A Characterization of Toxic Substances in the Peconic Estuary and its Watershed

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INTRODUCTION

Toxic contaminants refer to either man-made or naturally occurring substances that, when found in certain concentrations, can cause adverse ecosystem or human health effects. Within the estuary system, toxic substances can be found in surface waters and groundwaters, attached to sediments and soils, and in plants and animals. These substances can directly affect the ability of fish, shellfish, wildlife and plants to survive or reproduce. Some toxic contaminants can bioaccumulate in the tissues of edible fish and shellfish, making them dangerous to wildlife and unsuitable for unrestricted human consumption. Toxics of concern in the Peconic Estuary system are listed in **Table 6-1.**

The Peconic Estuary system has generally low levels of toxic materials in the water, sediment, and organisms especially compared to other regional coastal areas. There are, however, impairments which prevent the goals of the Peconic Estuary Management Conference from being fully realized and threats that should be addressed now to prevent impairments from occurring in the future.

Toxic substances can enter the estuary system from either point sources or nonpoint sources. Point source pollution is pollution that comes from discrete, identifiable locations or sources such as a discharge pipe from a sewage treatment plant. Nonpoint source pollution originates from a variety of dispersed and diffuse sources, including pollutants deposited within the watershed and then carried to the estuary through freshwater flows from rivers, runoff, and stormwater, as well as watershed drainage through groundwater underflow.

OVERALL QUALITY AND USE IMPAIRMENTS

Environmental Criteria and Standards for Toxic Substances

The Federal and State governments generally take a chemical-specific approach to regulating toxic contamination. Under this approach, the concentration of pollutants in the environment (water column, fish tissues, or sediments) is measured and compared to numeric criteria, standards, or effect levels. These criteria are generally developed in such a way so as to be protective of aquatic life, wildlife, and humans. These criteria, standards, and effects levels serve as surrogates for direct measurements of adverse pollution effects and are used as guidelines for pollution control and management programs.

An ecosystem or effects-based approach can be utilized as a substitute for the chemical-specific approach or as a check on the chemical-specific approach. Under an effects-based approach, direct field and laboratory studies of the adverse effects of toxic contamination in plants and animals are used to try to determine the level of contamination for an observed effect.

Surface Water Quality Criteria

The State, under Federal and State Laws, establishes water quality criteria to protect both aquatic life and wildlife, ensure their propagation and survival, and prevent tainting of species consumed by humans or other wildlife. These criteria also are designed to protect human health from oncogenic (tumor-forming) effects and chronic non-oncogenic effects from the consumption of fish, shellfish, and drinking water.

Groundwater Quality Criteria

From the Estuary's standpoint, groundwater can ultimately enter the estuarine system and contaminants the groundwater delivers can affect aquatic life, wildlife and humans. While groundwater is especially important as a source of nutrients to the Estuary, it can also be an important source of toxic substances, particularly pesticides that are applied to the landscape. The extent of pesticide contamination of groundwater has been extensively studied on Long Island. Most groundwater quality criteria are based on the protection of human health, and are expressed as Federal Maximum Contaminant Levels (MCLs) or New York State Maximum Contaminant Levels. Federal MCL standards are applicable for treated drinking water sources and are based on a one-year average concentration of more than one sample. Other applicable criteria are Federal Lifetime Health Advisories (HA) and New York State Class GA standards. New York State standards include general standards of 50 ug/L for unspecified organic contaminants and 5 ug/L for principal organic contaminants.

Sediment Quality Criteria/Dredged Material Guidelines

Toxic contaminants in bottom sediments create the potential for continued environmental impact even where water column levels comply with established criteria. The USEPA is in the process of establishing sediment quality criteria for chemicals which cause or have the potential to cause adverse effects to the pelagic (water column dwelling) and benthic (bottom dwelling) organisms and their food chains, including humans. Sediment quality guidelines already exist for assessing dredged material.

The U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) has specified "Effects Range" values for toxics in sediments to indicate contaminant concentrations at which bottom dwelling organisms may be adversely affected, and as an indicator of overall ecosystem health. While the NOAA Effects Range values are not sediment quality criteria for regulatory purposes, they provide a benchmark for evaluating sediment contaminant measurements. The NYSDEC document, Technical Guidance for Screening Contaminated Sediments (1994), incorporates these values.

Finfish, Shellfish, and Game

The State routinely monitors contaminant levels in fish and game and issues advisories on eating sportfish and game because some of these foods contain chemicals at levels that may be harmful to human health. These advisories are updated yearly. At the present time, chemical contaminants are present or believed to be present at elevated levels for a number of species throughout the State and within the Peconics which has led to the consumption advisories shown in Table 6-2. However, sources of contaminants of concern in these organisms may be from areas outside of the Peconic System.

Criteria for Radioactive Materials

The presence of radioactive materials in the environment is of concern in the Peconic Estuary system primarily due to the presence of Brookhaven National Laboratory in the headwaters of the Peconic River. Safe drinking water standards can be used to assess observed radiological measurements in the freshwater portion of the Peconic River, even though the Peconic River is not used as a source of drinking water. No standards exist for radionuclide concentrations in sediments or fish. Sediments and fish are normally evaluated in terms of their potential contribution to the radiation dose to the public. New York State has established limits for the effective dose equivalent to an individual from any facility. The NYSDEC has established guidance for evaluating clean-up plans for radioactively contaminated soils and specifies an annual exposure (greater than background radioactive exposure) goal after the remedial action is complete, while also requiring that the radiation exposures to the public from residual radioactive material in soil after clean-up also be "as low as reasonably achievable" (ALARA).

Risk Based Criteria

The USEPA and New York State both take a risk-based approach toward the protection of human health from known, probable, and possible carcinogenic substances. In the scientific literature and as a matter of public policy, it is recognized that for some chemicals, the presence of any amount, however small, is associated with some adverse effect, though the risk of this adverse effect may likewise be small. Recognizing that achieving a "zero level" in the environment for some contaminants is not possible at this time, these agencies have established risk based criteria (i.e., levels in the environment associated with a one in one million incremental cancer risk). This type of approach is not used for developing environmental criteria for the protection of aquatic life and wildlife. It is possible that the presence of some chemicals at any concentration may affect aquatic life and wildlife both at the level of the individual as well as populations, and therefore complex food webs. Individual criteria also do not, at this time, take into account additive or synergistic toxic effects. The risk associated with individual man-made radionuclides is, however, considered additive, and the allowable risk reflects the additive effect of exposure to multiple man-made radionuclides. For these reasons, the Peconic Estuary Program participants do therefore recognize that zero discharge (from point and nonpoint sources) of toxic and man-made radionuclide pollutants, and particularly of bioaccumulative chemicals, is a goal.

Characterization of the Resources of the Peconic Estuary with Respect to Toxics

The characterization of the resources of the Peconic Estuary with respect to toxics is based on an analysis of existing and new data on toxics in the Estuary's surface water, groundwater, sediments, soils and living resources, along with information that has been collected on specific areas of concern (such as Superfund sites). To supplement historical data and data collected through other environmental studies (i.e., pesticides in groundwater), the Peconic Estuary Program commissioned a study of toxic chemical distributions in Peconic Estuary sediments for 12 sites, that was completed in 1996. In 1998, the USEPA conducted a survey of sediments from 34 tidal creeks and embayments. These sediments in this later study were evaluated both for chemical specific contamination and overall toxicity to a marine organism ("toxicity testing"). EPA conducted additional sediment sampling for chemical specific analyses and toxicity testing in 2000. In 1999, EPA collected finfish, shellfish and crustaceans and will be analyzing the edible portions for toxic substances, including radiological contaminants.

Some toxic substances which enter the estuarine system break down fairly rapidly and cause few if any problems. Others tend to be very slow to break down, often accumulating in bottom sediments, where they may eventually be ingested or absorbed by bottom-dwelling organisms. Some toxic substances have a tendency to travel through the food chain and accumulate in the tissues of finfish, shellfish and crustaceans. For these reasons, the emphasis of the recent sampling efforts for toxics in the Peconic Estuary involve investigations of sediments and tissues of aquatic animals.

Surface Water Quality

Monitoring for toxics in the estuarine water column has occurred on a limited basis in the Peconic Estuary system. Detailed new investigations have focused on sediments and fish tissues where toxics tend to accumulate. The available data show no exceedances of State water quality criteria for toxics. Therefore, there are no identified surface water quality impairments due to toxics in the estuarine water column.

