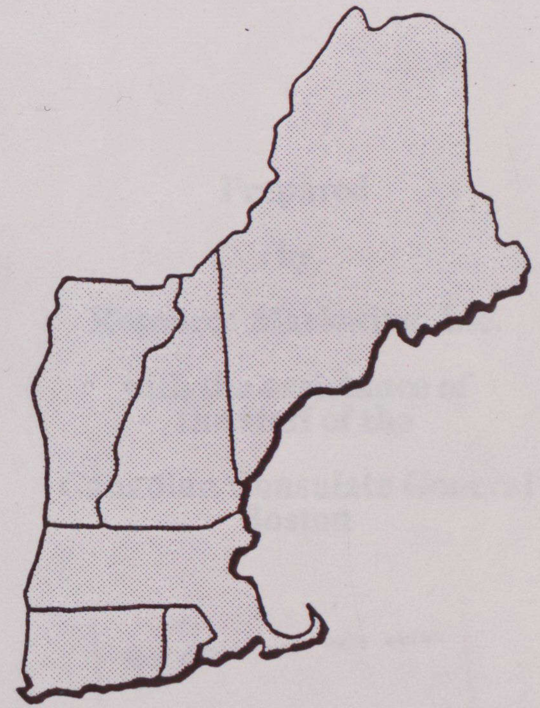
MARKET OPPORTUNITIES FOR CANADIAN ENVIRONMENTAL PRODUCTS & SERVICES COMPANIES IN NEW ENGLAND



Prepared by Resource Marketing, Inc.
with the assistance of the staff of the
CANADIAN CONSULATE GENERAL
Boston

July 1993

Canada

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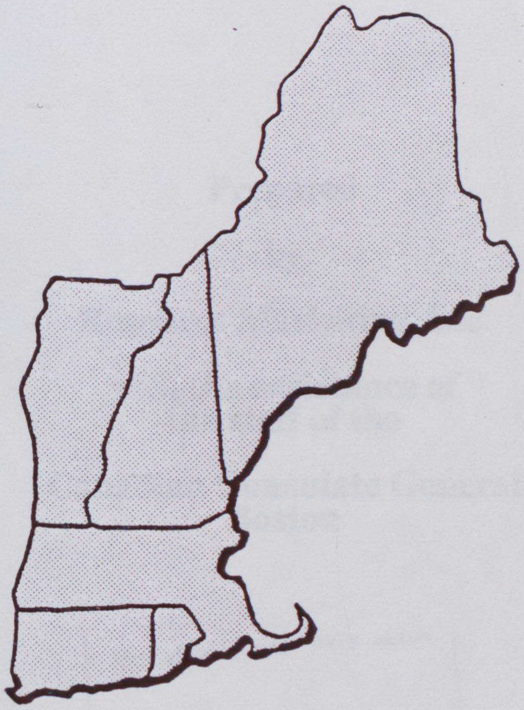

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I. INTRODUCTION

The purpose of this study is to provide an assessment of the market potential for Canadian environmental products and services (EPS) in five New England states: Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

Identifying market opportunities begins with understanding the structure of the EPS industry, market and economic forces, products and services specification and buying processes and special issues. Some aspects of this study will require further investigation... specifically, the New England sales and market potential for a particular environmental product or service marketed by a specific Canadian company. Data on EPS market potential is more generally available for the U.S. nationally than on a regional or state-by-state basis.

It was not the intent of this study to rely on primary market research, although some of this was conducted. It was rather to identify, interpret and summarize existing relevant material. Estimates and interpretations of data and information collected are based on Resource Marketing's experience in assessing and marketing to the EPS market.

Sources used in this study included trade publications, reports, and interviews with industry experts, government agencies, associations and other industry groups. Data in this study vary in compatibility due to the variety of sources used and the fragmented nature of EPS market segments. This is a problem widely recognized by marketing research experts.

Definitions

The term "Environmental" as used in this study generally will include products and services sold to, used by or specified by corporations, laboratories, local, state and federal departments and agencies and other decision-makers to influence or control air or water pollution or solid or hazardous waste.

A comprehensive list of environmental products and services complied from a number of reference sources is contained in the Appendices section.

The term "New England" generally includes the states of Massachusetts, Rhode Island, New Hampshire, Vermont, Maine and Connecticut. For purposes of this study, however, Connecticut will not, unless otherwise noted, be included when referring to "New England".

The term "Northeast" generally includes the states of Massachusetts, Rhode Island, New Hampshire, Vermont, Maine, Connecticut, New York, New Jersey and Pennsylvania.

Dollar amounts used in this study are expressed as U.S. dollars unless otherwise noted.

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II. SUMMARY

1. New England will provide good growth potential for many Canadian environmental products and services (EPS) looking to enter this market.

2. New England is still in a recession. High unemployment and layoffs continue, especially at the technical and professional level, a condition that is expected to continue well into 1994. Large New England employers such as Digital Equipment Corporation are reducing staff by many thousands. Among computer companies, only software firms are growing while others are closing or laying off. Defense giants such as Raytheon and GTE are also cutting back production and employment while shifting emphasis to non-defense related businesses. New businesses such as biotech, video conferencing and communications companies are viewed as New England's growth areas for at least the next decade. Selected environmental products and services are also viewed as growth markets in New England well into the 21st century.

3. Environmental products and services generally forecast by experts to have excellent sales potential over the next five years nationally and in New England include:

   Air pollution control equipment
   Water pollution control and analysis equipment
   Solid waste disposal products and services
   Recycling products, services and systems
   Most green/consumer products that are competitive in price and performance with "non-green" products
   Most environmental services that offer unique capabilities or benefits

4. Environmental market drivers include:

   Emphasis on Environmental Issues
   Environmental/Economic Interdependency
   Regulations
   Environmentalism in the Corporate Strategic Plan
   Environmentalism and The Corporate Image
   The Pressure of Environmental Enforcement
   New Directions
   Rank-Ordering Priorities
   Potential Environmental Backlash
   Regulatory Pressure
   Social Responsibility
   Concerns about Actual or Potential Liability
   Community Relations
   Shareholder Pressure
   Leadership

5. New England industries doing the most spending on EPS include chemicals, paper, metals, transportation, electronics and utilities.

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6. There is no real impediment for a Canadian environmental product or service company to export to the U.S. Furthermore, since New England is a border area, there is no real prejudice against a Canadian-source EPS product or service. With a marketing plan and recipe for execution, a Canadian environmental company's prospects for success are good and in a market that may, depending on the specific environmental product or service being offered, represent a larger potential than in Canada.

5. New England *excluding Connecticut* will grow approximately 7% from 9,905,000 in 1990 to 10,580,000 by 2000 and its 12 major metropolitan areas (MSAs) will continue to account over 80% of the area's population and a similar percentage of its income, households and growth prospects over the next ten years. This growth, coupled with an already high level of environmental consciousness on the part of New Englanders in general, will provide good potential for Canadian consumer or "green" environmental products.

6. When EPS retailers and wholesalers add environmental products, their decisions are influenced not so much by where the products are manufactured as much as by the quality of the line and the margin that they can garner. Top factors in selecting new products include quality, profit margins, customer requests, delivery, breadth of line, inventory requirements, price competitiveness with non-"green" products, current vendor, space requirements and product uniqueness.

7. For non-consumer environmental services and some products, partnering, strategic alliances or joint ventures with U.S. partners provide the best way to enter the New England market.

8. Independent manufacturer's reps are recommended as the vehicle for environmental products market entry. Such reps, however, find pioneering a new product difficult, since there is a considerable investment in time and energy and a lengthy payback.

9. Environmental services companies must have a thorough understanding of U.S., state and local regulations and political structures, compliance and laws. They must also demonstrate this knowledge to potential customers and clients and/or to their U.S. partners via an aggressive marketing and networking program in order to gain credibility in the marketplace.

10. Canadian EPS sellers must understand the workings of influentials such as governmental offices and agencies (especially EPA and state environmental quality agencies), Publicly Owned Treatment Works (POTW) managers, engineers, consultants, etc.

11. Most environmental instruments must be performance-approved by the U.S. Environmental Protection Agency.

12. The New England Environmental Business Council (EBC) is quite active and a good source for EPS networking and business contacts, especially for Canadian environmental services seeking potential U.S. partners. In addition, they are taking a lead position in establishing a national U.S. Environmental Business Council.

13. Other local, regional and national trade groups and associations within those major industries responsible for most spending on EPS (paper, chemicals, petrochemicals, primary metals, metal fabrication, transportation, etc.) should also be actively pursued by Canadian EPS companies targeting specific industries. Many excellent contacts and business opportunities result from shows, conferences and networking events sponsored by such groups and associations.

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III. NEW ENGLAND OVERVIEW

A. Population and Demographic Trends

New England's population should grow by 6.6% during the 1990s versus 6.3% for the 1980s. Massachusetts will grow the slowest and will be the only New England state to lose more people to other states (primarily New Hampshire and Maine) than it gains. New Hampshire will gain the most migrants from other states accounting for 75% of the state's growth.

New England *excluding Connecticut* will grow by 675,000 people... from 9,905,000 in 1990 to 10,580,000 by 2000, or 6.8%. New Hampshire will grow the fastest, both in terms of numbers (270,000) and percent (23.7%), followed by Massachusetts (238,000), Maine (108,000), Rhode Island (50,000) and Vermont (48,000). New Hampshire will overtake Maine as the region's second largest state behind Massachusetts. Maine will be third largest followed by Rhode Island and Vermont.

Changes in New England Population: 1980 to 2000

State	Population 1990	1980-90 Change	Percent Change	Population 2000	1990-00 Change	Percent Change
Maine	1,236,000	111,000	9.9	1,344,000	108,000	8.7
New Hampshire	1,140,000	219,000	23.8	1,410,000	270,000	23.7
Vermont	571,000	60,000	11.7	619,000	48,000	8.4
Massachusetts	5,921,000	184,000	3.2	6,159,000	238,000	4.0
Rhode Island	998,000	51,000	5.4	1,048,000	50,000	5.0
Connecticut	3,226,000	158,000	5.1	3,422,000	156,000	4.8
Total	13,131,000	783,000	6.3%	14,002,000	871,000	6.6%

Sources: American Demographics; U.S. Census Bureau Current Population Reports

A recent forecast using 1990 U.S. Census figures puts the *1992 estimated population* in the 12 New England Metropolitan Statistical Areas (MSAs) that account for approximately 80% of New England's total population (excluding Connecticut) as well as the majority of its retail spending and disposable income, as follows (see *Appendix B* for maps and definitions of New England MSAs):

1992 Estimated Population for New England MSAs

National MSA Rank	MSA Area	MSA Population
7	Boston/Lawrence/Salem/Lowell/Brockton, MA	3,808,003
58	Providence/Pawtucket/Woonsocket, RI	928,427
70	Worcester, MA	722,376
83	Springfield, MA	607,087
96	New Bedford/Fall River/Attleboro, MA	512,662
127	Portsmouth/Dover/Rochester, NH	367,112
133	Manchester/Nashua, NH	350,056
169	Portland, ME	248,528
233	Bangor, ME	148,505
239	Burlington, VT	142,849
246	Pittsfield, MA	138,200
295	Lewiston/Auburn, ME	106,348
Total of Above MSAs		8,080,153

Source: Editor and Publisher

1995 population estimates for New England states (excluding Connecticut), which represent an overall 3.9% increase over 1990 population estimates, are as follows:

Changes in New England Population: 1990 to 1995

State	Population 1990	Population 1995	1990-95 % Change
Maine	1,236,000	1,297,800	4.8
New Hampshire	1,127,200	1,233,800	9.5
Vermont	568,000	598,600	5.4
Massachusetts	6,042,200	6,199,100	2.6
Rhode Island	1,007,890	1,040,800	3.2
Totals	9,984,000	10,370,100	3.9

Source: 1991 Survey of Buying Power

In early 1993, the U.S. Census Bureau redefined a number of SMAs, including Boston. Metropolitan Boston, with its official boundaries extended into Maine, Connecticut and New Hampshire by the federal government, is now home to more than 5.4 million people, according to the Census Bureau. The expanded area, which increased metro Boston's population from 3.8 million, did not change the region's ranking as the seventh-largest metropolitan area in the country.

The new metro Boston region, which federal officials said better reflects the area's commuting patterns and population density, now stretches south to New Bedford, west to Barre and north to Berwick, Maine and Hooksett, New Hampshire. A number of large metropolitan areas previously listed separately, including Worcester, Lowell, Lawrence and Fitchburg, Massachusetts and Nashua and Manchester, New Hampshire, are now included in metro Boston under the new guidelines.

	10 Largest US Metropolitan Areas	**Population**
1.	New York-Northern New Jersey-Long Island	19,383,615
2.	Los Angeles-Riverside-Orange County	14,818,370
3.	Chicago-Gary-Kenosha	8,339,715
4.	Washington-Baltimore	6,830,296
5.	San Francisco-Oakland-San Jose	6,331,526
6.	Philadelphia-Wilmington-Atlantic City	5,924,591
7.	Boston-Brockton-Nashua	5,432,273
8.	Detroit-Ann Arbor-Flint	5,214,837
9.	Dallas-Fort Worth	4,134,638
10.	Houston-Galveston-Brazoria	3,858,911

B. New England Business Population

Most non-consumer EPS would be targeted at manufacturing companies (SIC Groups 20 thru 39) and state agencies and local municipalities, since these typically have the largest sales or contract potential. Other business/institutional targets could include medical facilities, colleges and universities, laboratories, federal government facilities, certain retail establishments and military installations.

Canadian EPS potential in the New England states can be assessed in a variety of ways. Due to the extensive needs for EPS by such major industries as public utilities, industrial power plants, chemicals, paper, petrochemicals and primary metals, an analysis of the number of manufacturers within each SIC group by state can provide an idea of the raw number of prospective firms for a given EPS product.

Total Number of New England Manufacturers by Industry and State

SIC	Industry	US	NE	ME	MA	NH	RI	VT
20	Food Products	23,285	826	171	471	40	89	55
21	Tobacco	210	1	0	1	0	0	0
22	Textiles	5,949	523	49	253	50	159	12
23	Apparel	15,980	697	43	538	50	41	25
24	Lumber & Wood	17,765	820	238	312	126	35	109
25	Furniture	10,409	426	35	297	41	23	30
26	Paper	11,296	664	40	506	45	49	214
27	Printing/Publishg	102,377	4,256	337	2,987	404	329	199
28	Chemicals	13,379	587	35	422	43	71	16
29	Petroleum	2,203	78	13	46	5	13	1
30	Rubber/Plastic	18,574	983	50	716	91	98	28
31	Leather	2,178	398	79	225	56	28	10
32	Stone/Glass/Clay	15,491	609	69	313	85	48	94
33	Primary Metals	9,651	459	14	298	47	89	11
34	Fabricated Metals	39,292	1,889	99	1,227	178	338	47
35	Industl Machnry	68,088	3,012	208	1,984	381	332	107
36.	Elect Equipt	16,107	1,108	57	766	161	80	44
37	Trnsptn Equipt	9,118	329	83	174	23	36	13
38	Instruments	7,725	668	20	481	72	74	21
39	Misc Mfg	36,562	2,015	157	1,031	132	604	91
	Totals	381,916	18,086	1,590	11,669	1,774	2,223	830
	% of US	100	4.8	0.4	3.1	0.5	0.6	0.2

* Excludes Connecticut

Source: Dun & Bradstreet

State Percentages of U.S. Totals

State	Population	Manufacturers	Retail Sales
Massachusetts	2.77	3.60	2.70
Rhode Island	.47	.81	.45
New Hampshire	.35	.40	.36
Maine	.48	.45	.45
Vermont	.22	.22	.22
Connecticut	1.49	1.86	1.59

All Businesses in New England SMAs*

Rank	Metropolitan Marketing Areas	Businesses
6	Boston/Lawrence/Salem/Lowell/Brockton, MA	131,000
57	Providence/Pawtucket/Woonsocket, RI	30,000
70	Worcester/Fitchburg/Leominster, MA	20,000
82	Springfield, MA	18,000
91	New Bedford/Fall River/Attleboro, MA	13,000
137	Portsmouth/Dover/Rochester, NH	9,000
139	Manchester/Nashua, NH	10,000

* Excludes Connecticut. *Source:* Dun & Bradstreet

This is not to suggest that the New England states do not offer a good potential market for most Canadian environmental products and services. It will depend, however, on many variables, such as the product or service being offered, its competitiveness with similar products produced or services marketed in New England, price, the markets or audiences being targeted (i.e. consumers, specific industry groups, size of companies, etc.) and methods of distribution to be employed (distributors, dealers, manufacturers reps, etc.).

New England has lost hundreds of thousands of manufacturing jobs since 1988 due to lay offs, corporate downsizing, the recession and the relocation of manufacturing plants and to southern U.S. and foreign locations. This trend will continue. Smaller, high technology businesses and information services companies, most with less need for environmental products and services in general, will replace many of the traditional manufacturing companies that have left in New England. Newer companies that do require environmental products and services will stress advanced compliance with local, state and federal regulations and the avoidance of environmental penalties, community problems and the like as the businesses are started and as they grow, rather than the remediation or environmental "retrofitting" forced on older New England manufacturing industries.

Due to New England's projected population growth of approximately 7% to 10.6 million by the year 2000 and the already high existing level of environmental consciousness by New Englanders in general, there will continue to be a good market for selective consumer EPS, especially those focussing on recycling, air and water pollution reduction, "all natural" or "environmentally safe" chemicals, paints, solvents, fertilizers, pesticides, building products, air filters, detergents, and other consumable and durable goods.

C. Waste Generators

Another measure of New England's potential for Canadian environmental products and services is to review the number and size of waste generators in the region. The biggest waste generators in New England include food, paper, chemicals, petroleum, primary metals and transportation manufacturers. Data from the U.S. Environmental Protection Agency on the number of small and large quantity generators of hazardous waste in each New England state are shown below. Massachusetts has third greatest number of small-quantity generators (9,080) in the U.S. EPA's Region I (New England) has a total of 14,741 small-quantity generators.

Large-Quantity Waste Generators in New England

State	Number of Large Generators (1989)	Total Number of Generators (1989)	Waste Tons/Yr (1987)	Rank in Waste Generation (1987)
Connecticut	1,434	3,076	1,800,400	31
Maine	86	960	11,455	42
Massachusetts	1,023	10,031	725,224	22
New Hampshire	115	2,025	13,727	40
Rhode Island	97	2,905	26,715	37
Vermont	195	622	9,282	43

Small-Quantity Waste Generators in New England

State	Number of Small Generators	Total Number of Generators	% of Small Generators Nationwide
Connecticut	1,642	3,076	1.3
Maine	874	960	0.7
Massachusetts	9,008	10,031	6.9
New Hampshire	1,910	2,025	1.5
Rhode Island	2,808	2,905	2.1
Vermont	427	622	0.3

Source: Environmental Information, Ltd.

D. The New England Economy

New England's economy and where it's headed can best be interpreted in context with the current national U.S. economic situation, as described by the *Wall Street Journal*:

> People continue to be worried about their jobs. The construction industry is in for prolonged slump, the housing boom is over because the baby-boomer surge in household formations is over, and the glut of office buildings and other commercial real estate won't be absorbed for years. Manufacturers are still announcing layoffs. The military probably will hold down recruiting for years to come. Even worse the current wave of service-industry layoffs is the beginning of a productivity-enhancing spree that will last until the end of the decade and probably beyond.
>
> Meanwhile, consumers are still overextended and paying off debt. Expecting high unemployment and seeing the value of their homes declining, they may remain hesitant for years, buying just what they need and raising their savings. This litany of problems, few of which seem likely to go away anytime soon, suggest that the 1990s won't be pleasant.

In February 1993, the Bank of Boston made this assessment of New England's economy:

> Financial markets should respond favorably to the realities of meaningful deficit reduction and stable inflation, causing long-term interest rates to hold steady at close to current level in spite of a moderately paced expansion. Short-term rates, however, will gradually increase as the Federal Reserve remains vigilant in its efforts to maintain a low inflation environment.
>
> The New England region's belated recovery is expected to become more firmly established over the next two years, though a return to 1980's-style prosperity is highly unlikely. Labor market indicators suggest that the employment free-fall which began late in 1988 reached bottom during the summer of 1992. Subsequent growth has been slow, and the region has recovered only about 5 percent of the jobs lost during the preceding four year period. Still, at 7 per cent the New England unemployment rate is now equal to the national average.
>
> Economic growth in New England will be disparate, and vary from state to state. Nevertheless, a couple of broad generalities can be made. First, job growth is likely to be slowest in Massachusetts, Connecticut and Rhode Island due to their higher cost structures. Despite a slow pace of job gains, however, wages should rise at, or above, the national rate as higher wage industries supplant those which have long been in decline. The northern New England states, conversely, will continue to experience more rapid rates of growth due to their lower costs of living and doing business.

The welcome warming of East-West relations has had, and will continue to have, its adverse consequences, especially in New England. After peaking at 6.5 percent of GDP in 1986, defense spending has been gradually winding down. Barring any unforeseen developments, that trend is sure to accelerate over at least the next four years.

The cause for concern regionally is that New England is more dependent on defense spending than other parts of the U.S. As a share of gross state product (GSP), New England is 26 percent more defense-dependent than the rest of the U.S., and when measured by the value of contracts awarded to the private sector, the region is more than twice as dependent. Based on either measure, Massachusetts, Connecticut and Maine have the strongest links to the Pentagon.

While every category of defense spending will come under pressure in the years ahead, spending on the operations and maintenance of military facilities and hardware procurement are likely to take more than proportionate cuts. Hence, the states of Maine, Rhode Island and Connecticut are expected to take greater hits, while Massachusetts may benefit from its exceptionally high emphasis on research activities.

Despite these uncertainties, New England possesses attributes which do augur well for the years ahead. Many of the excesses which fettered growth during the past are now in abeyance: housing is more affordable, inflation is subdued, and financial institutions are nearly recovered from their foray into real estate lending and investment.

Above all, its highly educated workforce and extensive educational infrastructure are distinct advantages in an increasingly global economy. New England is already well positioned in many emerging industries which hold promise for the future.

Massachusetts

Massachusetts' economy accounts for roughly 46 percent of New England's economic activity. Dominant industries include machinery manufacture, computers, defense-related research and production, financial services, health care products and service, software, and higher education. The state's population is older than the nation's and it has tended, over the years, to grow more slowly. In recent years, it has actually declined.

Perhaps more than any other state in the nation, Massachusetts' fortunes have been driven by the successes and failures of its advanced technology industries. While the minicomputer industry was an important engine of growth in the past, many emerging industries are likely to step into the breech during the 1990's.

Connecticut

Connecticut is New England's second largest state, accounting for approximately 28 percent of the region's economy. Its population is fourth oldest in the nation and its per-capita income is the highest (even after three years of considerable hardship). Dominant industries include machinery and metal manufactures, insurance, and transportation equipment (especially defense-related). Connecticut is also home to the head offices of many large, nationally-oriented firms.

Coping with declining defense expenditures will be Connecticut's major challenge in the new-term. Virtually every large contractor to the Pentagon has reduced its highly paid workforce in the past three yeas and further cutbacks are likely.

Rhode Island

Rhode Island, accounting for 6 percent of the New England region's economic activity, is dominated by metal and machinery manufacturing, textile production, and jewelry manufacturing. Unfortunately, these have not been rapidly growing industries over much of the past decade, which goes a long way towards explaining the state's moderate growth during the 1980s. Like its southern New England neighbors, Massachusetts and Connecticut, it has an older and more slowly growing population.

Rhode Island has successfully recovered from a savings and loan insurance fiasco that put a crimp in consumer confidence and spending. Its next challenge will be to develop new industries capable of creating the jobs that its traditional manufactures are no longer creating.

Maine

Maine, like its western neighbor New Hampshire, accounts for roughly 8 percent of the region's economic activity. Its population, not as old as in the southern three New England states, has been growing at a moderate pace (about the national rate of growth). Of all the New England states, Maine has been least affected by the region's economic difficulties. In part, this is attributable to its industrial composition, which is dominated by relatively stable consumers goods industries: footwear, textiles, seafood, and recreational services. Forest products (paper and lumber) are also large in the state.

In general, Maine is a relatively affordable place to live and its home prices are the most attractive in the region. For this reason, many younger families from southern New England have moved there to live, a trend likely to continue in the coming years.

New Hampshire

New Hampshire has been the most extreme example of boom-and-bust over the past decade or so. From 1979 to 1988, it was New England's most rapidly growing state, rising from fifth to third largest in the six-state area. While it still holds the rank of third, its proportion of jobs lost during the 1989-1992 period was greater than any other state in the nation, except Massachusetts. Dominant industries include forestry products, computers and other electronics, and recreational services.

New Hampshire's distinctive trademark is that of low-tax state. This development strategy has generally served the state well in the past as smaller firms from Massachusetts' high-tech complex have moved northward to reduce costs.

Vermont

Vermont's economy is New England's smallest, accounting for less than 4 percent of the region's output. Agriculture, especially dairy farming, is an important part of the state's economy, as are the forestry-related industries (especially furniture and paper production), and recreational services. Electronics manufacturing also plays a key role in the state's performance, through a few large producers dominate this industry.

Vermont has been one of the nation's greatest beneficiaries of the Canadian Free Trade Agreement, which was signed in 1990 and will be implemented in steps over the course of a decade. During the early 1990s, increased trade and investment flows served as a vital lifeline for the state's economy. Looking ahead, they will certainly provide opportunities for growth.

An article in *The Boston Globe* had these observations on New England's economy:

> What will it take to reinvigorate the down-at-the-heel Northeast? What will recovery look like? We are talking about a true sea change, the comeback from the worst slump since the Depression.
>
> New England will never be the same. The 1990s recovery is not going to look like anything we've seen, and certainly not like the 1980s boom. Full recovery-regaining the 570,000 jobs we've lost over the last three years probably won't come until 1997-98. For most of New England, future economic success is going to depend on the Yankee ingenuity of small-scale entrepreneurs.

In the 1990s, the big industries won't rebound to absorb a giant work force. The sudden demise of the Cold War crippled the defense industry and PC-based products knocked the wind out of the minicomputer business. The financial services sector has contracted in the absence of frenetic takeover-era trading and lending, and the decline of commercial real estate lending.

Where will the momentum for recovery come from? The drivers of the New England economy are going to be the kind of drivers it had in the late 1970s and early 1980s... the high value-added, knowledge intensive industries such as biotechnology, telecommunications, software, artifical intelligence and *environmental services.* Lots of small enterpreneurial start-ups are also forseen.

The activity will be centered around Boston, with perhaps some spillover to southern New Hampshire. Even around Boston, these companies will offer employment only on a very selective basis. The newer high-tech ventures will involve fewer workers than the businesses they replace and will not have the clout the minicomputer industry had in terms of its manufacturing employment base.

Historically it's the small to medium-sized businesses of all sorts that have accounted for 80 to 90 percent of the job growth in the early stages of recovery. In fact, a recent national survey by Dun & Bradstreet found that, while big companies will still be reducing staff this year, those with 19 or fewer employees will increase staff by 6.2 percent, together accounting for more than half of all the jobs expected to be added to the U.S. economy this year.

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IV. MARKET ASSESSMENT

Although New England is a small part of the total U.S. market for EPS, it is important to understand the national scope of the market in assessing New England's EPS potential.

The $100+ billion per year EPS market is large and growing. Major sources requiring control are industrial, municipal and utility-owned. Most EPS purchased in the U.S. by a variety of decision-makers, businesses and institutions are interrelated or tied together in systems. Many of these products and services are manufactured in foreign countries, including Canada, then marketed in the U.S. The degree to which these products and services are successfully marketed in New England depends on the environmental needs of local, state and federal governments, consumers, businesses, utilities and institutions in the area. This is largely a factor of the amount of air or water pollution, solid landfill and hazardous waste produced in each New England town, city, region or state.

MARKET STRUCTURE

The environmental market consists of four basic segments: air pollution control, water and wastewater treatment, solid waste disposal, and hazardous materials management. Significant trends affecting the market include the following:

> The U.S. Environmental Protection Agency is forecasting any annual market for pollution control and waste management at $185 billion by 2000. 2% of the nation's total capital investment will be spent on pollution control equipment.
>
> Land resource protection will account for 34% of total pollution control expenditures in 1997. Water protection costs will account for 36%.
>
> It will cost federal, state, and local governments over $80 billion in the next 20 years to build and improve publicly-owned sewage treatment facilities.
>
> The Chicago Board of Trade will begin trading pollution futures in 1993, a process authorized by the Clean Air Act Amendments.
>
> In 1991, over $1.75 billion was recovered in civil penalties, private party cleanup commitments, and EPA cleanup cost recoveries.
>
> In 1991, Superfund defendants were required to undertake hazardous waste cleanups of $843 million and through both referrals and settlements to pay EPA $308 million for EPA's past cleanup costs.
>
> Over 60,000 chemical compounds are in use today by industry and the number of new chemicals increases by 1,000 annually.
>
> The U.S. solid waste industry is maturing.
>
> The environmental legal services market is estimated at $600 million annually and rising.
>
> 22,650 industrial facilities released 5.7 billion pounds of toxic chemicals into the nation's environment in 1989.

