RETURN TO 1998 ROD AR INDEX

Superfund Records Center
SITE: New Bedford
BREAK: 13.04
OTHER: 47559

Handouts for New Bedford Forum, March 1, 1994

13.4.

PROPOSED QUESTIONS FOR TECHNOLOGY REPRESENTATIVES

Set out below are a number of proposed questions for the technology representatives. These questions raise important issues to be evaluated in the selection of a technology to remediate the New Bedford Harbor Hot Spot sediments. The questions also help explain the kind of information which EPA must use in determining which technology best meets the criteria set out in the Superfund regulations.

These questions are organized by the Superfund criteria which are used to compare and contrast potential technologies (the "balancing criteria"). You will also note that the questions are keyed to the criteria set out on the proposed scorecard for evaluating technologies.

Since these questions are designed to be asked of the technology representatives, we have not included questions for which the representatives may have no expertise. For instance, there are no questions presented for "community acceptance" of a technology since the representatives are not the appropriate people to answer questions on this topic. However, the scorecard includes a place for Forum members to evaluate whether the technology is likely to be acceptable to the community.

There are three questions which relate to all the criteria, which should be regularly asked of the representatives:

Is there **data** from completed projects to support the answers to the questions?

What has been the experience in the field with this technology?

What site or client references are available for the technology?

Please note that this is not intended to be a complete list of questions for the technology representatives. All Forum members should feel free to add other questions.

SDMS DocID 47559

Questions on Short-Term Effectiveness (Protectiveness)

1. Potential for Hazardous Air Emissions

- Does the process produce air emissions?
- What is the make-up of these emissions?
- Is there a potential for unplanned air emissions?
- What controls are in place for air emissions?
- What is likely to happen if the control system fails?
- Who will be exposed to these emissions?
- Are all air emissions monitored?
- How are these emissions monitored?

2. Potential for Hazardous Releases to Water and/or Land

- Does the process result in releases to water or land?
- What is the make-up of these releases?
- What controls are there on these releases?
- How are these releases monitored?
- What are the likely impact of a spill?
- Who will be exposed to these releases?

3. Other Potential Safety Risks (including fire & explosion)

- Is there a risk of fire and/or explosion?
- What is the system operating pressure?
- What control systems are in place?
- What happens if the control system fails?
- Over what period of time has the system operated?
- What is the safety history of the system?
- What are the shut-down procedures?
- What level of worker protection is required for the process?
- Is the unit National Fire Protection Association approved?

4. Potential Transportation Risk

- Will additional hazardous substances be brought to the site as part of the treatment process? What are they?
- Will any hazardous substances be transported away from the site?
- What hazards are associated with transporting the materials?

- Where will these substances be taken and over what route?

5. <u>Duration of Process & Risks</u>

- How long will construction take?
- What are the construction impacts (dust/noise/traffic)?
- What time period will be required to treat the Hot Spot waste?
- What is the projected thru-put rate?
- What percent operating time was used to calculate a treatment rate?
- What is the total time from the signing of the contract until treatment is complete and equipment removed? What is the basis for this answer?

Questions on Reduction of Toxicity, Mobility, and Volume through Treatment

1. Nature and Reliability of the Process

- What pre-treatment and post-treatment would be required for the Hot Spot sediment? (for example, screening, de-watering, consolidation)
- Can you explain what happens to the contaminants during the treatment process?
- Do you have mass balance data to confirm the process?
- Where has the process been used before?
- Do you have performance data on operating reliability?
- Have there been any problems using this process?
- Can you explain what caused the problems?
- What percentage of the time was the process operational?
- Do any of the specific characteristics of the Hot Spot waste have the potential to interfere with the success of your treatment process? (For example, the high saltwater content, the high percentage of silt and clay, the high PCB content, heavy metals content, and high organic content.)

2. Reduction in Toxicity of Contaminants

- Does the process reduce the toxicity of the PCBs?
- Does the process reduce the toxicity of the metals?

3. Reduction in Mobility of Contaminants

- Does the process reduce the mobility of the PCBs?
- Does the process reduce the mobility of the metals?

4. Reduction in the Volume of Contaminants

- Does the process reduce the volume of the PCBs?
- Does the process reduce the volume of the metals?
- Does the process increase or decrease the total volume of hazardous substances?

5. Remaining Concentrations of PCBs and Metals

- What concentrations of PCBs and/or heavy metals has the process effectively treated in the past?
- What were the concentrations in the material after treatment?

- What are the intermediate products and by-products of the process?

Questions on Long Term Effectiveness (Protectiveness) and Permanence

1. What is your experience with long-term management of the hazardous substances remaining after treatment?

2. What restrictions would there be on future use of the site, if there are hazardous substances remaining?

3. What operation and maintenance at the site would be required after treatment is complete?

4. How long is the design life of any containment unit for hazardous residuals (on-site or off-site)? What is the history of reliability with similar units?