Data analysis has however indicated widespread contamination of groundwater from Aldicarb (a nematocide once used on potato plants), particularly along the North Fork. Aldicarb also has been detected in the surface waters of East Creek and other North Fork Creeks. While Aldicarb is no longer in use, its presence in surface waters is likely due to inputs from groundwater. Another emerging concern is MTBE (methyl tert-Butyl Ether), an octane booster in gasoline, which has been showing up in surface water samples, including Sag Harbor Creek near Havens Beach (perhaps related to an active recovery operation nearby), the Peconic River, and other surface waters.

In 1997, New York State and the U.S Geological Survey began a cooperative effort to monitor pesticides in State waters, including one station in the Peconic Estuary Watershed on the Peconic River. Samples were analyzed for 47 pesticides, including herbicides, insecticides and their

degradation products. The pesticide concentrations measured in this survey probably do not reflect maximum annual concentrations because most of the samples were collected during base flow (low-flow) conditions. While no pesticides with water quality criteria available were identified present in excess of the applicable criteria, the pesticides atrazine and simazine were detected in surface water samples (USGS, 1997).

Some trace metals analysis has also been performed on Peconic Estuary waters (see Distribution of Trace Metals and Dissolved Organic Carbon in a Brown Tide Influenced Estuary: The Peconics, E. Breuer, May 1997). Results for the metals sampled for which New York State has adopted and EPA has approved aquatic life based water column criteria (cadmium, copper, lead, nickel, and silver), while showing evidence of anthropogenic (man-made) inputs, did not exceed the established criteria.

Observed radiological measurements in the freshwater portion of the Peconic River have been compared to safe drinking water standards, even though the Peconic River is not used as a source of drinking water. While the tritium concentration in a few samples exceeded the drinking water standard, the annual average concentrations have consistently been less than the drinking water standards.

Sediment Quality

Under the Peconic Estuary Program, sediments from twelve locations were sampled for the presence of 98 naturally occurring and man-made substances (Arthur D. Little, 1996). Five stations were selected to characterize the "main bays" water quality. The other seven were chosen because of specific management concerns.

In this study, pollutant concentrations were compared to "Effects Range-Low" (ER-L) and "Effects Range-Medium" (ER-M) values developed by NOAA. ER-L values generally correspond to concentrations below which contaminant induced effects are unlikely. Values at or above ER-M levels indicate that contaminant induced effects are likely. None of the samples collected exceeded ER-Ms. Some ER-Ls were exceeded, which indicates the need for actions to reduce sources to prevent problems in the future. Sediments with levels above the ER-L tended to be in sheltered bays and harbors in the vicinity of rivers where fine-grained sediments and decaying organic matter tend to accumulate. ER-Ls for metals were exceeded 18 times (based on 12 stations and 9 metals with available ER-L values). Two metals, arsenic and lead, accounted for ten of the exceedances of the ER-Ls. The other metals are copper, mercury, silver, cadmium and zinc. Overall, the Peconic Estuary has clear instances of elevated metal concentrations, especially in East Creek and Meetinghouse Creek. There is the potential for occasional adverse biological effects due to the presence of metals in sediments.

Pesticide concentrations in sediments were low, except DDT residues, which were present in some locations. This is very likely due to the drainage of agricultural areas containing persistent residues of DDT. DDT was banned from use in the United States in the 1970s.

The total PCB concentrations at Meetinghouse Creek exceeded the ER-L. This measurement, when compared to the other PCB measurements in Peconic Estuary sediments, suggests a potential localized source of PCBs to Meetinghouse Creek.

In 1998, the USEPA collected sediments for analysis under the "Peconic Estuary Tributaries Sediment Toxics Survey." Locations were selected to be representative of the typical land uses in the estuary (undeveloped, developed residential, agricultural, mixed use urban/industrial). A total of 34 sites were selected. The samples consisted of a composite of equal grab samples collected from 3 locations at each sampling site. Sediments were analyzed for a total of 108 toxic contaminants, including polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), pesticides, and metals. In addition to the analysis for individual chemical constituents, the sediments were evaluated for overall sediment toxicity using the marine amphipod *Ampelisca abdita*. These toxicity tests lasted 10 days and the endpoint measurement is mortality.

A complete report is not yet available for the chemical specific results of the EPA Tributaries Sediment Toxics Survey. A majority of the analysis results, which have been subjected to a quality assurance cross check are available, and some preliminary observations can be made. The preliminary results for metals are comparable with the A.D. Little Toxics Survey, and as in the that survey, some ER-Ls for metals were exceeded, most noticeably for arsenic, but also for mercury and copper, and perhaps silver. In addition, Meeting House Creek sediments exhibited the only ER-L exceedances of zinc, copper, and nickel. No ER-M values for metals have been exceeded at those stations for which data are available. Also similar to the A.D. Little Toxics Survey, levels of the pesticide DDT and its breakdown products (DDD and DDE) in excess of the ER-L were observed in numerous locations. This included one station, Jockey Creek, where the level of DDT exceeded the level of its breakdown products, suggesting on ongoing or continuing source or application of DDT. The individual levels of DDD and DDE in Sawmill Creek exceeded the ER-M for total DDTs. Because of the special nature of the DDT-related results for Jockey Creek and Sawmill Creek, these sites have been referred to the NYSDEC for further investigation. An analysis of the EPA sampling results for PCBs and PAHs has not been completed. A final, complete report on chemical specific results with a rigorous analysis of the data is being prepared by the USEPA.

A final report on the sediment toxicity testing results, for the 34 sites tested, is available (Sediment Toxicity Testing in the Peconic Estuary/Watershed Using the Amphipod, *Ampelisca Abdita*, USEPA Region II, August 1998). Toxicity Testing is a valuable gauge because the results provide an assessment of the overall toxicity resulting from exposure to multiple contaminants. The toxicity test lasts 10 days and the endpoint measurement is mortality. The results are expressed in terms of percent survival of the test organisms. For each sampling location, five replicate tests were performed and the results were evaluated, combined and reported as an overall survival rate . The survival rate was relatively high across all stations, from 76 % to 97%. A percent survival result of less than 80% can indicate some toxicity, and this result occurred at five stations: Little Bay (76%), Paynes Creek (78%), West Neck Bay (78%), Sag Harbor STP (79%), and Northwest Creek (79%). Paradoxically, the stations with the highest survival rates included sites which had some of the most

frequent incidences of exceedances of ER-Ls for metals. The five stations with the highest *Ampelisca* survival rates were: the Peconic River at Riverhead (97%), Downs Creek (96%), Reeves Creek (95%), Meetinghouse Creek (95%) and Peconic River at the STP outfall (94%). These results illustrate the importance of investigations involving both chemical specific analyses and overall toxicity testing in assessing sediment quality. The toxicity testing results will be further assessed in light of the results on the chemical specific report now under preparation. EPA conducted additional sediment sampling for toxicity analyses in 2000.

Finfish, Shellfish and Crustacean Quality

Based upon the relative paucity of data available on the concentrations of toxics in the living resources of the Peconic Estuary, EPA initiated a "Peconic Estuary Fish, Shellfish and Crustacean Toxics Survey." The objectives of this survey were to:

- Determine whether the toxic compounds identified by the New York State Department of Health as being important for the issuance of human health advisories for the consumption of aquatic species are relevant in edible tissues of selected fish and shellfish, and tissues and hepatopancreas (tomalley) of selected crustacean species in the Peconic Estuary.

- Assess and compare concentrations of toxics identified by the New York State Department of Health as being important for the issuance of human health advisories in legal sized fish, shellfish, and crustaceans in open areas or tributaries, as applicable to a given species, for the four Peconic Bays and selected tributaries

- Assess and compare the general quality of representative open and closed shellfish areas in creeks of the Peconic Estuary with respect to toxics in hard clams.

- Assess and compare the general quality of representative open shellfish areas in creeks of the Peconic Estuary with respect to toxics in bay scallops.

- Evaluate whether radiochemicals associated with Brookhaven National Laboratory are present in blue crabs and fluke above background (reference site) levels.