4

Air Pollution Control Market

In 1992, the world air pollution market grew at over 15% with more than $12 billion in systems placed for particulate and gaseous contaminant removal. Approximately 50% of all flue gas desulfurization systems purchased worldwide were purchased in North America, $3 billion worldwide. World fabric filter system orders, electrostatic precipitators and scrubbers/adsorbers and thermal/catalytic fume incinerators all reached approximately $2 billion worldwide. Other air pollution control devices including cyclones will be ordered at a rate of approximately $600 million worldwide.

The estimated 1996 share of the total $21 billion air pollution control market includes fabric filters (18%), ESPs (16%), Scrubbers (23%), Oxidation (25%), NOX (8%), and Carbon Adsorption (11%).

In total, the U.S. market for air pollution control equipment is forecast to grow 68% in sales to $1.0 billion in 1996 as follows:

Flue gas desulfurization systems	$181 million
Fabric filters	290 million
Oxidation systems	233 million
Scrubber sales	75 million
Carbon adsorbers	56 million
Electrostatic precipitators	100 million

Implementing the Clean Air Act and its amendments is expected to increase air pollution abatement equipment and services spending to $40 billion in 1993 and to $67 billion in 2000. U.S. sales of industrial air pollution control equipment will increase 11% annually to over $1.0 billion dollars in 1995.

The EPA has proposed new landfill regulations for handling 100,000 metric tons or more of solid waste and which emit 150 metric tons or more of non-methane organic compounds (NMOCs) annually. Approximately 620 existing landfills and 90 projected new landfills are affected, and the new rule is expected to cost $240 million per year for the existing landfills and $26 million per year for new landfills. The cost of air pollution control for 30 planned municipal incinerators is estimated at $170 million per year by 1994, or a cost increase of about $11 per ton of waste combusted. National costs associated with controlling the 100 existing municipal incinerator facilities are estimated at $302 million per year, or about $10 per ton of waste combusted.

The 1996 market for indoor air quality (IAQ) consulting and analytical services, radon detection products and indoor environmental monitors is forecast to be $2.5 billion.

U.S. utilities have already signed purchase orders for $2 billion worth of flue gas desulfurization FGD systems and will commit another $6 billion over the next five years. 20,000 megawatts of scrubbers will be constructed for 1995 and 40,000 megawattts of retrofit scrubber systems will be ordered by 1997. Toxic air pollution issues will favor scrubbing instead of fuel switching in Phase II. Plants that fuel switch in Phase II will have to upgrade particulate removal systems. Utilities waiting until 1997 to order FGD systems will not be able to meet the 2000 Phase II deadline for compliance with the Clean Air Act.

Hazardous Waste Materials Market

Of the original one billion pounds of polychlorinated biphenyls (PCB's) produced in the U.S., an estimated 330 million pounds still remain in closed and controlled use, principally in electrical transformers.

The EPA has designated 1,211 hazardous waste sites as posing the greatest threat or potential threat to human health and the environment. These sites appear on EPA's National Priorities List (NPL) and are eligible for remedial action funded under the Superfund program. Only 15 states have commercial landfills for disposal of hazardous wastes. See Page 4-7 for a list of New England Superfund sites.

The U.S. market for all sorbent material is over 13 billion pounds and the market will grow at an average annual rate of 3%, reaching 15 billion pounds by 1995.

Approximately 1,400 leaks per month from underground storage tanks (UST's) are reported to EPA, with an estimated 2.0 million UST's at 670,000 facilities. A total of 450,000 tanks are estimated to be leaking their contents and an estimated 10-15% of current tanks are expected closed permanently. An estimated 30,000 contractors and consultants supply services in such areas as tank removal and installation, remediation contracting, tank lining, well drilling, tank testing and consulting.

In 1989, between 800,000 and 1 million metric tons of lead were used in lead-acid batteries, representing approximately 80% of total U.S. lead consumption. The current rate of battery recycling is about 80-85%.

In 1989 approximately 141,000 tons of hazardous waste were exported from the U.S. to nine countries. Canada received 74% of the exports, Mexico 20%, and 6% went to the United Kingdom, West Germany, Finland, Belgium, Japan, Sweden and South Africa.

Water Pollution Control Market

According to the EPA, federal, state and local governments will have to spend over $80 billion over the next 20 years to build and improve publicly-owned sewage treatment facilities. The largest needs are for new or improved secondary treatment costing $25 billion and for controlling combined sewer overflows at $16.5 billion. There are also supplemental state estimates totaling $30 billion for additional wastewater treatment needs in 40 states and territories. When added together, the total national wastewater treatment needs in excess of $110 billion.

Since 1972 Congress has provided over $57 billion in sewage treatment plant construction grants to 59 states and territories. The 1993 federal fiscal budget includes $18.3 million for EPA research for biotechnological research programs.

As of the end of 1991, there were only 44 accredited environmental laboratories in the U.S., Canada, Korea, Italy and Switzerland.

Solid Waste Market

The solid waste market approximately $25 billion in 1990. In 1989 there were 445 million pounds disposed of in landfills, 1.2 billion pounds injected into underground wells and 916 million pounds transferred to Treatment/Storage/Disposal (TSDs) facilities. There are less than 6000 commercial landfills in the U.S., down from 18,500 in 1976.

There are 100 existing incinerator plants in the U.S. An additional 30 new plants with a total of 70 units are expected to be built within the next five years. All of these incinerators have the capacity to burn 250 tons per day of solid waste, which is 85% of current capacity. Currently, 14% of all municipal solid waste is incinerated, 13% is recycled and 73% is landfilled. In 1988, nearly 180 million tons of municipal solid waste was produced or about 4 pounds per person per day. It is expected that these figures will increase by 10% by the year 2000.

U.S. consumption of degradable plastic products in 1990 was over 100 million pounds and valued at over $200 million. U.S. consumption of primary raw materials for degradable plastics, including inherently degradable resins and degradants totaled over 50 million pounds in 1990 and was valued at over $30 million. A double digit growth rate is predicted through the year 2000 for degradable plastic resins, degradant additives and degradable plastic products.

By 1995, residential sources will contribute over 72 %, or 145 million tons, to the solid waste stream, solid wastes from commercial establishments will reach 47 million tons, and sanitary landfilling will drop from to 106 million tons. Packaging accounts for one-third of the products found in municipal solid waste streams and will account for an increase by two % annually to 65 million tons in 1995. Newspapers and disposable diapers will account for 58 million tons and durable goods will increase 1.4 % per year to 27 million tons in 1995.

A ton of paper made from recycled wastepaper, rather than virgin fiber, saves 17 trees, 7,000 gallons of water, and enough energy (4,100 kilowatt hours) to run an average home for six months. It also reduces the use of toxic chemicals required for pulping and bleaching paper, eliminating 60 pounds of air pollutants, and saves three cubic yards of landfill space.

MARKET DRIVERS

The issues that have driven and will continue to drive national and New England EPS markets are many. By far the biggest drivers are the continuing international concern about saving, protecting or restoring all aspects of the environment, and an increasingly complex environmental regulatory climate by local, state and federal agencies. Different segments of the EPS market in New England will respond differently to different issues, laws and regulations and will grow or decline accordingly. A recent report by Richard K. Miller Associates defines the market drivers for the environmental industry as follows:

1. Emphasis on Environmental Issues: the 1990s will be an era of increased concern about environmental issues.
2. Environmental/Economic Interdependency: ecological and economic concerns are interdependent and must be integrated from the start in decision-making, not just to protect the environment but to promote long-term economic development.
3. Regulations: All levels of government are introducing new legislation to meet the global environmental challenge and are thereby opening new possibilities for innovative technology.
4. Environmentalism in the Corporate Strategic Plan: Manufacturers should be concerned with ozone depletion, recycling materials, hazardous waste management, air pollution, and the broad spectrum of environmental issues. It is good business in the eyes of the public.
5. Environmentalism and The Corporate Image: Positive environmental actions can have a positive public reaction. Investment firms advise clients on which companies promote good environmental practices, and recommend investments in these companies.
6. The Pressure of Environmental Enforcement: Between 1983-1990, 809 indictments for federal environmental crimes had been reported and $70.3 million in fines.
7. New Directions: Annually, North American manufacturers spend in excess of $100 billion on pollution control measures and equipment. "End-of-pipe" often only succeeds in transferring pollutants from one medium to another and is a nonintegrated approach to waste management. Government, the industrial community and trade associations are endorsing a revolutionary approach to waste management called waste minimization or pollution prevention.
8. Rank-Ordering Priorities: Indoor air pollution, pesticides and drinking water are the greatest risks to human health. EPA's New England region cited ambient ozone pollution as the greatest health problem, followed by radon and lead. Indoor air, radon and pesticides receive relatively little attention by EPA.
9. Potential Environmental Backlash: While the Clean Air Amendments were being passed at the federal level, a number of environmental initiatives were defeated in state elections in 1990. It also appears that some environmental dangers have been overstated: asbestos exposure in buildings does not pose the health threat previously thought, and an asbestos backlash has occurred. The health impacts of radon and dioxins are less than previously estimated.

EPA's priorities also drive the market for certain EPS products. These priorities currently include the following:

High-Risk Problems:

- Destruction and alteration of habitats rain forests and wetlands)
- Species extinction
- Stratospheric ozone depletion
- Global climate change

Medium-Risk Problems:

- Herbicides and pesticides
- Toxic chemicals and other pollutants in surface water
- Acid rain
- Airborne toxics (factories, vehicles)

Lower-Risk Problems:

- Oil spills
- Groundwater pollution (form landfills and toxic waste sites)
- Airborne radioactive particles
- Acid runoff from farms and industry
- Thermal pollution

In addition, at least six forces drive the implementation of the environmental management strategies of most corporations. These include:

- Regulatory pressure
- Social responsibility
- Concerns about actual or potential liability
- Community relations
- Shareholder pressure
- Leadership (setting an example as an environmentally responsible company).

There is a close correlation between these six drivers and those for environmental marketing of EPS:

- Preempting regulation (behaving in ways so as to avoid regulatory action)
- Competitive image advantage (socially/environmentally responsible behavior)
- Activist group pressure can create negative publicity and liability
- Retail relations and community relations: both involve stakeholder relations
- Shareholder pressure translates into demand to develop business opportunities
- Vision and leadership

ENVIRONMENTAL OPPORTUNITIES IN NEW ENGLAND

The U.S. environmental products and services, or envirotech, industry includes approximately 60,000 companies generating revenues of $120 billion. Although a fragmented industry, it's estimated that the U.S. share of the envirotech market will decline to approximately 40% of the worldwide $408 billion by 1996, down from approximately 45% share today. Other countries (Canada, Mexico, Latin America, Eastern Europe and Southeast Asia) and projected to increase their shares of the global envirotech market.

Although the U.S. envirotech market is considered relatively mature in many areas, opportunities for growth still exist among EPS companies. The opportunities depend on the segment of the industry the company is in, its leadership position in its segment and the geographic area of the U.S. (such as New England) it may be targeting.

New England Superfund Sites

One area of importance to Canadian EPS companies seeking to identify opportunities for their products or services in New England is knowing where the New England regional (EPA Region I) sites currently on the Superfund National Priority List (NPL) are located and the status of each of these sites. A list of these New England Superfund sites is shown below. A more detailed review of each site's progress through the various steps in the Superfund cleanup process (initial response, site studies, remedy selection, remedial design, cleanup ongoing and construction complete) is published in the latest edition of *The Green Book*. Abbreviations used in this list include LF for Land Fill and WS for Water Supply.

Connecticut

Site Name	**Town**	**NPL Date**
Barkhmpstd/Nw Hrtfrd LF	Barkhamsted	Final 10-04-89
Beacon Heights LF	Beacon Falls	Final 09-08-83
Cheshire GW Cntmntn	Cheshire	Final 06-21-88
Durham Meadows	Durham	Final 09-29-89
Gallops Quarry	Plainfield	Final 10-04-89
Kellogg-Deering Wells	Norwalk	Final 09-01-84
Laurel Park	Naugatuck	Final 09-08-83
Linemaster Switch	Woodstock	Final 02-21-90
New London Naval Base	Groton	Final 10-26-89
Nutmeg Valley Road	Wolcott	Final 03-31-89
Old Southington LF	Southington	Final 09-21-84
Precision Plating	Vernon	Final 10-04-89
Revere Textile Prints	Sterling	Final 09-08-83
Solvents Recovery Srvc	Southington	Final 07-01-87
Yaworski Waste Lagoon	Canterbury	Final 09-08-83

Maine

Site Name	Town	NPL Date
Brunswick NAS	Brunswick	Final 07-02-87
Loring AFB	Limestone	Final 02-21-90
McKin Company	Gray	Final 09-01-83
O'Connor Company	Augusta	Final 09-08-83
Pinnette Salvage Yd	Washburn	Final 09-01-83
Saco Municipal LF	Saco	Final 02-15-90
Saco Tanry Waste Pits	Saco	Final 09-01-83
Union Chemical	South Hope	Final 10-04-89
Winthrop LF	Winthrop	Final 09-01-83

Massachusetts

Site Name	Town	NPL Date
Atlas Tack Corp	Fairhaven	Final 02-21-90
Baird & McGuire	Holbrook	Final 09-01-83
Blackman & Union	Walpole	Prop. 12-30-88
Cannon Engineering	Bridgewater	Final 09-08-83
Charles George Reclmtn	Tyngsborough	Final 09-08-83
Fort Devens	Sudbury	Final 02-16-90
Fort Devens	Ayer	Final 11-15-89
Groveland Wells	Groveland	Final 09-08-83
Haverhill LF	Haverhill	Final 06-01-86
Hocomonco Pond	Westborough	Final 09-08-83
Industri-Plex	Woburn	Final 09-08-83
Iron Horse Park	Billerica	Final 09-21-84
New Bedford Site	New Bedford	Final 09-08-83
Norwood PCBS	Norwood	Final 06-01-86
Nyanza Chemical Dump	Ashland	Final 09-08-83
Otis ANG Camp Edwards	Falmouth	Final 11-21-89
Plymouth Hrbr/Cannon	Plymouth	Final 09-08-83
PSC Resources	Palmer	Final 09-08-83
Re-Solve	Dartmouth	Final 09-08-83
Rose Disposal Pit	Lanesborough	Final 06-01-86
Salem Acres	Salem	Final 06-01-86
Shpack LF	Norton	Final 12-01-82
Silresin Chemical	Lowell	Final 09-08-83
Sullivan's Ledge	New Bedford	Final 09-21-84
W.R. Grace	Acton	Final 09-08-83
Wells G & H	Woburn	Final 09-08-83

New Hampshire

Site Name	Town	NPL Date
Auburn Road LF	Londonderry	Final 09-08-83
Coakley LF	Greenland	Final 02-20-86
Dover Municipal LF	Dover	Final 09-08-83
Fletcher Paint	Milford	Final 03-31-89
Holton Circle WS	Londonderry	Final 03-31-89
Kearsage Metllrgcl	Conway	Final 09-10-84
Keefe Environmental	Epping	Final 09-08-83
Mottolo Pig Farm	Raymond	Final 07-01-87
New Hampshire Plating	Merrimack	Prop. 02-21-91
Ottati-Goss/Kingston	Kingston	Final 09-08-83
Pease AFB	Portsmith	Final 02-01-90
Savage Municipal WS	Milford	Final 09-01-84
Sanitary LF	Somersworth	Final 09-08-83
South Municipal WS	Peterborough	Final 09-01-84
Sylvester Site	Nashua	Final 09-01-83
Tibbetts Road	Barrington	Final 07-10-86
Tinkham's Garage	Londonderry	Final 09-08-83

Rhode Island

Central LF	Johnston	Final 06-01-86
Davis (GSR) LF	Glocester	Final 06-01-86
Davis Liquid Waste	Smithfield	Final 09-08-83
Davisville Naval Cnst	N. Kingston	Final 11-15-89
LF & Resource Rcvry	Smithfield	Final 09-01-83
Newport Naval Trng	Middletown	Final 11-15-89
Peterson/Puritan	Cumberland	Final 09-01-83
Picillo Farm	Coventry	Final 09-01-83
Rose Hill Rgnl LF	S. Kingston	Final 10-04-89
Satamina Mills	N. Smithfield	Final 09-01-83
W. Kingston/URI	S. Kingston	Prop. 02-21-91
Western Sand & Grvl	Burrilville	Final 09-01-83

Vermont

Bennington LF	Bennington	Final 03-31-89
BFI/Rockingham	Rockingham	Final 10-04-89
Burgess Brothers LF	Woodford	Final 03-31-89
Darling Hill Dump	Lyndon	Final 10-04-89
Old Springfield LF	Springfield	Final 09-08-83
Parker LF	Lyndon	Final 02-21-90
Pine Street Canal	Burlington	Final 09-08-83
Tansitor Electronics	Bennington	Final 10-04-89

Private Sector/Industrial Market

The sale of environmental products (instrumentation, controls, pumps, etc.) is generally made to industrial, compliance or other user segments of the market using manufacturers reps and in some cases, through a distribution network. Representing a number of complementary product lines, reps specializing in the environmental area would be calling on industrial and other accounts on a regular basis. Most would offer a consultive sales approach to accounts and would make sales based on solving a customer's need or problem.

In many instances, a rep will subscribe to construction reports, government contract reports, and other sources that relate to the environmental area. Sales leads come from advertising, product publicity and other promotional or marketing activities. In most cases, a rep will develop close ties to design engineering and consulting firms to have products specified by the engineer/consultant leading to sales at time of purchase by the user of the product or system. He will attend and display at local and regional shows and environmental trade association meetings/shows.

Typical as a few examples of markets that reps would follow for sales are:

Air Pollution: chemical, petrochemical and HPI companies; power generation and public utilities, CFC producers/dischargers, institutions (power plants), incinerators, other "stacks", etc.

Water Pollution: one key area for sales opportunities is following companies to whom permits have been issued by the National Pollution Discharge Elimination System (NPDES). Obviously, the industrial manufacturing companies as above are sales prospects. Underground storage tanks represent another important market for sales.

Sewage Treatment: mostly municipal government sponsored; sales leads come from contractors providing the required services. Contact and sales would be with these contractors.

Solid Waste: residential and industrial recycling, all levels of government, manufacturing industries, land fills, automotive, etc. Local contacts would be developed by reps.

Hazardous Waste: manufacturing companies especially chemical, petrochemical, HPI industries as well as U.S. EPA Superfund sites.

Public Market

A number of important sources are available to Canadian EPS companies that provide a wealth of information on sales opportunities in the public sector. These sources include:

Massachusetts

The Central Register: Provides weekly information on governmental projects throughout the year on design services, requests for proposals, general contracts:invitations to bid and on contract awards, ground water permits, requests for studies, and names of contractors obtaining plans and specifications. Cost: $200 per year. Availability:

The Central Register
Massachusetts Secretary of State
One Ashburton Place
Boston, MA 02108
(617) 727-2834

The Goods and Services Bulletin: Provides weekly information on notices of invitations to bid and requests for proposals of state contracts. Of interest in the environmental area, requests are published for General Supplies, General Services and Laboratory Equipment. Cost is $45 per year. As examples, in one issue reviewed, the following is a brief summary of bid requests that were solicited:

Town of Erving, MA: sealed bids for collection and transportation of solid waste and recyclables to a disposal site.

Massachusetts Department of Public Health: In Bristol County, provide approved services of on-site sampling and laboratory analysis of formaldehyde levels in homes insulated with Urea Formaldehyde Insulation.

Fall River, MA: supply and delivery of various water treatment chemicals as requested by the Town Water Board.

Availability:

The Goods and Services Bulletin
Massachusetts Secretary of State
One Ashburton Place
Boston, MA 02108
(617) 727-2834

New Hampshire

In New Hampshire, project bid solicitations are available for pick up at the State House in Concord. Also, qualified companies can be listed on the bidders list with the State purchasing agency and will receive copies of published solicitations. Solicitations for services are published by individual state agencies. Availability:

Bureau of Purchase & Property
State House Annex, Room 102
25 Capitol Street
Concord, NH 03301
(603) 271-2201

Rhode Island

The State of Rhode Island advertises bid solicitations in local and regional newspapers and elsewhere. A company can qualify and be placed on the state bidders lists and be mailed solicitations as they are published. Availability:

Office of Purchases
State of Rhode Island
One Capitol Hill
Providence, RI 02908-5855
(401) 277-2317

Vermont

Vermont publishes a weekly report of government solicitations and other requests for bids. Cost to receive reports by mail is $75 per year. The State also has an electronic bulletin which can be accessed by computer modem. All State of Vermont departments and agencies are required to post information about all contracts with a value exceeding $10,000 that are available for bid. (Access is free). Availability:

Vermont Department of Libraries
Information Services
Montpelier, VT 05602
Attention: Sybil McShane
(802) 828-3261

Maine

All using agencies publish their own solicitations which are then published by the local *Kennebec Journal* newspaper. Availability:

Kennebec Journal
274 Western Avenue
Augusta, ME 04332-1052
(207) 623-3811

At the national level, the Bureau of National Affairs, Inc. (BNA) in Washington, D.C. is a primary source of information in the environmental area publishing about 18 comprehensive reports on a regular basis for the environmental industry. Of particular interest to New England environmental companies is BNA's State Environment & Safety Regulatory Monitoring Report (published every other week) which provides information for monitoring national, but also New England state environmental programs for air, water solid waste, underground storage, etc. Cost is $895 per year. Availability:

U.S. Bureau of National Affairs
Customer Service Center
1231 25th Street
Washington, DC 20037
Phone: (800) 372-1033; (202) 452-4200

Environmental Market/General

The primary source for environmental contract information is the Northeast edition (Maine, Vermont, New Hampshire, Massachusetts, Connecticut and Rhode Island) of *The Green Book Report*, a weekly report to the environmental industry. Each issue covers projects in the planning stage, out for bid, bid results, awards, and a calendar of events and listing of training programs. Annual subscription cost for this report is $1195. Availability:

The Green Book Report
Corporate Place
100 Burtt Road
Andover, MA 01810
800 527 2204; (508) 474-5000

In addition to the New England issue of *The Green Book*, an important directory is published by the Massachusetts Water Pollution Control Association (MWPCA). This directory provides information on Massachusetts municipal wastewater treatment facilities and includes: the name of the facility, its mailing address, phone number, the primary contact person, the "grade" of the facility, its design flow and degree of treatment.

F.W. Dodge Construction Reports provides information on contract sale opportunities in the construction industry including those in the environmental sector. Costs of these reports varies by selection criteria desired (geographic coverage, types of projects, etc.). Availability:

Dodge Construction Reports
24 Hartwell Avenue
Lexington, MA 02173
(617) 860-6270

In addition, the following governmental agencies are other sources of project and program information:

Massachusetts:

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Room 2000
Boston, MA 02203
Michael Freshour
Environmental Business Coordinator
(617) 727-2754

Rhode Island:

State of Rhode Island
Department of Environmental Management
9 Hayes Street
Providence, RI 02908
Louise Durfee, Director
(401) 277-2771

New Hampshire:

State of New Hampshire
Department of Environmental Services
6 Hazen Drive
Concord, NH 03301
Robert W. Varney, Commissioner
(603) 271-3503

Maine:

State of Maine
Department of Environmental Protection
State House Station 17
Augusta, ME 04333
Dean Marriott, Commissioner
(207) 289-7688

Vermont:

Agency of Natural Resources
103 South Main Street
Waterbury, VT 05676
Jan Eastman, Secretary
(802) 244-7347

Regional Environmental Protection Agency (Region I: all New England States):

U.S. Environmental Protection Agency
John F. Kennedy Federal Building
One Congress Street
Boston, MA 02203
(617) 565-3715

In each New England state there are several governmental offices dealing with environmental matters. An excellent reference for these offices is *The Green Book*", an environmental resource directory for New England. Availability:

The Green Book
155 West Street
Wilmington, MA 01887
(617) 935-4800
Arthur Kohler, Publisher

Of particular importance to Canadian EPS companies seeking information or assistance in the environmental area is the (New England) **Environmental Business Council** (EBC). This trade association consists of envirotech firms that manufacture products, companies providing environmental/energy services, engineering and consulting firms, professional service companies and leading investment, legal and financial organizations. In addition, the membership includes governmental offices and educational institutions. It provides a wide range of programs and services to assist members in developing their environmental business. Contact point is:

Environmental Business Council
Exchange Place
53 State Street, Suite 3400
Boston, MA 02109
(617) 367-0282
Diana S. Coates
Executive Director

Hydrocarbon Processing Industry

An example of private sector/industrial sector opportunities for Canadian EPS companies is the chemicals industry, which accounts for a major portion of air and water pollution control. A portion of this industry, hydrocarbon processing or HPI, is involved in the manufacture of petrochemicals and has extensive EPS needs.

HPI spending is being driven by a proliferation of environmental compliance activity, and will be for the foreseeable future. In 1993, the HPI will spend more than $6.8 billion for the prevention, containment, treatment recycling and disposal of air, liquid and solid wastes. More than 35% of the total, $2.4 billion, will be spent in the U.S. Environmental control compliance is impacting all aspects of the HPI: raw materials; process technology; plant design,construction, operation and maintenance; and product quality, performance and disposability.

Stringent environmental controls are administered by both the Environmental Protection Agency (EPA) and state agencies. Nationally, most compliance requirements fall under demands of the Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA), National Pollutants Discharge Elimination System (NPDES) and various mandates of the Clean Air Act amendments of 1990. As these laws and regulations proliferate they tend to overlap and affect more than one waste medium. Consequently, the HPI is making greater use of consultants and service companies for environmental audits and control program evaluations and implementation.

HPI emphasis has shifted to waste minimization, incorporating waste reduction procedures into the design, engineering and construction of new plants and the operation, maintenance and retrofitting of existing ones. Equipment and materials that best help minimize waste or hazardous or toxic materials are being selected.

More companies are recycling plant wastes as an economic means of reduction. Recycling can involve increased spending to modifying rotating equipment, reactors, furnaces, distillation columns, heat exchangers, control systems, insulation, coatings, piping, fittings, valves, etc.

In 1993, HPI spending will top $4.2 billion for the treatment of wastewater, which accounts for most HPI wastes. The money will be spent for chemicals and for equipment, materials, systems and services that can efficiently filter, separate, reprocess and recycle oil residues, particulate substances and other pollutants. More water treating chemicals, including inorganic and polymers, and sophisticated chemical programs will be used to inhibit corrosion and scale and microbiological deposits.

Membrane separation technologies provide reverse osmosis and ultrapurification opportunities for water disalination and purification. Disposing of its solid wastes continues to be a challenge for the HPI. Included are the elimination and/or stringent cleanup of landfarms, landfills, decommissioned plant sites, waste sites, contaminated plant soils and solid wastes. Soil cleaning and biotreatment technologies are increasing in number and sophistication. Indeed, biotechnology in cleanup efforts is seen as the wave of the future.

HPI's large and growing environmental control expenditures represent significant profit potential for Canadian suppliers of the following equipment, materials and services:

Air

Closed pressure and relief valves system
CO boilers
Connectors
Crude or residual desulfurization
Dust Suppression Systems
Electrostatic precipitators
Emission and ambient air monitoring
Environmental monitoring equipment
Filters and Baghouses
Flanges
Floating roof tanks
Flue Gas Desulfurization
Gaskets
Incineration of waste services
Increased processing
Instruments
Leak detection systems
LPG odor control
Monitoring equipment
Odor control systems
Packing
Pressure relief devices
Pumps
Recovery facilities
Sampling equipment
Seals
Smoke control of fired heaters
Smokeless flare systems
Sour H_2O stripper O.H.
Sulfur recovery plants and systems
Vapor recovery systems

Water

Activated carbon adsorption
Activated sludge plants
Ballast and bilge shore
Bioremediation
Biotreating
Caustic treating
Chemicals
Clarification systems
Cleanup equipment
Collection systems
Deep well disposal
Environmental monitoring
Flocculators
Flotation equipment
Groundwater management
Instrumentation
Mechanical aerators
Monitors
Oil recovery and handling systems
Oily waste treatment
Oxidation ponds and treatment facilities
Sampling equipment
Sanitary sewerage systems
Separators
Sludge dewatering equipment
Sludge farming
Sludge incinerators
Solvent extraction systems
Spent caustic treating systems
Spill booms
Tank bottom disposal
Trickling filter plants
Valves

Land and Other

Baffles/noise reduction
Bioremediation
Disposal equipment
Environmental monitoring
Fire walls or tank dikes
Incinerators
Mufflers
Noise protective equipment
Revegetation
Sanitary landfills
Screening or buffering
Silencers
Soil-cleaning
Solid waste hauling and disposal

As with HPI, similar opportunities for Canadian environmental products and services can, with extensive investigation, can also be identified in other major manufacturing industries in New England known for their extensive EPS use. These industries include paper, printing and publishing, electronics, primary metals, metal fabrication and chemicals.

Consumer EPS Opportunities

Not only do consumers want products that are green, they also are eager for help in managing their relatively new conservation and solid-waste responsibilities. Green products are one way in which companies can provide assistance. Green products most frequently bought by consumers include household-cleaning products (38%), paper products (33%), garbage and trash bags (24%), beauty products (21%) and food products (12%).