Questions on Implementability

1. Availability of Equipment & Trained Operators

- Is equipment currently available to treat the Hot Spot sediment?
- Is a full-scale unit available?
- Are all materials needed for the process currently available?
- How long would it take, after signing a contract, to have the equipment fully operable?
- Is specialized training required to operate the treatment equipment?
- Are there trained and experienced operators available?

2. Availability of Off-Site Facilities

- If the process requires off-site storage, treatment, or disposal, are these facilities available?
- Where are these facilities?
- Are they certified to receive PCBs and hazardous wastes?
- Are they in full compliance with all environmental laws and their operating permits?

3. Ability to Monitor Process

- At what points in the treatment chain can the process be monitored?
- How quickly can the process be modified or stopped if monitoring indicates hazardous emissions or a failure to properly treat the sediment?

Questions on Cost

1. What are the capital and operating costs for implementing the process (cost per ton)?

2. What are the post-treatment operation and maintenance costs (in present value)?

3. Will any contaminants be left on the site at completion of treatment? If so, how will these contaminants be monitored and what are the costs (in present value)?

Questions on Compliance with Federal and State Environmental Laws and other Requirements (ARARs)

1. How does the technology meet the requirements of the Toxic Substances Control Act (TSCA)?

2. How does the technology meet the requirements of the Resource Conservation and Recovery Act (RCRA)?

3. Will any waivers of legal requirements be required to implement this technology?

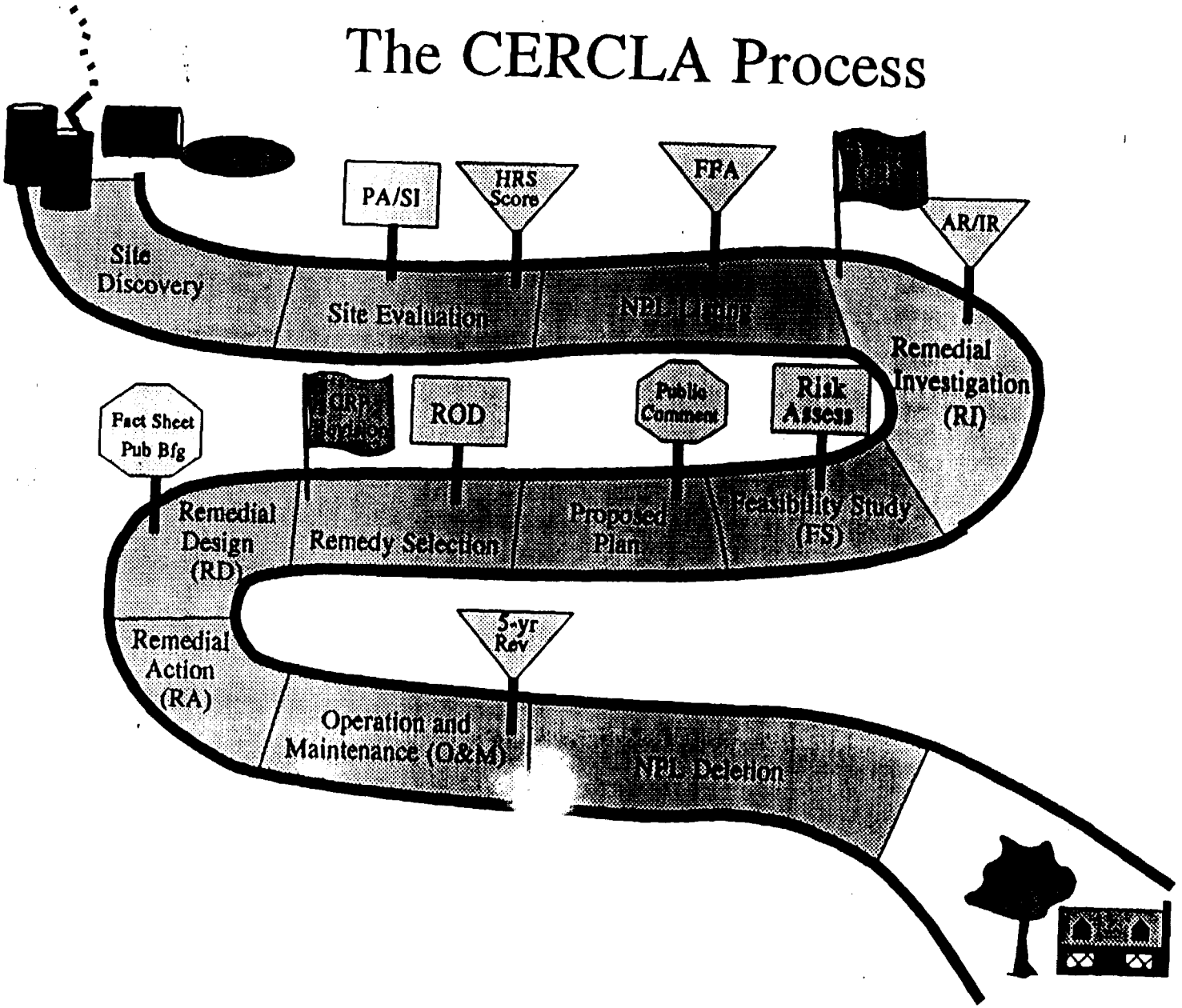
4. If any off-site disposal is required, does it meet the RCRA land disposal restrictions and the Superfund Off-Site Policy?

