerous chemicals may be, they can cause terrible damage when set loose on the public. Moreover, because we do use these substances in such a large volume, the number of incidents involving them has increased dramatically in the recent past.

## Early Years (cont.)

- Technology and enforcement tools were “blunt” instruments
  - Excavate and land disposal
  - Large and small companies were problems
  - However, tax on oil, chemical, and metals industries to pay for trust fund
- Communities distressed with pace of action and lack of answers
- Questions arose: who will pay, which sites to work on, health, and technologies available
- Reporting of releases required; formal system to “triage” sites called for; list” of 400 National Priority List sites (1983)

## Early Years: Prevalence of Emergency Response Actions

- Drum removals and contaminated soil excavation were the most common activities in the early years of Superfund



## Middle Years: Remediation/Restoration

- 1986 – mid-90s
  - 1986– Superfund Amendments and Reauthorization Act (SARA)
  - Large scale Federal program
    - Enforcement authorities refined
    - Citizen involvement defined
    - Research program and associated technology demonstration programs launched
    - Separate health agency (ATSDR) created as “voice” for health effects (vs. EPA)

## Middle Years (cont.)

- Treatment and new technologies preferred
- Regulation (NCP) further defines Hazard Ranking System & remedy selection criteria
- National inventory grows to 30K+ sites
  - Concern for impact on property values
  - Stigma leads to “archiving” sites for no further action
- More sites characterized, few “cleaned”
- Major political interest and oversight
  - Pace and type of cleanup
  - Many “studies” of program by NGO’s, think tanks, etc.

## Later Years

Mid 1990s to present

- More sites “cleaned” -- '04 > 900 completions
- Long term commitments
  - Institutional controls
  - Groundwater success
- Expensive construction phase underfunded; more sites ready than \$ available
- Pace of site listing slows with program alternatives (e.g. voluntary programs)
- States' site inventories = 63,000+ sites
- Innovative approaches nurtured for statutory, policy and technical approaches (esp. BF and state voluntary programs)

## Policy Development—Cleanup Programs

- Early years
  - Defined “releases” of hazardous substances vs. sites
  - Emergency response and longer term cleanup programs created
  - Sole national cleanup program; centralized decisions
  - Short to mid term “program”
  - Environmental agency is principal actor

## Policy (cont.)

- Middle years 1986 – mid 1990s
  - 10 EPA regions plus 40+ state Superfund programs plus UST programs
  - Multiple federal agencies for health AND natural resource issues
  - Long-term investment in health and other research
  - Numerous administrative reform initiatives by EPA; “better government” era

## Policy (cont.)

- Present and Future
  - SF programs plus multiple state programs for industrial sites (closed and operating), UST, Brownfields, and other voluntary programs
  - Brownfields legislation dominates landscape
    - Development is engine for cleanup vs. health/environment alone
  - Smarter “allocation” of contaminated sites among appropriate programs by govt.
  - Mega-sites—i.e. mining and sediment sites loom large
  - CBR agents adding new dimension to “decon” role of SF program

## Enforcement – “Polluter Pays”

Early years -- Statutes

- Pre-CERCLA – mainly public health, nuisance, and water pollution statutes (including navigation)
- CERCLA (1980) -- strict, joint and several, and retroactive liability
- All parties—government and industry “new” to the process

## Enforcement (cont.)

Middle Years -- 1986 – mid 1990's

- Separate roles created for EPA and Dept. of Justice after early “sweetheart deals” revealed
  - Process: consent decrees in Federal court for PRP site cleanup
- Complex sites with many parties required a lot of info gathering (i.e. tens of thousands PRPs for ~1200 sites)
- Administrative reforms(1989): enforcement FIRST (went from 30% to 70% polluter pays)

## Enforcement (cont.)

Later years - mid 1990's to present

- Fairness reforms—experiments
  - Simplification of settlements with small parties
    - De minimis settlements for small amts.
    - De micromis settlements for \$0
  - Simplify process for major parties
    - Work jointly to search for other PRP's
    - EPA suggests “allocation” among parties
  - Remove liability barriers for lenders, prospective purchasers, owners