The emerging science of design for the environment (DFE) calls upon product designers to factor the following considerations into their planning:

The production process: issues to be addressed include raw-materials usage, energy consumption, pollution prevention and solid-waste implications.

Designing for disposal: environmental impacts of product once it reaches end of its useful life

Designing for nondisposal: how reusable or recyclable is the product?

Designing for pollution prevention: implications of manufacture and use for air and water quality

Designing for resource conservation: are recycled materials used whenever possible?

Walter Coddington in his book *Environmental Marketing* indicates that green products operate in a free-market environment as follows:

They must compete on equal footing with established product lines which enjoy the advantages of extensive name recognition, economies of scale, and established footholds in mainstream retail channels.

Most consumers base their decision whether or not to buy green products on the following purchase considerations.

Quality and performance being equal, consumers will usually choose the cheaper brand. This especially true when consumers are strapped for funds, as during a recessionary period.

For green-product marketers, consumers are a good-news/bad-news story. The good news is that they are increasingly concerned environmentally and eager to take action. The bad news is that they don't know what actions to take and they think twice before listening to corporations.

Green consumerism has enormous potential, but businesses must fight through a lot of distrust and confusion to realize it. Three basic strategies will help companies reach that goal:

Achieve price and performance parity (or better) with competitive products. We know that it is the rare green consumer who will buy an environmentally benign product that is more expensive than its more traditional counterpart. Performance is equally important. The product that does not perform up to snuff will be bought only once. The environment is the tie-breaker. If all other factors are equal, then consumers will buy the environmentally friendlier product. A corollary of this principle is that it is generally more advisable to target consumers' primary purchase criteria (i.e., price, performance and convenience) rather than their underlying psychographics.

Woo retailers aggressively. Green products that don't get stocked are green products that don't get bought. It is critically important to solicit the support of retailers to help make green products a success.

Be environmental educators. Consumer education encourages consumers to seek out environmental information on product labels and it helps them to understand the labels once they read them.

In addition to consumers and environmental groups, a number of other players are important members of the environmental marketing infrastructure.

Retailers must respond daily to consumers' environmental concerns and complaints. With the exception of green products, where they have moved forward cautiously, retailers have responded strongly to environmental issues, laboring hard to respond to environmental issues across a range of fronts. They are extremely receptive to manufacturer-initiated environmental promotions, which give them a chance to improve their own environmental reputations as little or no cost.

Industry and trade associations serve a particularly useful function for industries under heavy environmental firs, such as the oil and chemical industries. While there are certainly virtues in speaking with a common voice, companies should take care not to hide behind the skirts of industry associations when it comes to environmental initiatives. The existence of an industry or trade association is not a justification for inactivity.

A wide range of regulatory bodies is keeping tabs on environmental marketing. To date, most of the laws and enforcement activity have come from the state and local level. Although uniform guidelines for environmental labeling have been issued by the FTC, some states may be expected to hold manufacturers to their often stricter regulations.

Policy institutions help to chart the directions which environmental problem solving will take. The information that these organizations provide can be enormously useful to companies as they plot their own strategic courses.

Educational institutions are a source of expertise on environmental issues and they also provide a forum for companies to make their own positions known.

Only by maintaining ongoing relations with these groups can an environmental marketer be confident that his environmental marketing strategy is on target.

A green product positioning strategy requires marketers to address the following issues: user features and benefits, the price point, distribution channels, labeling, environmental benefits, environmental performance and the corporate environmental policy.

Product Development Consideration	**Green-Product Positioning**	**Marketing/Communication Considerations**
Performance/Application	Primary Benefits	Unique Selling Point
User	Distribution	Media
Environmental Protection and Conservation Imperatives	Environmental Benefit(s)	Relativity to Target Market Environmental Imperatives
State of the Art Science/Technology	How Product/Packaging Works to Reduce Impact	Empowerment (Product Involvement)
Environmental Regulation Compliance	Required Labeling	Environmental Regulation Compliance
Corporate Culture, Operations, Resources	Corporate Environmental Policy	Corporate Heritage and/or Commitment
Profitability	Price Point	Added Value

A product's positioning is a function of its channels of distribution. Distribution channels also affect how a product is positioned environmentally. The higher the income level, the likelier it is for people to be well informed about environmental issues and willing to buy green.

Because of this, environmental promotions are likely to be more effective in upscale distribution channels than in mass outlets. Another implication is that, where a decision is made to accentuate a product's environmental virtues in mass channels, a more extensive educational program will be needed to support the product's positioning.

It may be desirable to vary the content of environmental messages that are being delivered, depending on the distribution channel and the demographics of the groups who shop there. Lower-income buyers tend to have more of a "use" orientation towards the environment, i.e., their concerns about it are premised largely on the use they get out of the environment for hunting, fishing, boating, etc. Upscale audiences are likely to have less use-oriented and more conservation concerns about the environment. Sharply contrasting environmental messages would be appropriate for these two groups. Marketers who wish to position their products as green must at a minimum communicate two discrete sets of information: the nature of the problem and how the product in question contributes to the solution.

POLLUTION ABATEMENT COSTS & EXPENDITURES

U.S. pollution abatement capital expenditures by manufacturing establishments with 20 employees or more amounted to $7.4 billion in 1991. Of this total, $3.7 billion was for air, $2.8 billion was for water, and $869 million was for solid waste. In addition, operating costs related to pollution abatement activities totaled $17,387 million, of which $5,034 million was spent for air, $6,345 million was spent for water, and $6,008 million was spent for solid waste. Total pollution abatement capital expenditures increased 23%. Approximately 74% of the $7,390 million new capital expenditures for pollution abatement were made by businesses in four major industries: Chemicals (SIC 28), Petroleum and Coal Products (SIC 29), Paper and Allied Products (SIC 26), and Primary Metal Industries (SIC 33).

Air and water pollution abatement capital expenditures can be separated on the basis of abatement technique. Plant and equipment designed to abate pollutants through end-of-line (EOL) techniques and those designed to reduce or eliminate the generation of pollutants through changes-in-production processes (CIPP). The major portion of pollution abatement capital expenditures is spent on EOL techniques.

Operating costs related to pollution abatement totaled $17,387 million in 1991. The operating costs, excluding payments to government for pollution removal, amounted to $15,764 million for plants with 20 or more employees. Industries with the largest payments to governmental units for public sewage services and solid waste collection/disposal are Food and Kindred Products, Chemicals and Allied Products, and Paper and Allied Products. Pollution abatement capital expenditures by nonmanufacturing companies amounted to $275 million for mining, $3,560 million for petroleum, and $1,943 million for electric utilities. All three industries showed a shift from water pollution abatement capital expenditures to air.

Pollution abatement means the reduction or elimination of pollutants created by the production process. Pollution abatement includes prevention, treatment, and recycling. Treatment refers to the wide variety of techniques used to cool, detoxify, decompose, and separate-to-store or ameliorate. Efforts to improve environmental aesthetics or employee comfort, such as landscaping or air conditioning, are not included. Neither are expenditures for health and safety or purchases of motor vehicles with pollution abatement devices.

Air pollutants are airborne substances, including particulates (dust, fly ash, smoke), sulfur oxides, nitrogen oxides, carbon monoxide, hydrocarbons, volatile, organic compounds, lead, hazardous air pollutants (arsenic, asbestos, benzene, beryllium, mercury, radioactive material, and vinyl chloride or those designated by the Clean Air Act and EPA) and other air pollutants.

Water pollutants are harmful or objectionable water-borne substances causing alterations in water quality. They include conventional pollutants (total suspended solids, oil and grease, BOD5), nonconventional pollutants (aluminum, ammonia, iron, barium, boron, chlorine, cobalt, fluoride, manganese, phosphorous, sulfur-hydrogen sulfide, titanium, COD), toxic metals/toxic inorganic compounds (antimony, arsenic, asbestos, beryllium, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver, thallium, zinc) toxic organic (benzene, chloroethane, chloromethane, toluene, zylene or those designated by the Clean Water Act and EPA).

Solid waste management is the collection and disposal of solid waste created by the production process, and changes-in-production processes to reduce the generation of solid waste. Collection and disposal refer to the collection, storage, transport, processing, and disposal of solid waste by incineration, sanitary or other landfill methods, and dumping in authorized areas.

Nonhazardous wastes includes garbage, trash, sewage sludge, dredged spoils, incinerator residue, wrecked or discarded equipment. Include solid waste produced as a result of air and water pollution abatement.

Hazardous solid waste is waste having one of the following characteristics: ignitability, corrosivity, reactivity, or toxicity. Ignitable waste poses a fire hazard during routine management. Corrosive waste has an extreme pH (strongly acidic or basic) or corrodes steel used in containment. Reactive waste is explosive, readily undergoes violent changes without detonating, or reacts violently or generates toxic gases when mixed with water or moderately strong acids or bases. Toxic waste contains more than allowable concentrations of contaminants such as arsenic, lead, endrin, and toxaphene.

Materials and energy recovery refers to taking materials that cannot be converted into profit making output and recycling them for further use. Included are capital expenditures to recycle scrap metal, scrap paper, scrap wood, used oil, used chemicals, etc.; excluded are capital expenditures for secondary products (e.g., animal hides).

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V. ACCESSING THE NEW ENGLAND ENVIRONMENTAL MARKET

Overview

As covered initially in this report, the environmental market consists of four basic segments: air pollution control, water and wastewater treatment, solid waste disposal, and hazardous materials management.

Access to these markets will depend upon the nature of a Canadian EPS company's business, their product acceptance by engineering and specifying influentials, or their ability to meet U.S. governmental, legal and regulatory requirements (such as "EPA Approved").

Market Access

Sellers to this marketplace can be defined in three basic areas: Services, Manufactured Products and Consumer Products.

Services: A listing of principal EPS services are as follows:

Consultants and scientists
Monitoring/testing/sampling/analysis
Engineering, design, & auditing
Transportation/disposal, recovery
Legal services
Chemical and other treatment
Compliance/evaluation assessment
Remedial recycling & disposal management
Construction, installation and maintenance
Plant or site services
Laboratory services
Health, safety, HVAC
Public relations

Access: In general, the preferred path to market access by a Canadian EPS services company is through *partnering, strategic alliance or joint venture* with a U.S. company with similar or complementary capabilities (or where the Canadian EPS company is in the same niche market with specialized capabilities). The reason for this route is that a Canadian company immediately confronts U.S. environmental laws and legal systems, government regulations, control and accreditation, engineering and construction standards and labor situations, local politics, etc. where a U.S. partner has already established itself (and its credibility with clients) in these areas.

It is doubtful that a Canadian company could provide laboratory services to the U.S. from a Canadian lab site (unless the services are extremely unusual or unavailable in the U.S.). Likewise extension of legal services from Canada is improbable.

Manufactured Products:

As differentiated from consumer products, the list of products sold to the environmental market is extensive. A representative sample of these products includes: air and water pollution control equipment, analyzers, air moving equipment, containers, instruments, flow meters, controls and control systems, detectors, filters, meters, laboratory equipment, pumps & HVAC equipment, tanks, etc. and systems including these products.

Access: Independent manufacturers' representatives are the preferred market entry sales organization. In the case of the environmental products market, these reps should be technically qualified and handle complementary products to those of the Canadian EPS manufacturer. A sample list of environmental instrumentation rep organizations is listed below.

Manufacturers' reps are independent businessmen who earn a commission on sales made in a given territory, assuming all expenses connected with the sales of products and their operations. They sell products (usually complementary ones) of other principals, know their territory, have close contact with customers and influentials, and properly trained, are qualified to sell the products represented.

Independent manufacturer's reps, the logical and usual market entry sales organization, find pioneering a new product difficult since there is a considerable investment in time and energy and the payback may be a long time in coming. Pioneering or "missionary" effort is considerably more difficult with a small or entrepreneurial company that may be unable to support a required marketing effort to gain sales.

Such things as merchandising effort, display materials, advertising, distributor sales support and service are needed for a complete and successful sales program. In this regard, it was specifically pointed out that packaging, displays, installation aids and no bi-lingual or "Canadian English" literature are important considerations in support of sales.

A qualified marketing/sales consultant who has experience in setting up rep sales forces and can assist the Canadian EPS manufacturer in all phases of establishing its regional (or national) rep network. Many sources exist for identifying rep organizations (e.g., Manufacturers' Agents National Association or MANA) and candidates can be screened interviewed and selected. Since this is a serious recruitment process, appointment of reps takes time and should be executed as a phased program so that important geographic markets are covered first, based on sales potential.

For lower unit price/high volume product, a distributor organization who stocks and resells product may be a requirement. Many sources list distributor organizations and, again, this becomes a recruitment process by the Canadian EPS manufacturer usually with the assistance of a U.S. marketing consultant (see *Consumer Products* below).

Manufacturers Reps Organizations: The rep firms listed below are geared to handling environmental instrumentation and services sold to industrial and governmental accounts. All are capable of handling all six New England states. Canadian EPS companies should be prepared to discuss product introduction dates, approximate prices, commissions, training and exclusive or non-exclusive representation in individual territories. All reps listed carry compatible, non-competitive product lines, have sales and other contacts in the environmental area and are solid companies with years of experience.

Rep companies listed are categorized by the types of products or services they offer as follows:

(a) air pollution control equipment
(b) water pollution control equipment
(c) instruments and analyzers
(d) containers/tanks
(e) water and/or air pollution control services

ETA Associates, Inc.
23 Farwell Street
Newton, MA
Edward Green, General Manager
(617) 527-4544; Fax: (617) 244-6683
a, b, c

Reptek
21 Manomet Road
Sharon, MA 02067
Russell Kraiterman, Owner
(617) 784-6700; Fax: (617) 784-7326
a, b, c, e

Tyson Controls Company, Inc.
15 Creeden Street
Mansfield, MA 02048
Dean Pillsbury, President
(508) 339-4999; Fax: (508) 339-4153
Dean Pillsbury, President
c

Bisco Environmental
Dedham, MA
Edward Tierney, Principal
(617) 461-1560
c, e

Regis Scientific, Inc.
48 Depot Street
Sharon, MA 02067
Robert Groh, Principal
(617) 784-9071
c

Pure Flow
174 Concord Street, Suite 32
Peterborough, NH 03458
Charles F. Iltis, Principal
(603) 824-4008
b, e

PMCA
18 Surrey Drive
Brookfield, CT 06804
Peter McAllister, Principal
(203) 775-9669
a, b, e

HME Associates
P.O. Box 520
Booth Bay Harbor, ME 04538
Terry Clopper, President
(207) 633-3441
c, e

Ayer Sales, Inc.
Two Industrial Parkway
Woburn, MA 01801
Bruce Ayer, President
(617) 933-1141
b, c, e

Abbott Associates
430 Main Street
Acton, MA 01720
Tracy Abbott, Principal
(508) 263-5047
b, c

H. W. Case Sales Company, Inc.
P.O. Box 470
Palmer, MA 01069
H. W. Case, Principal
(413) 283-9768
a, b, d, e

Eastern Environmental Systems, Inc.
10 Industrial Park Road
Hingham, MA 02043
William M. Ripley, Principal
(508) 749-9070
a, c

Eastern States Associates, Inc.
6 Aberdeen Street
Newton, MA 02161
Bill Campion, President
(508) 439-7775
a, b, c, d, e

Hayes Process Equipment Company
P.O. Box 4026
Peabody, MA 01961-4026
Thomas C. Hayes, President
(508) 535-6921
b, c, e

Markwell Assoc., Inc.
54 Front Street
Ashland, MA 01721
Jeffrey T. Powers, President
(508) 881-6848
a, b

O'Connor Associates
Engineered Products, Inc.
54 Central Street
Fayville, MA 01745-1096
James P. O'Connor, Jr., President
(508) 481-7755
b, d, e

Portland Sales Company, Inc.
P.O. Box 2379
South Portland, ME 04106
Donald P. Curry, President
(207) 767-5901
a, c

Process Equipment Unlimited Inc.
7 Everts Street
Londonderry, NH 03053
Steven R. Gegnon, Principal
(603) 434-2523
b, c, e

Rosco Industries Inc.
P.O. Box 575
North Andover, MA 01845
Michael Rosco, President
(508) 521-2369
a, e

Systematics Inc.
26 Burnside Street
Bristol, RI 02809
David Stewart
Principal Executive
(401) 253-0050
b, d, e

Plating Services Company
849 Winsted Road
Torrington, CT 06790
G.L Rucucci
Principal Executive
(203) 496-7608
a, b, c, d, e

Instrument & Control Engineering
630 Silver Street
Agawam, MA 01001
Frank Basile, Principal
(413) 789-3840
b, e

Primary Measurements
20 Middle Street
Plymouth, MA 02360
Dave Clark, Principal
(508) 746-3588
b, e

Ultimate Instrumentation Contractors, Inc.
#15 Village Park Apartments
Amherst, MA 01002
Hakon Dybwad, Principal
(413) 549-6717
e

Charles Wehrly & Company
124 Lasalle Road
Hartford, CT 06107
Charles A. Wehrly, Executive
(203) 236-1231
a, c

Enviroser V Inc.
1793 Smith Street
North Providence, RI 02911
Robert Pope, Vice President
(401) 231-1038
b, c, e

Jordan Technology, Inc.
133 Mass Ave, P.O. Box 362
Lexington, MA 02173
David Pollins
General Manager
(617) 863-8898
c

R.P.M. Associates
Box 179
Sudbury, MA 01776
Bob Mailly, President
(508) 443-3261
b, c, d, e

Rep Specifications: An example of specifications for selecting an EPS environmental instrument representative is as follows:

1. Experience and credibility in sales of instrumentation or other measurement/control meters or products required.

2. Environmental, technical or chemical degree and/or background preferred.

3. Knowledge of environmental and industry instrumentation markets desirable.

4. Sales contacts with industrial environmental engineers, compliance managers, pollution control managers, etc.

5. Contacts with environmental consultants and other industry influentials. Knowledge of state and local government compliance agencies desirable.

6. Able to provide good references from principals, key customers and influentials in the markets being targeted.

7. Established and financially stable rep business with at least five years active sales of instrumentation products.

8. Time to devote to effective promotion/sale of EPS company's products.

9. Permanent office in the territory with telephone, fax and copy machine service; telephone answering service office support (minimum).

10. Able to provide timely and reliable market intelligence and feedback to EPS company's sales and marketing managers.

11. Make at least one or more key salesperson(s) available for in-depth sales training at EPS company's headquarters.

Consumer Products

A large market exists for consumer products such as plastic recycling bins for the home and apartment markets. Most municipalities in New England have instituted recycling of home plastics, bottles, cans, newspapers, etc. which are collected weekly at the curb or are taken to the local landfill dump which has large recycling receptacles. Other markets include air cleaning and ionizing equipment, radon sensors, water and air filters and filtration systems, "clean" heating and air conditioning equipment, replacement for asbestos insulation, non-polluting refrigerants, and noise control products, etc.

Access: To reach the high volume consumer market requires a significant initial investment and commitment, highly professional distribution network and advertising and merchandising support, entry to volume retailers such a home improvement companies (Home Depot, HQ, Grossmans, etc.), hardware stores, and chain stores such as Sears, K-Mart, Bradlees, Caldor, etc.

Consumer product sales require a sophisticated sales distribution, local warehousing and such items as merchandising support, display materials, heavy advertising, distributor sales support such as cooperative advertising, sales display materials, warranty service, etc.

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VI. MARKET OVERVIEW AND GROWTH TRENDS

The following U.S. overviews, trends and projections for pollution control equipment and instrumentation, solid and hazardous waste treatment, waste-to-energy systems, environmental engineering, consulting and design services, recycling systems and analytical services/laboratories can be applied on a smaller scale when determining the market potential for these Canadian products and services in New England. Coupling the current size/demand of existing national markets for specific types of environmental products and services with projected growth rates can provide a fairly accurate assessment of the market potential for these same products and services in the New England states.

Pollution Control Equipment and Instrumentation

Due to compliance with the Clean Air Act, sales of air pollution control devices have increased dramatically. Manufacturing industrial air pollution devices, sales totalled approximately $900 million in 1992. Particulate emissions collectors, such as electrostatic precipitators and fabric filters, make up more than half of all dollar shipments of air pollution control equipment or $513 million in 1990. Shipments of gaseous emissions control devices, such as oxidation systems and flue gas desulfurization systems, have decreased to $220 million, while all other air pollution control equipment has grown by more than 85% to $165 million.

Heavy manufacturing sectors, such as electric utility and industrial power plants, are the biggest end users of air pollution control devices, closely followed by process industries. Power plant spending on particulate emission collectors, paper and chemical industries spending on air pollution equipment, and spending in the petroleum sector all increased dramatically in 1990. Spending on air pollution control devices will continue to increase annually for many years to come.

Long term demand for environmental equipment (industrial air pollution control equipment, water and wastewater systems, and solid waste and recycling technologies) is expected to grow between 3 and 4% annually for the forseeable future.

In 1990 the value of U.S. production of environmental equipment (or pollution abatement equipment) and services was about $80 billion. Major users included chemical and allied products, motor vehicles, paper and allied products, motor vehicles, paper and allied products, petroleum and coal products, primary metal industries, and the public sector. The growth of this market has been due primarily to the enactment and enforcement of pollution control legislation.

Air quality control equipment removes pollutants from a gaseous stream, or converts pollutants to a non- or less-polluting form before discharge into the atmosphere. Pollutants include solid particulates, gases and liquids or liquid fumes. Equipment to control particulates include fabric filters, electrostatic precipitators, and mechanical collectors. Acid emissions may be controlled by scrubbers, catalytic reduction, and electron beam methods. Control of gases and vapors may require desulfurizations, oxidation, or carbon adsorption.

Major end users' shipments of particulates emission collectors in 1990 included steam electric utility power plants ($90 million), steam industrial power plants ($72 million), pulp and paper mills ($65 million), chemical and fertilizer production ($44 million) and petroleum refining ($23 million).

Capital expenditures for new air pollution control-related plant and equipment by all U.S. manufacturing industries in 1990 was $2.6 billion, continuing an upward trend since the mid 80's. Major investing industries included those supplying chemical and allied products, petroleum and coal products, primary metals, paper and allied products, and transportation equipment.

As the largest segment of the environmental industry worldwide, water pollution abatement focuses on purification of groundwater/wastewater and reclamation. Filters and clarifiers remove solid particles, biological treatment and chlorination remove bacteria, and reverse osmosis/chemical recovery systems remove chemical or metal compounds. Newer equipment is required for more recent developments such as anaerobic methods, ion exchange, and membrane technologies.

U.S. demand for water pollution abatement equipment has been driven primarily by requirements of four laws driving the water and wastewater treatment markets: The Clean Water Act of 1972, The Safe Drinking Water Act of 1974, The Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response Compensation and Liability Act of 1980.

In 1991, the Environmental Protection Agency (EPA) required 22 states and territories to adopt Federal quality standards which should further increase expenditures on equipment. New limits will be written in state discharge permits for factories and publicly-owned water treatment facilities as the permits come up for renewal. Industrial process and power plants account for the major share of water and wastewater treatment expenditures. A 1990 survey estimated that it would cost $68 billion to provide required level sewage treatments for the 1990 U.S. population. Capital expenditures for water pollution control-related new plant and equipment by all U.S. manufacturing industries in 1990 was $2.7 billion, primarily by the chemical and allied products, paper and allied products, and petroleum/coal products industries.

Products for the collecting and transporting solid waste are the largest component of the waste management category, followed by incineration equipment, landfilling of toxic wastes, and recycling. Types of equipment include compactor trucks and separators for solid waste, and trucks and chemicals for liquid waste, and landfilling equipment and incinerators for toxic or hazardous waste. Newer technologies include a cleaner method for producing polyethlene, more effective hazardous waste incineration, live organisms for treating petroleum wastes, and multi-plastics recycling facilities.

U.S. capital expenditures for solid waste-related new plant and equipment by all industries in 1990 was $817 million, primarily by the chemical and allied products and paper and allied products industries.

The world market for environmental equipment and services (including engineering and consulting) in 1990 was $200 billion. The water and effluents treatment sector accounted for 30%, waste management 20%, air quality control 15%, other equipment 11%, and services 24%.

A significant share of international exchanges in the environmental industry occurs through technology licensing instead of trade. Large firms develop their own pollution abatement technologies first for home country use and then license it to foreign firms to increase market presence abroad. In the air pollution control sector, licensing abroad is advantageous because local manufacturers capture most of the home equipment market.

Another important international development has been the globalization strategies initiated principally by large U.S. manufacturers. Methods include: direct investment, cross-border mergers, acquisitions, joint ventures or collaboration with foreign partners. Environmental companies seeking a competitive advantage in global markets must be proficient in more than one regulatory setting. Most of these activities have occurred in the waste management sector.

Shipments by the U.S. pollution abatement equipment and services industry are projected to grow at an annual compound rate of 3 to 4% over the 1993-1997 period. More emphasis will be directed to preventive technologies that are integrated into production systems by changes-in-production processes (CIPP) replacing the end-of-line (EOL) technologies currently emphasized.

Because of their mandatory requirements, domestic laws and regulations (national, state and local) have driven the need for environmental products, equipment, processes and services. In the past, environmental instruments have been primarily directed toward control or remediation of an environmental problem, as opposed to taking a preventative approach. However, there is a new emphasis and focus on pollution prevention, as a part of any environmental strategy, and the use of market-based policy instruments to achieve environmental goals. Many U.S. industries have taken a proactive response to environmental concerns, examining products and processes with the intent of creating new ones, or modifying existing ones to make them more environmentally acceptable.

International environmental agreements (IEA's) and the environmental problems and regulations of other countries have influenced or dictated the need and demand for environmental goods and services. IEAs, though negotiated to address specific areas of environmental concern, also present trade opportunities.

Environment and trade policies of the future will be shaped by two considerations: the interrelationship of trade and the commitment to environmentally and economically sustainable development. The United Nations Conference on Environment and Development inaugurated this new approach to policymaking. The North America Free Trade Agreement (NAFTA) is the first international agreement that recognizes these policy concepts.

Environmental regulations, such as those in the Clean Air Act of 1990, will continue to drive the demand for measuring and controlling instruments. In 1990, U.S. companies spent $7.7 billion on instruments to abate air, water, and solid waste pollution. 60% of these expenditures were used to measure and control air pollutants.

The air pollution monitor market is highly-fragmented. Compliance levels are set at local, state, and federal levels. Various pollutants are monitored at different legislative levels, requiring a wide variety of technologies. Ambient, continuous emission, and point source (or stack) monitors use filters, opacity metering, flame ionization, ultraviolet, metal oxide/electrochemical, colorimetric, atomic absorption, chemiluminescent, and gas chromatography/mass spectrometry (GCMS) technology to identify and quantify air pollutants.

Increased levels of government funding, improvements in technology, and increased public awareness of environmental issues will drive continued decreases in the levels of pollutants and, coupled with Clean Air Act Amendments of 1990, will cause decreases in air toxics (hazardous air pollutants and volatile organic compounds).

The 1992 market for air pollution monitors was about $163 million. During the 1993 to 1997 period, average annual growth in value for all types of air pollution monitors is projected to be approximately 40%. By 1997, air pollution monitors are forecast to represent an $840 million market. It is estimated that the annual cost of meeting the 1990 Clean Air Act Amendments will be about $25 billion and air quality monitors are projected to represent over 3% of this annual expenditure by 1997.

The fastest growing atmospheric monitor technology is projected to be GC/MS due to the proven record of these systems in chemical laboratories and its versatility to detect and measure a wide range of substances. The slowest growing technology is estimated to be gas filter correlation. In spite of the EPA's decision not to require continuous emissions monitoring, the value of monitors to measure air toxics emissions is projected to grow at a much faster pace than the value of monitors to measure criteria pollutant emissions. "Enhanced" monitoring will be required, giving manufacturers the opportunity for cost-effective measures.

In 1992, the five basic monitor technologies used to measure criteria pollutants were: atomic absorption, ultraviolet absorption and ultraviolet fluoescence, chemiluminescence, gravitmetric, and gas filter correlation. In 1992, the value of monitors to measure criteria pollutants on a continuous emissions basis were higher than the value of monitors to measure criteria pollutants on an ambient basis. It is projected that this same order will hold true for 1997.

In 1992, the two most important monitor technologies to measure air toxics emissions were GC/MS and gas chromatography/flame photometry (GC/FPD). The value of GC/MS was higher than that of GC/FPD in 1992 and is expected to be in 1997. In 1992, the value of monitors to measure air toxics on an ambient basis was higher than the value of monitors to measure air toxics on an continuous emissions basis. It is projected that this relationship will be reversed by 1997, with continuous emissions monitors for air toxics having a higher value than ambient air toxics monitors.

Although air pollution monitoring technology has made great strides, continued improvement is necessary to improve the reliability of the equipment in industrial environments. Cost reduction will also be required if the equipment is ever to be placed in all installations and locations necessary to reduce pollution emissions to mandated levels.

Solid and Hazardous Waste Treatment

Approximately 200 million tons of municipal solid waste were generated in 1990, of which only 17% was recycled. The EPA projects that by the year 2000, the amount of solid waste generated will reach 216 million tons.