DRAFT

NEW BEDFORD COMMUNITY TECHNOLOGY SCORECARD

CRITERIA	TECHNOLOGY:
SHORT-TERM EFFECTIVENESS/ PROTECTIVENESS • Air Emissions • Water/Land Emissions • Safety Risks • Transport Risks • Duration of Process & Risks	
REDUCTION IN TOXICITY, MOBILITY & VOLUME • Nature & Reliability of Process • Reduction in Toxicity • Reduction in Mobility • Reduction in Volume • Remaining Concentrations	
LONG TERM EFFECTIVENESS/ PROTECTIVENESS • Risks Remaining at Site • Future Use of Site	
IMPLEMENTABILITY • Availability of Equip. & Operators • Availability of Off-Site Facility • Ability to Monitor Process	
COST • Capital, Operating & Operation and Maintenance	
COMPLIANCE WITH FEDERAL AND STATE LAWS & OTHER REQUIREMENTS	
COMMUNITY ACCEPTANCE • Local Issues/Impacts • Interest Groups	
STATE ACCEPTANCE	
OTHER	

The CERCLA Process



F1d055-3

U.S. ENVIRONMENTAL PROTECTION AGENCY

SUPERFUND CRITERIA FOR SELECTING REMEDIES

- Superfund Statute
- Superfund Regulations (NCP)
- EPA Policy & Guidance

EPA must evaluate each of the criterion to comply with the law.

COMMUNITY ACCEPTANCE

- Local Issues/Impacts
- Interests Groups

SCORECARD & QUESTIONS

- This is a draft; feel free to add to it
- Order on the scorecard reflects the concerns of Forum participants
    - Health
    - Safety
    - Economics
    - Communication
- Questions translate general criteria into useable concepts

OVERALL PROTECTION OF HUMAN HEALTH & THE ENVIROMENT

- How the Cleanup Protects Human Health & the Environment
  - Reduction of risk to human health
  - Reduction of risk to biota

COMPLIANCE WITH FEDERAL & STATE ENVIRONMENTAL LAWS & POLICIES

- Federal Environmental Laws
  - Example:
    Toxic Substances Control Act (TSCA)
  - Example:
    Resource Conservation & Recovery Act (RCRA)
- State Environmental Laws
  - Only more stringent laws
  - Example:
    Massachusetts Ambient Air Limits

U.S. ENVIRONMENTAL PROTECTION AGENCY

NINE CRITERIA FOR SUPERFUND REMEDIES

THRESHOLD CRITERIA

- Overall Protection of Human Health and the Environment
- Compliance with Federal and State Environmental Laws and policies

BALANCING CRITERIA

- Long-term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, and Volume through Treatment
- Short-Term Effectiveness
- Implementability

MODIFYING CRITERIA

- State Acceptance
- Community Acceptance

NOTES ON THE NINE CRITERIA

- Order of criteria does not reflect their importance
- Any one criterion can require modifications or elimination of a technology or remedy
- "Community Acceptance" under the proposed Superfund Reform Act of 1994

COSTS

- Capital Costs
- Operation and Maintenance Costs

U.S. ENVIRONMENTAL PROTECTION AGENCY

STATE ACCEPTANCE

LONG-TERM EFFECTIVENESS AND PERMANENCE

- Magnitude and location of residual contamination
- Adequacy and reliability of long-term controls

REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT

- Treatment process used and materials treated
- Amount of hazardous materials destroyed or treated
- Degree of expected reductions in toxicity, mobility, and volume
- Degree to which treatment is irreversible
- Type and quantity of residuals remaining after treatment

SHORT-TERM EFFECTIVENESS (PROTECTIVENESS)