The species that were collected for analysis included: striped bass (bluefish and weakfish were alternate species), american eels, fluke/summer flounder (bluefish and weakfish were alternative species), hard clams, bay scallops, blue crabs, and lobsters. Samples will be analyzed for a comprehensive suite of toxic chemicals including metals, pesticides, polychlorinated biphenyls (PCBs), dioxins, furans, as well as radiological isomers of strontium, cesium, and plutonium and gross alpha, beta, and gamma radiation. The complete results of this survey should be available in 2001.

NOAA's Mussel Watch Program includes one sampling site in the Peconic Study area (in Gardiners Bay). While samples from mussels from Gardiners Bay did not show concentrations of chemicals exceeding public health guidelines, concentrations of dieldrin and PAHs were identified as "high" relative to concentrations in other locations, though NOAA reported there is no reason to suppose such concentrations cause harm to marine organisms or to humans.

Dredge Material Quality

At the present time, no restrictions have been placed on the placement of dredged material from the Peconic Estuary due to the presence of toxic substances. All dredged material from the Peconic System presently is put to beneficial use, such as beach nourishment or wetland restoration, or is otherwise disposed of upland (i.e., above the spring high tide water line).

Testing of dredged material for toxic substances is required only under certain conditions (depending on factors including: volume; make up of the material (i.e., percent sand); place of origin; likelihood of contamination; and proposed placement location). Typically, there are between 50 and 100 permit applications approved per year in the Peconics involving dredging and dredged material placement. Generally, dredged material from the Peconic Estuary consists of coarse-grained sandy material, and testing for the presence of toxics has not been required.

Groundwater Quality

Significant pesticide contamination of groundwater resources in the Peconic Estuary Watershed has been found in connection with at least two recent studies. One, entitled *Water Quality Monitoring Program to Detect Pesticide Contamination in Groundwaters of Nassau and Suffolk Counties, NY* (June 1999) relates to an 18-month study conducted by the Suffolk County Department of Health Services in cooperation with the NYSDEC. The second study is entitled *Pesticides and their Metabolites in Wells of Suffolk County, New York 1998* (June 1999) and was conducted by the USGS in cooperation with the NYSDEC.

Pesticides and their Metabolites in Wells of Suffolk County, New York 1998 (June 1999)
As described in this report, the permeable soils in Suffolk County make the surficial sand-and-gravel aquifer highly susceptible to contamination from activities on the land surface. This highly permeable aquifer is a source of water for domestic and public supply systems in the county and is hydraulically connected to underlying aquifers that are also used for public water supply. Because of this vulnerability and the importance of the surficial sand-and-gravel aquifer and in response to the documented contamination of the surficial aquifer by aldicarb in the early 1980s, the SCDHS established a groundwater monitoring program for pesticides and other chemicals of concern. The SCDHS has consistently demonstrated the presence of older persistent residues from pesticides like

aldicarb, which are no longer used on Long Island. In a joint study conducted by USGS, NYSDEC and SCDHS, wells (including water supply wells) with known or suspected pesticide residues were sampled. The primary purpose of this study was to supplement the SCDHS monitoring program. Because all of these samples were from raw, untreated water from the surficial aquifer, the results are not representative of chemical characteristics of drinking water.

Pesticides monitored included many of the most commonly used pesticides in the county. The laboratory methods used to analyze the samples collected had lower detection limits for many pesticides than do the methods used by SCDHS. Because this study was intended to complement the SCDHS program, however, many pesticides that are commonly detected by the SCDHS (including aldicarb and its degredates) were not investigated. Thus, the results do not represent a complete description of all pesticide residues in groundwater in Suffolk County. The report presents data on the concentration and frequency of detection of the 60 pesticide residues monitored and discusses the concentrations in relation to Federal and State water quality standards. The report also relates the detection of selected herbicide residues to the predominant land use around 50 wells sampled and discusses the concentrations of these residues in relation to one another.

Of the 60 pesticide residues monitored, 25 were detected. Five of these were insecticides or insecticide metabolites. At least one pesticide or metabolite was detected in 44 of the 50 samples. Some samples contained as many as 11 different pesticides or pesticide metabolites. Many of the compounds had not been previously monitored. The data collected indicated that some pesticides that are commonly monitored by the SCDHS are present at trace levels, well below the level of detection provided by the laboratory analytical methods used by the SCDHS. The concentrations of only a few compounds detected in the samples collected exceeded applicable State or Federal water quality standards. However, no Federal drinking water standards have been established for many of the pesticides and pesticide metabolites that were detected.

Comparison of the presence of seven frequently detected herbicides or herbicide metabolites with land use around the wells indicates that the occurrence of these pesticides is related to land use, such as weed control associated with agricultural production and at utility substations and utility rights-of-way, and possibly residential uses.

The 25 pesticide residues that were detected are as follows:
Insecticides: p,p,-DDE; Carbofuran; Dieldrin; Carbaryl; Lindane.
Herbicides: Atrazine; Simazine; Deethylatrazine; Metolachlor; Metolachlor ESA; Metolachlor OA; Tebuthiuron; Deisopropylatrazine; Metribuzin; Prometon; Alachlor; Alachlor ESA; EPTC; Linuron; Trifluralin; 2,6-Diethylanaline; Alachlor OA; Cyanazine; Hydroxyatrazine; Terbacil.

Water Quality Monitoring Program to Detect Pesticide Contamination in Groundwaters of Nassau and Suffolk Counties, NY (June 1999)
As stated in this report, the goal of this study was to obtain water quality information across the full geographic area of both Nassau and Suffolk Counties. The main objective of the sampling program was to identify pesticides and metabolites that leach to groundwater and to help define where these pesticide impacts have occurred. The sampling program was not randomly conducted. In addition to

obtaining the geographic coverage needed, specific areas thought to be vulnerable to pesticide impacts were targeted by the testing program. The results of the testing are representative only of the specific locales tested, and should not be considered representative of groundwater quality in all areas. The sampling program was conducted by collecting groundwater samples from monitoring wells, private domestic wells, and public supply wells, and analyzing them for a wide range of pesticide and metabolite compounds. In cases where a public or private well contained water treatment, only the raw water was sampled for this project. A total of 2,306 samples were collected and analyzed for this project, including 1,901 from Suffolk County. Fifty percent of the samples were collected in Suffolk's five eastern towns to determine pesticide impacts to private wells and because the region contains the bulk of Long Island's agricultural acreage.

Pesticides were found in every type of well tested, and were detected at levels exceeding drinking water Maximum Contaminant levels (MCLs) in all well types. All of the community supply wells found to exceed MCLs were either removed from active service or fitted with granular activated carbon filtration for contaminant reduction.

The results indicate that 89% of the wells exceeding pesticide related MCLs are located in Suffolk's five eastern towns, that is 15.4% of the wells tested in eastern Suffolk exceeded an MCL. Private wells in agricultural areas of Suffolk's five eastern towns are at the highest risk of pesticide contamination, with 50.5 % (324 of 642 wells tested) containing detections of pesticides. The data show that 30 different pesticides (including metabolites) were detected in (western and eastern) Suffolk wells. Ten pesticides (in Nassau and Suffolk) exceeding drinking water MCLs are now banned from use on Long Island due to concerns of potential adverse health effects and ability to leach to groundwater. Banned or discontinued pesticides accounted for 88% of the wells that exceeded MCLs. The stability and persistence of pesticide residues in Long Island groundwater is clearly demonstrated by the fact that six of the 10 chemicals found to exceed drinking water MCLs have been banned from sale or use for 10 to 20 years.

Due to the movement of groundwater, and the migration of contaminants with it, private wells located hundreds to thousands of feet downgradient of the points of likely chemical applications were found impacted by agricultural pesticides. Groundwater impacts resulting from pesticide use at golf courses were examined by testing 31 wells located at 18 Long Island golf courses. One pesticide/pesticide metabolite was found above the MCL in the golf course monitoring, in one well in each county. The monitoring results indicate that turf management practices can effectively control impacts to groundwater at golf courses. The implementation of Best Management Practices can even further reduce the levels of pesticides found in the groundwater.

The SCDHS has done a follow-up study of golf courses with an expanded list of analytes and with new monitoring wells at five more courses in the county, including Shinnecock, National, and Maidstone. Preliminary data suggests that a few low concentrations of pesticides exist. The NYSDEC has been funding the monitoring program for three years at about $100,000 per year.