In 1990 the manufacturing sector spent $817 million on pollution abatement equipment to control solid waste. Chemical and paper manufacturers are the two industries spending the most on capital equipment to control solid waste pollution, together accounting for $413 million or 50% of the total. The petroleum, lumber, primary and fabricated metals industries combined saw spending on solid waste control expenditures climb 65%. Until manufacturers develop procedures both for restricting the amount of waste they produce and finding productive uses for it, the solid waste management industry will continue to enjoy above average growth.

Expenditures on solid waste abatement have grown annually by about 8% since 1984. This coincides with a significant increase in its share in the total spending for pollution abatement in this country, which is expected to climb to over 20% during the 1990s. Air abatement expenditures dropped to 41.4% while wastewater treatment expenditures saw a moderate increase to 39%.

In 1990, American firms spent $14 billion for pollution abatement operating costs, $4.3 billion of which went to solid waste. The burden of cleaning up solid waste pollution is heavily concentrated on several major industries: chemicals and allied products industry had the highest operating costs ($912.2 million) for pollution abatement, followed by transportation, primary metals, paper and allied products and electric and electronic equipment. These five industries were responsible for 57% of the total expenditures spent on all industries.

Solid waste management spending will continue to rise by about 19% annually until 1995. Growing environmental concerns, a series of governmental legislation and regulations, notably the Clean Air Act Amendments of 1990, will fuel pollution abatement expenditures.

The solid waste market is made up of a number of major components which include collection and transportation, landfilling operations, incineration (including waste-to-energy facilities) and recycling. The components are estimated to generate the following revenues in 1991:

Collection and Transportation	$19.0 billion
Landfill Operations	7.0 billion
Incineration	1.5 billion
Recycling	28.5 billion

The National Solid Waste Manufacturers Association is predicting the market will grow to $50 billion by 1995. There are capacity shortages in the solid waste market caused by the declining number of sanitary landfills. This is especially true in the New England states. Today, there are less than 6,000 commercial landfills in the United States, down

from 18,500 in 1976. Of the remaining landfills, 680 handle 75% of the solid waste that is buried. Sanitary landfill is predicted to decrease. Suitable land is becoming more scarce near major metropolitan areas. The landfill regulations regarding air emissions, water runoff and groundwater protection are so stringent that many developers will opt to use available land in other ways.

Today there are only 100 existing incinerator plants in the U.S. EPA is projecting that an additional 30 new plant with a total of 70 new incinerators should be built within the next five years. Each incinerator would have the capacity to burn 250 tons per day of solid waste, which is 85% of the current capacity. EPA can not solve the problem of where these incinerators should be built. The estimated time to obtain all necessary environmental permits, go through public hearings and build a municipal incinerator is about six years.

The problem the public perceives with incineration is the potential for release of toxic gases into the air. Currently, 14% of all municipal solid waste is incinerated, 13 % is recycled and 73% is landfilled. The public produces about 4 pounds of solid waste each day for every man, woman and child. By the year 2000, these figures will increase by 10%. 22,650 industrial facilities release approximately 5.7 billion pounds of toxic chemicals (gases, liquids and solids) annually into the environment.

The hazardous waste market is made up of a variety of components, which include off-site storage, treatment and disposal, on-site storage, treatment and disposal; asbestos abatement; consulting services; remediation (underground storage tanks and cleanup of old disposal sites); and recycling. The size of the hazardous waste market differs greatly depending on the components included. One estimate was $14.8 billion with growth at an annual rate of 17%. The asbestos abatement industry had 1990 revenues of $4.2 billion and is predicted to grow 12% annually. Another estimate forecast the 1992 hazardous waste market as follows:

Off-site treatment and disposal	$3.9 billion
On-site treatment and disposal	2.2 billion
Consulting Services	1.9 billion
Remediation	2.7 billion
Asbestos abatement	3.0 billion
Recycling	8.0 billion
Total	$21.7 billion

During the recent recession, many companies reduced their workforces. As a result, less product was produced and less hazardous waste generated. Consultants felt the blow of the recession the hardest. Many industries, fearful of falling profits, delayed environmental projects until the end of the recession was in sight.

The Superfund portion of the hazardous waste market has proven to be a disappointment to organizations hoping to provide remediation services. The market has not developed at the rate predicted. There are hundreds of sites to be cleaned up, but nothing seems to be getting done. Superfund sites are commonly quoted as costing $10 million to cleanup. Potentially Responsible Parties (PRPs) stall and litigate as long as possible to avoid such expenditures. As a result, the market for environmental legal services has now grown to over $600 million annually.

Among hazardous waste generators, most are responsible for environmental or regulatory compliance. They are also responsible for purchasing the following types of environmental products and services:

Labels/Marketing Products:	62%
Spill Containment/Control/Cleanup:	58%
Protective Clothing/Equipment:	50%
Laboratory Services:	39%
Hazardous Waste Treatment/Disposal Equipment:	36%
Storage Tanks/Containers:	34%
Computer Hardware/Software:	33%
Analyzers/Samplers/Testing Equipment:	32%
Hazmat Management Services:	32%
Consulting Services:	29%
Filters/Filter Media:	28%
First Response/Rescue Equipment:	27%
Pipes/Valves/Fittings/Pumps:	27%
Water Treatment:	22%
Transportation Equipment:	21%
Laboratory Equipment:	19%
Detection/Monitoring/Sensing Equipment:	18%
Groundwater Monitors/Treatment:	18%
Sludge Treatment/Disposal:	18%
Air Handling/Treatment Equipment:	17%
Asbestos Control/Removal:	12%
Liners/Geotextiles:	7%

Another area of hazardous waste disposal concern is nuclear waste. Driven by cuts in defense spending, the rising cost of waste disposal and pressure from the Nuclear Regulatory Commission, a record number of nuclear facilities, including a number in New England, will soon be going through radioactive decontamination in preparation for shutdown.

The Watertown, Massachusetts lab is one of at least 51 U.S. nuclear facilities, including seven in Massachusetts, that are expected to turn in their NRC licenses to handle radioactive material in the next few years, or to reduce their operations. And that does not count military bases or the 25 nuclear reactors that some predict will shut down by the year 2000.

Each facility is supposed to remove radiation to background levels, leaving the land ready to be used for another purpose. For about half of the license holders, such as labs where the radioactive material is encased in metal, decontamination will require minimal effort. But other facilities which generate vast amounts of radioactive waste will cost tens of millions of dollars to decontaminate. The NRC has limited experience in decommissioning and officials rely on an admitted "hodgepodge" of rules and regulations, some dating from the 1960s, that have to be applied on a case-by-case basis.

Waste Management

Waste management is the greatest problem facing New England municipalities, yet it is often poorly understood by the very government officials, business people and other decision makers who deal with it. It is also the potentially biggest group of business opportunities for Canadian environmental products and services companies wishing to do business in New England. Thousands of New England cities, towns and business decision-makers spend $1.5 billion for waste management equipment and services each year.

Waste Dynamics of New England, for example, lists 4,050 officials in 1,523 New England municipalities, 4,200 waste professionals and 12,000 waste generators.

The 4,050 city and town officials include all New England mayors, city council heads, board of selectmen chairpersons, city/town managers, administrative assistants, planning board heads, public works directors, city/town engineers and environmental, conservation and landfill committee chairmen.

The 4,200 waste professionals include private contractors, engineers, consultants, facility managers, lawyers, project overseers, middle managers, haulers, educators, researchers, equipment dealers, vendors, and other experts who study, teach and develop systems and standards for the industry.

The 12,000 waste generators include all manufacturers with 20 or more employees including those who have obtained EPA permits. Also, haulers, processors, brokers, managers and others who handle solid, special medical and hazardous wastes with those who generate these wastes, including decision-makers in every city and town, waste district and state and federal environmental offices, as well as manufacturers.

Buyers of equipment and supplies, including those who buy conveyors, compactors, bins, loading systems, vehicles, granulators, bale breakers, truck covers, scales, drums, grapples, balers, magnets, safety gear, liners, emission controls, shredders, crushers, debaggers, grinders, tanks, valves, meters, filters, data loggers, pads, booms, pumps, ancillary products and more.

Buyers of professional services searching for civil and environmental engineers, lawyers consultants, technicians, hydrogeologists, laboratories, analysts, planners, permitting specialists, public relations advisers, insurance representatives, designers and environmental scientists.

Seekers of financial arrangements such as municipalities and businesses seeking a wide variety of financial support, including help from lenders, venture capitalists, industrial revenue bond experts, leasing firms, collection agencies and advisers.

Those who hire contractors and subcontractors to remove asbestos or leaky tanks, building or demolition or those who need remediation specialists to handle illegal dumping, leaking drums, polluted lagoons and spills.

Waste-To-Energy

Although the recycling/composting of 196 million tons of municipal solid waste (MSW) produced annually has increased dramatically during the last five years, the quantity of MSW requiring disposal has also risen due to an increase in the total amount of waste generated. With landfill capacity expected to continue to decline, combustion of MSW at waste-to-energy (WTE) plants and non-energy recovering incinerators (collectively known as municipal waste combustors or MWC's) appears to be an effective alternative.

While MSW volume processed at WTE plants has grown each year, future industry growth is expected to decline significantly. Reasons include a number of projects that continue to remain on hold or that have been cancelled as a result of limited financial resources or lack of project support; also, the lack of clear legislative and regulatory guidelines.

There are 190 MWC plants now processing and combusting MSW in the U.S. Of these, 176 facilities are actually burning MSW, processing nearly 34 million tons annually or 17% of the total. The total number of WTE combustors now operating in the U.S. is 142. Thirty-four states have operating plants, with the majority of facilities concentrated in the Northeast and South. 50% of the facilities are equipped with continuous emissions monitoring (CEM) equipment.

Approximately $20 billion will be spent on WTE construction during the 1990's. The WTE market (construction and operations) was valued at $2 billion in 1990, and is forecast to grow by 20% per year through 1995. The primary market driver is the "burn or bury" option for non-recycled waste. The business outlook is strong for the major players in this field. But the current trend favors fewer, larger facilities. The value of energy produced from WTE plants will grow from $5 billion in 1990 to $10 billion by 1995. Capital expenditures on capital equipment for WTE systems was $2.5 billion in 1990 and will increase to $5 billion annually by 1995. By 2000, WTE facilities burning municipal solid waste, landfill gas and agricultural waste to produce power for sale to utilities will more than double to 425 plants with an estimated production capacity of 7,500 MW.

A number of states, most notably Massachusetts and New Jersey, have introduced "pauses" on WTE projects to encourage recycling and the "regionalizing" of integrated solid waste management strategies. Although such limits have proved temporary, a number of proposed combustors were put on hold or cancelled outright. Many localities are moving toward integrated waste plans which involve all phases of waste management: waste reduction, recycling, combustion, composting, and landfilling.

94 installations are scheduled to come on line over the next five years. U.S. resource recovery plants now accept about 27 million tons of MSW annually. An additional 21 million tons of capacity will be added if all currently planned installations eventually come on line. More sophisticated air pollution control devices are now being utilized by most large U.S. resource recovery plants.

MWC greatly reduces the volume of waste by up to 90%, thereby helping to preserve valuable landfill space at a time when waste quantities are continuing to grow and disposal capacity is declining in many parts of the country. The long-term outlook for MWC in the U.S. is positive. However, market conditions will remain flat through the mid-1990s, while current legislative and regulatory initiatives continue to evolve and are implemented.

Environmental Engineering, Consulting and Design

The environmental segment of the construction industry is aggressively repositioning itself for the burgeoning market of the next decade. 1993 promises to be a year of transition. "For those who thrive," indicated one company executive, "the rewards will be great."

Recovery in the environmental business will lag improvement in the general economy and in state budgets, but most companies are predicting 1993 revenue growth at about 10 %, although it will vary by market sector and region.

There is plenty of work in the multi-billion dollar environmental market in 1993:

The Department of Defense (DOD) will spend $3.7 billion on environmental compliance and restoration, an increase of 34% over the prior year.

The Department of Energy (DOE) has budgeted $5.5 billion for environmental restoration and waste management, up 29% over fiscal year 1992.

State and local governments, oil companies, utilities and manufacturers will be spending millions to meet existing environmental standards.

Also gathering steam are industrial conversions from pollution control add-ons to manufacturing process.

Says Hugh Holman, chief financial analyst for Alex Brown & Sons:

"There are fundamental changes taking place. We are focusing on a transition from and industry that has its roots in the garbage business to one that will be technology driven, process oriented, less end-of-the-pipe, landfill and incineration dependent, and more treatment and recycling dependent."

Familiar competitors in the environmental engineering business are starting to find themselves facing new, sometimes bigger rivals. The service business is transitioning away from smaller firms working on smaller projects to larger firms working on the larger projects. The market is tending to give the advantage to bigger, engineering-driven companies like Fluor, Ebasco and CH2M hill. The emphasis is on what expertise you have in managing experts, not on having the expertise.

Successful companies of the 1990s will possess either proven, sophisticated project management expertise or indepth expertise in particular niche areas.

After almost two years of deepening economic doldrums, the environmental industry should soon see the bottom of its downturn if it hasn't already. According to Alan Farkas of the Farkas Berkowitz & Co. consulting firm:

1992 could be have been the worst year for environmental consulting in the last decade. The off-site services sector, hazardous waste disposal, incineration and recovery, continued to register steady revenue growth of 12 to 16% over the past two years, but it is a much smaller sector than the $9 billion a year consulting market. For many environmental consultants, billings have been flat since the third quarter of 1991. Consulting traditionally lags economic trends both going in and coming out of recessions. The sector's 1992 growth rate of about 10% compares to previous years' increases of 30% or more. It is largely a function of the economy, the slow industrial markets. There certainly hasn't been a sense of urgency in regulation. The maturation of the marketplace may also be a contributing factor, with pollution generators becoming more informed in their use of consulting firms.

The number of consultants used by industry has been cut down rather drastically even though expenditures remain steady. It has meant the best-positioned firms are the larger ones and that should also mean a continuation of the trend toward mergers and acquisitions in the consulting sector.

The remediation construction market should grow to over $5 billion by 1995, up from a projected $2.5 billion in 1992.

The increasingly strong anti-regulatory policy of the Bush administration has had a chilling effect on aggressive enforcement and compliance. With Clinton, we expect a stronger enforcement posture and more generous funding for public environmental infrastructure.

Although there is consolidation among companies nationally, there will continue to be room for local firms to handle small projects and provide contacts with local officials and knowledge of local conditions even on larger jobs.

By 2000, spending on hazardous waste cleanups in the U.S. will be on the decline. Landfills will no longer be a growth market and profits are likely to remain elusive in most recycling segments. Process management, clean air and clean water are likely to be on center stage in the U.S. in the early next century, but may not offer sufficient rewards. The hierarchy will be dictated by basic need, with water supply being foremost, followed by wastewater and solid waste, with hazardous waste cleanups being undertaken only when other needs have been met.

There at least four major pieces of environmental legislation which may come up for review in this Congress: the Resource Conservation and Liability Act (CERCLA), or "Superfund", the Clean Water Act; and the Endangered Species Act. The environmental agenda for Congress had not yet gelled. Superfund expires in 1994.

At the federal agencies most involved in environmental issues or projects, regulations and plans laid down years ago are driving much of the action expected this year. The solid waste industry is watching implementation of new rules governing landfill gas control and sludge management and other regulations that are expected to force the closing of many smaller, mostly rural landfills.

The chemical industry is monitoring closely possible changes to the "mixture and derived from rule" under RCRA. New rules will govern wastes, such as incinerator scrubber water, that are not initially hazardous but come into contact with hazardous waste. They now must be treated themselves as hazardous wastes.

With many states experiencing revenue shortfalls, environmental regulations issuing from Washington seem to indicate that states should enact these regulations if they care about their state's future, but should not ask for any Federal money to help. The national deficit still means that Washington is in no position to fully underwrite the environmental laws it is demanding the states enforce. Many state legislatures and environmental agencies, however, are experimenting with new ways to clean up the air and water and manage solid waste.

A push is on in New England and other states to adopt California's tailpipe emissions standard, which exceed in strictness those established by the EPA. The air is to greatly reduce the release of carbon monoxide, nitrous oxide (NOx) and hydrocarbons. By 1994, at least 10 % of cars sold in California must have exhaust systems that reduce emissions to .125 grams per mile or less. Auto and oil industry groups argue, however, that California"s emissions standards are not appropriate for the different climate of the Northeast.

Solid waste will continue to be one of the biggest environmental areas for the states. Legislatures will have a packed agenda of solid waste issues on which to deliberate, such as the Environmental Trust Fund and the Environmentally Sound Packaging Act. Despite the focus on residential recycling, the greatest potential for waste reduction is in commercial and industrial areas. Though use of consultants won't be mandatory, many large companies will no doubt turn to professionals to do the job.

The Clean Water and Safe Drinking Water Acts are up for reauthorization by Congress in 1993. Concern is being expressed about non-point source issue whereas the first Clean Water Act primarily focused on point sources. Non-point issues include contaminated sediment, aquatic sediment, atmospheric deposition and storm water run-off. Aging water and sewer lines and water treatment plants that were expected to last 20 years are now well beyond that.

A four-fold increase in federal safe drinking water testing requirements now means that states are testing for 83 contaminants instead of 22. Those that can afford to are doubling or tripling staff in order to keep up with the work load; those that can't may end up losing control over their state water quality programs.

States are successfully finding ways to not only carry out the federal government's laws, but to take the initiative in handling many of the nation's environmental problems. If current trends continue, many important environmental battles of the future likely will be fought and won at the state and local level.

For fiscal year 1993, federal spending on environmental programs continues its yearly, double-digit growth. The Department of Energy (DOE) received appropriations of over $5.5 billion for environmental restoration and waste management. The Department of Defense (DOD) will spend about $3.7 billion on environmental compliance and restoration. While EPA budget increased only about 5.3%, the total of $6.9 billion is its largest ever.

The 1993 budget continues a shift at DOE from weapons manufacturing to facility cleanup. The environmental restoration and waste management account, at $5.5 billion, increased 29% over the prior year. Environmental restoration to comply with EPA hazardous waste requirements is to get $1.9 billion of this total, a 25% increase. Waste management operations include minimization, treatment, and storage for radioactive, hazardous, and mixed wastes. The most ambitious of DOE's plans is the establishment of several Environmental Restoration Management Contracts (ERMCs) for the overall management of cleanup activities at former nuclear weapons facilities.

Congressional appropriations for cleanup and compliance at Defense facilities are growing at record levels. About $3.7 billion is budgeted for DOD in 1993, and increase of some 34%. Of this amount, spending for environmental restoration will total over $1.5 billion, a 57% increase. The department is to designate $200 million for expedited cleanups at its facilities.

Of all federal appropriations for environmental remediation, only EPA's Superfund program has a dedicated source of funds outside of the general Treasury. Yet Superfund appropriations lag behind both the levels granted to DOD and DOE and the requests made in the President's budgets. About $1.6 billion was spent on Superfund in 1992 and the President asked for $1.75 billion for 1993. But Congress provided only $1.5 billion for the year, a 3% decrease. This is the first decrease in Superfund appropriations since the 1986 reauthorization of the statute.

Significant growth in private sector environmental expenditures can be expected. Cleanups aimed at returning contaminated properties to productive use and pollution control equipment to bring manufacturing operations into compliance with environmental statutes should be included in any stimulus program.

Growth in Superfund expenditures will depend on the success of EPA's "enforcement first" policy. The pace of RCRA Corrective Actions is dependent upon issuance of final Agency rules providing certainty to the program and a means for state assumption of authority. Hazardous air pollutant engineering and equipment expenditures are not likely to increase until EPA issues many of the important air rules that are now more than a year behind schedule. Wastewater toxic expenditures are unlikey to increase until states respond to EPA's recent issuance of new toxic guidance. Management of solid, non-hazardous or special waste at industrial sites will not be under any new mandates since this contentious issue was not addressed by the last Congress.

The driving force behind the clean air market is the Clean Air Act Amendments (CAAA) which will not be felt much until 1994 when the regulations affecting air toxic, stationary source control and air permitting and compliance programs at the state level are in place.

1993 should be brighter for engineering and equipment orders than 1992, due to new plant installations by approximately 80 to 100 companies under EPA's "early reduction" program (which rewards companies who clean up their act sooner rather than later), the 33/50 program to reduce generation of 17 high-priority toxic wastes, chlorofluorocarbons (CFC) recovery, and possibly some early coke-oven control projects. Another factor boosting such orders is the fast-approaching compliance date, January 1, 1995, for acid rain controls, state air pollution regulations and some federal air toxic regulations.

Environmental expenditures are driven by regulation. They begin slowly after enactment of the legislation as regulations are developed and implemented, reach a peak and then decline to a sustaining level. At this plateau, purchases are a function primarily of industry growth in new or modified plants and to a lesser degree on replacements.

In the clean air market new regulations particularly the 1990 CAAA, are boosting spending beyond replacement levels. The total expenditures under the CAAA over time can be projected with reasonable accuracy, but the timing of actual expenditures by year is difficult to forecast due to the vagaries of the regulatory process. Consulting and engineering firms generally will see business increase in 1993 for plants that need permit submittals, conceptual design work, dispersion modeling and emission inventories.

Engineering construction firms play a role in building both off-site recycling facilities such as MRFs and specialty processes, and on-site facilities for recycling wastes where they are generated for disposal. Other waste minimization alternatives, such as modification of current manufacturing processes or installation of new processes or installation of new processes to reduce the generation of waste in the first instance, present the major growth opportunities for these companies. This should be a robust market well into the 21st century.

An estimate by the federal Office of Technology Assessment (OTA) puts the cost of meeting the stationary source requirements of title I at $1.8 billion in 1994, rising to $1.93 billion in 1999. The types of control systems that will be installed on stationary sources will include incinerators, absorbers and condensers for the control of volatile organic compound emissions. Process changes will reduce fugitive emissions from equipment leaks and will lower storage tank and transfer losses.

For controlling emissions from mobile sources, enhanced inspection and maintenance and more stringent tailpipe standards. The remainder of expenditures will be for service station pump controls, lowered gasoline volatility, and alternative fuels.

Incremental spending on air toxic control is not expected to be significant in 1993, since only a few regulations will be on the books. The money that is spent will be primarily for costs incurred by the 80-100 companies involved in the early reduction program or for voluntary controls under the 33/50 program.

But big spending on air toxic is right around the corner under the hazardous organics emission (HON) statutes. The HON requirements cover reactors, storage tanks, equipment leaks, transfer systems, and wastewater systems in synthetic organic chemical manufacturing plants. The types of control systems expected to be used are incinerators, condensers, absorbers, vapor balancing, floating and fixed roofs on tanks and process change equipment or leak detection for valves, pumps, flanges and other connectors.

By 2003, according to a report by the McIlvaine Company, cumulative capital expenditures for add-on equipment to meet Title III's air toxic mandates will total $4.3 billion distributed among the following control systems:

Control System Total Dollars
1993-2000

Incinerators/Absorbers	$2.2 billion
Absorbers	0.5
Fabric Filters	1.0
Precipitators	0.5
Carbon Absorbers	0.1

Facilities that treat, store, or dispose of hazardous wastes will be required to install air pollution control equipment during the 1990s, which will cost approximately $0.58 billion in 1994, rising to $0.66 billion in 1999. The two principal types of control technologies benefiting from this requirement are incinerators and absorbers. A number of laws other than the CAAA also will cause air pollution control expenditures to rise, including the Pollution Prevention Act and others.

The forecast for 1993 is for modest growth for the air pollution control industry. Although air pollution control spending as a whole is sizeable, the bulk of the increases over the next decade will be on controlling mobile sources, process changes or fuel substitutions. Only about a third of the increased spending will be for traditional, add-on controls.

As U.S. water quality has improved, newer and more subtle water quality problems have been identified. Merely controlling pollution through treatment is not always enough, as some residuals will always remain and may persist in the environment. The impact of these residuals has prompted a call for preventing, rather than merely treating pollution, and for totally eliminating certain pollutants.

Some advocates of zero discharge propose discharge limits below currently detectable levels without regard to approach or technology. Other advocates of zero discharge propose the "sunsetting" of undesirable chemicals. Sunsetting involves legislating definite dates by which the use of prescribed substances would be permanently banned, thus forcing the development of replacement technology. Still others prefer a "reverse onus" concept, which means requiring absolute proof that a substance is safe in terms of health and the environment before its manufacture and use are allowed.

Incorporating any of these approaches into environmental legislation will force alternative technology and chemicals to be developed. However, the "forcing" of technology through legislation may also have unwanted consequences. Although the approach may work on an industry-wide level, as in the cases of automotive emissions, fluorocarbon-based refrigerants, and asbestos insulation, its application may close down individual businesses.

If a corporation is faced with a law requiring zero discharge of pollutants and compliance seems impossible or to expensive, management may decide to close the plant and buy the product from a foreign supplier not subject to the ban imposed by U.S. laws, or may move operations to a country that will allow such production. The environmental effect of foreign production of substances banned here will continue unless some type of enforceable restriction exists worldwide.

Manufacturers of equipment or materials for the water environment market are faced with the same dilemma. The push for zero discharge has been a market driver for developing sophisticated treatment and analysis equipment. Manufacturers using more environmentally friendly methods of manufacturing, such as recycling, also are able to successfully market that advantage.

On the other hand, all of these manufacturers are faced with growing regulation of waste discharges resulting from the manufacturing process. Unlike municipal dischargers, manufacturers could be forced out of business by higher manufacturing costs resulting from regulations that in some cases set limits beyond the current capabilities of detection equipment. These costs will obviously have to be passed on to customers. All of this contributes to a dynamic marketplace for consulting engineers, manufacturers, construction firms, and anyone else remotely related to the water quality industry.

Recycling

The recycling industry's volume increases resulting from the success of voluntary separation of recyclables by households and offices have been more than offset by price decreases for recyclable commodities for several years. That trend is likely to continue even as the economy slowly resuscitates, making it difficult for the industry to revive in the next few years.

Generally the recycling industry's two most important segments today are the recycling of municipal solid waste and the recycling of materials that would be regulated hazardous waste if discarded. In both cases, recycling activities involve the recovery of salable products from materials that have been discarded as wastes until relatively recently.

Prices for most recycled products dropped in 1992 to their lowest levels in years, as a result of growing supplies of recyclables, a weak economy and consumer indifference to products made from recycled material. Companies involved in the business of recycling were hit hard in 1992 and will continue to struggle in 1993.

Mixed municipal refuse, before it can be put to any use, must have its recyclable components segregated. Mechanical systems for conducting such segregation are capital-intensive and prone to break down. Therefore, the source segregation that more and more households and offices are doing voluntarily is critical to businesses based on municipal solid waste (MSW) recycling.

Firms in the business of recycling MSW fall into two general categories, municipal recovery facilities (MRFs) and specialty processors. MRFs receive commingles or source-separated recyclables, perform further separation or mechanical processing, and market the materials to brokers or end users. There were over 200 in the U.S. in 1992, an increase of close to 100% over 1991. Design and construction of MRFs can be profitable, but problems arise in operating them.

Specialty processors manufacture products from municipal solid waste steam constituents, either under contract with a primary manufacturer or for sale to end users. Market segments include processing of used aluminum beverage cans for primary sheet stock manufacturers, processing of waste glass for glass container manufacturers and other end users, processing of spent tires to produce supplemental fuel, composting of yard wastes or mixed municipal refuse, and processing of plastic wastes to produce clean resin pellets for primary manufacturers or molded plastic wood products of various kinds.

Used aluminum cans are one of the few success stories in the recycling industry, because it is cheaper to manufacture sheet stock from spent cans than from virgin bauxite ore.

About three billion spent tires no longer suitable for retread are stockpiled, and an additional 170 million are discarded annually. Technically feasible solutions include shredding, manufacture of tire-derived fuel (TDF), tire-to-energy conversion and chemical decomposition using heat. Economically feasible solutions are elusive.

Composting is used more for yard waste than for mixed municipal refuse, but neither type of operation has proved profitable.

In plastics, most primary manufactures are involved in some type of recycling. It is not clear whether manufactures are entering the market to improve profit margins or to preserve markets for virgin plastics which are threatened by environmentalists who oppose use of disposables. Consumers are not clamoring to pay higher prices for products made from waste, which are no higher quality than those made from virgin materials.

Hazardous wastes represent potential niche opportunities for recycling, because the costs of allowable alternatives, such as incineration or landfill disposal are increasing. The oldest of the hazardous waste recyling markets is solvent recovery for either material or fuel value. The 1992 market for off-site solvent recovery and fuel blending was about $1 billion. Continued growth depends on diversifying into other solvent and oil recovery markets that are more competitive and less profitable. A newer niche market is the recovery of zinc from electric are furnace dusts.

A study of recycling costs in 30 cities and communities in 21 states by the Institute for Local Self-reliance finds that such programs can actually save tax dollars and provide other local economic benefits. The institute's study finds that recycling-collection costs are often lower than standard waste-collection costs per ton. The institute claims that a city of one million people with typical landfill costs of $24 million a year can save its local government, business and households about $7 million through aggressive expansion of materials-recovery efforts.

In New Hampshire, for example, the New Hampshire Resource Recovery indicated that municipal recycling collection of containers increased by 63 percent from 1990 to 1991, accounting for 26 percent of the 54.5 tons of all recyclables recovered in 1991.