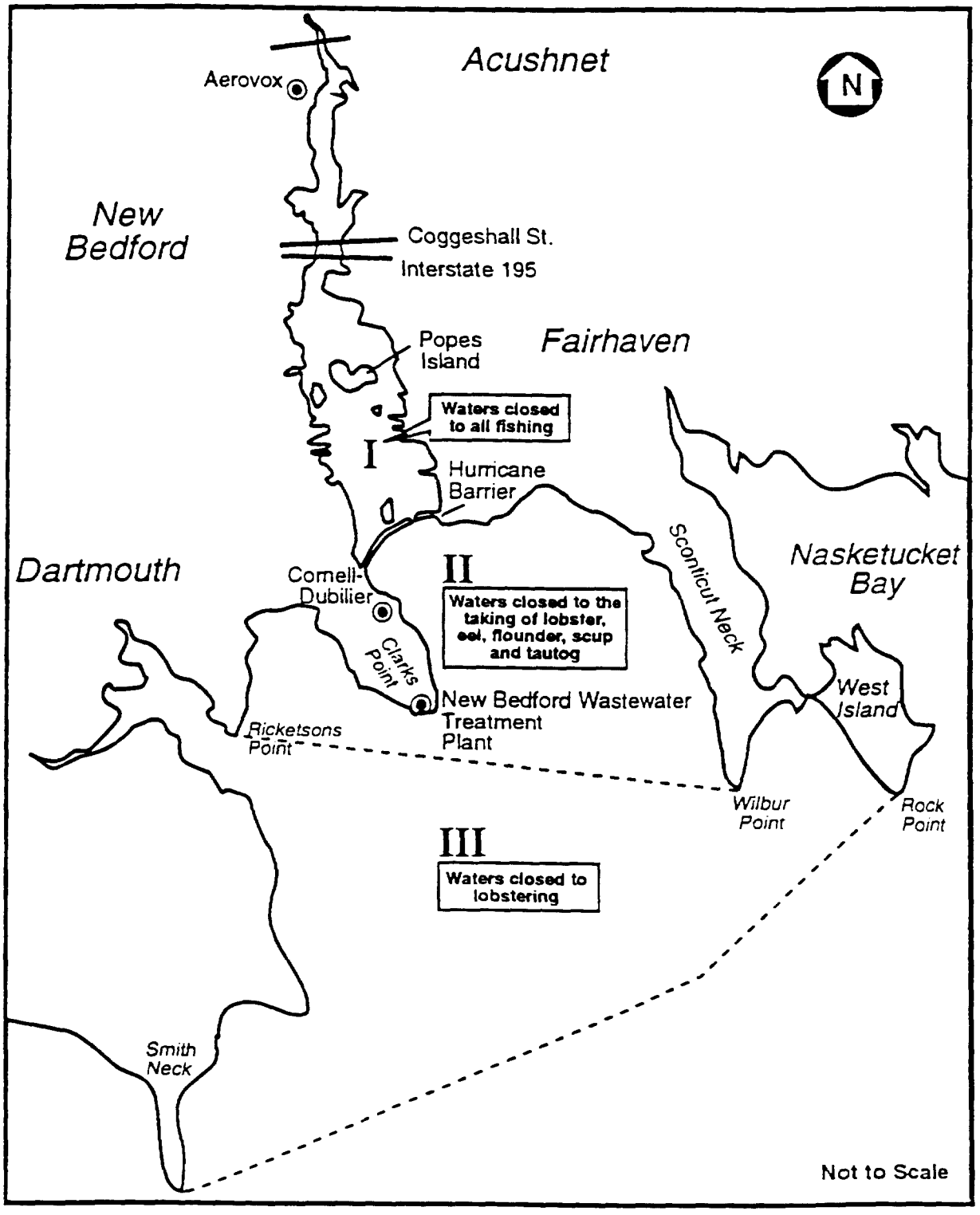
- Protection of community during cleanup
- Protection of site workers during cleanup
- Short-term environmental impacts
- Time until cleanup objectives are achieved

IMPLEMENTABILITY

- Ability to construct and operate the technology
- Availability of necessary equipment and specialists
- Operational reliability of the technology
- Ability to monitor effectiveness of remedy
- Ability to obtain approvals from other agencies
- Coordination with other agencies
- Availability of off-site treatment, storage, and disposal services and capacity

