

Action Plan

Reducing Toxic Pollution

Problem

Although most of Buzzards Bay is considered pristine compared to other more developed estuaries, located within the Bay is one of the few marine Superfund sites in the country. Buzzards Bay is further distinguished by having the only fishing area in Massachusetts closed because of chemical contamination (others are closed because of pathogens). Most of the toxic problems in Buzzards Bay are associated with the Acushnet River watershed, which includes the municipalities of New Bedford, Acushnet, and Fairhaven. Toxic materials enter the system from point-source discharges, e.g., sewage treatment facilities, industrial discharges, combined sewer overflows, and storm sewers. Less recognized as a problem are the numerous small, unregulated toxic inputs that are discharged directly into receiving waters from the atmosphere, groundwater, overland runoff, and other sources. Of greatest concern is the risk that toxic chemicals pose to human health through direct contact or consumption of contaminated seafood.

Although there is a general perception that toxic contamination is widespread, the geographic extent, ecological significance, and human health impacts of the problem are not well understood because of a lack of basic data.

This plan focuses on the baywide management of toxic contaminants. Several other action plans make recommendations that are directly related to this issue, including those on reducing oil pollution and managing dredging and dredged material disposal. Other related action plans include recommendations that decrease toxic inputs from point and nonpoint sources (e.g., wastewater treatment facilities, combined sewer overflows, industrial discharges and stormwater run-off).

Background

Over 70,000 man-made chemicals have been introduced into the environment since the 1940s. Although there are many beneficial uses for these chemicals, some cause cancer, change genetic material, and cause birth defects in human and marine organisms. Toxic contaminants are divided into two major classes — metals and organic compounds. A third, diverse group is classified as household hazardous wastes and includes some additional inorganic chemicals. These chemicals have multiple routes of entry to the marine environment, which complicates identification of the relative contribution of toxicants from specific sources. Once toxic chemicals reach the marine environment, they behave differently and have different effects on organisms and humans. In an effort to simplify the complexity of the effects, this section describes important contaminants and major sources and briefly discusses the fate and effect of contaminants once they reach the marine environment.

Metals

Metals of concern are copper, arsenic, lead, cadmium, mercury, silver, chromium, nickel, and zinc. Sources of metals are associated with metal-plating industries, jewelry-making, textile mills, and leather manufacturing. Almost all industrial discharges are regulated by NPDES permits or their wastestreams are discharged into public sewers. Copper and lead from pipes and silver from home darkrooms and small photographic businesses are examples of metals that continue to enter the Bay at elevated levels. Chromium and cadmium are associated with automobiles and other vehicles and enter via road runoff. Decreases in metal inputs are typically related to implementation and enforcement of pollution prevention and pre-treatment controls on industrial users, and elimination of lead in gasoline. To achieve future reductions in metal loadings to coastal waters, it will be increasingly important to manage the acidity (Ph) of public water supplies to minimize the rate of copper and lead leaching from plumbing.

Organic Compounds

Organic compounds include fossil fuel hydrocarbons and a subset of chemicals known as polynuclear (or polycyclic) aromatic hydrocarbons (PAH); polychlorinated biphenyls (PCB); pesticides (including herbicides and fungicides); and several other organic compounds, e.g., dibenzofurans and phthalates. PAHs are pervasive compounds that represent a significant threat to humans and the ecosystem. Both combusted and noncombusted fossil fuels contribute to the pollution of the environment via the atmosphere, road runoff, oil spills, and point-sources of discharge. Some PAHs cause cancers and birth defects and others are accumulated in tissues, causing physiological damage.

Most chlorinated pesticides have been banned and replaced by shorter-lived, target-specific chemicals. Pesticides enter Buzzards Bay largely from nonpoint sources, e.g., agricultural runoff, golf courses, lawn care, and gardens. Cranberry growers have lowered pesticide input by reducing applications and adopting integrated pest-management practices.

PCBs are a group of chemicals primarily used in the manufacture of electrical equipment. These chemicals are long-lived and accumulate in sediments and organisms. The major sources are several industries in the New Bedford area that manufactured capacitors and generators and discharged PCB-containing waters through the sewage treatment plant. Because PCBs are present in fluorescent light transformers, nonpoint sources of contamination from legal and illegal dumping are additional sources.

PCB levels in the New Bedford area resulted in designation of the Upper Acushnet River as a Superfund site. Feasibility studies to remove, destroy, and remediate the affected areas are being developed. Although PCBs are no longer manufactured and have not been since 1978, they still persist in sediments to levels that violate water quality standards, posing a risk to humans and the ecosystem. As a result, fisheries, both finfish and shellfish, throughout New Bedford Harbor and into Buzzard Bay have been closed.