Containers Recovered (Tons)

	1990	**1991**
Glass containers	6,679	10,110
Aluminum cans	586	804
Steel cans	588	1,381
Mixed cans	NA	211
PET	339	553
HDPE	323	711
Mixed PET/HDPE	NA	126
Total	8,515	13,896

Owners of soil contaminated by various petroleum products are also seeking an alternative to landfilling their tainted soil. Available landfill spaces are rapidly disappearing, but even where it remains a viable option, landfilling can subject a generator to enormous liabilities in today's litigation society.

In addition, other remediation alternatives, such as bioremediation, are time consuming, no less expensive and produce uncertain cleanup results. The demand to cleanse soils is rising as businesses try to comply with increasingly rigid environmental standards.

Approximately 2 million properly registered tanks filled with petroleum products are hidden underground. At least 500,000 are leaking into the surrounding soil, The EPA estimates, and threatening such natural resources as groundwater.

A thermal treatment system for cleaning petroleum-contaminated soil is operated from several strategically located facilities in the U.S. to maximize accessibility to generators of the waste. Thermal soil recycling is fast, efficient and enables the soil to be used again after cleaning. Customers truck soil to these facilities to be cleaned. After cleaning, during which the soil is heated and resulting gasses destroyed, customers can choose to take the soil back and return it to the ground of uses for it.

TPST soil-recycling centers guarantee that final cleanup levels will fall below detectable limits as determined by the local regulatory agencies. These levels are achieved quickly and without any lingering liabilities because the contamination no longer exists. TPS Technologies is a subsidiary of Thermo Process Systems, a subsidiary of Boston-based Thermo Electron Corporation.

The greatest barrier to municipal solid waste recycling is the lack of markets for collected material, according to officials from 258 municipalities surveyed by the U.S. Conference of Mayors' Municipal Waste Management Association (MWMA). Collection costs and market prices for recyclable materials ranked second and third, respectively, as barriers most commonly cited nationwide. Responses differed slightly by region.

Lack of public participation presented the greatest barrier to recycling, followed closely by market availability. Participation was cited as a much lower concern in all other regions, particularly in New England states. Public participation in recycling programs was cited as a drawback more commonly in cities with fewer than 50,000 residents. Concern over market availability was of roughly equal concern in municipalities of all sizes. Without a national policy to stimulate markets, cities may be required to slow down the expansion of their recycling collection programs at a time when other disposal options may not be available.

Northeastern cities with older recycling programs put slightly less emphasis on market availability as a barrier, showing that cities with programs in operation for longer periods are finding ways to deal with this problem. Localities that identify markets before starting recycling programs tend to do better. Paper topped the list of recycled products purchased by local government. A wide variation in the remaining useful life of area landfills exists. New England municipalities have an average landfill life expectancy of only 4.2 years while cities in the Mountain states reported an average of 53.7 years useful life remaining. Average landfill life expectancy in all other regions ranged from 11 to 17 years. Fees paid for disposal at waste facilities were highest on average in the Middle Atlantic states, where cities reported average landfill tipping fees of about $70 per ton. The New England states' average landfill tipping fee of $53 per ton was the second-highest reported.

Analytical Services and Laboratories

Conservative estimates put the growth rate for environmental labs at 10% each year in the 1990's, with the total market for commercial environmental laboratories reaching $1.8 billion by 1994 and $2.5 billion by the end of 1999.

The investigation and cleanup of hazardous waste sites are becoming an increasingly important segment of the environmental market and increasingly important to the business of environmental analysis. Both in-lab and on-site testing is done.

This development, combined with a growing demand for wastewater monitoring under the National Pollution Discharge Elimination System (NPDES) and drinking water testing under the Safe Drinking Water Act, has elevated field testing and on-site services to one of a significant environmental analysis trend.

Environmental laboratories consist of commercial labs, industrial facilities, government facilities and university/research institutions.

Commercial lab employees are primarily individuals involved in the purchasing/specifying process: lab directors, owners, managers, department heads, supervisors and chemists performing environmental analytical work for government agencies and private-sector clients.

Industrial sector employees represent in-house lab operations at companies whose manufacturing processes are heavily affected by environmental regulations, such as those in the chemical, petrochemical, primary metals, processing, agriculture, biotechnical, medical and transportation industries.

Government professionals at agencies include the Environmental Protection Agency, The Department of Energy and the Department of Defense, as well as individuals in state and municipal government agencies and environmental laboratories.

University/research institution employees include scientists, researchers and department heads involved with the ongoing development of environmental testing methodologies and instrumentation.

Three leading environmental laboratory associations include The American Council for Independent Laboratories, the American Association for Laboratory Accreditation and the International Association of Environmental Testing Laboratories.

Typical environmental laboratory job functions include: Laboratory Director, laboratory Manager, Purchaser-Laboratory, Executive Mgmt./Administration, Industrial Hygienist, Consultant, Research Director, Research Scientist, University Professor, University Department Head, QC/QA Supervisor, Analytical Manager, Chemist, Laboratory Technician and Field Tester.

A 1991 survey revealed the following environmental laboratory insights:

Average Lab Size: 53 employees

Location: 49% of laboratories have more than one location.

Annual Billings:

$250,000 & Under	24.9%
300,000 to $1.9 million	29.2%
$2 million to $4.9 million	16.4%
$5 million to $9.9 million	9.3%
Over $10 million	6.8%

Type of Analysis:

76.5% perform organic analysis
82.8% perform inorganic analysis
75.1% perform wastewater analysis
72.7% perform drinking water analysis
68.9% perform hazardous waste analysis
65.6% perform soil analysis
56.8% perform field testing & analysis
54.9% perform solid analysis
52.7% perform sewage analysis
42.6% perform air analysis

Scientific Disciplines:

Biochemistry	4.6%
Biology	6.3%
Chemistry/Analytical	57.2%
Ecology	6.3%
Food	1.8%
Geology	3.7%
Microbiology	9.4%
Toxicology	3.9%
Other	6.8%

About 68% of these scientists perform some environmental research in their laboratories. Approximately 47% reported that they or their staff carried out environmental measurements on site. 53% anticipated an increase in the amount of future field testing.

Types of samples analyzed in respondents' laboratories include:

Air	40.2%
Biological	35.6%
Infectious Waste	4.4%
Mixed Waste	27.3%
Radioactive	15.0%
Soil	62.3%
Water	81.0%

Budget expectations for environmental laboratories instrumentation purchases in 1993 are as follows:

Increase over 1992	30.0%
Same as 1992	48.0%
Less that 1992	22.0%

Product usage and purchasing plans for laboratory products and short-term purchasing plans by senior scientists in environmental laboratories are as follows:

Products Bought	Percent
Balances	91.1 %
Baths	56.0
Centrifuges	25.4
Gas Chromatographs	55.0
HPLC Systems	33.2
Computers	62.1
Thermal Analyzers	15.0
Optical Microscopes	39.1
Ovens	75.8
Furnaces	47.1
pH Meters	71.1
Titrators	29.9
Recorders	63.4
FT/IR Spectrometers	34.8
Mass Spectrometers	15.6
UV/Vis Spectrophotometers	47.1
AA Spectrophotometers	46.3
Plasma Spectrometers	23.1
Fume Hoods	79.8
Autosamplers	32.8
Stills	39.9

Environmental Lab magazine's 23,140 readers are professionals in commercial labs, industrial facilities, government and university/research institutions. Readers are primarily individuals involved in the purchasing/specifying process: lab directors, owners, managers, department heads, supervisors and chemists.

Commercial lab readers perform environmental analytical work for government agencies and private-sector clients. Industrial sector readers represent in-house lab operations at companies whose manufacturing processes are heavily affected by environmental regulations, such as those in the chemical, petrochemical, primary metals, processing, agriculture, biotechnical, medical and transportation industries. Government readership includes professionals at agencies including the Environmental Protection Agency, The Department of Energy and the Department of Defense, as well as individuals in state and municipal government agencies and environmental laboratories. University/research institution readers include scientists, researchers and department heads involved with the ongoing development of environmental testing methodologies and instrumentation.

Association involvement of readers: American Council of Independent Laboratories, American Association for Laboratory Accreditation and International Association of Environmental Testing Laboratories.

Environmental Lab magazine's circulation reflects the growth and diversity of the environmental testing community...both in-lab and on-site. Readers perform analytical work for government, industry, private commercial facilities and university/research institutions. The industrial segment includes in-house lab operations at companies whose manufacturing processes are heavily affected by environmental regulations. Chemical, petrochemical, primary metals, processing and transportation industries include manufacturers with extensive analytical laboratory operations. Government readership includes EPA (and CLP) state-certified and municipal operated laboratories. Commercial lab operations continue to expand as more and more private clients rely on the monitoring and analysis abilities of independent environmental labs for their regulatory needs. The university setting is important to the ongoing development of environmental testing methodologies. *Environmental Lab*'s readership includes university scientists, researchers and department heads helping to shape future analytical techniques.

Lab Size: Average company size is 53 employees

Location: 48.6% of companies have more than one location

Annual Billings:

$250,000 & Under	24.9%
$300,000 to $1.9 million	29.2%
$2.0 to $4.9 million	16.4%
$5.0 to $9.9 million	9.3%
Over $10 million	6.8%

Type of Analysis:

76.5% perform organic analysis
82.8% perform inorganic analysis
75.1% perform wastewater analysis
72.7% perform drinking water analysis
68.9% perform hazardous waste analysis
65.6% perform soil analysis
56.8% perform field testing & analysis
54.9% perform solid analysis
52.7% perform sewage analysis
42.6% perform air analysis

A survey conducted of 2,500 senior laboratory scientists conducted by *American Environmental Laboratory* magazine in February 1993 indicated that 47% of respondents carry out environmental measurements on-site and 53% of respondents anticipated increases in the amount of future field testing business. Sample types analyzed in respondents' laboratories:

Air	40.2%
Biological	35.6%
Infectious Waste	4.4%
Mixed Waste	27.3%
Radioactive	15.0%
Soil	62.3%
Water	81.0%

Budget Expectations for Respondents' Laboratory Instrument Purchases in 1993 vs. 1992: Increase: 30.0%; Same: 48.0%; Less: 22.0%. 68% of scientists responding perform environmental research in their labs. The following results were obtained for current usage of laboratory products and short-term purchasing plans by senior scientists in environmental laboratories:

	Now Use	6-Month Purchase
Analyzers:		
Biological Oxygen Demand	24.3%	2.1%
Chemical Oxygen Demand	22.6%	1.0%
Flow Injection	13.0%	1.0%
Total Organic Carbon	28.0%	3.4%
Volatile Organic Carbon	17.6%	1.2%
Volatile Organic Halide	11.6%	1.0%
Balances	83.5%	8.0%
Baths/Circulators, Thermostatic	66.9%	4.7%
Centrifuges	64.2%	2.9%
Chromatography:		
AutoSamplers	45.3%	8.7%
Gas, Columns	60.1%	10.6%
Gas, Detectors	55.6%	16.6%
Gas, Systems	53.0%	7.0%
Gas, Headspace Accessories	20.8%	4/7%
Gas, Purge/Trap Accessories	38.0%	6.2%
G-C FTIR	11.1%	0.8%
GC-MS	42.1%	7.9%
Gel Permeation, Columns	18.4%	7.2%
Gel Permeation, Systems	14.2%	5.3%
HPLC, Columns	45.0%	13.6%
HPLC, Detectors	44.3%	4.9%
HPLC, Pumps	43.8%	4.4%
HPLC, Systems	42.2%	5.4%
Ion, Columns	27.1%	5.4%
Iron, Systems	24.2%	7.0%
LC-MS	8.0%	1.4%
SFC, Systems	9.2%	2.8%
Syringes	54.7%	15.6%

Computers:		
Mini/Workstation	50.1%	9.6%
Personal	86.0%	21.6%
Evaporators	42.9%	2.9%
Filtration Apparatus and Supplies	55.9%	15.6%
Fumehoods	82.8%	8.4%
Furniture	72.4%	8.9%
Grinders	35.7%	5.4%
Homogenizers	34.0%	2.8%
Incubators	41.0%	2.8%
Instrument Rental Services	10.6%	3.3%
Isotopes	22.2%	6.5%
Kjeldahl Apparatus	26.8%	2.6%
Laboratory Robots	7.7%	2.2%
Microscopes:		
General Purpose	60.7%	4.0%
Electron, Scanning	13.5%	1.0%
Stereo	31.9%	2.4%
Microwave Digestion Ovens	21.1%	6.8%
Mobile Laboratories	7.2%	2.4%
Ovens:		
Electrical	70.9%	3.3%
Microwave	29.3%	1.9%
Particle Size Analyzers	18.3%	1.9%
pH Electrodes	84/0%	16.8%
pH and Specific Ion Meters	72.0%	8.9%
Pipettors, manual and Automatic	74.0%	14.6%
Pumps, General-Purpose, Liquid	42.1%	3.3%
Portable Field Test Apparatus:		
Anlysis Test Strps	18.7%	4.3%
Conductivity Meters	28.4%	2.8%
GC	10.1%	2.2%
Immunoassay	3.0%	2.2%
Mass Spectrometers	3.3%	0.5%
pH/Specific Ion Meters	25.2%	4.1%
UV-VIS Spectrophotometers	7.9%	1.9%
Safety Products	73.1%	24.3%
Sample Containers/Vials	78.9%	30.4%
Software:		
Chromatography, Data Management	49.2%	8.9%
Environmental Compliance	13.5%	5.1%
LIMS	25.2%	5.4%
Scientific Word Processing	43.3%	5.4%
Solid Phase Extraction Supplies	29.2%	13.6%
Solvent Extraction Apparatus	40.8%	7.9%
Specialty Gases	57.7%	19.6%
Specific Ion Electrodes	49.2%	10.6%

Spectrometers:		
AA, Flame	48.3%	2.6%
AA, Graphite Furnace	41.3%	4.1%
Fluoescence	20.4%	1.6%
FTIR	19.3%	1.7%
ICP	30.3%	2.1%
ICP-MS	7.0%	1.4%
IR Dispersive	14.2%	0.5%
Mass Magnetic	8.0%	0.7%
Mass, Quadrupole	24.5%	2.6%
UV-VIS	52.7%	3.6%
Standards	70.2%	29.1%
Supercritical Fluid Extraction Apparatus	11.3%	4.3%
Titrators	30.8%	3.0%
Vacuum Concentrators	18.0%	1.9%
Water Purification Systems	69.7%	8.4%

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VII. ENVIRONMENTAL PUBLICATIONS

There are numerous New England regional and local publications that Canadian EPS companies can access in order to remain current on environmental news, trends and events. They can also be useful as vehicles for marketing and promoting specific environmental products and services using advertising and public relations and as information resources for product and industry research. The following lists New England regional and local publications.

Action
54 Portsmouth Street
Concord, NH 03301
(603) 224-9945

Alternative Energy Retailer
Box 2180
Waterbury, CT 06722
(203) 755-0158

American Dowser
Danville, VT 05828
(802) 684-3417

Annual Editions: Environment
Dushkin Publishing Group, Inc.
Sluice, Dock
Guilford, CT 06437
(203) 453-4351

Aquasphere
New England Aquarium
Central Wharf
Boston, MA 02110
(617) 742-8830

Boston College Environmental Affairs Law Review
Boston College, School of Law
885 Centre Street
Newton, MA 02159
(617) 552-4354

Boston Harbor Association News
51 Sleeper Street
Boston, MA 02210
(617) 330-1134

Concerned Educators Allied for a Safe Environment News
17 Gerry Street
Cambridge, MA 02138
(617) 864-0999

Coastwise Commuinications
104 Water Street
Rehoboth, MA 02769
(508) 336-6455

Cogeneration
Box 44
Southport, CT 06490
(203) 259-1812

Citzens' Bulletin
Department of Environmental Protection
State Office Building, Room 112
Hartford, CT 06106
(203) 566-5599

ConnStruction
P.O. Box 9768
Wethersfield, CT 06109
(203) 529-3246

Conservation Biology
3 Cambaridge Center, Suite 208
Cambridge, MA 02142

Conservation Commission News
54 Portsmouth Street
Concord, NH 03301
(603) 224-7867

CPI Purchasing
275 Washington Street
Newton, MA 02158
(617) 558-4266

E Magazine
Box 5098
Westport, CT 06881
(203) 854-5559

E.H.M.I. Resource
10 Newmarket Road, P.O. Box 70
Durham, NH 03824
(603) 868-1496

Energy Journal
245 Merrian Street
Weston, MA 02193
(617) 647-3609

Environmental Compliance Update
P.O. Box 1923
Brattleboro, VT 03501
(802) 254-3539

Environmental Manager's Compliance Advisor
39 Academy Street
Madison, CT 06463
(203) 245-7448

Environmental Professional
University of New England
Biddeford, ME 04005
(207) 283-0171

Environmental Software
Computational Mechanics Inc.
25 Bridge Street
Billerica, MS 01821
(508) 667-5841

Garbage
2 Main Street
Gloucester, MA 01930
(508) 283-3200

Global Environmental Change Report
37 Broadway
Arlington, MA 02174
(617) 648-8700

Green Book
The Green Book, Inc.
155 West Street
Wilmington, MA 01887
(617) 935-4800

Green Book Report, The
The Green Book, Inc.
155 West Street
Wilmington, MA 01887
(617) 935-4800

Hazardous Material Intelligence Reports
Box 535
Cambridge, MA 02238
(617) 491-5100

Industry Magazine
441 Stuart Street
Boston, MA 02116
(617) 262-1180

International Environmental Affairs
17 1-2 Lebanon Street
Hanover, NH 03755
(603) 646-3349

Journal of Environmental Pathology, Toxicology and Oncology
Three Cambridge Center, Suite 208
Cambridge, MA 02142
(617) 225-0401

Newsletter
Massachusetts Assn. of Conservation Commissions
10 Juniper Road
Belmont, MA 02178
(617) 489-3930

Maine Environment
271 State Street
Augusta, ME 04330
(207) 622-3101

Maine Environews
Office of the Commissioner
State House Station No 17
Augusta, ME 04333
(207) 289-2343

Maine Fish and Wildlife
Station 14, 284 State Street
Augusta, ME 04333
(207) 289-2871

MassCitizen
29 Temple Place
Boston, MA 02211
(617) 292-4800

New England Water Works Association Journal
42A Dilla Street
Milford, MA 01757
(508) 478-6996

New Hampshire Audubon
3 Silk Farm Road, Box 528-B
Concord, NH 03302
(603) 224-9909

O.S.H.A. Compliance Advisor
39 Academy Street
Madison, CT 06443
(203) 245-7488

Quinnehtukqut
Sierra Club, Connecticut Chapter
23 Greenfield Street
Wethersfield, CT 06019
(203) 527-9788

Sanctuary
Massachusetts Audubon Society
South Great Road
Lincoln, MA 01773
(617) 259-9550

State Hazardous Waste Regulation
90 Stiles Road
Salem, NH 03079
(800) 548-4001

T.B.H.A News
51 Sleeper Street the Boston
Boston, MA 02210
(617) 330-1134

Valley Newsletter
125 Combs Road
Easthampton, MA 01027
(413) 584-0057

Vermont Business
Route #30, P.O. Box 6120
Brattleboro, VT 05301
(800) 750-4800

Vision
Mill River Plaza, 9 W. Broad
Stamford, CT 06902
(203) 323-8987

Voice of Walden
P.O.Box 275 Concord, MA 01742
(508) 371-2421

Waste Disposal & Pollution Control
Box 1939
New Haven, CT 06509
(203) 865-8519

Waste Dynamics of New England
150 Dow Street
Manchester, NH 03101
(603) 624-1442

Waste Treatment Technology News
Business Communications Company, Inc.
25 Van Zant Street
Norwalk, CT 06855
(203) 853-4266

Water Connection
New England Interstate Water Pollution Control Commission
85 Merrimack Street, 3rd Floor
Boston, MA 02114
(617) 367-8522

Wind Energy News
Box 4008
St.Johnsbury, VT 05819
(802) 748-2425

World Information Systems
P.O. Box 535
Cambridge, MA 02238
(617) 491-5100

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VIII. ENVIRONMENTAL ASSOCIATIONS

New England local and regional, as well as U.S. national environmental associations are listed in the following pages. Members of these associations include specifiers and purchasers of environmental products and services.

Associations can provide extensive and useful market research and other information and insights on specific market segments and market potential for various environmental products and services. Membership in select associations, especially at the local or regional level, can provide valuable "networking" opportunities with other members that can result in increased exposure for company capabilities, products and services and business.

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NEW ENGLAND REGIONAL & LOCAL ASSOCIATIONS

Air and Waste Management Association/New England Section
P.O. Box 424
Mansfield, MA 02048

American Association of University Women Environmental Network
229 Cheshire Road
Prospect, CT 06712
(203) 758-4606

Associated Industries of Massachusetts
441 Stuart Street
Boston, MA 02116
(617) 262-1180

Association for the Preservation of Cape Cod
P.O. Box 636
Orleans, MA 02653
(508) 255-4142

Association of Vermont Recyclers
P.O. Box 1244
Montpelier, VT 05602
(802) 229-1833

Atlantic Center for the Environment
39 S. Main Street
Ipswich, MA 01938
(508) 356-0038

Boston Greenspace Alliance
44 Bromfield Street, #207
Boston, MA 02108
(617) 426-7980

Boston Harbor Association, The
51 Sleeper Street
Boston, MA 02210
(617) 330-1134

Boston Water and Sewer Commission
425 Summer Street
Boston, MA 02210
(617) 330-9400

Cape Cod Commission
3225 Main Street
Barnstable, MA 02630
(508) 362-3828

Catalyst
P.O. Box 73
Stafford, VT 05072
(802) 765-4337

CEIP Fund, The
68 Harrison Avenue
Boston, MA 02111
(617) 426-4783

Center for Coastal Studies
P.O. Box 1036
59 Commercial Street
Provincetown, MA 02657
(508) 487-3622

Center for Ecological Technology
147 Tyler Street
Pittsfield, MA 01201
(413) 445-4556

Charles River Watershed Association
2391 Commonwealth Avenue
Auburndale, MA 02166
(617) 527-2799

Clean Water Action
76 Summer Street, 6th Floor
Boston, MA 02110
(617) 424-4661

Clean Water Action
98 Main Street
Northampton, MA 01060
(413) 584-9830

Clean Water Action
400 Smith street
Providence, RI 02908
(401) 331-6972

Clean Water Coalition
P.O. Box 133
Machias, ME 04654
(207) 255-4290

Coastal States Organization
444 N. Capitol Street NW
Suite 312
Washington, DC 20001
(202) 508-3860

Conservation Law Foundation of New England
3 Joy Street
Boston, MA 02108
(617) 742-2540

Coolidge Center for Environmental Leadership, The
1675 Massachusetts Avenue
Cambridge, MA 02138
(617) 864-5085

D.D.I./The Development Guild
233 Harvard Street
Brookline, MA 02146
(617) 277-2112

Earth Access
87 Cherry Street
Cambridge, MA 02139
(617) 868-0758

Energy Federation, Inc.
354 Waverly Street
Framingham, MA 01707
(508) 653-4299

Environmental Business Council, Inc.
Exchange Place
53 State Street
Suite 3400
Boston, MA 02109

Environmental Hazards Management Institute
10 Newmarket Road
P.O. Box 932
Durham, NH 03824
(603) 868-1496

Environmental Institute, The
University of Massachusetts
Blaisdell House
Amherst, MA 01003
(413) 545-2842

Environmental Lobby of Massachusetts
3 Joy Street
Boston, MA 02108
(617) 742-2553

Environmental Safety
733 15th Street NW
Suite 1120
Washington, DC 20036

For a Cleaner Environment,Inc.
United Methodist Church
523 Main Street
Woburn, MA 01801
(617) 938-8544

Fundamental Action to Conserve Energy
75 Day Street
Fitchburg, MA 01420
(508) 345-5385

Global Action Network
Environmental Citizenship Program
Tufts University
Medford, MA 02155
(617) 381-3423

Habitat Institute for the Environment
10 Juniper Road, P.O.Box 136
Belmont, MA 02178
(617) 489-5050

Harris Center for Conservation Education
King's Highway, R.R.1
P.O. Box 773
Hancock, NH 03449
(603) 525-3394

Hitchcock Center for the Environment
Larch Hill Conservation Area
525 S. Pleasant Street
Amherst, MA 01002
(413) 256-6006

Institute for Environmental Leaders, The
16 Germain Street
Worcester, MA 01602
(508) 755-9223

Institute for Resource and Security Studies
27 Ellsworth Avenue
Cambridge, MS 02139
(617) 491-5177

Katharine Nordell Lloyd Center for Environmental Studies
P.O. Box 7037
South Dartmouth, MA 02748
(508) 990-0505

Maine Coast Heritage Trust
167 Park Row
Brunswick, ME 04011
(207) 729-7366

Maine Coastal Program, Maine State Planning Office
State House Station 38
Augusta, ME 04333
(207) 289-3261

Maine/New Hampshire Voice
P.O. Box 3061
Portsmouth, NH 03802
(603) 742-9434

Mainewatch Institute
184 Water Street
P.O. Box 209
Hallowell, ME 04347
(207) 622-7000

Massachusetts Association of Septic Pumping Contractors
P.O. Box 18
Alston, MA 02134
(617) 782-1550

Massachusetts Bay Marine Studies Consortium
P.O. Box 660
Boston, MA 02125
(617) 287-6540

Massachusetts Bays Program
Massachusetts Office of Coastal Management
100 Cambridge Street
Boston, MA 02202

Massachusetts Campaign to Clean Up Hazardous Waste
37 Temple Place
Boston, MA 02111
(617) 292-4821

Massachusetts Citizens for Safe Energy
37 Temple Place
Boston, MA 02111
(617) 292-4821

Massachusetts Congress of Lake and Pond Associations
135 Washington Street
Holliston, MA 01746
(508) 429-5805

Massachusetts Environmental Education Society
15 State Street
Boston, MA 02109
(617) 740-1605

Massachusetts Environmental Trust
100 Cambridge Street, 20th Floor
Boston, MA 02202
(617) 727-9800

Massachusetts Institute of Technology Sea Grant Program
292 Main Street, Building E38-368
Cambridge, MA 02139
(617) 253-7041

Massachusetts League of Environmental Voters
76 Summer Street, 6th Floor
Boston, MA 02110
(617) 423-4661

Massachusetts Marine Educators
Institute of Learning & Teaching
University of Massachusetts
Boston, MA 02125
(617) 287-7666

Massachusetts Office of Technical Assistance
100 Cambridge Street
Room 1904
Boston, MA 02202
(617) 727-3260

Massachusetts Society of Municipal Conservation Professionals
c/o M.A.C.C.
10 Juniper Road
Belmont, MA 02178
(508) 358-7701

Massachusetts Toxics Network
163 Kent Street
Brookline, MA 02146
(617) 731-1341

Merrimack River Watershed Council
694 Main Street
West Newbury, MA 01985
(508) 363-5777

Narragansett Bay Project
291 Promenade Street
Providence, RI 02908
(401) 277-3165

New England Coastal Campaign
24 Mount Vernon Avenue
Newport, RI 02840
(401) 846-1673

New England Council
581 Boylston Street
Boston, MA 02116
(617) 437-0304

New England Environmental Education Alliance
P.O. Box 105
Glendale, MA 01229
(413) 298-5244

New England Environmental Network
Lincoln Filene Center
Tufts University
Medford, MA 02155
(617) 381-3423

New England Green Alliance
P.O. Box 703
White River Junction, VT 05001
(802) 295-1544

New England Interstate Water Pollution Control Commission
85 Merrimack Street
Boston, MA 02114
(617) 367-8522

New Hampshire Association of Conservation Commissions
54 Portsmouth Street
Concord, NH 03301
(603) 224-7867

New Hampshire Coastal Alliance
c/o Backriver Studio
R.F.D. 4 Old Garrison Road
Dover, NH 03820
(603) 742-9434

New Hampshire Resource Recovery Association
P.O. Box 721
Concord, NH 03302
(603) 224-6996

North & South Rivers Watershed Association
P.O. Box 43
Norwell, MA 02061
(617) 659-8168

North American Association for Environmental Education
P.O. Box 400
Troy, OH 45373
(513) 339-6835

Northeast Citizen Action Resource Center
32 Grand Street
Hartford, CT 06106
(203) 525-3688

Northeast States for Coordinated Air Use Management
85 Merrimack Street
Boston, MA 02114
(617) 367-8540

Northeast Sustainable Energy Association
23 Ames Street
Greenfield, MA 01301
(413) 774-6051

Northeast Waste Management Officials Association
85 Merrimack Street
Boston, MA 02114
(617) 367-8558

Rhode Island Solid Waste Management Corporation
West Exchange Center
260 West Exchange Street
Providence, RI 02903
(401) 831-4440

Rural Housing Incorporated/Rural Water Resources
218 Central Street
P.O. Box 429
Winchendon, MA 01475
(508) 297-1376

Safer Water in Massachusetts
Northeastern University
Marine Science Center E. Point
Nahant, MA 01908
(617) 581-0075

Seacoast Anti-Pollution League
5 Market Street
Portsmouth, NH 03801
(603) 431-5089