Figure 1

Fishing Closure Areas



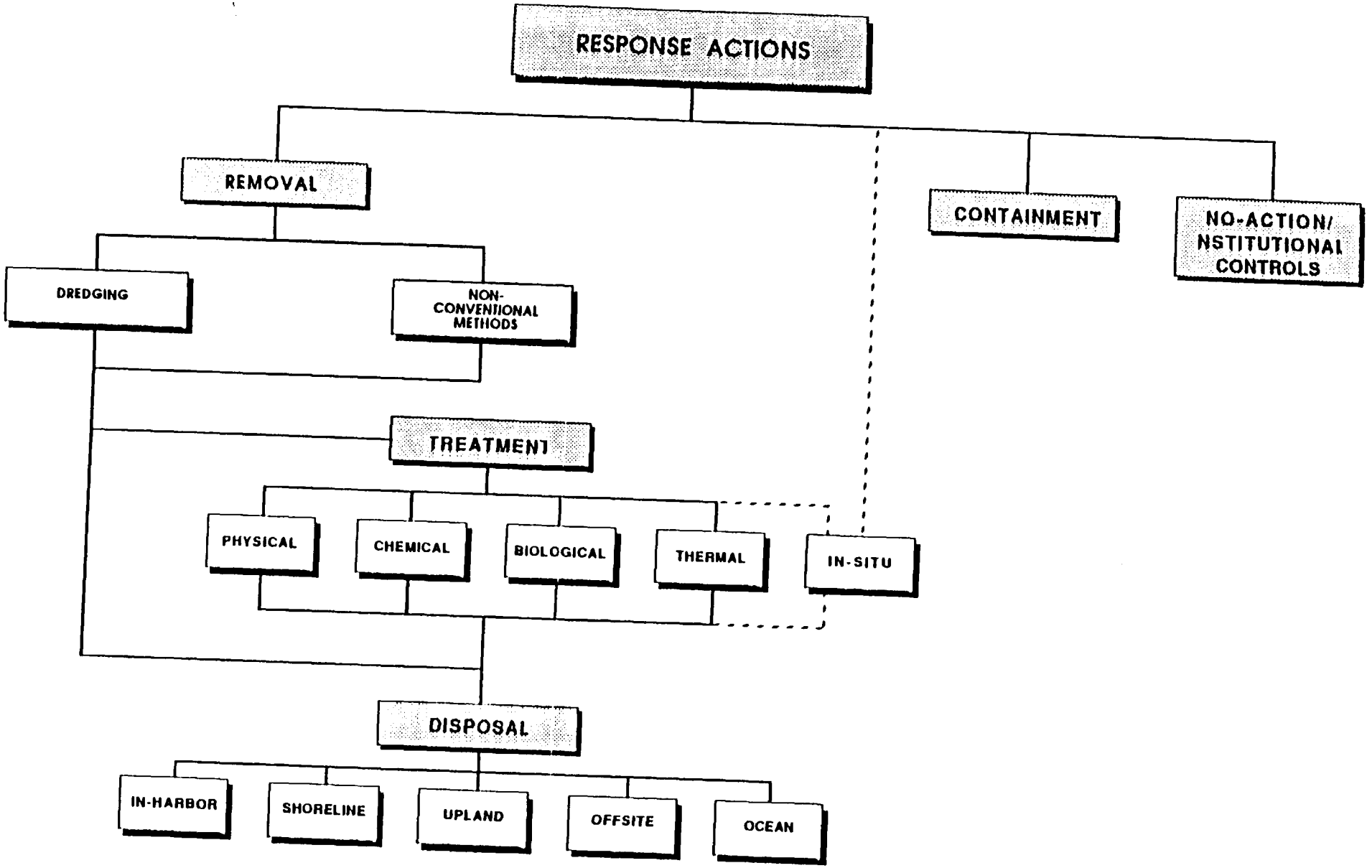


FIGURE 5-1
GENERAL RESPONSE ACTIONS & TECHNOLOGY TYPES
IDENTIFIED FOR NEW BEDFORD HARBOR
HOT SPOT FEASIBILITY STUDY
NEW BEDFORD HARBOR