## Enforcement (cont.)

### Later years

- “Pocketbook” reforms—follow the \$\$
  - Orphan share policy (1996)—EPA makes offer for share of bankrupt party
  - Removing liability barriers—lenders, prospective purchasers, owners
  - Special Accounts created -- \$ from PRP’s into separate accounts for that site vs. back to Treasury

## Enforcement (cont.)

### Present and Future

- “Reforms” have become routine practice; codified in Brownfields legislation
- Brownfields legislation converted enforcement thinking to enabling developers, i.e., prospective purchaser agreements
- Institutional controls
- Financial assurance for long term remedial actions (e.g. prevention and long term care)

## Risk Assessment (and Management)

- Early years
  - Exposure prevention
  - Remove threat; dig and haul to landfill
  - Public dialogue on risk assessment vs. risk management “defined” by NAS in 1983 (Red Book)

## Risk (cont.)

- Middle years – 1986 to mid 1990's
  - Permanence and treatment to maximum extent practicable; reduce toxicity, mobility, and volume
  - Residential use is focus of cleanup levels
  - Require use of Applicable, Relevant, and Appropriate Regulations and Stds. (e.g., use national or state drinking water standards for GW)

## Risk (cont.)

- Later Years -- mid 1990's to present
  - Treatment of principal threat; containment allowed for remainder
  - Role of “baseline risk assessment”; cleanup not needed within risk range
  - Land use considered in remedy selection (1995)
  - Soil Screening Guidance (1996) de minimis levels in soils; national consistency across regions

## Risk (cont.)

- Latest developments/Future
  - President's Council on Risk Assessment— (1997) *closer* linkage -- RA and Risk Mgt.
  - RBCA arrives for use at petroleum sites
  - Fine tuning guidances
    - Probabilistic risk assessment (2001)
    - Dermal risk (2004)
    - Inhalation risk – revisions underway
  - Revisit/new toxicology information
    - TCE, Perchlorate, MTBE and other fuel oxygenates
  - Development of “upper” screening levels for chem/bio constituents

## Citizen Information/Empowerment

Early Years pre –1986

### Community Relations

- Citizens frustrated by lack of knowledge about effects of problem and how it will be dealt with
- Focus on information “out”
- EPA did not understand the importance of citizens’ interests
- Little research about aspects of citizen understanding

## **Citizen Info/Empowerment (cont.)**

Middle Years 1986 – mid 1990's

Community Involvement

SARA changes -- transparent & engaged

- Community Involvement Plans
- Information Repositories
- Public invited to comment on Proposed Plans
- Responsiveness Summary to public comments
- Technical Assistance Grants

Community Advisory Groups - stakeholders, e.g., residents, local business, local govt officials and others, discuss and resolve site issues

## Citizen Info/Empowerment (cont.)

Later Years -- mid 1990's -- present

Community Empowerment--early and meaningful involvement (2001); build capacity

- Technical Assistance Grants (matured; 250+)
- Technical Outreach Services for Communities - agreements with universities to provide independent technical assistance
- Provide neutral facilitators, conveners, and mediators
- Involve communities in the Risk Assessment
- Obtain community feedback on satisfaction with Agency involvement activities

## Looking Down the Road

### Policy

- Vigilance for unintended consequences; e.g. listing sites vs. lenders, oxygenates, etc
- Accelerated temporal nature of work; faster identification, assessment, response plans needed
- Technology progress— more dependent on dual use developments; investors' parade passed by
- New chemicals and new effects from old perennials – perchlorate, TCE, dioxin
- Redevelopment engine gaining momentum

## Down the Road (cont.)

### Policy (cont.)

- Preventing future site problems with financial or other vehicles

### Site level

- Cost management and post construction focus
  - “Smarter monitoring will save before, during, after cleanup, e.g. the Triad approach
  - Optimization of existing systems more routine
  - Managing institutional controls a challenge
- Economics and feasibility of groundwater DNAPL source control in transition
- Looming state liability for O&M for groundwater

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