Sierra Club of New England
3 Joy Street
Boston, MA 02108
(617) 227-5339

Tellus Institute for Resource and Environmental Strategies
89 Broad Street
Boston, MA 02110
(617) 426-5844

Toxics Use Reduction Institute
University of Massachusetts at Lowell
Work Environment Programs
Lowell, MA 01854
(508) 934-3275

Urban Harbors Institute
University of Massachusetts
Boston Harbor Campus
Boston, MA 02125
(617) 287-5570

Vermont Clean Air Coalition
43 State Street
Montpelier, VT 05602
(802) 223-5221

Vermont Environmental Board and Waste Facility Panel
120 State Street
Montpelier, VT 05620
(802) 828-3309

Vermont Environmental Caucus
9 Bailey Avenue
Montpelier, VT 05602
(802) 223-2328

Vermont Natural Resources Council
9 Bailey Avenue
Montpelier, VT 05602
(802) 223-2328

Vermont Public Interest Research Group
43 State Street
Montpelier, VT 05602
(802) 223-5221

Vermont Trails and Greenways Council
c/o Department of Forests
103 S. Main Street, 8 South
Waterbury, VT 05676
(802) 244-8713

Vermont Water Resources Board
120 State Street
Montpelier, VT 05620
(802) 828-2871

Water Resources Research Center
Blaidsdell House
University of Massachusetts
Amherst, MA 01373
(413) 545-2842

NATIONAL ASSOCIATIONS

American Mining Congress
1920 N Street NW. Suite 300
Washington, DC 20036
(202) 861-2800

American Nature Study Society
5881 Cold Brook Road
Homer, NY 13077
(607) 749-3655

American Petroleum Institute
1220 L Street NW
Washington, DC 20005
(202) 682-8000

American Public Works Association
1313 E. 60th Street
Chicago, IL 60637
(312) 667-2200

American Shore and Beach Preservation Association
University of California
412 O'Brien Hall
Berkeley, CA 94720
(415) 642-6777

American Society for Environmental History
Center for Technology Studies
NJ Institute of Technology
Newark, NJ 07102
(201) 596-3269

American Society of Agricultural Engineers
2950 Niles Road
St. Joseph, MI 49085
(616) 429-0300

American Society of Agronomy
677 S. Segoe Road
Madison, WI 5371
(608) 273-8080

American Society of Ichthyologists and Herpetologists
c/o Walter Courtenay
Florida Atlantic University
Boca Raton, FL 33431
(407) 367-3331

American Society of Naturalists
Biological sciences Division
University of Kansas
Lawrence, KS 66045
(913) 864-3763

American Society of Sanitary Engineering
P.O. Box 40362
Bay Village, OH 44140
(216) 835-3040

American Solar Energy Society
2400 Central Avenue, G-1
Boulder, CO 80301
(303) 443-3130

American Water Resources Association
5410 Grosvenor Lane, Suite 220
Bethesda, MD 20814
(301) 493-8600

American Wind Energy Assn
777 N. Capitol Street NE, Suite 805
Washington, DC 20002
(202) 408-8988

Appalachian Mountain Club
5 Joy Street
Boston, MA 02018
(617) 523-0636

Asbestos Information Association/North America
1745 Jefferson Davis Highway
Suite 509
Arlington, VA 22202
(703) 979-1150

Association of American Pesticide Control Officials
2004 le Suer Road
Richmond, VA 23229
(804) 288-8181

Association of Conservation Engineers
64 N. Union Street
Alabama Department of Conservation
Montgomery, AL 36130
(205) 242-3476

Association of Ground Water Scientists and Engineers
6375 Riverside Drive
Dublin, OH 43017
(614) 761-1711

Association of Local Air Pollution Control Officials
444 N. Capitol Street NW
Washington, DC 20001
(202) 624-7864

Association of Metropolitan Sewerage Agencies
1000 Connecticut Avenue NW
Suite 1006
Washington, DC 20036
(202) 833-2672

Association of State and Interstate Water Pollution Control Administrators
750 First Street NE Suite 910
Washington, DC 20002
(202) 898-0905

Air and Waste Management Association
P.O. Box 2861
Pittsburgh, PA 15230
(412) 232-3444

Air Resources Information Clearinghouse
46 Prince Street
Rochester, NY 14607
(716) 271-3550

Alliance to Save Energy
1725 K Street NW, Suite 509
Washington, DC 20006
(202) 857-0666

American Academy of Environmental Engineers
130 Holiday Court, #100
Annapolis, MD 21401
(301) 266-3311

American Academy of Environmental Medicine
P.O. Box 16106
Denver, CO 80216
(303) 622-9755

American Chemical Society
1155 16th Street NW
Washington, DC 20036
(202) 571-4600

American College of Toxicology
9650 Rockville Pike
Bethesda, MD 20814
(301) 571-1840

American Council for and Energy-Efficient Economy
1001 Connecticut Avenue NW
Suite 801
Washington, DC 20036
(202) 429-8873

American Forest Council
1250 Connecticut Avenue NW
Suite 320
Washington, DC 20036
(202) 463-2455

American Forestry Association
1516 P Street NW
Washington, DC 20005
(202) 667-3300

American Horticultural Society
P.O. Box 0105
Mount Vernon, VA 22121
(703) 768-5700

American Industrial Health Council
1330 Connecticut Avenue NW
Suite 300
Washington, DC 20036
(202) 659-0060

American Industrial Hygiene Association
345 White Pond Drive
P.O. Box 8390
(216) 873-2442

American Institute of Biological Sciences
730 11th Street NW
Washington, DC 20001
(202) 628-1500

American Institute of Biomedical Climatology
1023 Welsh Road
Philadelphia, PA 19115
(215) 673-8368

American Institute of Chemical Engineers
345 E. 47th Street
New York, NY 10017
(212) 705-7338

American Institute of Chemists
7315 Wisconsin Avenue
Bethesda, MD 20814
(301) 652-2447

American Littoral Society
Sandy Hook
Highlands, NJ 07732
(201) 291-0055

Association of State and Territorial Solid Waste Management Officials
444 N. Capitol Street, NW, Suite 388
Washington, DC 20001
(202) 624-5828

Center for Environmental Information, Inc.
46 Prince Street
Rochester, NY 14607
(716) 271-3550

Center for Environmental Management
Tufts University, Curtis Hall
474 Boston Avenue
Medford, MA 02155
(617) 381-3486

Center for Marine Conservation
1725 DeSales Street NW
Washington, DC 20036
(202) 429-5609

Center for Resource Economics
1718 Connecticut Avenue
Suite 300
Washington, DC 20009
(202) 232-7933

Chamber of Commerce of the united states
1615 H Street NW
Washington, DC 20062
(202) 659-6000

Chemical Manufacturers Association
2501 M Street NW
Washington, DC 20037
(202) 887-1100

Chemical Producers and Distributors Association
1220 19th Street NW
Suite 202
Washington, DC 20036
(202) 785-2732

Chemical Waste Transportation Council
1730 Rhode Island Avenue NW
Suite 1000
Washington, DC 20036
(202) 659-4613

Citizens' Clearinghouse for Hazardous Wastes
P.O. Box 6806
Falls Church, VA 22040
(703) 237-2249

Clean Sites
1199 N. Fairfax Street
Alexandria, VA 22314
(703) 683-8522

Clean Water Action
1320 Eighteenth Street NW
Washington, DC 20036
(202) 457-1286

Coalition for Environmentally Responsible Economics
711 Atlantic Avenue
Boston, MA 02111
(617) 451-0927

Concerns, Inc.
1794 Columbia Road NW
Washington, DC 20009
(202) 328-8160

Conservation and Research Foundation, The
Connecticut College
New London, CT 06320
(203) 873-8524

Conservation Foundation
1250 24th Street NW
Washington, DC 20037
(202) 293-4800

Council on Economic Priorities
30 Irving Place
New York, NY 10003
(212) 420-1133

Council on Plastics and Packaging in the Environment
1275 K Street NW, Suite 900
Washington, DC 20005
(202) 789-1310

Datacenter, The
464 19th Street
Oakland, CA 94612
(510) 835-4692

Earth Island Institute
300 Broadway, Suite 28
San Francisco, CA 94133
(415) 788-3666

Ecological Society of America
9650 Rockville Pike
Suite 2503
Bethesda, MD 20814
(301) 530-7005

Energy Conservation Coalition
6930 Carroll Avenue, Suite 600
Tacoma Park, MD 20912
(301) 891-1104

Environic Foundation International
916 St. Vincent Street
South Bend, IN 46617
(219) 233-3357

Environmental Action Foundation
6930 Carroll Avenue, Suite 600
Tacoma Park, MD 20912
(301) 891-1100

Environmental and Energy Study Institute
122 C Street NW, Suite 700
Washington, DC 20001
(202) 628-1400

Environmental Defense Fund
257 Park Avenue South
New York, NY 10010
(212) 686-4191

Environmental Industry Council
1825 K Street NW, Suite 210
Washington, DC 20006
(202) 331-7706

Environmental Law Institute
1616 P Street NW, Suite 200
Washington, DC 20036
(202) 328-5150

Environmental Management Association
1019 Highland Avenue
Largo, FL 33540
(813) 586-5710

Environmental Mutagen Society
19110 Montgomery Village Avenue
Suite 310
Gaithersburg, MD 20879
(415) 422-5698

Environmental Quality Instruction Resources Center
Ohio State university
1200 Chambers Road, Room 310
Columbus, OH 43212
(614) 292-6717

Forest History Society
701 Vickers Avenue
Durham, NC 27701
(919) 682-9319

Freshwater Foundation
725 County Road 6
Wayzata, MN 55391
(612) 449-0092

Friends of The Earth
218 D Street SE
Washington, DC 20003
(202) 544-2600

Genetic Toxicology Association
Cleary, Gottleib, Steen & Hamilton
1752 N Street NW
Washington, DC 20036
(202) 728-2700

Halogenated Solvent Industry Alliance
1225 19th Street NW
Suite 300
Washington, DC 20036
(202) 223-5890

Hazardous Materials Advisory Council
1110 Vermont Avenue NW
Suite 250
Washington, DC 20005
(202) 728-1460

Hazardous Materials Control Research Institute
9300 Columbia Boulevard
Silver Spring, MD 20910
(301) 587-9390

Hazardous Waste Treatment Council
1440 New York Avenue
Suite 310
Washington, DC 20005
(202) 783-0870

Industrial Chemical Research Association
1811 Monroe
Dearborn, MI 48124
(313) 563-0360

Inform
381 Park Avenue South
New York, NY 10016
(212) 689-4040

Infraspection Institute, The
1971 Shelburne Road, Suite C
Shelburne, VT 05482
(802) 985-2500

Institute for Environmental Auditing
P.O. Box 23686
L'Enfant Plaza Station
Washington, DC 20026
(703) 818-1000

Institute for Environmental Negotiation
Campbell Hall
University of Virgina
Charlottesville, VA 22903
(804) 924-1970

Institute for Local Self-Reliance
2425 18th Street NW
Washington, DC 20009
(202) 232-4108

Institute of Environmental Sciences
940 East Northwest Highway
Mt. Prospect, IL 60056
(708) 255-1561

Institute of Noise Control Engineering
P.O. Box 3206
Arlington Branch
Poughkeepsie, NY 12603
(914) 462-4006

Institute of Scrap Recycling Industries, Inc.
1627 K Street NW
Washington, DC 20006
(202) 466-4050

International Bio-Environmental Foundation
15300 Venture Boulevard, Suite 405
Sherman Oaks, CA 91403
(818) 907-5483

International Clearinghouse for Environmental Technologies
12600 W. Colfax Avenue
Suite C-310
Lakewood, CO 80215
(303) 233-1248

International Consortium for Energy Development
114 The Fenway
Boston, MA 02115
(617) 247-1919

International Society of Chemical Ecology
University of Delaware, 700 Pilotto
College of Marine Studies
Lewes, DE 19958
(302) 645-4262

Interstate Conference on Water Policy
955 L'Enfant Plaza, 6th Floor
Washington, DC 20024
(202) 466-7287

Manufacturers of Emission Controls Association
1707 L Street NW, Suite 570
Washington, DC 20036
(202) 296-4797

National Academy of Sciences
Environmental Studies & Toxicology
National Research Council
2001 Wisconsin Avenue, Room HA
Washington, DC 20007
(202) 334-3060

National Agricultural Chemicals Association
1155 15th Street NW
Madison Building, Suite 900
Washington, DC 20005
(202) 296-1585

National Air Toxics Information Clearinghouse
U.S. EPA Pollutant Assessment Branch
MD-13
Research Triangle Park, NC 27711
(919) 541-0850

National Association For Plastic Container Recovery
4828 Parkway Plaza Boulevard
Suite 260
Charlotte, NC 28217
(704) 357-3250

National Association of Environmental Professionals
P.O. Box 15210
Alexandria, VA 22309
(703) 610-2364

National Association of Environmental Risk Auditors
4211 E. Third Street
Bloomington, IN 47401
(812) 333-0077

National Association of Manufacturers
1331 Pennsylvania Avenue, NW
Suite 1500 North
Washington, DC 20004
(202) 637-3000

National Association of Noise Control Officials
53 Cubberly Road
Trenton, NJ 08690
(609) 984-4161

National Association of Professional Environmental Communicators
P.O. Box 106 8352
Chicago, IL 60661
(312) 661-1721

National Association of Solvent Recyclers
1333 New Hampshire Avenue NW
Suite 1100
Washington, DC 20036
(202) 463-6956

National Association of State Land Reclamationists
542 8th Street
LaSalle, IL 61301
(815) 223-3322

National Coalition for Marine Conservation
5105 Paulsen Street, Suite 243
P.O. Box 23298
Savannah, GA 31405
(912) 354-0441

National Council of Local Environmental Health Administration
3333 Forbes Avenue
Pittsburgh, PA 15213
(412) 578-8030

National Council of the Paper Industry for Air and Stream Improvements
260 Madison Avenue
New York, NY 10016
(212) 532-9000

National Council on Radiation Protection & Measurements
7910 Woodmont Avenue
Suite 800
Bethesda, MD 20814
(301) 657-2652

National Environmental Development Association
1440 New York Avenue NW
Suite 300
Washington, DC 20005
(202) 638-1230

National Environmental Health Association
720 S. Colorado Boulevard #970
South Tower
Denver Co 80222
(303) 756-9090

National Environmental Training Association
8687 Via De Ventura, Suite 214
Scottsdale, AZ 85258
(602) 951-1440

National Oil Recyclers Association
805 15th Street NW, Suite 900
Washington, DC 20005
(202) 962-3020

National Sanitation Foundation
3475 Plymouth Road
P.O. Box 130140
Ann Arbor, MI 48113
(313) 769-8010

National Solid Wastes Management Association
1730 Rhode Island Avenue NW
Suite 1000
Washington, DC 20036
(202) 659-4613

National Toxics Campaign
1168 Commonwealth Avenue
Boston, MA 02134
(617) 232-0327

National Water Well Association
6375 Riverside Drive
Dublin, OH 43017
(614) 761-1711

National Waterways Conference
1130 17th Street NW
Suite 200
Washington, DC 20036
(202) 296-4415

National Wetlands Technical Council
Environmental Law Institute
1616 P Street NW, Suite 200
Washington, DC 20036
(202) 328-5150

Natural Resources Council of America
801 Pennsylvania Avenue SE
Suite 410
Washington, DC 20003
(202) 547-7553

Natural Resources Defense Council
40 W. 20th Street
New York, NY 10011
(212) 727-2700

North American Association for Environmental Education
P.O. Box 400
Troy, OH 45373
(513) 339-6835

North American Water Office
1519A East Franklin Avenue
Minneapolis, MN 55404
(612) 770-3861

Plastics Recycling Foundation
1275 K Street NW, Suite 400
Washington, DC 20005
(202) 371-5212

Renew America
1400 16th Street NW
Suite 710
Washington, DC 20036
(202) 232-2252

Renewable Natural Resources Foundation
5430 Grosvenor Lane
Bethesda, MD 20814
(301) 493-9101

Resources for the Future
1616 P Street NW
Washington, DC 20036
(202) 328-5000

Safe Energy Communication Council
1717 Massachusetts Avenue NW
Suite LL-215
Washington, DC 20036
(202) 483-8491

Sierra Club
730 Polk Street
San Francisco, CA 94109
(415) 776-2211

Society of Toxicology
1101 14th Street NW
Suite 1100
Washington, DC 20005
(202) 371-1393

Soil & Water Conservation Society
7515 NE Ankeny Road
Ankeny, IA 50021
(515) 289-2331

Solid Waste Association of North America
P.O. Box 7219
Silver Spring, MD 20910
(301) 585-2898

Spill Control Association of America
400 Renaissance Center
Suite 1900
Detroit, MI 48243
(313) 567-0500

State and Territorial Air Pollution Program Administrators
444 N. Capitol Street
Washington, DC 20001
(202) 684-7864

Student Conservation Association
Main Street
P.O. Box 550
Charleston, NH 03603
(603) 826-4301

Synthetic Organic Chemical Manufacturers Association
1330 Connecticut Avenue NW
Suite 300
Washington, DC 20036
(202) 659-0060

Technical Association of the Pulp and Paper Industry
P.O. Box 105113
Atlanta, GA 30348
(404) 446-1400

U.S. Operating Committee on Ecological & Toxicological Association
1330 Connecticut Avenue
Suite 300
Washington, DC 20036
(202) 659-0060

United Nations Environment Programme
DC2 Building, Room 803
2 United Nations Plaza
New York, NY 10017
(212) 963-8093

Water Environment Federation
601 Wythe Street
Alexandria, VA 22314
(703) 684-2400

Water Quality Association
4151 Naperville Road
Isle, IL 60532
(708) 505-0160

Water Resources Congress
3800 N. Fairfax Drive, Suite 5
Arlington, VA 22314
(703) 525-4881

World Environment Center
419 Park Avenue South, Suite 1403
New York, NY 10016
(212) 683-4700

World Resources Institute
1709 New York Avenue NW
Washington, DC 20006
(202) 638-6300

Worldwatch Institute
1776 Massachusetts Avenue NW
Washington, DC 20036
(202) 452-1999

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IX. 1993 ENVIRONMENTAL TRADE SHOWS & CONFERENCES

Listed below are major national and New England regional and local environmental trade shows and conferences. Included are show dates and locations for 1993 and (where available) phone numbers for the group or association sponsoring each event.

Due to the increasing volume of such events, it is advisable to monitor appropriate environmental publications, most of which update show and conference listings each month for a particular segment of the environmental market. Another accurate and excellent source for current environmental trade show and conference listings, published and updated quarterly, is *Environmental Calendar* (published by Business Publishers, Inc., 951 Pershing Drive, Silver Spring, MD 20910; 301/587-6300).

1993

January

27-29	Solid Waste Management & Materials Policy Conference, New York, NY

February

17-20	Asphalt Recycling & Reclaiming Association, Tucson, AZ (410) 267-0023
28-4	Recycling Symposium and Exposition, New Orleans, Louisiana, (800) 332-8686

March

2-3	Energy Efficiency and Environmental Expo, Pittsburgh, PA (800) 388-8820
8-12	Analytical Chemistry and Applied Spectroscopy, Atlanta, GA (412) 825-3220
9-10	Plastic Recycling Conference, Madison, WI (608) 262-2061
9-11	HazMat ’93 Central, Rosemont, IL (708) 469-3373
9-13	Pittsburgh Conference, New Orleans, LA
12-14	Eco Expo, Los Angeles, CA (818) 906-2700
13-16	Paper Stock Institute Conference, Orlando, FL
13-16	ISRI Annual Convention, Orlando, FL (202) 466-4050
16-17	Electric Utility Business Environment Conference, Denver, CO (303) 770-8800
18-19	Annual Pulp and Paper Conference, Kalamazoo, MI (616) 387-2776
18-19	Integrated Resource Planning Conference, Denver, CO (303) 770-8800
22-25	Corporate Environmental Management Conference, Arlington, VA (202) 842-3600
22-23	Environmental Business ’93 Conference, Boston, MA (800) 666-4430
24-25	Industrial Energy Technology Conference, Houston, TX (409) 955-8274
28-1	PetroChemical Expo ’93, Houston, TX (212) 705-7660
28-2	American Chemical Society, Denver, CO (202) 872-6128
29-1	International Oil Spill Conference, Tampa, FL
31-2	Reality-Based Recycling Conference, Washington, DC (202) 293-7330

April

3-7	EM '93, Nashville, TN (404) 633-2622
5-8	Fourth Global Warming International Conference, Woodridge, IL (708) 910-1551
5-8	Particulate Control Symposium, Washington, DC (415) 855-8763
5-8	Symposium on InSitu/On-Site Bioreclamation, San Diego, CA (800) 783-6338
6-8	Air Monitoring Instrumentation, Orlando, FL (614) 792-0005
6-8	Hazmacon '93 Conference, San Jose, CA (510) 464-7960
6-8	Hazmacon '93 Hazardous Materials Conference, Oakland, CA (415) 464-7900
7-9	Environmental Management Forum, New Orleans, LA
13-15	New England Environmental Expo, Boston, MA (617) 489-4199
13-16	Pollution Prevention, Recycling & Environmental Efficiency, Baltimore, MD (412) 232-3444
14-16	Wastepaper, Pulp & Paper Conference, Chicago, IL (415) 905-2368
21-23	Indoor Environment '93, Baltimore (301) 913-0115
26-27	A2LA Annual Meeting, Location TBD
26-28	World Recycling Conference and Exposition, Baltimore, MD (203) 852-0500
26-29	Environmental Toxicology and Risk Assessment, Atlanta, GA (215) 299-5478

May

2-4	Woodfiber-Plastic Composites, Madison, WI (608) 263-2840
2-5	North American No-Dig '93, San Jose, CA (312) 644-0828
2-7	Institute of Environmental Sciences Technical Conference, Las Vegas, NV (408) 736-1120
3-7	Measurement of Toxic and Related Air Pollutants, Durham, NC (412) 232-3444
4-6	HazMat West/Spring Hazardous Materials & Environmental Management Conference, Long Beach, CA (708) 469-3373
5-6	EPA Conference on Analysis of Pollutants in the Environment, Norfolk, VA
5-7	Monitoring Well Design, Installation, and Sampling, Madison, WI (608) 262-2061
10-12	Industrial Waste Conference, West Lafayette, IN (317) 494-2756
15-21	American Industrial Hygiene Association Conference, New Orleans, LA (703) 849-8888
24-26	CARI Convention, Montreal, Quebec, Canada (416) 510-1244
25-27	National Groundwater Association, Las Vegas, NV (614) 761-3446
26	VOC Sampling and Analysis, Piscataway, NJ (908) 463-5062

June

1-4	Recycling Plus, Washington, D.C.
2-4	Cost-Effective Collection of Recyclables, Madison, WI (608) 262-2061
6-10	American Water Works Association Conference, Denver, CO (303) 749-7711
6-10	AWWA Annual Conference & Exposition, San Antonio, TX (303) 749-7711
7-11	Hazardous Materials/Hazardous Wastes Spill Prevention, Corpus Christi, TX (512) 991-8692
9-11	HazMat International '93, Atlantic City, NJ (708) 469-3373
9-12	Hazardous Materials and Environmental Management Conference, Atlantic, NJ (412) 323-3444
12-16	Water Testing & QA Symposium, Arlington, VA
14-16	Pollution Prevention in the Laboratory Conference, Boston, MA (508) 837-5182
15-17	Air and Waste Management Association Conference, Denver, CO (412) 232-3444
20-23	American Society of Safety Engineers Conference, Dallas, TX (708) 692-4121
21-25	International GPS/GIS Conference, Seattle, WA (406) 248-6771
22-25	Waste Expo '93, Chicago, IL, (202) 659-4613

July

14-15	EnvirACS Expo, Arlington, VA
19-21	ASTSWMO National Solid Waste Forum Assoc, Lake Buena Vista, FL (202) 624-5828
26-29	Association of Analytical Chemists, Washington, DC

August

2-5	SWANA Annual Exposition, San Jose, CA (301) 585-2898
22-27	American Chemical Society Fall Expo, Chicago, IL

September

19-23	ICMA Annual Conference & Show, Nashville, TN (202) 962-3672
19-24	Instrument Society of America National Conference, Chicago, IL (919) 549-8411

October

1-3	ECO Expo, Los Angeles, CA (818) 906-2700
3-7	National Safety Congress, Chicago, IL (312) 527-4800
3-7	Water Environment Conference, Anaheim, CA (703) 684-2464
11-14	National Recycling Congress, Nashville, TN (202) 625-6406
12-14	HazMat North-America Conference, Detroit, MI (708) 469-3373
13-15	ALEX '93, San Francisco, CA
18-20	Emission Inventory, Air & Waste Management Association, Los Angeles, CA (412) 232-3444
18-20	National Groundwater Association Conference, Kansas City, MO
26-28	National Association of Chemical Recyclers, Phoenix, AZ (202) 986-8150
26-28	Environmental Technology Expo, Atlanta, GA (404) 447-5083
28-30	World Environmental Engineering Conference, Atlanta, GA (404) 447-5083
29-30	Conference on Flocculents and Coagulants for Water Treatment, Washington, DC (207) 781-9800

November

4-6	Petroleum Hydrocarbons/Organic Chemicals in Groundwater Conference, Houston, TX (614) 761-1711
10-13	Paper Stock Institute Convention, Coronado, CA (202) 466-4050
11-13	Solid Waste Composting Conference, Washington, DC (703) 739-2401
14-17	Environmental Management Forum, San Diego, CA
16-20	Eastern Analytical Symposium, Somerset, NJ
18-20	Pollution Prevention Exposition and Conference, Dallas, TX (202) 659-4613
29-3	Hazardous Materials Control Conference, Washington, DC (301) 982-9500
30-2	HMCRI, Washington, DC

December

4-8	Congress of Cities & Exposition, Orlando, FL (202) 626-3100
6-8	Restoration '93, Boston, MA (617) 933-9699
6-9	Chem Show '93, New York, NY (212) 986-4232

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X. CONCLUSIONS AND RECOMMENDATIONS

1. The New England economy is still recovering from a recession. This recovery is expected to be different from those of the past...much slower and uneven...lasting well into 1994. The recovery of New England jobs lost in the recession (especially manufacturing-based jobs) will, according to most experts, take many years. In fact, many of these jobs may never be recovered. The pace and scope of the recovery will affect the rate of EPS spending by many companies, municipalities, utilities and institutions on specific environmental products and services, despite increased emphasis on regulatory compliance at local, state and national levels and the desire by most organizations to do what is necessary to avoid environmental problems, fines and image problems.

2. New England sales opportunities for Canadian EPS products (especially consumer environmental products) exist with the many New England distributors, wholesalers, and retailers as well as with national retail chains. Sales to national companies with headquarters elsewhere in the U.S. require local sales coverage at their buying headquarters location, generally via the use of manufacturers representatives.

3. Manufacturers' reps are the recommended sales coverage method for environmental products since this permits immediate access to the market, experienced sales coverage, and the ability to provide marketing, merchandising and other support to local companies, distributors and retailers. "Partnering" with New England companies is the recommended sales coverage method for Canadian environmental services companies, especially those with a specific or "niche" service that may not be generally available in the U.S. or New England.

4. Successful sales of environmental products and services into New England by Canadian companies will require a proactive, results-oriented marketing plan, as well as a marketing program that implements a well-defined "marketing mix" of such marketing elements as public relations and publicity, literature, advertising, sales promotion, trade shows and active participation in regional and national trade shows and associations.

5. It is important for Canadian EPS companies to gain a thorough, advanced knowledge of influentials in the New England EPS marketplace, such as government agencies, environmental managers at major companies and utilities, etc., as well as magazine and trade media, trade associations and regional and national trade shows. "Know your audience and your markets" is an absolutely essential first step in the marketing of a Canadian environmental product or service in New England.

6. The EPS market is demanding on EPS product suppliers (especially consumer products), who must maintain adequate production capability, sufficient inventories and dependable deliveries in quantity. Concerns about Canadian EPS companies will center more on their ability to provide a product or service that is competitively priced, of good quality, that can be delivered on time and that show an understanding of the users problems and needs.

7. There are generally no trade impediments for a Canadian environmental products and services company. There are still some "Buy American" feelings, especially in some areas of New England hard hit by the recession, which could negatively affect certain sales opportunities. But in general, if the features and benefits of the Canadian EPS vs. those available in New England are real and are effectively marketed via a variety of marketing and sales methods, Buy American is not a major obstacle.

8. Additional, detailed market analysis to determine the market potential for a specific EPS product or service is strongly recommended before a Canadian EPS company ventures into the New England market. This analysis can best be conducted and accelerated by using the services of a U.S.-based marketing consulting firm familiar with the EPS market, with New England consumers and businesses and with the specific industries (paper, chemicals, metals, etc.) responsible for most of the spending on EPS. The time and money spent on this market analysis process is critical to determining in advance the potential for success or failure of a new EPS into the New England market.

9. The market for most Canadian environmental products and services in New England is good and success for a Canadian EPS company is possible. But it requires commitment, resourcefulness, follow-through and, above all, patience. Gaining acceptance of a Canadian environmental product or service in New England is not a six month process. The market introduction process should be done cautiously, deliberately, and with realistic "payback" expectations of no sooner than two to three years.