4059-22

TABLE 5-4
RESULTS OF BENCH- AND PILOT-SCALE TESTS OF TREATMENT TECHNOLOGIES
CONDUCTED FOR NEW BEDFORD HARBOR

HOT SPOT FEASIBILITY STUDY
NEW BEDFORD HARBOR, MASSACHUSETTS

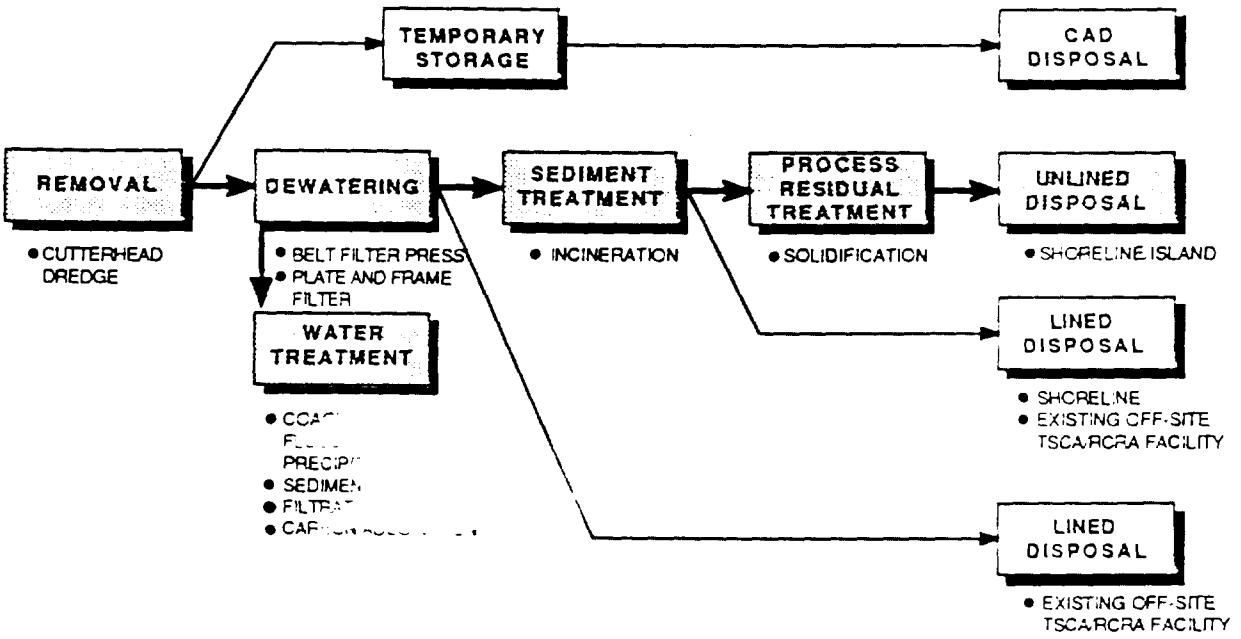
TECHNOLOGY	RESULTS OF TREATMENT TEST	ADVANTAGES	DISADVANTAGES	RETAINED
Solvent Extraction (B.E.S.T. Process)	• 99.1% reduction in PCBs in low level (780 ppm) sediment after 3 extraction stages • 99.4% reduction in PCBs in high level (4,300 ppm) sediment after 3 extraction stages • 94% reagent recovery • 90% solids recovery • Apparent immobilization of metals	• High PCB removal • Not limited by moisture content • Energy efficient • Proven in field test • Commercial units available	• TEA solvent is flammable • Secondary treatment for metals may be required	Yes
Alkali Metal Dechlorination (KPEG process)	• 99.8% removal of PCBs in low level (440 ppm) sediment after 9 hours • 99.8% removal of PCBs in high level (7,300 ppm) sediment after 12 hours • 75% reagent recovery (min) • 43% solids recovery (dry wt)	• High PCB removal • Biphenyl ether end product not acutely toxic, and does not bioaccumulate.	• Low reagent/sediment recovery suggests material handling problems need to be overcome • Secondary treatment necessary for metals • Moisture inhibits dechlorination reaction • No commercial process available at present time	No
Solidification/ Stabilization	• Chemical stabilization properties of the three technologies tested were similar • Hardened material exceeded 50 psi USEPA-OWSER standard • PCB leachability reduced by 10X to 100X (depending on formulation)	• Effective stabilization of PCBs • Effective stabilization of cadmium and zinc • Numerous commercial processes available	• Apparent mobilization of certain heavy metals • No information or data on long-term structural integrity of solidified material	Yes

TABLE 5-4 (Continued)
RESULTS OF BENCH- AND PILOT-SCALE TESTS OF TREATMENT TECHNOLOGIES
CONDUCTED FOR NEW BEDFORD HARBOR

HOT SPOT FEASIBILITY STUDY
NEW BEDFORD HARBOR, MASSACHUSETTS

TECHNOLOGY	RESULTS OF TREATMENT TEST	ADVANTAGES	DISADVANTAGES	RETAINED
Solidification/ Stabilization (continued)	• Cadmium and zinc leachability significantly reduced; eliminated in one process • Copper and nickel apparently mobilized			
Vitrification	• 99.94% destruction of PCBs • 99.9985% DRE (soil-to-offgas) • Metal concentrations in TCLP extract below regulatory limits	• Effective destruction of PCBs and encapsulation of metals	• High energy requirements • No commercial units available at this time	No
Liquified gas extraction (propane)	• 97% reduction of PCBs in low level (<400 ppm) sediment after 10 passes through unit • 96% reduction of PCBs in high level (>2,000 ppm) sediment after 6 passes through unit • 93% solids recovery	• High PCB removal	• Further development needed to address problems with materials and system operating parameters experienced during pilot test • No commercial units available at this time	No
Advanced Biological Methods (aerobic)	• Limited degradation of lower chlorinated congeners (di- and trichlorobiphenyls)) • No degradation of higher chlorinated PCB isomer groups	• Insufficient data to assess advantages of this relative to other treatment processes	• Incomplete destruction of PCBs • Insufficient data to determine process rates and process design parameters	No
Plate and Frame Filter Press	• 38% solids sample dewatered to 62% solids cake	• Effective method of sediment dewatering • Commercial units readily available	• None identified	Yes