The pesticide chemicals detected in Suffolk County wells were:
alachlor; aldicarb sulfoxide+sulfone; arsenic; atrazine; bis 2-ethylhexyl phthalate; cadmium; carbofuran; 2,4-D; dicamba; 1,2 dichloroethane; 1,2 dichloropropane, 1,3 dichloropropane; dieldrin; dinoseb; ethylene dibromide (EDB); endosulfan sulfate; ethofumesate; MCPP; metalaxyl; methomyl; metolachlor; metribuzin; 4-nitrophenol; oxamyl; prometon; propachlor; simazine; tebuthiuron; tetrachloroterephthalic acid; 1,2,3-trichloropropoane (Note: In this study chlordane and propoxur were detected in Nassau County but not Suffolk County wells)

MTBE

MTBE is a special concern nationally, in New York, on Long Island, and in the Peconic Estuary study area. Congress required in the Clean Air Act of 1990 that areas of the country with the worst ozone smog problems use reformulated gasoline (RFG). MTBE is the oxygen additive most commonly used by the petroleum industry to satisfy the RFG mandate. Ethanol is the second most commonly used additive. MTBE is very soluble in water, does not "cling" to soil well and has a tendency to migrate much more quickly than other components of gasoline. Most detections of MTBE are below levels of public health concerns and are within the range EPA has set for a taste and odor advisory (at 20 to 40 ppb). Small individual fuel spills and stormwater runoff contribute to low level detections of MTBE in water supplies. Even though significant air quality gains have been made using RFG, these air benefits can be maintained without using MTBE and without endangering water resources, through the use of safe alternatives like ethanol.

In March 2000, EPA and the USDA released a legislative framework to encourage immediate congressional action to reduce or eliminate the use of MTBE and promote renewable fuels like ethanol, through amendment the Clean Air Act. Further, EPA announced the beginning of a regulatory action to eliminate MTBE in gasoline, issuing an advanced notice of proposed rulemaking under section 6 of the Toxic Substances Control Act. This section gives EPA the authority to ban, phase out, limit or control the manufacture of any chemical substance deemed to pose an unreasonable risk to the public or environment. EPA expects to issue a full proposal to ban or phase down MTBE by November 2000, after which more time is required by the law for analysis and public comment before a final action can be taken.

Endocrine Disruptors

Injury to endocrine function by environmental contaminants is potentially debilitating to a variety of physiological systems. The endocrine system in animals consists of glands that produce hormones that enter the bloodstream to regulate important bodily functions such as growth, development, reproduction, and behavior. Previous studies have found correlations between specific impairments of reproductive activity and elevated tissue concentrations of certain contaminants. These contaminants may mimic or block endocrine system processes, potentially affecting critical bodily functions. The reproductive injuries reported to date include: reduced fertility; impaired hatchability and viability of offspring; impaired reproductive hormone activity; and altered sexual development

and behavior. There are also reports of slow growth, atrophy, and lower rates of metabolic behavior. At least 45 chemicals have been identified as potential endocrine disrupting contaminants, including industrial contaminants (such as polychlorinated biphenyls (PCBs) and dioxins), insecticides (such as DDT) and herbicides (such as dichlorophenoxy acetic acid (2,4-D) and atrazine).
At the present time, environmental criteria are not being derived specifically to take into account endocrine disruption impacts. It is possible that these effects may occur when contaminant concentrations are below current criteria and standards

Site Specific Characterizations

Environmental Impacts in the Peconic Estuary Study Area Associated with Brookhaven National Laboratory

New York State Department of Health Sampling

Water, sediment and fish samples taken from the Peconic River outside of BNL, as part of the New York State Department of Health monitoring program, contain measurable levels of different radioactive materials. The detected radioactive materials include tritium (H-3), cobalt-60 (Co-60), strontium-90 (Sr-90), cesium-137 (Cs-137), and americium (Am-241). The observed concentrations of these radionuclides are more than can be attributed to fall-out (from above-ground atomic weapon tests). This indicates that discharges from BNL have contributed to these observed concentrations. The radiation dose from the observed radionuclide concentrations in fish is small. At less than one millirem per year, the average committed effective dose equivalent from radioactive materials that may be attributed to releases from BNL is less than one percent of the established New York State limit of 100 millirems per year. The projected radiation dose from Sr-90 and Cs-137 contamination in the river is less than 10 percent of the New York State guidance value for remedial action, and therefore no remedial action to reduce contamination in the Peconic River is called for. The overall trend of the concentration of Sr-90 and Cs-137 in fish shows a decrease with time.

Brookhaven National Laboratory Sampling

Brookhaven National Laboratory(BNL) is a U.S. Department of Energy laboratory conducting research in physical, biomedical, and environmental sciences, as well as in selected energy technologies. Brookhaven Science Associates, a not-for-profit research management organization, operates BNL under a contract with DOE. In 1980, the BNL site was placed on the New York State Department of Environmental Conservation (DEC) list of Inactive Hazardous Waste Disposal Sites. In 1989, it was included on EPA's National Priorities List of Superfund sites. BNL's inclusion on the

Superfund and DEC lists was primarily due to the effects of discontinued past operations, which could impact Long Island's sole source aquifer, the Island's sole primary drinking water source.

As reported in the Proposed Plan for Operable Unit V: Peconic River/Sewage Treatment Plant (BNL, February 9, 2000) BNL has a total of 29 Areas of Concern. To ensure effective management of them, these areas were grouped into six distinct Operable Units. Only Operable Unit V potentially influences the Peconic Study area. Operable Unit V consists of three Areas of Concern: the Sewage Treatment Plant (AOC 4)); Capped and Retired Formerly Leaking Sewer Pipes within the Operable Unit (AOC 21); and the Former Eastern Tritium Plume (AOC 23). The Sewage Treatment Plant AOC includes Peconic River sediment and surface water, the soils in the area of the Sand Filter Beds, Hold-up Ponds, and the Satellite Disposal Area.

An OU V Remedial Investigation was conducted to identify the nature and extent of soil, sediment, groundwater and surface water contamination. The investigation included geophysical and biological surveys; sampling of soil, groundwater, surface water, and sediments; chemical and radiological analyses; benthic invertebrate toxicity testing; fish bioaccumulation studies; data validation; and preparation of the Remedial Investigation and Risk Assessment Report. Subsequent to the final Remedial Investigation report, BNL conducted a more comprehensive sampling of soils, sediment, and water for plutonium, uranium and other radionuclides. The results of this study are reported in BNL's separate Plutonium Contamination Characterization and Radiological Dose and Risk Assessment Report (January 21, 2000).

State and Federal standards, criteria and guidance values were reviewed to evaluate the nature and extent of contamination in soil, sediment, groundwater and surface water. Screening criteria used to identify contamination were derived from these requirements. These screening criteria are given in the Operable Unit V Remedial Investigation and Risk Assessment Report.

The principle contaminants that have been released to the Sewage Treatment Plant include metals, solvents, and radionuclides. Elevated levels of metals and PCBs, and low levels of pesticides and radionuclides, were detected in Peconic River sediments. Concentrations were highest in on-site surface sediments and most prominent in the on-site depositional areas located approximately 0.5 mile, 1 mile, and 1.5 miles downstream of the STP. The following is a summary of the range of contaminants found in the Peconic River sediments, Sewage Treatment Plant soils, fish, sludge inside and soils surrounding the retired and capped sewer lines, and groundwater.

Peconic River Sediments: Fourteen inorganic contaminants were detected at concentrations greater than the sediment-screening levels. Of these, the metals mercury (maximum 24.5 mg/kg), silver (maximum 171 mg/kg), and copper (maximum 1140 mg/kg) were detected most often, and at the highest concentrations above the screening level. Other analytes detected at concentrations above the screening level included the PCB Aroclor-1254 (maximum 1.5 mg/kg), DDD (maximum 0.096 mg/kg), DDE (maximum 0.089 mg/kg), alpha-chlordane (maximum 0.073 mg/kg), gamma-chlordane (maximum 0.043 mg/kg), and endosulfan (0.018 mg/kg). Contamination was highest in surface sediments and was most prominent in a depositional area approximately 1 mile downstream of the STP.