Sources

Urban centers such as New Bedford and Fairhaven contribute substantially to mass loadings of toxicants largely via point sources of discharge through sewage treatment facilities, industrial discharges, combined sewer overflows, stormwater outfalls, and surface runoff. Because of the intensive sampling for the Superfund site, wastewater treatment facilities and compliance monitoring requirements for NPDES permits, more data are available on types and levels of contaminants in the New Bedford area than elsewhere. Both organic compounds (PAHs and PCBs) and metals make this area one of the most contaminated in the nation.

Less well-known are the cumulative impacts of chronic pollution from nonpoint sources that enter small embayments, harbors, and marinas. Nonpoint sources of contaminants include boat antifouling paints, oil spills, creosoted and chemically treated pilings, and overland runoff carrying metals, organic compounds, and pesticides into receiving waters. These contaminants are often associated with particles and accumulate in sediments; but without an adequate monitoring program, the extent of contamination remains undocumented.

Homes are responsible for 25% of the hazardous waste disposal in the Commonwealth and discharge a variety of toxic materials into the wastewater stream and landfills. Contaminants from this source include everyday household products such as chlorine, ammonia, shampoos (which may contain high levels of selenium), batteries, oven cleaners, spot removers, paints and paint solvents. Empty and partially empty containers are disposed of in landfills or the contents are poured directly through drains to enter sewers and septic systems. An unknown, but dangerous, household hazardous waste are degreasing agents used in some septic systems. One of these cleaners contains trichloroethylene (TCE), which is a common contaminant of drinking water and is difficult or impossible to eliminate once it reaches water supplies. Groundwater carrying household contaminants is an important nonpoint source of toxic input into embayments throughout Buzzards Bay.

Fate and Effect

The fate and effect of contaminants in Buzzards Bay depends on several factors. Most contaminants are associated with particles and accumulate in sediments, usually near the source of the input or in depositional areas. The greatest concentrations are found closest inshore where there is the greatest human activity and productive shellfishing. Metals do not degrade, but are usually accumulated. Some organic compounds, e.g., low molecular weight PAHs, may be degraded or broken down by organisms into compounds that are more or less toxic. Other organic compounds, e.g., PCBs and high molecular weight PAHs, are bioaccumulated and transferred along the food web to higher organisms. PAHs are known carcinogens; PCBs have deleterious effects on nervous systems; and both PAHs and PCBs negatively impact reproduction, survival, and growth.

Even if all sources of toxic chemicals were eliminated tomorrow, it would be a very long time before the ecosystem was restored to its original state. The numerous pathways

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by which contaminants enter, accumulate, and move in marine ecosystems make them difficult to regulate. In general, it is easier to regulate point sources of discharge than nonpoint sources. Regulations are designed to protect the ecosystem and human health, and criteria have been established for chemicals in the water, in sediments, and in tissues (of seafood). Nonetheless, there are many unknowns, and much basic data must be gathered if we are to set realistic and cost-effective goals.

Major Issues

Some specific toxic contamination issues in Buzzards Bay are being addressed or reviewed by regulatory agencies. These include remediation of the Superfund site in the Upper Acushnet River and attention to sewage treatment problems in New Bedford. The latter includes upgrade of the treatment facility from primary to secondary, development of a plan for controlling combined sewer overflows, and aggressive pursuit of a pretreatment program. Ongoing review of NPDES permits allows for incorporation of best available technology or best management practices to reduce wastes in discharges.

This technology-based approach must be balanced with water quality-based controls. Sometimes effluent limitations by themselves will not be stringent enough to meet water quality standards. In these cases, pollutant-specific standards will be necessary to achieve or maintain the beneficial uses of the Bay.

Once toxic chemicals get into the marine environment, they are difficult to remove. One estimated cost for remediation of PCBs from the New Bedford area range from \$30 million for removal, treatment, and incineration of the hot spot sediments to more than \$300 million for a similar effort to remove, treat, and /or cap sediments contaminated down to 1 ppm. Most speculate total cleanup costs will be closer to \$100 million. Preventing contaminants from reaching the marine environment is cheaper and more protective. Massachusetts has recently passed a Toxics Use Reduction Act that requires a 50% reduction in hazardous wastes in discharges by the year 1997 and provides for a funding mechanism to do so. A pilot project in the Taunton and Fall River areas was successful in reducing metal discharges from jewelry manufacturers. Other areas of the country have implemented toxic audit program to assist small businesses and industries in reducing both the use and generation of toxic materials.