FIGURE 6-8
SCREENING OF REMOVAL ALTERNATIVES
HS-TREAT-1: INCINERATION ALTERNATIVE
HOT SPOT FEASIBILITY STUDY
NEW BEDFORD HARBOR



Effectiveness

Advantages
- Permanent and significant reduction in volume, toxicity, and mobility of hazardous waste
- Attains state/federal ARARs
- Reasonable time until protection is achieved

Disadvantages
- None

Implementability

Advantages
- Proven technology; high technical feasibility
- Excellent equipment availability

Disadvantages
- Will require coordination with other agencies

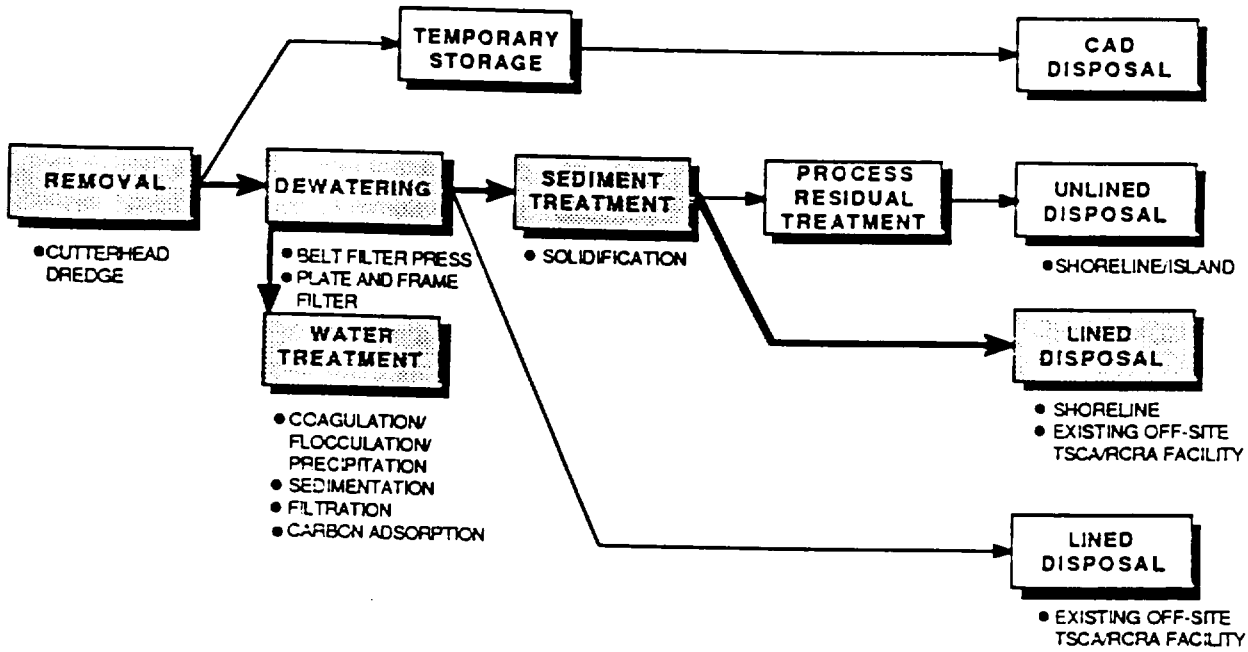
Cost

Advantages
- Low potential for future remedial action costs
- Will not require 5-year review
- Will not require long-term environmental monitoring

Disadvantages
- None

4959-22

FIGURE 6-9
SCREENING OF REMOVAL ALTERNATIVES
HS-TREAT-2: SOLIDIFICATION ALTERNATIVE
HOT SPOT FEASIBILITY STUDY
NEW BEDFORD HARBOR



Effectiveness

Advantages
- Permanent and significant reduction in mobility; increase in volume
- Complies with most federal/state ARARs
- Will reduce existing and long-term risk associated with Hot Spot sediment

Disadvantages
- Not anticipated to be completely effective in immobilizing PCBs

Implementability

Advantages
- No need for long-term maintenance at the site as the solidified sediment will be disposed of off-site.
- Bench-scale tests have been conducted
- Good potential for favorable community response

Disadvantages
- May require follow-up testing after bench-scale tests
- Will require coordination with several other federal and state agencies