Cesium-137, americium-241, and plutonium 239/240 were found at higher activities in the Peconic River sediments than in the reference sediment samples collected from the Connetquot River, a river with similar characteristics as the Peconic River and outside the influence of the BNL site. The maximum cesium-137 concentration in sediments on site was 21.1 picoCuries per gram (pCi/g). The maximum americium-241 and plutonium-239/240 concentrations were also found on-site at 1.91 pCi/g and 0.158 pCi/g, respectively. Similar to the inorganic contaminants, the low level radionuclides detected were highest in the surface sediments and were most prominent in a depositional area approximately 1 mile downstream of the STP.

Sewage treatment plant soils: Surface soils and subsurface soils in, or in the vicinity of, the Sewage Treatment Plant (including the sand filter beds and related berms) were found to contain elevated levels of several inorganic constituents including mercury, silver, copper, chromium, lead, zinc, and thallium. The maximum concentrations were 15.1 milligrams per kilogram (mg/kg) for mercury, 112 mg/kg for silver, 80.7 mg/kg for copper, 157 mg/kg for chromium, 95.5 mg/kg for lead, 60.7 mg/kg for zinc, and 1.2 mg/kg for thallium. Elevated levels were concentrated in the top 6 inches and did not extend beyond a depth of 3 feet.

In the soils of the sand filter beds and berms, the most frequently detected radionuclides were naturally occurring uranium-233/234 and uranium-238; all detected activities of both were within the range of background. Plutonium was detected less frequently, and at low activities. The maximum activity of plutonium-239/240 in the berms was 7.31 pCi/g, and in the sand filter beds was 0.399 pCi/g. The radionuclide with the highest levels was cesium-137; its levels were highest in the berms and areas adjacent to the sand filter-beds, with a maximum concentration of 98.8 pCi/g. Americium-241 was highest in the sand filter beds with a maximum concentration of 3.74 pCi/g. Generally, the activities of the radionuclides were highest in the top one foot of soil.

Peconic River fish: Fish collected from the Peconic River headwaters had bioaccumulated PCBs (the average Aroclor-1254 concentration in fish on site was 1.8 mg/kg). Naturally occurring uranium radionuclides were detected in some of the fish samples, with highest activities in the inedible portions of the fish. The radionuclide cesium-137 was detected most frequently. It was found in higher concentrations in fish collected on-site, and generally in slightly higher concentrations in the flesh and skin than in the bone and viscera. The highest activity of cesium-137 in fish was in a whole-body sample of pickerel taken on site (2.712 pCi/g).

Sludge and soil (retired and capped sewer line): The Laboratory sampled soils surrounding the areas where leaks were identified along the retired and capped sewer line during the Operable Unit V investigation. The results of the investigation identified only a few areas with low concentrations of inorganic constituents. This indicates that the sewer line leading to the STP is not a likely source of significant contamination to the surrounding soils. The formerly leaking pipes in Operable Unit V were replaced in 1993. As part of a more recent investigation, sludge was collected from the bottom of manholes along the retired and capped sewer line and analyzed for radionuclides. The results identified elevated activities of a few radionuclides. Americium-241 and cesium-137 were found at

the highest activities relative to screening levels, and plutonium was detected, generally at low levels.

Groundwater: Current groundwater sampling results indicate that levels of tritium in the groundwater are well below the drinking water standard. The highest concentration of trichloroethene (TCE) found on site during the Remedial Investigation was 32 ppb. Maximum off-site levels were 8.5 ppb, slightly greater than the drinking water standard of 5 ppb. Concentrations of VOCs are decreasing in magnitude. A more recent sampling in 1999 found a maximum TCE concentration on site of 17 ppb and a maximum off-site concentration of 8.2 ppb.

The elevated levels of TCE in groundwater off site were found at depths (200 feet) below the depths at which residential wells are typically screened, and public exposure to TCE in groundwater is unlikely. Homes and businesses in the OU V area were offered public water in 1997. Seventeen new monitoring wells have been installed as outpost wells on the eastern perimeter of the public water hookup area. Monitoring of contaminants in groundwater will continue.

Both soil and groundwater samples were collected in the area of the Hold-up Ponds during the investigations, and no evidence of leakage was found. No further action is planned and these ponds will remain as part of the operating Sewage Treatment Plant. A groundwater monitoring network will be put in place as part of the Lab's Groundwater Improvement Program (Phase II) to assure continued effectiveness of the Hold-up Ponds.

Extensive sampling and exploratory excavations were conducted at the Satellite Disposal Area and no evidence of contamination was found. In 1985, bromine trifluoride cylinders and two boxes of laboratory chemicals were removed from the Satellite Disposal Area. No additional remediation is planned for this area.

Tritium Contamination

Concerns have been raised about possible tritium contamination from BNL in the Peconic River and adjacent areas with possible impacts to human health and the ecosystem, including possible implications regarding brown tide. However, the NYS Department of Health (NYSDOH) has estimated the potential radiation dose to a person to be small, less than one percent of the applicable standard in NYSDOH regulations, and less than 10 percent of the NYSDEC remedial action threshold. Radiation experts from USEPA have reviewed the NYSDOH report and concur with the findings. This contamination is separate and distinct from the groundwater tritium plume detected in December 1996 associated with BNL's High Flux Beam Reactor (HFBR). The HFBR tritium plume is outside of the Peconic Estuary Program Study Area. The Peconic Estuary Program will continue to involve radiation experts from the NYSDOH and USEPA to assist in data interpretation and evaluation.

SOURCES OF TOXIC CONTAMINANTS TO THE PECONIC ESTUARY SYSTEM

Both point sources and nonpoint sources of pollution contribute toxic contaminants to the estuary system. Because there are a limited number of point source surface water discharges in the Peconic Estuary system, most toxic pollutants found in the area are nonpoint in origin, carried into the bays via groundwater and runoff.

Point Sources

Point source discharges in the Peconic Estuary consist of wastewater discharges, certain stormwater discharges, and a limited number of industrial discharges. Point source discharges to surface and ground waters are regulated under the State Pollutant Discharge Elimination System (SPDES) Program administered by the New York State Department of Environmental Conservation (NYSDEC). Permits are written to ensure that these discharges do not cause or contribute to the violation of ambient water quality standards. Under Phase I of the SPDES stormwater program, permits are required to be issued for municipal separate storm sewers systems serving large or medium-sized populations (greater than 250,000 or 100,000 people, respectively), and for stormwater discharges to surface waters associated with industrial activity, including certain types of marinas. At the present time, nine establishments in the Peconic Estuary Program Study Area have been issued SPDES stormwater general permits.

Permits also are issued on a case-by-case basis if the United States Environmental Protection Agency (USEPA) or the State determines that a stormwater discharge to surface water contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States. No permits of this type have been issued to date in the Peconic Estuary Study Area.

Discharges to ground waters include sanitary wastes from residences and commercial establishments and non-contact cooling waters. There are no permitted discharges of wastewater from industrial activities to groundwater in the Peconic Estuary Study Area (aside from a permit at Brookhaven National Laboratory [BNL]). Businesses which generate wastewater containing toxic substances dispose of such wastewater by containing the limited volumes of wastewater on-site, and then removing them by approved hazardous waste handlers/transporters for treatment off-site. This method is often referred to as "hold and haul".

There are eight permitted surface water dischargers in the Peconic Estuary system: Brookhaven National Laboratory (discharge includes sanitary wastewater and cooling waters as well as wastewater from industrial-type activities), Navy Weapons Industrial Reserve Plant (NWIRP) at Calverton, Riverhead Sewage Treatment Plant, Plum Island Animal Disease Center, Riverhead Foundation Aquarium (discharges wastewater from animal display and rehabilitation operations),

Bayview Ventures (discharges filter backwash from a potable water treatment plant), Shelter Island Heights Sewage Treatment Plant, and Sag Harbor Sewage Treatment Plant.

Nonpoint Sources of Pollution

There are numerous nonpoint sources of toxic substances in the Peconic Estuary. These nonpoint sources frequently contribute a wide variety of pollutants to the estuary in addition to toxic contaminants, such as pathogens and nutrients. Groundwater underflow and stormwater runoff are the primary pathways by which nonpoint pollution enters the estuary system. Loadings from suburban and urban areas (residential and commercial uses), roads, agricultural land, marinas, boating, and industrial sites contribute pollutants to the estuary system. In addition, some toxics enter the estuary system via atmospheric deposition. Once deposited on land within the estuary, stormwater runoff and groundwater can carry these substances into receiving waters. While each of these diffuse sources of pollution may seem unimportant, the cumulative effects of the nonpoint source loading can be significant.