Toxic contaminants associate with particles and accumulate in the sediments, where they remain for long periods. Through complex interactions they may be buried, resuspended, eaten, or directly absorbed into organisms. Although federal agencies have been attempting to set sediment criteria that protect the environment and human health, this has not occurred. Recently, the state of Washington proposed criteria based on organic content in sediments. Massachusetts is preparing a draft PAH policy. These criteria are needed and should be established.

There are a number of critical unknowns in defining risk to humans from eating contaminated seafood. Based on the conclusions from the Symposium on Chemically Contaminated Aquatic Food Resources and Human Cancer Risk held by the National Institute of Environmental Health Sciences, some basic approaches are available that are more appropriate than our past approaches. The recommendations include, but are not limited to, locating sources of carcinogens in water, suspended and sedimented particles; identifying biochemical markers in seafood as indicators of organisms of

concern; and pursuing specific research studies that link environmental neoplasms (cancerous tissues) to specific causes. Many of these recommendations require resources at a national level. Nonetheless, some of the actions will be of direct benefit to Buzzards Bay communities and are included in this section.

Goal

Protect the public health and the Bay ecosystem from the effects of toxic contaminants entering Buzzards Bay.

Objectives

1. To reduce the amount of toxic contaminants entering Buzzards Bay.
2. To reduce hazardous leachate from landfills and to minimize other nonpoint sources of toxic contaminants to the Bay.
3. To meet all state, federal, and local action levels for water and seafood.

Recommended CCMP Actions

1. Municipalities should establish and implement a program of toxic-waste reduction for industries that discharge directly into receiving waters or sewage treatment facilities.

Target date: 1993

The Commonwealth has just passed a Toxic Use Reduction Act that will require a 50% reduction of hazardous wastes by the year 1997. Funds will be available to assist industries in implementing this goal. Part of the waste-minimization program should include an environmental audit team to assist industries and businesses to reduce their toxic usage. The metal-reduction program in Fall River by DEM was discontinued due to lack of funding; this should be reinstated.

Implementation Costs

Preliminary cost estimates for conducting a toxic audit can be found in the Financial Plan, Chapter 2 (Toxic Audit Teams). This includes time requirements, on-site activities, follow-up activities and overall total costs.

2. DEP should reduce oil entering the environment through enforcement of adequate collection regulations.

Target dates: Oil strategy policy enforcement, immediately; legislative action on refundable tax, 1992; boat waste collection regulations, 1993.

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DEP should enforce legal provisions requiring large retail facilities to provide collection containers (See Oil Strategy Policy, 1989). In addition, the Massachusetts legislature should pass a refundable tax on each can of oil sold. A third target area is to establish a boat-waste collection program with regulatory teeth.

3. Buzzards Bay municipalities should collect and properly dispose of household hazardous waste on a continuous basis.

Target dates: DEP household hazardous waste permitting by 1992; bans on organic degreasers by 1993; funding by 1993.

DEP should facilitate the permitting process for municipalities to create collection facilities for hazardous waste. Buzzards Bay municipalities should develop an aggressive program to educate the public about the use of alternatives to common household products. Municipalities, possibly through boards of health, should collectively agree to ban the sale of septic-system cleaners, especially those using organic degreasers. The legislature should identify and provide a funding source that ensures public safety.

4. SCS and the Cooperative Extension Service should develop and implement strategies to minimize the use and potential off-site impact of agrichemicals

Target dates: 75% implemented by 1995.

Currently, farmers are encouraged to adopt integrated pest management programs and best management practices to reduce the off-site impact and the use of pesticides. A similar program for lawn-care services should be developed to reduce or eliminate herbicides and pesticides. An education program to decrease lawn-care applications may be effective, or local or state legislation may be necessary.

5. EOEA should establish sediment criteria that are protective of the ecosystem and of human health for selected contaminants.

Target date: Draft PAH policy by September 1991; final by 1992; sediment criteria by 1994.

CZM is preparing a PAH policy that defines acceptable levels of PAH in sediments, including methods for analyses. This policy should be adopted by regulatory agencies. EOEA agencies, particularly DEP, should establish criteria for acceptable levels of contaminants in sediments.

6. EOEA should coordinate with the Massachusetts Department of Public Health to review the current seafood-testing program and develop recommendations for future actions.

Target date: 1992.