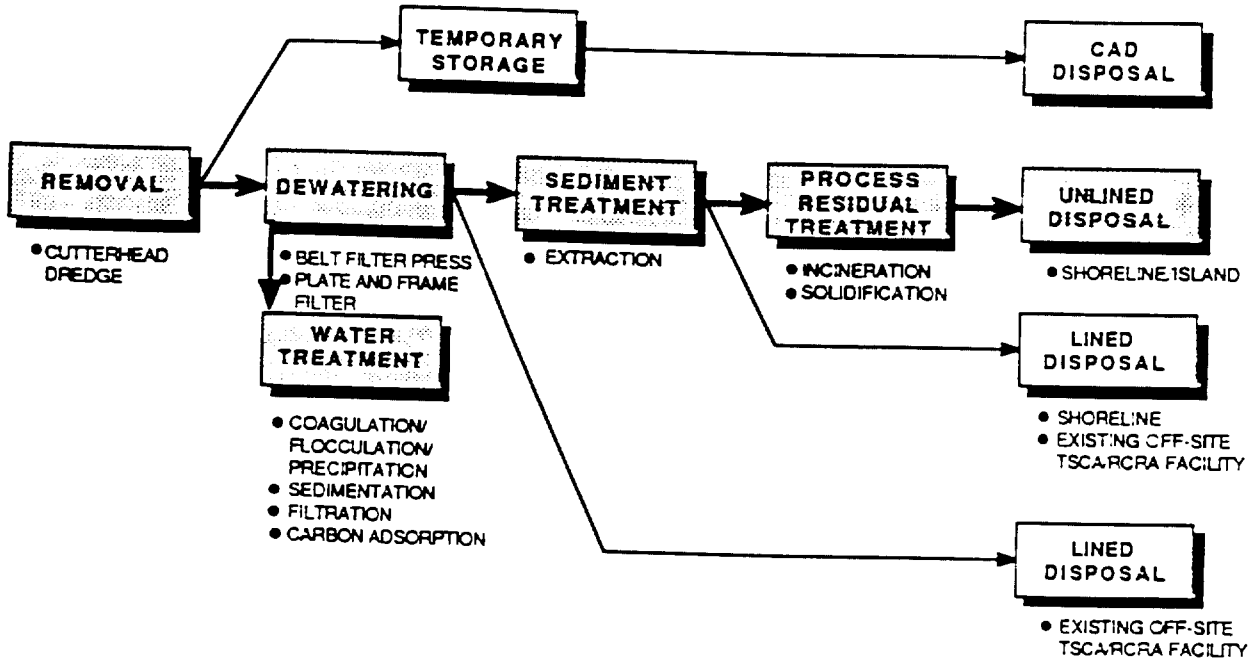
Cost

Advantages
- Limited potential for future remedi action costs
- Will not require 5-year review

Disadvantages
- Costs are highly variable dependir on disposal facility selected

4959-22

FIGURE 6-10
SCREENING OF REMOVAL ALTERNATIVES
HS-TREAT-3: SOLVENT EXTRACTION ALTERNATIVE
HOT SPOT FEASIBILITY STUDY
NEW BEDFORD HARBOR



Effectiveness

Advantages

- Permanent and significant reduction in mobility and volume. Toxicity is increased during the extraction step but permanently reduced following incineration
- Attains federal/state ARARs

Disadvantages

- None

Implementability

Advantages

- Innovative technology; bench-scale tests performed on New Bedford Harbor sediment
- No need for long-term management at the site
- Equipment available
- Good potential for favorable community response

Disadvantages

- May require follow-up testing after bench-scale tests
- Will require coordination with several other federal and state agencies

Cost

Advantages

- Will not require long-term maintenance at the site
- Limited potential for future remedial action costs
- Will not require five-year review

Disadvantages

- Higher costs anticipated; unproven technology

4959-22

EMISSIONS MONITORING

1. During trial burn
   - sets operating conditions

2. Continuous Emissions Monitoring
   - automatic shut off if conditions exceeded or if monitoring fails

3. Ambient Air Monitoring for PCBs
   - at least 4 stations around CDF
   - at least 3 stations off site

EMISSIONS MONITORING

1. During trial burn
   - sets operating conditions

2. Continuous Emissions Monitoring
   - automatic shut off if conditions exceeded or if monitoring fails

3. Ambient Air Monitoring for PCBs
   - at least 4 stations around CDF
   - at least 3 stations off site

U.S. ENVIRONMENTAL PROTECTION AGENCY

PERFORMANCE REQUIRMENTS

- for PCBs (TSCA)

  99.9999 % destruction and removal

- for metals (MA Ambient Air Limits)

lead	0.07 ng/m^3 *
chromium	0.68 ng/m^3
cadmium	0.001 ng/m^3
nickel	0.02 ng/m^3

- for dioxins & furans

  risk no greater than 1 in 100,000

* ng/m^3 = microgram/cubic meter
1,000,000 microgram = 1 gram 457 grams = 1 lb