Pesticides, an emerging concern, may be introduced to the Peconic System from suburban and urban sources as well as from agricultural operations. Though no causal link has been identified, low levels of pesticides may be affecting aquatic resources, including eelgrass, sensitive larval stages of commercially and recreational important finfish and shellfish, including lobsters, and other ecologically important species. Even pesticides that are banned or not being applied can cause or contribute to environmental problems if they are not disposed of or are improperly stored.

Suburban and Urban Inputs

Stormwater runoff and groundwater can carry many different substances from parking lots, roads and highways, and residential and commercial areas. When contaminants are introduced to these areas, they can be swept into receiving water bodies with groundwater and stormwater runoff during rainfall events. Suburban and urban areas are believed to contribute a variety of chemicals, including arsenic, copper, lead, mercury, silver, cadmium, zinc, MTBE (methyl tert-Butyl Ether), and Polynuclear Aromatic Hydrocarbons (PAHs) to the Peconic Estuary system.

Potential sources of toxic substances include

- Leaks from industrial facilities due to sloppy housekeeping practices, insufficient containment and improper storage;
- Improper storage, use and disposal of household hazardous chemicals, including automotive fluids, solvents, cleaning fluids, and lawn and garden pesticides;
- Operation and maintenance of onsite disposal systems, including organic solvents improperly used as septic system "cleaners" containing halogenated and aromatic hydrocarbons (currently banned)
- Discharge of pollutants in storm drains, such as waste oils;

- Commercial activities and land uses, including parking lots, gas stations, and other entities not under the SPDES permits and purview; and
- Existing underground storage tanks under 1100 gallons for storage of heating oil for on-premises use that are not double walled, constructed of non-corrodible materials and equipped with leak detection or overflow prevention systems.

Pesticide use on residential and commercial properties, publicly owned lands, and golf courses is a concern. The Peconic Estuary Program encourages the management of lawns and landscaped areas in accordance with integrated pest management (IPM) principles (properly applying only those pesticides when needed). As reported in the Consumer Unions 1996 piece *Pest Management at the Crossroads*, "Consumer lawn care products and the formulation applied by lawn care companies tend to be mixtures of fertilizers and herbicides, insecticides and sometimes fungicides. By selling a few common mixtures, the industry keeps costs down, but on the downside, many applications include one or more active ingredients not really needed on a particular lawn or only marginally useful in many areas."

Vector control ditches (mosquito ditches) are maintained by the Suffolk County Department of Public Works, who typically applies sprays for larval control of mosquitos. Problem areas are monitored to determine effective treatments. The primary insecticide used is Bti (bacillus thuringiensis var, israelensis); in some areas methoprene is used. Recently, the pesticide malathion has been applied in residential areas. The use of the mosquito larvicides in storm drains and catch basins has been advocated as a mosquito control measure. This could contribute larvicides to surface waters following rainfall events.

Pollutants associated with construction sites (including roads, highways and bridges) and road, highway and bridge operation, maintenance and runoff systems include pesticides, petrochemicals (oil, gasoline, and asphalt degreasers); construction chemicals such as concrete products, sealers and paints; wash waters associated with these products and paint chips. Road runoff can contain petroleum products (including the octane booster MTBE), heavy metals (lead, zinc, copper, cadmium, chromium, nickel, and manganese) and cyanide from vehicle and tire wear- and-tear and exhausts.

Underground Storage Tanks

Leaks in excess of a thousand gallons from underground storage tanks are known to have occurred in the past in the Peconic Estuary, on Long Island, and nationally. The extent of these sources of pollution is potentially large because the contamination is underground and may go unnoticed for an extended period of time.

New York State law includes provisions for preventing spills of petroleum. These provisions require all facilities with a minimum capacity of 1,100 gallons to be registered, set forth standards for the handling and storage of petroleum, and set forth standards for new and substantially modified underground and aboveground storage facilities. Owners and operators must notify NYSDEC of any spills. Another State program addresses the requirements for the bulk storage of other hazardous substances, including the registration of storage tanks, spill reporting procedures and specifications for the sale and delivery of such substances. Suffolk County sanitary code requirements (Article 12) are even more stringent than state requirements. The County law went into effect in 1980 and addresses all underground and aboveground tanks storing fuels, solvents, and chemicals, virtually anything that could contaminate groundwater or surface water. New underground tanks are required to have secondary containment and be constructed of non-corrodible materials, and must have leak detection and overflow protection systems. All existing facilities had to be brought up to new construction standards by 1990.

The County law exempted existing tanks from the replacement requirement that were under 1100 gallons and used for the storage of heating oil for on-premises use. However, new tanks of this type must be made of non-corrodible materials. The Financing chapter of the Comprehensive Conservation and Management Plan (CCMP) includes several recommendation regarding incentives for private homeowners to address this potential threat to groundwater and surface water

Leaks and Spills

Historically, spills or leaks of contaminants within the Peconic Estuary System have not been a major source of pollution. Records from October 1985 through August 1988 indicate that, of the 25 reported spills or leaks within the study area, approximately 25 percent involved volumes greater than 100 gallons. The predominant type of spill or leak during this review period involved electrical transformers on poles that spilled or leaked coolant oil. Such spills have on occasion contained PCBs. Most of these spills were reported to be one gallon or less in volume.

Major fuel storage sites pose a potential threat, in the event of catastrophic failure. In the Peconics, bulk storage exists at Plum Island, Shelter Island, at and Brookhaven National Laboratory. Spillage at Northville also could conceivably drift around the North Fork into the Peconics. Recommendations regarding the State Oil Spill Areawide Contingency Plan for the Peconic Estuary is discussed in the Habitat and Living Resources Chapter of the CCMP.

Agricultural Inputs

When water drains agricultural lands where pesticides are in use or were used in the past, contaminants can be introduced to the estuary system. Both DDT and Aldicarb have been found in sediment and water samples in the Peconics, despite the fact that these substances can no longer legally be used. Pesticides are also believed to be a source of arsenic found in the estuary system.

Golf Courses

The use of pesticides and fertilizers on golf courses is a potential groundwater problem. A SCDHS 1999 study detected pesticides in 7 of the 31 golf course wells tested, with two of these wells exceeding the drinking water Maximum Contaminant Levels. However, in shallow wells that would show impacts from recent pesticide and fertilizer applications, no pesticides were detected and average nitrate concentrations were below state and Federal MCLs. Thus the implementation of Best Management Practices appears to have greatly reduced the risk of pesticide and fertilizer contamination at the golf courses tested.

Marinas and Boating

During the course of normal marina operations, various activities and locations in the marina can generate polluting substances. Such activities include waste disposal, boat fueling, and boat maintenance and cleaning; such locations include storage areas for materials required for these activities and hull maintenance areas. Of special concern are substances that can be toxic to aquatic life, pose a threat to human health, or degrade water quality. Paint sandings and chips, oil, grease, and fuel are examples. Because marinas are located at the water's edge, there is often no buffering of the release of pollutants to waterways.

The principal pollutants in runoff from marina parking areas and hull maintenance areas are suspended solids and organics (predominately oil and grease). Toxic metals from boat hull scraping and sanding are part of, or tend to become associated with, the suspended solids. For example, lead is used as a fuel additive and ballast, and may be released through incomplete fuel combustion and boat bilge discharges. Arsenic is used in paint pigments, pesticides, and wood preservatives. Zinc anodes are used to deter corrosion of metal hulls and engine parts. Copper and tin are used as biocides in anti-foulant paints. Other metals (iron, chrome, etc.) are used in the construction of marinas and boats. Petroleum hydrocarbons (including polynuclear aromatic hydrocarbons, or PAHs) can be elevated in marina waters due to refueling activities and bilge or fuel discharge from nearby boats.

It is important that marina operators and patrons take steps to control or minimize the entry of toxic substances into marina waters. For the most part, this can be accomplished with simple preventative measures such as performing boat cleaning and repair activities on protected sites, locating servicing equipment where the risk of spillage is reduced, providing adequate and well-marked disposal facilities, and educating the boating public about the importance of pollution prevention. The benefit of effective pollution prevention to the marina operator can be measured as the relatively low cost of pollution prevention compared to the potentially high cost of environmental cleanup.