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XI. APPENDICES

A. Metropolitan Statistical Areas
B: Environmental Products and Services Categories
C: Glossary of Environmental Terms
D: Market Information from Environmental Publications
E. Sources Used for This Study
F. Resource Marketing, Inc.

Appendix A: Metropolitan Statistical Areas

1. Definitions

Metropolitan Statistical Areas (MSAs) are defined according to a set of detailed standards prepared by the Federal Committee on MSAs, which advises the Office of Management and Budget.

The general concept underlying the MSA is that of a geographic area consisting of a large population nucleus together with adjacent communities which have a high degree of economic and social integration with that nucleus. An MSA includes one city of at least 50,000 or more inhabitants or an urbanized area of at least 50,000 with total metropolitan population of at least 100,000. MSAs are defined in terms of entire counties; each MSA has one or more central counties, containing the area's main population concentration.

In addition to the county (or counties) containing the main city (or cities), an MSA may also include outlying counties which have close economic and social relationships with the central counties. Such counties must meet certain standards regarding "Metropolitan character," such as populating density, and must have a specified level of commuting to the central counties.

In the six New England states, MSAs are defined in terms of cities and towns rather than entire counties. Because smaller areas are used, the total MSA population requirement is reduced from 100,000 to 75,000.

The official title of an MSA always includes the state or states into which it extends and the name of the largest city in that MSA. It might include several cities, all dependent upon relative and minimum populations of the central city and other cities in the MSA title, and they are usually ordered by their relative population. In total, in the U.S. there are 265 regional MSAs and 21 CMSAs, consisting of 73 PMSAs.

An area with more than 1 million population may be defined as a Primary Metropolitan Statistical Area (PMSA). A PMSA is large urbanized county or a cluster of counties that exhibit very strong social and economic links. Local opinion, obtained through congressional delegation, is also a very strong factor in determining if and area will be designated a PMSA. The specific standards for defining PMSAs are as follows:

> The area must include at least one county with a population of more than 100,000.
>
> At least 60 percent of this county's population must be classified as urban.
>
> Less than 50 percent of its workers commute to jobs outside of the county.

The larger area of which all PMSAs are component parts is defined as a Consolidated Metropolitan Statistical Area (CMSA). MSAs in New England have been combined to form New England County Metropolitan Statistical Area (NECMSA).

Source: 1991 Survey of Buying Power

2. New England MSAs

Bangor, ME: Penobscot County

Boston/Lawrence/Salem/Lowell/Brockton, MA: Essex County, Middlesex County, Norfolk County, Plymouth County and Suffolk County

Burlington, VT: Chittenden County; Grand Isle County

Lewiston/Auburn, ME: Androscoggin County

Manchester/Nashua, NH: Hillsborough County

New Bedford/Fall River/Attleboro, MA: Bristol County

Pittsfield, MA: Berkshire County

Portland, ME: Cumberland County

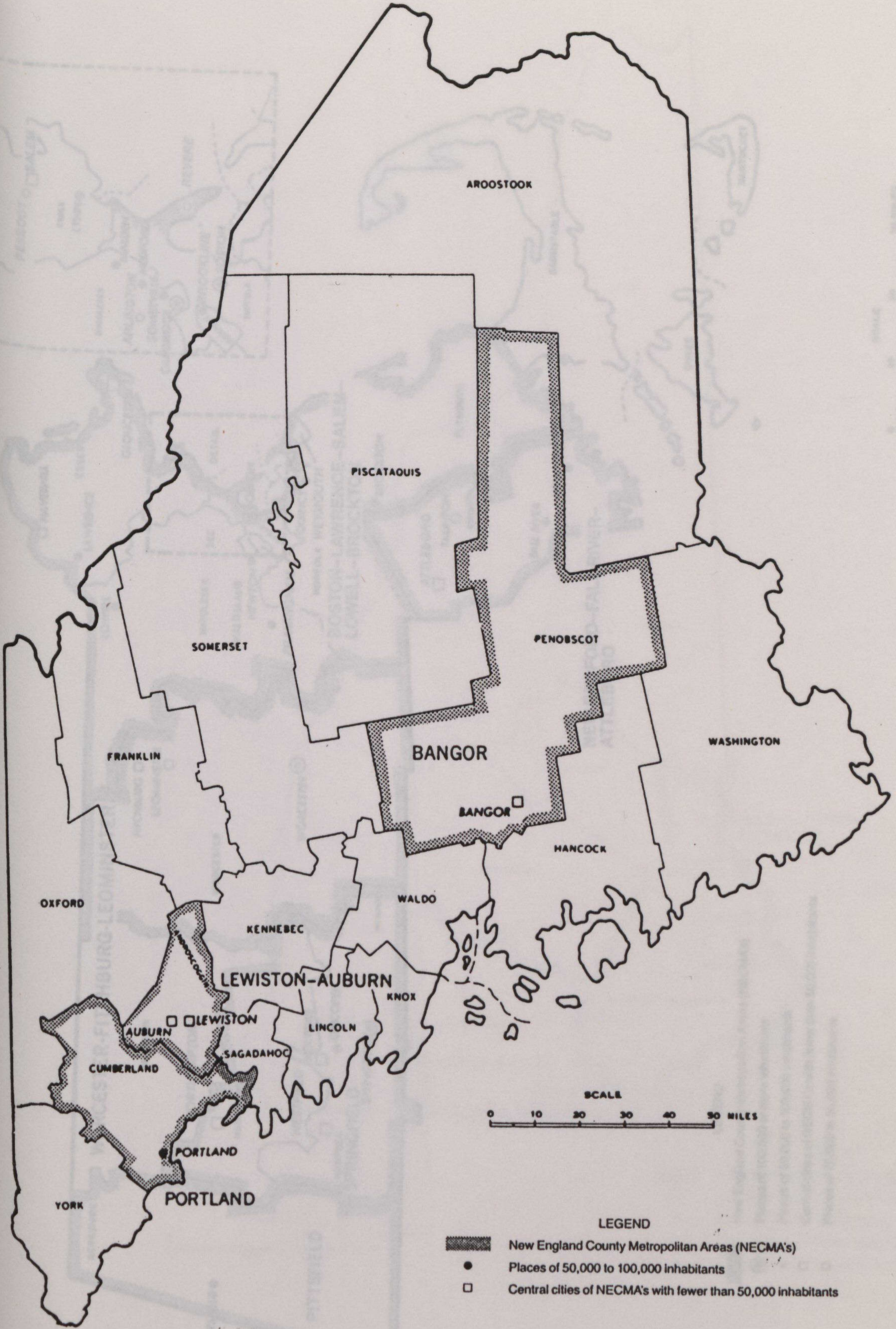
Portsmouth/Dover/Rochester, NH: Rockingham County; Stafford County

Providence/Pawtucket/Woonsocket, RI: Bristol County, Kent County, Providence County and Washington County

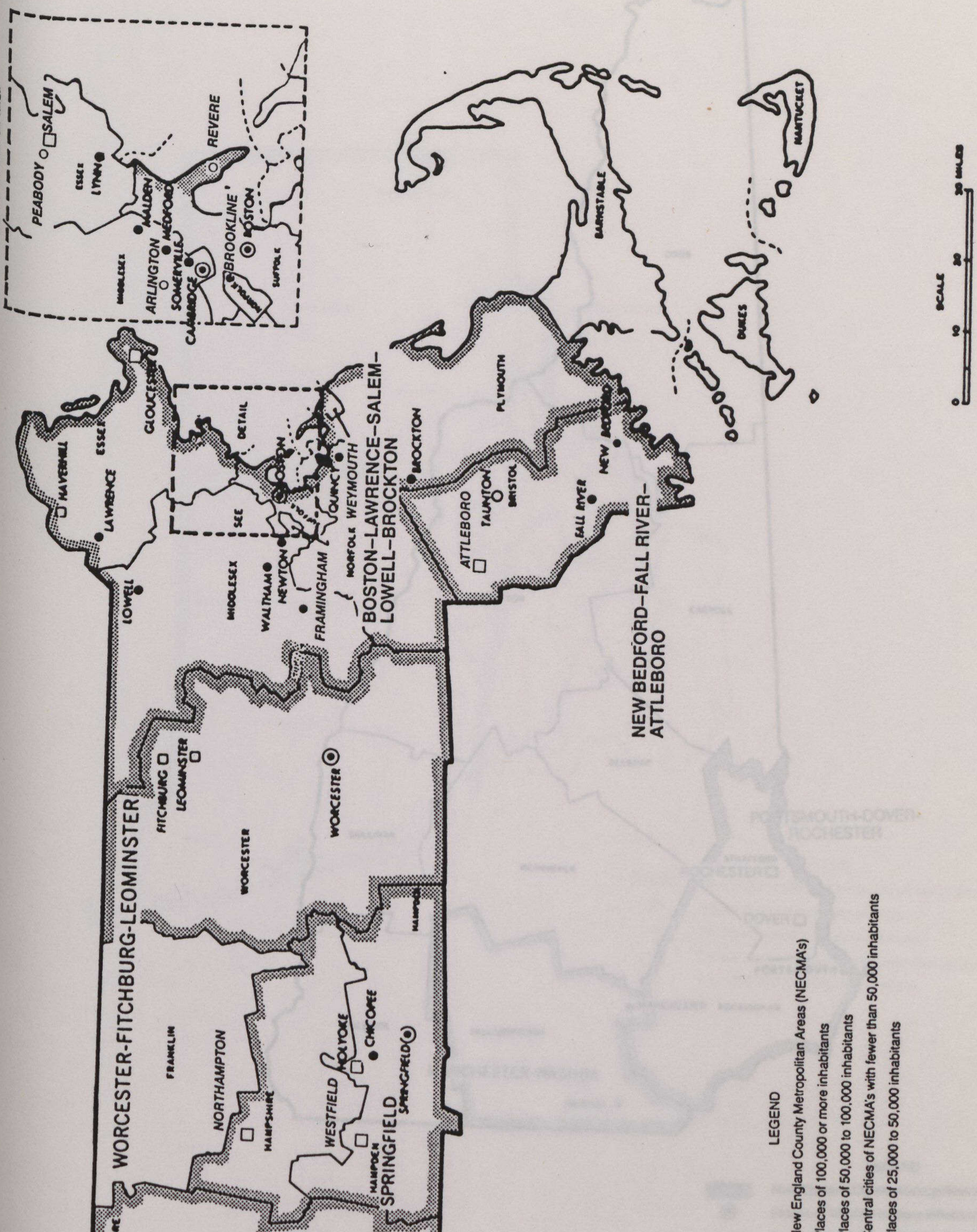
Springfield, MA: Hampden County; Hampshire County

Worcester/Fitchburg/Leominister, MA: Worcester County

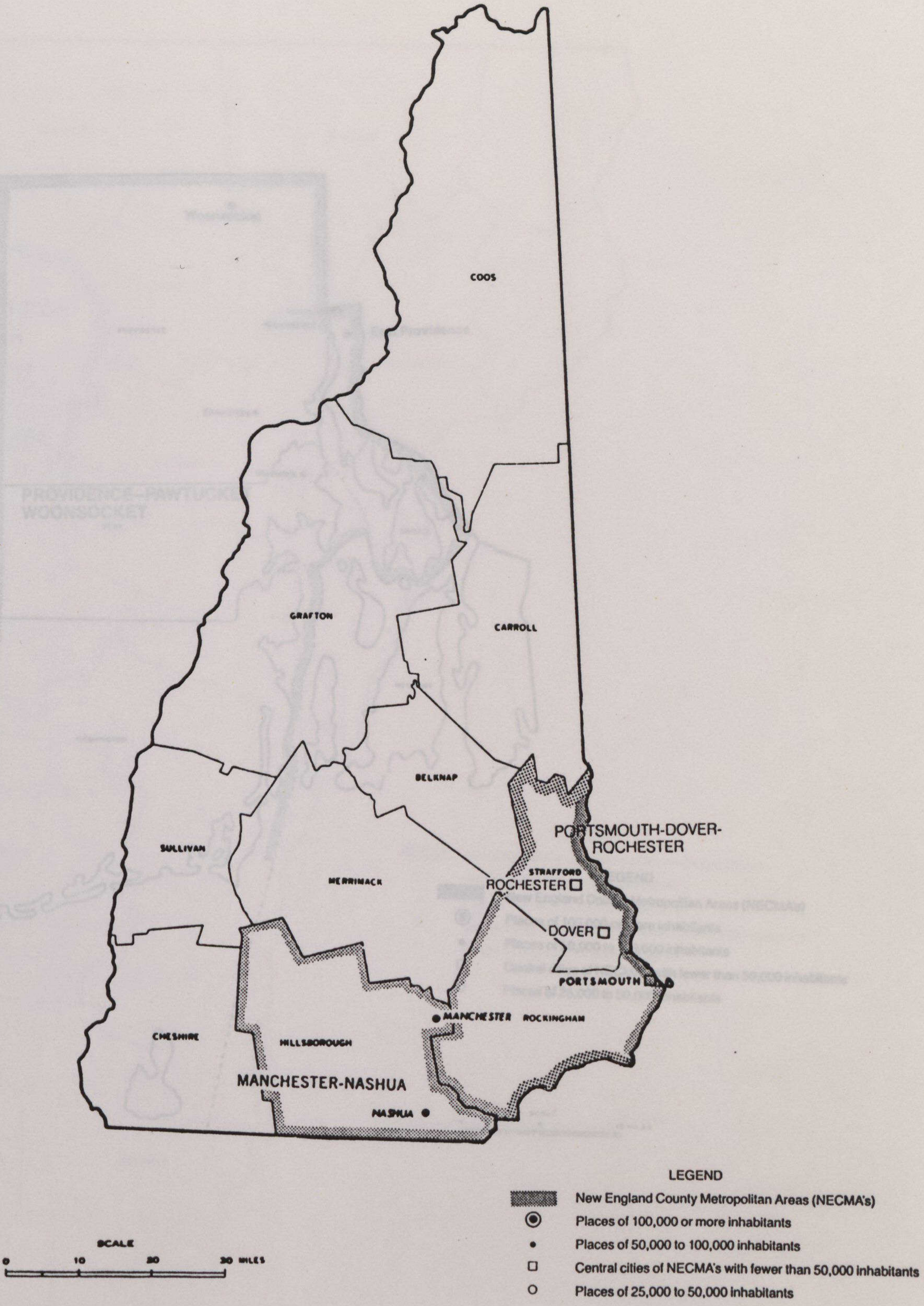
MAINE


AROOSTOOK
PISCATAQUIS
SOMERSET
PENOBSCOT
WASHINGTON
FRANKLIN
BANGOR
BANGOR
HANCOCK
OXFORD
WALDO
KENNEBEC
ANDROSCOGGIN
LEWISTON-AUBURN
KNOX
AUBURN
LEWISTON
LINCOLN
SAGADAHOC
CUMBERLAND
PORTLAND
PORTLAND
YORK
SCALE
0 10 20 30 40 50 MILES
LEGEND
▨ New England County Metropolitan Areas (NECMA's)
● Places of 50,000 to 100,000 inhabitants
□ Central cities of NECMA's with fewer than 50,000 inhabitants

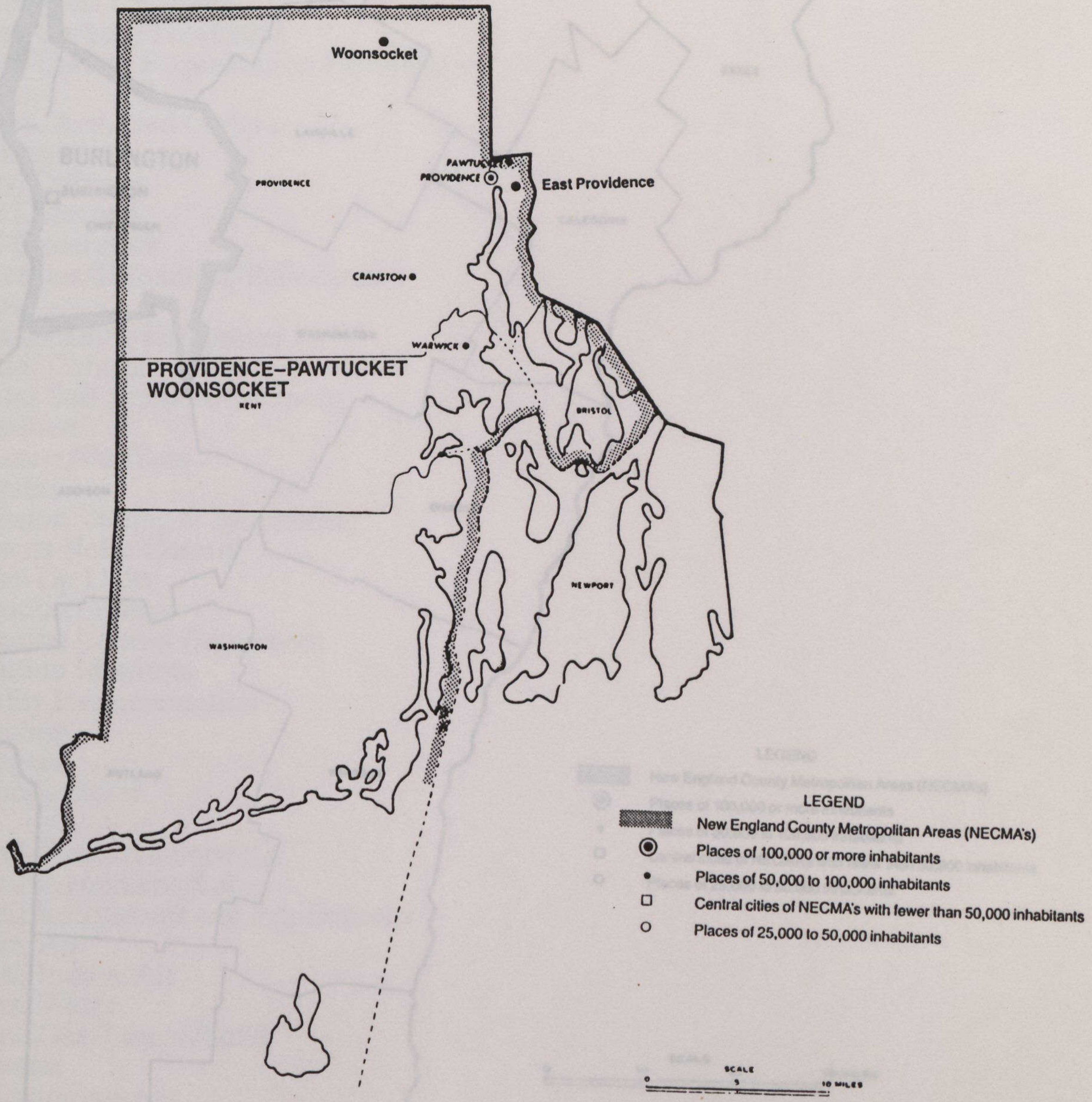
MASSACHUSETTS



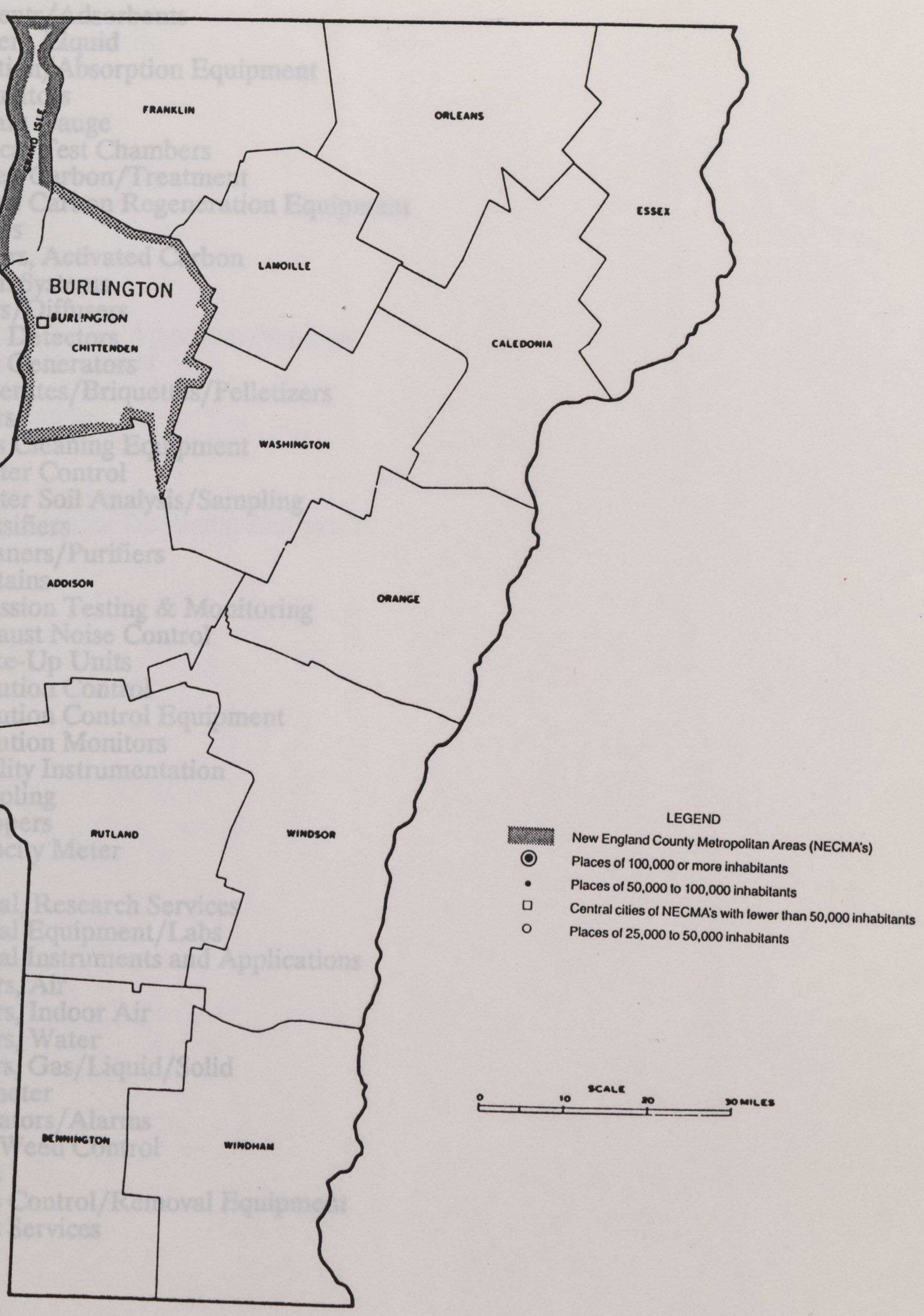
NEW HAMPSHIRE



RHODE ISLAND



VERMONT


GRAND ISLE
FRANKLIN
ORLEANS
ESSEX
LAMOILLE
BURLINGTON
BURLINGTON
CHITTENDEN
CALEDONIA
WASHINGTON
ADDISON
ORANGE
RUTLAND
WINDSOR
BENNINGTON
WINDHAM
LEGEND
New England County Metropolitan Areas (NECMA's)
Places of 100,000 or more inhabitants
Places of 50,000 to 100,000 inhabitants
Central cities of NECMA's with fewer than 50,000 inhabitants
Places of 25,000 to 50,000 inhabitants
SCALE
0
10
20
30 MILES

APPENDIX B: Environmental Products and Services Categories

Absorbents/Adsorbents
Absorbers, Liquid
Absorption/Absorption Equipment
Accumulators
Acid Rain Gauge
Acoustical Test Chambers
Activated Carbon/Treatment
Activated Carbon Regeneration Equipment
Actuators
Absorbers, Activated Carbon
Aeration Systems
Aerators/Diffusers
Aerosol Detectors
Aerosol Generators
Agglomerates/Briquettes/Pelletizers
Agitators
Air/Gas Cleaning Equipment
Air/Water Control
Air/Water Soil Analysis/Sampling
Air Classifiers
Air Cleaners/Purifiers
Air Curtains
Air Emission Testing & Monitoring
Air Exhaust Noise Control
Air Make-Up Units
Air Pollution Control
Air Pollution Control Equipment
Air Pollution Monitors
Air Quality Instrumentation
Air Sampling
Air Strippers
Air Velocity Meter
Alloys
Analytical/Research Services
Analytical Equipment/Labs
Analytical Instruments and Applications
Analyzers, Air
Analyzers, Indoor Air
Analyzers, Water
Analyzers, Gas/Liquid/Solid
Anemometer
Annunciators/Alarms
Aquatic Weed Control
Asbestos
Asbestos Control/Removal Equipment
Asbestos Services

Backfill Preventors
Bacterial/Enzymes
Bacteriological Supplies
Bag Rupture Detectors
Baghouse Maintenance
Baghouse Monitoring
Baghouses
Bailers
Balances
Balers
Batching/Blending Systems
Bearings/Bushings
Bentonite
Bin Discharger
Bins/Hoppers
Bioassay
Biological Testing Apparatus/Supplies
Biological Treatment
Bioreactor
Bioremediation
Bioremediation Services
Blowers
BOD Test Equipment
Boiler Feedwater Treatment Equipment
Boilers
Burners

Calibrators
Calorimeters
Carbon Absorption Systems, Design, Installation
Carbon Dioxide Detectors
Carbon Monoxide Detectors
Carbon Reactivation/Regeneration Systems
Cascade Impactors
Catalysts
Catalytic Oxidizers
Catalytic Purifier
Cathodic Protection Equipment
Centrifuges
CFC/Refrigerant Recycling Equipment
Chain, Treatment Plant
Chemical Feeders
Chemical Process Services
Chemical Storage
Chemicals
Chemicals, Analytical & Reagent
Chemicals, Wastewater Treatment
Chemicals, Water Treatment
Chillers
Chlorination Equipment
Chlorine Detectors
Chromatographs
Chromatography
Chromatography Supplies
Civil Engineering
Clamps, Pipe/Hose/Tubing
Clarifier Drive Units
Clarifiers
Clean Room Services
Clean Rooms/Supplies
Cleaning/Flushing Services
Cleaning Equipment/Supplies
Climbing Safety Devices
COD Instrumentation
Coagulation
Coatings/Linings
Collector Pans
Colorimeters
Combustible Gas Detectors
Combustion Control Instruments
Comminutors/Grinders
Compactors
Composting Equipment
Composting Systems
Compressors
Computer Control

Computer Modeling
Computer Software
Computers
Computers, Software Development
Concentrators
Condensation Equipment
Conductivity Instrumentation
Confined Space Entry
Consulting Services
Containers, Hazardous Waste
Containers, Recycling
Containers, Solid Waste Storage
Containers, Storage
Contaminated Soil Management Contractors
Continuous Emission Monitoring
Control Systems
Conveyor Components
Conveyors
Cooling Tower Water
Cooling Towers
Core Sampler
Corrosion Instrumentation
Corrosion Protection
Couplings Covers/Domes
Crushers
Cyclones

Dampers
Data Acquisition/Processing
Data Acquisition Systems
Data Acquisition Equipment
Deaerators/Degasifiers
Decontamination Equipment
Deep Well Systems
Defoaming/Degreasing Equipment
Degritting Equipment
Dehumidifiers
Deionizers
Demineralizers
Density Instrumentation
Desalination Equipment
Detection Services
Detectors, Gas
Detectors, Leak
Dewatering
Dialers, Automatic
Diffusers
Digesters
Disinfection Equipment,Water/Wastewater
Dissolved Solids Detectors
Disposal Site Selection
Dissolved Air Flotation
Dissolved Oxygen Detectors
Distillation Equipment
Distributors
Dosimeters
Dosimetries Personal/Area
Dosing Siphons
Dredges
Dredging
Drillers
Drilling/Boring Services
Drilling Equipment/Supplies
Drinking Water Analysis
Drinking Water Supply Studies
Drum Handling
Drums
Dryers
Drying Equipment
Ducts
Ducts/Stacks/Chimneys
Dust/Fume Control
Dust Collector
Dust Collector Accessories/Supplies
Dust Collector Controls
Dust Collectors
Dust Control
Dust Discharge Valves

Earth Science Instrumentation
Economic Impact Analysis
Education/Training
Electric Phase Converters
Electrodes
Electrostatic Precipitator
Electrostatic Precipitator Supplies/Accessories
Elevators
Emergency Response Equipment
Emergency Spill Response
Emission Control
Emission Testing & Monitoring
Enclosures/Structural
Enclosures Instrument/Valve
Energy Consultants
Engine Test Equipment
Engines
Environmental Assessments
Environmental Audits
Environmental Consultants
Environmental Engineering
Environmental Impact Assessments
Environmental Investigators
Environmental Planning
Environmental Research
Environmental Services
Environmental Test Chambers
Environmental Waste Management Education
Equipment Enclosures
Equipment Rental/Leasing
Evaporators
Excavating
Expansion Joints
Expert Testimony
Explosion Vents