A marina is required to obtain a SPDES stormwater discharge permit if vehicle maintenance activities, such as vehicle (boat) rehabilitation, mechanical repairs, painting, fueling, and lubrication or equipment cleaning operations are conducted at the marina. SPDES permits apply only to the point source discharges of stormwater from maintenance areas at the marinas.

Marinas not involved in equipment cleaning or vehicle maintenance activities are not covered under the SPDES stormwater program. Likewise, a marina that has no point source discharges of stormwater is not regulated under the SPDES stormwater program, regardless of its classification and the types of activities conducted. In addition, some marinas are marine service stations which are not regulated under the SPDES stormwater program. These types of marinas are primarily in the business of selling fuel without vehicle maintenance or equipment cleaning operations.

Wet Exhausts from Marine Engines

Small boat engines commonly use seawater to both cool and quiet their exhaust. Seawater passes through the heat exchanger, gear oil cooler, and aftercooler (if equipped), and is then injected into the exhaust. When injected, some of the gaseous and solid component of the exhaust transfers into the cooling water. The cooling water then discharges into the receiving water. Small boats are powered by either inboard or outboard engines. Inboard engines are generally diesel fueled while outboard engines typically use gasoline. Inboard and outboard engines can be either two-stroke or four-stroke. The majority of small boat outboard engines are two-stroke gasoline engines. The moving parts of gasoline-powered, two stroke outboard engines are lubricated with oil that is pre-mixed with gasoline. Thus, the oil is continuously burned with gasoline. In four-stroke engines, lubricating oil is circulated and not intentionally introduced into the combustion chamber. The discharge consists of water injected as a cooling stream into the exhaust system of small boat engines. Exhaust constituents generated during the operation of the engines can be transferred to the engine's water cooling streams and discharged as wet exhaust. Inboard engines usually discharge wet exhaust above the water line, outboard engines generally discharge their wet exhaust through the propeller hub.

The main discharge constituents from all engines are oxides of nitrogen, organic compounds (including hydrocarbons (HCs)), carbon monoxide (CO) and particulates. The hydrocarbon constituents are primarily the result of incomplete combustion. Since diesel fuels have a different composition than regular gasoline the distribution of constituents in their exhaust differ between the two engine types. In general, diesel engines produce higher particulate emissions and lower organic emissions than gasoline powered engines.

Some limited studies have been done on the impact of marine engine exhaust on water quality. A 1995 study measured the rate of introduction of volatile organic compounds (VOCs) into water during the operation of gasoline powered two-stroke and four-stroke outboard engines. The VOC compounds found in the water were almost exclusively aromatic hydrocarbons, including pollutants such as benzene, toluene, ethylbenzene, and napthelene. In most cases, other types of hydrocarbons

were not found. No bioaccumulative pollutants are suspected to be present in these discharges. For many toxic constituents, there is a significant reduction in the individual pollutant loadings in two-stroke vs. four-stroke engines. While the reduction varies by pollutant, it typically ranges from 90% reduction to over 99% reduction.

Treated Lumber in the Marine Environment

As reported in "Assessment of the Risks to Aquatic Life from the Use of Pressure-Treated Wood in Water" (T.J. Sinnott, NYSDEC, June 1999), when wood is used for in-water construction such as pilings, breakwalls, abutments or other submerged or partially submerged structures, the potential exists for toxic preservatives to leach from the wood and harm adjacent aquatic ecosystems. Wood preservatives are chemical pesticides that are applied to wood to protect it from decay brought about by fungi or insect attack. While preservatives can be brushed on, sprayed on, or soaked into wood, the most effective treatment is to force preservative solutions deeply into the wood under high pressure. Creosote, pentachlorophenol and inorganic arsenicals are the three most widely used preservative compounds.

Creosote is a mix of polycyclic aromatic hydrocarbons (PAHs) that are products of the fractional distillation of coal tar. Pentachlorophenol is a manufactured organochlorine pesticide. Inorganic arsenicals are various blends of metallic salts such as CCA (chromated copper arsenic) or mixtures of metallic salts, arsenic and organic compounds such as ACA (ammoniacal copper arsenate) or copper naphthenate. All three wood preservatives work because they are toxic to insects and fungi.

Available scientific data for each of the three types of preservatives has been evaluated to attempt to assess the potential risks to aquatic life from the use of pressure treated lumber in water. For all three wood preservatives, the greatest amount of leaching occurs when the treated wood is first put in place. The rate of leaching drops off significantly after a short period of relatively high leaching. In general, any impacts to aquatic life are most likely to occur during the initial period of high leaching. The area where adverse effects occur is likely to be highly localized. The greater the distance from the treated wood, the more dilute the concentration of leached pesticide. For each of the preservative pesticides, fate processes such as volatilization, photolysis, sediment sorption, and microbial degradation work to degrade and reduce the concentration of the pesticide in the water even while it is leaching. For each specific type of wood preservative, recommendations are provided for minimizing the risks to aquatic life.

In recent years, a number of products made out of recycled plastic have come available. These products are designed to replace treated wood for fencing, pilings and decking. Products made of recycled plastics appear to be safer. They do not function by inherent toxicity, rather they are simply unsuitable substrate for fungi or insects to subsist in or on. Whether recycled plastic products release

contaminants to the environment or have the necessary structural or functional integrity or are economically viable replacements to pressure treated lumber is not assessed for this report.

Atmospheric Deposition

Acid rain has traditionally been a concern with respect to lowering the pH of freshwater ecosystems due to excessive loadings of acidity. In the context of the Peconic Estuary Program, acid rain is not a primary concern with respect to direct impact on surface water pH, due to the buffering capacity of the marine system. However, there may be a concern with respect to indirect impacts of rainfall acidity on the Peconic Estuary system. Such indirect impacts may be related to the effects of acidity on the Peconic River and on the solubility and transport of contaminants through soil, groundwater, and sediment.

While dry and wet deposition of toxic contaminants present in the atmosphere occurs, no particular toxic pollutants have been identified as being of concern from this source. PAHs, organic compounds derived from pyrogenic (combustion) and petrogenic (petroleum-based) sources, have been detected in sediments within the estuary. The distribution of PAHs suggests loadings are airborne (pyrogenic) PAHs which are deposited directly on surface waters, as well as in the watershed, and then carried to the estuary through freshwater flows from rivers, runoff, and stormwater, and watershed drainage through groundwater underflow. Nationally, programs are being implemented by the Federal and State governments under the Clean Air Act Amendments to further study and reduce toxic emissions.

Dredged Material Placement

At the present time, no toxic-related restrictions have been imposed regarding the placement of dredged materials in the Peconics. All dredged material from the Peconics is put to beneficial uses, such as beach nourishment or wetland restoration, or is otherwise placed upland (i.e., above the spring high tide water line).

Testing of dredged material for toxic substances is required only under certain conditions (depending on factors including: volume; make up of the material (i.e., percent sand); place of origin; likelihood of contamination; and proposed placement location). Typically, there are between 50 and 100 permit applications approved per year in the Peconics involving dredging and dredged material placement. Generally, dredged material from the Peconic Estuary consists of coarse-grained sandy material, and testing for the presence of toxics has not been required.

The EPA and the Corps have identified the likely need to continue marine placement of dredged material in the Long Island Sound Area. In 1999, the EPA in cooperation with U.S. Army Corps of Engineers issued a notice of intent to prepare an environmental impact statement to consider the

potential identification of one or more placement sites for Long Island Sound dredged material. EPA and the Corps have decided to consider the use of four existing sites and their identification as dredged material placement sites under Section 102(c) of the Marine Protection, Research and Sanctuaries Act. Other alternatives will also be evaluated, including other open water placement sites and other placement and management options. Identification of a site does not itself result in placement of any particular material, it serves only to make the identified site a placement option available for consideration in the alternatives analysis for each individual dredging project in the area. The PEP participants consider it unlikely a placement site will be proposed within the PEP study area.

Site Specific Concerns

There are a number of sites within the Peconic Estuary that contribute or have the potential to contribute toxic contaminants to the estuary system through point source discharges and/or from stormwater runoff. The sites which are of particular concern are shown in Figure 6-1 and described briefly below.