Fabricated Metal Products
Fabricated Plastics
Fan Repair /Rebuilding
Fans
Feeders
Feedwater Treatment Equipment
Fiberglass Products
Field Testing
Films
Filter Accessories
Filter Holders/Housings
Filter Media, Air
Filter Media, Liquid
Filter Presses
Filter Systems
Filters, Air
Filters, Liquid
Filters, Sampling
Filtration Systems
Financial Services
Fittings
Flame Arrestors
Floating Baffles
Floats/Pontoons
Flocculators
Flotation Equipment
Flotation Systems
Flow Calculator
Flow Instrumentation, Closed Pipe
Flow Instrumentation, Open Channel
Flow Instrumentation, Air/Gas
Flowmeters, Mass
Flowmeters, Variable Area
Flue Gas Conditioning
Flue Gas Desulfurization
Flumes/Weirs
Flushing/Cleaning Equipment
Fly Ash Recovery/Treatment Systems
Freeze Protection
Fume Destruction
Fume Exhaust System
Fume Hoods

Gas/Vapor Monitors
Gas Chromatography
Gas Cooling Equipment
Gas Detectors
Gas Handling Equipment
Gas Source/Supplies
Gas Storage Equipment
Gaskets/Packing/Seals
Geographic Information Systems
Geologic Consultants
Geophysical Instruments
Geophysics
Geotechnical Boring
Geotechnical Engineering
Geotechnical Services
Geotextile Drainage Systems
Geotextiles
Glassware
Grit Handling Equipment
Groundwater
Groundwater Consultants and Engineers
Groundwater Modeling
Groundwater Monitoring/Testing
Groundwater Monitors/Treatment
Groundwater Reclamation
Groundwater Remediation Equipment
Grout

Hazardous Waste Management
Hazardous Waste Recyclers
Hazardous Waste Storage
Hazardous Waste Transportation
Hazardous Waste Treatment
Hazardous Material/Waste Management Products
Hazardous Material/Waste Management Services
Hazardous Material/Waste Treatment
Hazardous Waste, Small Quantity Collection/Household
Hazardous Waste Consultants/Management
Hazardous Waste Removal/Disposal
Hazardous Waste Transportation
Hazardous Waste Treatment, Storage & Disposal Facilities
Health and Safety Services
Heat Exchangers/Energy Recovery
Heat Recovery Systems
Heated Hose
Heating, Ventilation and Air Conditioning (HVAC)
Heating Cable/Tape
Heavy Metal Detectors
Hose/Tube Fittings
Hose/Tubing
Hose Suspension System
Humidity Instrumentation
Hydrants
Hydrocarbon Detector
Hydrogen Sulfide Detectors
Hydrogeology
Hydrological Equipment

Incineration Systems Design/Services
Identification Systems
Indoor Air Pollution
Indoor Air Quality
Industrial Cleaning/Equipment
Industrial Hygiene
Inline Mixers
Instrument Accessories
Instrument Repair
Instrumentation Design/Services
Instrumentation Systems
Instrument Rental
Insulation, Thermal
Insurance
Intake Screens
Intercoms
Ion Exchangers

Lab Pack Services
Lab Packs
Labels/Markings
Labels For Hazardous Material Containers
Laboratory Services: Air
Laboratories, Analytical/Testing
Laboratory Digesters
Laboratory Equipment/Supplies
Laboratory Services: Gas
Laboratory Services: Hazardous Waste
Laboratory Services: Pesticides/PCB
Laboratory Services: Soil
Laboratory Services: Waste
Laboratory Services: Wastewater
Laboratory Services: Water
Laboratory Services/Testing
Lagoon Design/Management
Lagoon Separators/Baffles
Land/Air Surveying
Land Application Systems
Land Use Planning
Landfill Design, Monitoring, Closure
Landfill Liner, Testing
Landfills
Leachate Control and Monitoring
Lead Abatement Services
Lead Testing
Leak Detection
Leak Detection Services
Leasing Services
Legal Services
Level, Sight Gauges
Level Instrumentation
Level Monitors
Lift Stations
Lime Slackers
Liners/Landfills/Ponds
Locators, Pipe/Valve/Cable

Make-up Air System
Management Consulting
Manometers
Manufacturing, Equipment
Medical Waste, Collection/Disposal
Medical Waste Management
Membranes
Mercury Instruments
Mercury Spill Clean-up
Metal Recovery Systems
Meteorological Consultants
Meteorological Services
Metering Manholes
Meters
Microscopes
Mist Eliminators/Collectors
Mixers
Moisture Instrumentation
Monitors, Gases/Liquids
Monitor Wells
Monitoring, Air
Monitoring, Water
Monitoring Services
Motor Controllers
Motors

Nitrogen Oxide Detectors
Noise/Sound Instruments
Noise Abatement Systems/Supplies
Noise Consultants
Noise Deadening Supplies
Nonhazardous Materials Handling
Nozzles
Nuclear Waste Handling

Oceanographic Equipment
Odor Control Services
Odor Control Systems
Oil/Water Monitors
Oil/Water Separators
Oil Filter Compactor/Crusher
Oil Handling Services
Oil Skimmers
Oil Spill Control Equipment
Oil Spill Control Services
Opacity
Operation and Maintenance Services
ORB Instrumentation
Oxidizers
Oxygen Detectors
Ozonators
Ozone Detectors

Package Treatment Systems
Packaged Treatment Plants
Packaging Material
Packers
Packing Materials
Pallet Chippers
Particle Detectors
Particle Generators
Particle Sizing Instruments
PCB Removal and Transportation Services
PCB Replacement
PCB Sampling and Monitoring
PCB Testing
PCB Transformer Decontamination
PCB Treatment/Disposal
Permits, Environmental
Pest Control
Pilot Plants
Pipe, Double Wall
Pipe, Heat Traced
Pipe, Lines
Pipe, Sewer Relining
Pipe/Sewer/Valve Locators
Pipe Cleaning Equipment
Pipe Fittings
Pipe Installation Equipment/Tools
Pipe Penetration Seals
Pipe Sleeves/Repair Clamps
Pipe Stoppers
Pipe Strainers
Pipes/Valves/Fittings
Plastic Fabricators
Plating Waste Treatment
Pneumatic Collector/Loader
Pollution Control Equipment
Pollution Survey Equipment
Programmable Controllers/Timers
Power Supplies
Precast Drain
Precipitators
Pressure Instrument Protectors
Process Control Instrumentation
Process Control Systems
Professional Recruitment
Protective Clothing/Equipment
Pulverizers
Pump Controllers
Pumping Stations
Pumps
Purge & Trap Concentrators
Pyrometers
pH Instrumentation

Radiation Instrumentation
Radioactive Waste, Disposal Services
Radon
Radon Testing/Mitigation
Rain Gauges
RCRA Permitting and Compliance
Reclamation Services
Recorder Accessories
Recorder Strip Chart Digitizing
Recorders
Recovery/Remediation
Recruiters
Recyclers
Recycling, Aluminum
Recycling, Concrete/Asphalt
Recycling, Glass
Recycling, Hazardous Waste
Recycling, Metal
Recycling, Oil
Recycling, Paper
Recycling, Petroleum Contaminated Soil
Recycling, Plastic
Recycling, Wood
Recycling Consultants
Recycling Facilities, Material Recovery
Recycling Programs, Industrial
Recycling Programs, Municipal
Recycling Programs, Office
Recycling Services
Recycling Systems
Refractometers
Refractory Materials
Regulators
Regulatory Compliance
Remedial Systems Design & Installation
Remediation
Rental
Replacement Parts, Treatment Plant
Respirometers
Reverse Osmosis Equipment
Right-To-Know Compliance
Risk Assessment/Analysis
Rotating Biological Contractors
Rupture Disks

Saddles, Sewer
Safety Products Systems
Sample Containers
Sample Preparation
Samplers, Continuous
Samplers, Intermittent
Samplers, Underwater
Sampling Accessories
Sampling Equipment
Sampling Pump Repair Service
Sampling Systems
Scales/Weighing Equipment
Screening Equipment
Screens, Intake
Screens, Sizing
Screens/Strainers
Scrubbers
Sealants
Secondary Containment
Sedimentation Equipment
Sensors
Separation Systems
Separators
Septic Waste Haulers
Septic Tanks
Sequencing Batch Reactors
Sewage/Sludge Disposal Equipment
Sewage/Sludge Disposal Services
Sewer/Manhole Rehabilitation
Sewer Inspection TV System
Sewer Line Test Equipment
Sewer Pumps & Equipment
Sewer Studies/Design
Shredders
Shredding Equipment
Signal Conditioners
Silencers/Mufflers
Site Accessories/Safety
Site Assessment
Site Remediation, Bioremediation
Site Remediation, Groundwater
Site Remediation, Soil
Sludge Blanket Level
Sludge Concentrating Equipment
Sludge Consultants
Sludge Dewatering/Disposal Service
Sludge Dewatering Systems
Sludge Disposal Equipment
Sludge Handling/Treatment
Sludge Solidification
Sludge Treatment/Disposal

Slurry Cut-off Walls
Smoke Detectors
Smoke Generators
Software
Soil/Gas Surveying
Soil Remediation
Soil Sampling Equipment
Soil Stabilization
Soil Venting Equipment
Solid Waste Collection
Solid Waste Hauling
Solid Waste Management/Consultants
Solid Waste Transfer Stations
Solvent Recovery Equipment
Solvent Recovery Services
Solvent Treatment Recovery
Sonic Cleaning Devices
Sorbents, Spill
Spectrometers
Spectrophotometers
Speed Reducers
Spill Cleanup/Containment
Spill Cleanup Services
Spill Control Equipment
Spill Control Planning
Spill Control Products
Spill Monitors
Spill Response Equipment
Spraying Equipment
Stack Emission Monitoring
Stack Testing
Standards
Standby Power Equipment
Sterilizers
Storm Water Discharge
Strainers
Streaming Current Monitor
Strip Chart Digitizing
Sulfate/Sulfide Detectors
Sulfur Dioxide
Sulfur Oxide Detectors
Survey Services
Suspended Solids Instrumentation

Tanks, Cleaning
Tanks, Installation/Removal
Tanks, Testing
Tanks, Treatment/Storage
Taste Control/ Removal
Telemetry Systems
Temperature Instrumentation
Test Kits
Testing/Storage Labs
Testing Services
TOC Detectors
Total Carbon Detectors
Total Nitrogen Analyzers
Total Oxygen Demand
Total Sulfur Detectors
Toxic Gas Detectors
Toxicity Analyzers
Tracer Gas Analysis
Tracer Products
Training Services
Transmitters
Transportation
Traps
Tubing
Turbidity Instrumentation
TV Inspection

Ultrafiltration Equipment
Underground Storage Tanks, Testing
Underground Storage Tanks, Installation & Removal
Underground Tank Leak Monitors
UST Services

Ventilators
Vacuum Loading Equipment
Vacuums, Critical Filter
Valve Actuators/Operators
Valve Replacement Parts
Valve Systems
Valves, Control
Vapor Recovery
Variable Speed Drives
Vent Condensers
Vents
Vibration Controller/Dampeners/Isolators
Viscosity Instruments
VOC Removal Systems
Vacuum Systems
Vapor Recovery Systems
Volatile Organic Control Equipment
Vapor Extraction

Waste Encapsulations
Waste Exchange Services
Waste Handling Equipment
Waste Management
Waste Minimization
Waste To Energy Plant
Wastewater Treatment Equipment & Supplies, Industrial
Wastewater Treatment Equipment & Supplies, Municipal
Water/Wastewater Treatment Plants
Water/Wastewater Recycling Equipment
Water Conditioning Equipment
Water Conservation Equipment
Water Hardness Testers
Water Meters
Water Purification Systems
Water Quality Instrumentation
Water Seal Units
Water Treatment Chemicals
Water Treatment Services
Weighing Equipment
Wetland Services
Wiers

Zero Headspace Extractor
Zeta Potential Monitors

Source: Environmental Waste Management, Pollution Equipment News and 1993 Green Book

APPENDIX C: Glossary of Environmental Terms

CAA:

Clean Air Act (1955, 1977, 1990); federal law mandating and enforcing toxic emissions Standards for stationary sources and motor vehicles.

CERCLA:

Comprehensive Environmental Response, Compensation and Liability Act (also known as Superfund); federal law authorizing identification and remediation of abandoned hazardous waste sites.

CFC:

Chlorofluorocarbon; chemical substance used widely as aerosol propellants and refrigerants; associated with depletion of Earth's ozone layer.

CFR:

Code of Federal Regulations; details of regulations based on federal statutes.

CWA:

Clean Water Act (1977); federal law regulating pollutants discharge into surface waters.

DOD:

U.S. Department of Defense; federal department responsible for administration of military programs to protect the nation from external aggression; manages arsenals and other facilities containing toxic and hazardous materials and wastes.

DOE:

U.S. Department of Energy; federal department responsible for research and development of energy technology; marketing federal power, the nuclear weapons program and regulation of energy.

DOT:

U.S. Department of Transportation; enforces federal regulations governing transport of hazardous and nonhazardous materials via air, rail, water, highway or intermodally.

EPA:

U.S. Environmental Protection Agency; primary federal agency responsible for enforcing laws protecting the environment.

EPCRA:

Emergency Planning and Community Right-To-Know Act (1986); supplements CERCLA; sets up a chain of command extending from EPA to local area districts.

Generator:

Owner or operator of an industrial or other facility producing regulated quantities of toxic or hazardous waste.

HAZWOPER:

Hazardous Waste Operations and Emergency Response Regulations; OSHA standards applying to hazardous waste site workers and emergency response personnel; covered in 29 CFR 1910.120.

HMTA:

Hazardous Materials Transportation Act (1974); federal law assigning authority to various agencies to enforce hazmat transportation regulations; includes packaging and shipping classifications.

HMTUSA:

Hazardous Materials Transportation and Uniform Safety Act (1990); federal law assigning authority to various agencies to enforce hazmat transportation regulations. Includes packaging and shipping classifications; formerly known as the Hazardous Materials Transportation Acts (HMTA).

Hazardous Waste:

Any solid or combination of solid wastes, which because of physical, chemical or infectious characteristics, may pose a hazard when improperly disposed; listed under RCRA.

HWTC:

Hazardous Waste Treatment Council (Washington, DC); trade association of more than 60 treatment and disposal firms.

In-Situ:

Refers to treatment of contaminated area without excavation or other removal.

Land Bans:

Prohibitions of specific toxic materials from disposal in landfills under RCRA.

Land Disposal:

Placement in or on land, includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave placement in a concrete vault intended for waste disposal.

MSDS:

Material Safety Data Sheet; contains descriptive information of hazardous chemicals required by the Hazard Communication Standard (HCS).

NCP:

National Contingency Plan (National Oil and Hazardous Substances Pollution Contingency Plan) regulations promulgated by EPA to implement CERCLA and Section 311 of CWA.

OSHA:

Occupational Safety and Health Administration; federal agency charged with overseeing and regulating workplace health and safety.

PCB:

Polychlorinated biphenyl; Halogenated organic compound.

Personal Protection:

Any clothing and/or equipment which guards against inhalation or injury involving hazardous materials/waste.

POPS:

HM-181 Performance-Oriented Packaging Standards (1990); revises the Hazardous Materials Regulations (HMR) for the transportation of hazardous materials; includes new classification system, design/selection of packages, hazard communication requirements (labels, placards, etc.), package, marking and shipping papers.

PRP:

Potentially Responsible Party; an individual, business, organization or government the EPA may hold financially responsible for the cleanup of a Superfund site.

RCRA:

Resource Conservation and Recovery Act; regulates management and disposal of hazardous material and wastes currently being generated, treated, stored, disposed or distributed.

SARA:

Superfund Amendments and Reauthorization Act (1986); federal law reauthorizing and expanding the jurisdiction of CERCLA.

SARA Title II:

Requirements for annual public disclosure by industry of chemical information, and development of state and local emergency response plans.

Sludge:

Solids removed from sewage during the wastewater treatment process.

SQG:

Small Quantity Generator; a facility generating more than 100 kilograms and less than 1,000 kilograms of hazardous waste per month.

Solid Waste:

Any garbage, refuse or sludge, including solid, liquid, semisolid or contained gaseous material resulting from industrial, commercial, agricultural, mining operations, and community activities; excluding material in domestic sewage, discharges subject to regulation as point sources under Federal Water Pollution Control Act, or any nuclear material or by-product regulated under the Atomic Energy Act of 1954.

Transporter:

Any highway, rail, or water carrier who has registered with EPA and the state as a transporter of hazardous waste.

TSDF:

Treatment, Storage and Disposal Facility; any company operating a facility that treats, stores or disposes hazardous waster through underground injection, incineration, or land management; covered under RCRA.

UST:

Underground Storage Tank; RCRA-regulated tank and connected piping with 10% or more of its volume underground; used to store petroleum products or CERCLA-regulated hazardous chemicals.

VOC:

Volatile Organic Compounds; organic materials used in a variety of industrial applications (such as paint) that evaporates very quickly.

Wastewater:

Wastes that contain less than 1% by weight total organic carbon (TOC) and less than 1% by weight total suspended solids (TSS) with certain exceptions.

APPENDIX D: Market Information from Environmental Publications

Environmental Science & Technology Magazine

Read specifically by those responsible for the selection of instruments used in the detection, analysis and control of air and water pollution and in the treatment of liquid and solid wastes.

Geographic Area	Subscribers	Percent
New England States	878	7.1%
Middle Atlantic	1,919	15.5
East North Central	1,566	12.6
West North Central	537	4.3
South Atlantic	1,684	13.6
East South Central	377	3.0
West South Central	738	5.9
Mountain States	628	5.1
Pacific States	1,568	12.6
Canada	437	3.5
Europe	1,061	8.6
Asia & Pacific	750	6.0
Central & South America	138	1.1
Middle East	75	0.6
Africa	60	0.5
Total	12,416	100.0 %

Function	Subscribers	Percent
R&D Directors/Research Mgrs	1,192	9.6%
Lab Managers/Supervisors	2,805	22.6
Project/Group/Section Leaders	2,445	19.7
Senior Scientists & Engineers	1,652	13.3
Professional Staff Members	3,031	24.4
Purchasing/Buyers	1,130	9.1
Other Functions	161	1.3
Total	12,416	100.0 %

Employer	Subscribers	Percent
Government	3,799	30.6%
Industrial	3,787	30.5
College/University	3,427	27.6
Independent	807	6.5
Medical	324	2.6
Other Employers	232	2.2
Total	12,416	100.0%

Discipline	Subscribers	Percent
Analytical/Chemists	3,327	26.8%
Engineers,R&D	2,948	23.7
Engineers, Other	1,969	15.9
Life Scientists	1,626	13.1
Organic Chemists	621	5.0
Hygienists	619	5.0
Physical Chemists	509	4.1
Inorganic Chemists	273	2.2
Other Disciplines	524	4.2
Total	12,416	100.0%

Products Bought and Specified by Readers

Product	Percent Who Buy/Specify
Balances	91.1%
Baths	56.0
Centrifuges	25.4
Gas Chromatographs	55.0
HPLC Systems	33.2
Computers	62.1
Thermal Analyzers	15.0
Optical Microscopes	39.1
Ovens	75.8
Furnaces	47.1
pH Meters	71.1
Titrators	29.9
Recorders	63.4
FT/IR Spectrometers	34.8
Mass Spectrometers	15.6
UV/Vis Spectrophotometers	47.1
AA Spectrophotometers	46.3
Plasma Spectrometers	23.1
Fume Hoods	79.8
Autosamplers	32.8
Stills	39.9

Source: Environmental Science & Technology

Environmental Waste Management Magazine

Type of Business:

Generator/Shipper of Hazardous Materials/Chemicals/Waste:	83%
Hazardous Waste Treatment, Storage or Disposal Facility:	14%
Transporter/Common, Contract or Private Carrier:	14%
Other:	9%
Consulting Firm/Engineer:	7%
Federal/State/Municipal Facility	2%

Area of Responsibility:

Environmental Compliance or Regulatory Officer/Manager/Engineer	51%
Plant Manager/Department Head/Manager Of Plant Operations:	14%
Training/Personnel:	14%
Safety Manager/Officer/Engineer:	11%
Corporate Manager:	10%
Engineering Management/Engineer:	4%
Other:	11%

Are You Authorized to Buy and/or Recommend Products/Services?

Yes:	76%
No:	9%

What Types Of Products/Services Do You Buy?

Labels/Marketing Products:	62%
Spill Containment/Control/Cleanup:	58%
Protective Clothing/Equipment:	50%
Laboratory Services:	39%
Hazardous Waste Treatment/Disposal Equip.	36%
Storage Tanks/Containers:	34%
Computer Hardware/Software:	33%
Analyzers/Samplers/Testing Equipment:	32%
Hazmat Management Services:	32%
Consulting Services:	29%
Filters/Filter Media:	28%
First Response/Rescue Equipment:	27%
Pipes/Valves/Fittings/Pumps:	27%
Water Treatment:	22%
Transportation Equipment:	21%
Laboratory Equipment:	19%
Detection/Monitoring/Sensing Equipment:	18%
Groundwater Monitors/Treatment:	18%
Sludge Treatment/Disposal:	18%
Air Handling/Treatment Equipment:	17%
Asbestos Control/Removal:	12%
Liners/Geotextiles:	7%

Environmental Protection Magazine

A $100 billion-per-year pollution and environmental control field. It is designed to serve the informational needs of corporate executives, company managers, environmental engineers, safety directors, pollution engineers, chemists, industrial hygienists, scientists, toxicologists and others who need assistance with federal and state laws protecting the environment. The environmental market for analytical instruments, spurred by massive Superfund dollars revitalized government commitment, is now estimated at more than $900 million a year in the 1990's.

Circulation By Title	
Administrative/Executive Management	26,000
Consulting Engineers/Contractors	24,000
Plant/Site Managers	15,000
Environmental Engineers/Industrial Hygienists	13,000
Chemists/Researchers/Scientists	8,000
City, County & State Legislators/Professors	3,000
Lawyers/Compliance Officers	2,000
Total	91,000

Circulation By Industry	
Manufacturing/Mining/Utilities	45,000
Consulting Engineers/Architects	18,000
Equipment Manufacturing, Dealers, Distributors/Treatment, Storage & Disposal	4,500
Governmental/Municipal	15,000
Miscellaneous Services	3,900
Transportation	1,900
Private Refuse Firms/Independent Contractors	2,700
Total	91,000

Fortune 500 Companies Reached by *Environmental Waste Management* Magazine:

Abbott Laboratories
Agway
Albany International
Alliant Techsystems
Amerada Hess
American Greetings
Ametek
AMP
Anacomp
Archer-Daniels-Midland
Ashland Oil
Avery Dennison
B.F. Goodrich
Ball
Banta
BASF
Baxter International
Beckman Instruments
Bell & Howell
Betz Laboratories
Boeing
Borden
Bristol-Myers Squibb
Cabot
Caterpillar
Champion International
Chevron
Clark Equipment
Coastal
Colgate-Palmolive
Conagra
Consolidated Papers
Cooper Tires & Rubber
Coors (Adolph)
CPC International
Cray Research
Crown Central Petroleum
Data General
Deluxe
Diamond Shamrock
Dixie Yarns
Dow Corning
Dresser Industries
Du Pont (E.I.) De Nemours
E-Systems
Eastman Kodak
Emerson Electric
Ethyl
Exxon
Federal Paper Board

Advanced Micro Devices
Air Products & Chemicals
Allergan
Allied-Signal
American Cyanamid
American Standard
Amoco
Amstar Sugar
Anheuser-Busch
Armstrong World Industries
Atlantic Richfield
Avon Products
Baker Hughes
Bandag
Barnes Group
Bausch & Lomb
Beatrice
Becton Dickinson
Bemis
Black & Decker
Boise Cascade
Briggs & Stratton
Brunswick
Carter-Wallace
CF Industries
Chesapeake
Cincinnati Milicron
Clorox
Coca-Cola
Compaq Computer
Conner Peripherals
Control Data
Cooper Industries
Corning
Crane
Crown Cork & Seal
Cummins Engine
Deere
Dexter
Digital Equipment
Donnelley (R.R.) & Sons
Dow Chemical
Dresser-Rand
Duracell Holdings
Eagle-Picher Ind.
EG&G
Engelhard
Exide
Farmland Industries
Federal-Mogul

Ferro
Fleetwood Enterprises
Fruit Of The Loom
Gaylord Container
General Dynamics
General Instrument
General Signal
Georgia-Pacific
Goodyear Tire & Rubber
Grace (W.R.)
Grumman
Hanna (M.A.)
Harris
Hercules
Hewlett Packard
Hoechst Celanese
Hon Industries
Hormell (Geo.A.)
Illinois Tool Works
IMC Fertilizer Group
Ingersoll-Rand
Interco
Intergraph
International Paper
Jefferson & Smurfit
Johnson Controls
Kaman Corp.
Kellwood
Kerr-McGee
Kimball International
Knight-Ridder
LaFarge
Leggett & Platt
Lincoln Electronic
Lockheed
Loral
Louisiana-Pacific
Lubrizol
Masco
Manville
Masco Industries
Maytag
McDermott
McGraw-Hill
Medtronic
Meredith
Minnesota Mining & Mfg.
Monsanto
Motorola
Nalco Chemical
National Semiconductor
NCH

First Brands
FMC
GAF
Gencorp
General Electric
General Mills
Georgia Gulf
Gillette
Goulds Pumps
Great Lakes Chemical
H.B. Fuller
Harley-Davidson
Heinz (H.J.)
Hershey Foods
Hillenbrand Industries
Holnam
Honeywell
IBM
Imcera Group
IMO Industries
Intel
Interface
Interlake
ITT Rayonier
Johnson & Johnson
Jostens
Kellogg
Kennametal
Kiewit
Kimberly-Clark
LA-Z-Boy Chair
Land O' Lakes
Lilly (ELI)
Litton Industries
Loctite
Lorillard
LSI Logic
Lyondell Petrochemical
Magnetek
Martin Marietta
Mattel
McCormick
McDonnell Douglas
Mead
Merck
Millipore
Mobil
Morton International
Murphy Oil
Nashua
National Service, Ind.
NCR

Newell
North American Philips
Occidental Petroleum
Olin
Oxford Industries
Parker Hannifin
Pepsico
Pfizer
Philips Industries
Pitney Bowes
Pope & Talbot
PPG Industries
Quaker Oats
Quantum Chemical
Raychem
Reliance Electric
RJR Nabisco Holdings
Rohm & Haas
Rubbermaid
Schering-Plough
Scott Paper
Sequa
Shell Oil
Silgan
Snap-On-Tools
Southdown
Square D
Standard Register
Stanley Works
Storage Technology
Sun Microsystems
Sundstrand
Tektronix
Tenneco
Texaco
Textron
Thiokol
Tonka
Tredegar Industries
Trinity Industries
TRW
Tyson Foods
Union Camp
United Technologies
UpJohn
Valmont Industries
Vista Chemical
Wang Laboratories
West Point-Pepperell
Westvaco
Wickes
Xerox
Zurn Industries

Nortek
Northrop
Ocean Spray Cranberries
Owens-Corning Fiberglas
Pall
Pennzoil
Perkin-Elmer
Philip Morris
Philips Petroleum
Polaroid
Potlatch
Proctor & Gamble
Quaker State
Ralston Purina
Raytheon
Rhone-Poulenc Rorer
Rockwell International
Rohr Industries
Safety Kleen
SCI Systems
Seagate Technology
Shaw Industries
Sherwin-Williams
Smith (A.O.)
Sonoco Products
Springs Industries
Standard Products
Stanhome
Stone Container
Sun
Sunbeam/Oster
Tecumseh Products
Teledyne
Tesoro Petroleum
Texas Instruments
Thermo Electron
Thomas & Betts
Toro
Tri Valley Growers
Trinova
Tyco Laboratories
Union Carbide
Unisys
Unocal
USX
Varian Associates
W.M. Wrigley Jr.
Warner-Lambert
Westinghouse Electric
Weyerhaeuser
Witco
Zenith Electronics

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Cutter Information Corp.
37 Broadway
Arlington, MA 02174-5539

FIND/SVP
625 Avenue of the Americas
New York, NY 10011

Freedonia Group, Inc.
20600 Chargin Blvd.
Cleveland, OH 44122

Frost & Sullivan Inc.
106 Fulton Street
New York, NY 10038

Future Technology Surveys, Inc.
700 Indian Trail
Liburn, GA 30247

Instrument Society of America
P.O. Box 12277
Research Triangle Park, NC 27709

The Jennings Group Inc.
10 Aberdeen Road
Chatham, NJ 07928

Market Intelligence Research Corp.
2525 Charleston Road
Mountain View, CA 94043

The Mellvaine Company
2970 Maria Ave.
Northbrook, IL 60062

Strategic Analysis, Inc.
11 Fairlane Road
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Resource Marketing is a marketing consulting and services company that assists clients with all aspects of marketing, sales and communications. Its primary focus is on environmental, engineered products and building products companies. Each of its principals has over 25 years industry marketing and sales experience, thus providing the company with a client viewpoint in recommending and implementing marketing actions, strategies and sales emphasis.

Resource Marketing's expertise includes strategic marketing and communications, product publicity and public relations, market research, marketing planning, sales lead development and followup, competitive studies, advertising, literature preparation, sales force development and marketing training.

Resource Marketing has provided marketing assistance to a wide range of environmental and building products manufacturers, including several in Canada. The company has thorough knowledge of environmental industry and has performed extensive marketing work for its clients' distributors, dealers and sales representatives.