Sewage Treatment Plants

Sewage treatment plant (STP) effluents are subject to disinfection to limit the discharge of pathogens. The most common method of disinfection is chlorination. Chlorinated discharges to surface waters are of concern because, in systems like the Peconics which contain high levels of organic matter, chlorinated compounds can be formed which, although short lived, can be toxic to aquatic organisms. The complexity of the reactions of chlorine in the environment increases the difficulty of assessing its impact. Increased attention is being given to addressing the possible need to limit all uses of chlorine as a means of reducing the input of chlorinated compounds into the environment.

The Riverhead, Sag Harbor, and Shelter Island Heights STPs receive and treat sanitary wastewater from residences and businesses as well as wastewater generated by local commercial activities. Brookhaven National Laboratory and the Plum Island Animal Disease Center have their own sewage treatment plants.

Disinfection methods other than chlorination, such as ultraviolet (UV) radiation and ozone, appear to be as effective as chlorine for reducing bacteria and may be more effective in reducing other pathogens. UV disinfection is now used both the BNL and Plum Island Animal Disease Center STPs. UV has been proposed for use at Riverhead and Sag Harbor and has been tested on a pilot scale at Shelter Island Heights. Effective disinfection by methods other than chlorination can reduce

impacts on aquatic life and human health while still being protective of human health from pathogens.

Navy Weapons Industrial Reserve Plant (NWIRP) Site (Calverton, NY)

The NWIRP formerly engaged in the manufacture of aircraft parts and sub-assemblies. The facility has phased out all of its manufacturing process operations and the former operator of the property, the Northrop Grumman Corporation, vacated the property in February 1996. Since that time all property contained within the perimeter fence, with the exception of four (4) parcels of land of approximately 350 acres which have been retained by the Navy to continue the Installation Restoration (IR) program, have been conveyed to the Town of Riverhead. There are no longer any process-type operations that generate hazardous waste conducted on the Navy's 350 acres. Any waste (solid or hazardous) generated will be the result of the continuation of the installation restoration program. An initial assessment was completed by the Navy in 1986 and a site investigation has been completed. The site is currently being handled under the Federal Resource Conservation and Recovery Act (RCRA) corrective action program. Corrective action implementation includes a RCRA Facility Assessment, a RCRA Facility Investigation, and a Corrective Measures Study (CMS). If determined necessary, the state will issue a permit for carrying out corrective measures selected from the corrective measures alternatives evaluated in the CMS.

The RCRA Facility Assessment has been completed at this site for all identified solid waste management units/areas of concern (SWMUs/AOCs). The RCRA Facility Investigation (RFI) has been completed for a majority of the SWMUs/AOCs identified with contamination. The RFI process is still in progress at eight (8) SWMUs/AOCs. Solvents including toluene, 1,1,1 trichloroethane (TCA), and methyl ethyl ketone (MEK or 2 butanone) have been identified by the state as of concern in groundwater. The most recent permit for this facility was issued on April 24, 2000 and will expire on April 30, 2010.

The (Bulova) Watch Case Factory Site (Sag Harbor, NY)

At this site, New York State is requiring continued operation of ongoing soil and groundwater remediation systems to treat volatile organic compounds (VOCs). The VOCs include 1,1,1-Trichloroethane (TCA) and Trichloroethylene (TCE) which were the solvents used in intermediate cleaning operations during watch manufacturing. A fate and transport model demonstrated that chemicals at the site are not anticipated to impact Sag Harbor Cove. The treatment systems will operate until remediation goals are achieved or it is demonstrated to the State that achieving the goals is not technically practicable.

Plum Island Animal Disease Center

The Plum Island Animal Disease Center surface water discharge to the Peconic Estuary System consists of a wastewater treatment plant, which includes boiler blowdown and diked tank farm stormwater discharges. The wastewater treatment plant effluent is disinfected by ultraviolet light (UV) treatment process. This facility also has a separate general stormwater permit for the other stormwater outfalls that discharge to surface waters. The permit for this facility includes a special condition requiring the development and implementation of a Best Management Practices Plan to prevent or minimize the potential for the release of significant amounts of toxic or hazardous substances through runoff, spillage, leaks, sludge or waste disposal, and stormwater discharges, including but not limited to drainage from raw material storage.

Brookhaven National Laboratory (BNL), Upton, NY

Point source discharges at BNL include sanitary wastewater and cooling waters as well as wastewater from industrial-type activities. The BNL SPDES permit requires monitoring of effluents from industrial-type activities prior to discharge into the wastewater collection system. Information collected due to this monitoring requirement will be reviewed and considered when the BNL discharge permit comes up for renewal. USEPA completed a Multi-Media Compliance Evaluation Inspection at BNL, beginning May 5, 1997. This comprehensive inspection evaluated BNL's compliance with statutory and regulatory requirements including the effectiveness of its treatment and disposal practices, pollution controls, operations and maintenance procedures, and self-monitoring/reporting records and practices. BNL has, as a result of the inspection, entered into a memorandum of agreement (MOA) to implement a facility-wide environmental management system, and EPA has issued enforcement orders to BNL for the violations found during the inspection.

As described in the MOA, it is both EPA's and the U.S Department of Energy's (DOE's) objective that BNL be operated so as to maintain full compliance with applicable environmental requirements and to protect the environment and the health and safety of workers at the facility and the general public. While DOE as a generator of hazardous waste at BNL is subject to various legal requirements, the commitments in the MOA extend beyond such requirements and include a voluntary initiative on the part of DOE. The goal of these voluntary undertakings is to enhance environmental management at BNL through the development and implementation of an Environmental Management System (EMS) that is focused on environmental compliance and focuses on pollution prevention.

Specifically, BNL has agreed to develop and implement an expedited process evaluation of all experimental and industrial operations at BNL for the purpose of identifying all waste streams produced at the facility. The evaluation will also include determining the proper regulatory status of each waste stream to ensure the wastes are managed in accordance with applicable local, State and Federal environmental regulations and in such a manner as to pose no threat to the environment. The evaluation establishes a baseline of on-going BNL operations and will also be used to assess future

activities. All experimental and industrial-type operations will be inventoried and pollution prevention/waste minimization and assessment/prevention/control opportunities will be identified, tracked and assessed for implementation.

Superfund

The Federal Superfund hazardous substance cleanup program was created by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The Act authorizes the Federal government to respond to spills and other releases (or threatened releases) of hazardous substances, as well as leaking hazardous waste dumps. There are three Federal Superfund Sites on the National Priority List in the study area: the North Sea Municipal Landfill, Rowe Industries, and a portion of the Brookhaven National Laboratory Site. Two other sites in the PEP Study Area have been identified as inactive hazardous waste disposal sites by the NYSDEC -- Mattituck Airbase and the East Hampton Landfill Lagoons. These sites are not known to be impacting the Peconic Estuary and the State is addressing known and potential contamination problems.

North Sea Municipal Landfill Site, North Sea, NY

Remedial actions at this Superfund site have been completed and USEPA has determined that no further action (other than air and groundwater monitoring) is necessary. Impacts on surface waters were considered in the selected remedy. Contaminants of concern included volatile organic chemicals, PAHs, metals (arsenic and lead) and other organics.

Based on the monitoring that has taken place, the USEPA will be requiring the Town of Southampton to conduct additional benthic community and sediment toxicity testing, in accordance with an EPA approved plan. Based upon EPA's review of the monitoring, sampling and analysis results, EPA will evaluate the efficacy of the remedy under the Superfund law. If warranted, the Superfund record of decision will be amended and the remedy revised.

Rowe Industries Site, Sag Harbor, NY

Remedies selected for this Superfund site include in-situ vapor extraction, soil excavation and disposal, treatment of contaminated groundwater, and long-term monitoring. The toxic contaminants of concern are volatile organic chemicals, tetrachloroethylene (PCE) and trichloroethylene (TCE). The soil that required excavation has been excavated and disposed of off site. The in-situ vapor extraction system is presently being operated. The groundwater remedy is currently under construction.

Brookhaven National Laboratory

BNL has been placed on the Federal Superfund Site National Priority List. Because of the complexity of the site, it has been broken into several "operable units" (OUs). OU V contains the portion of the site which influences the Peconic Estuary study area. The Superfund status is based on preliminary studies which indicate that contamination at BNL is impacting the Peconic River. A Remedial Investigation (RI) for OU V has been completed to characterize the nature and extent of contamination and identify areas that pose an unacceptable risk to human health and the environment. The conclusions drawn from the RI will form the basis for the remedial action alternatives to be conducted. Surface soil, subsurface soil, groundwater, surface water, sediments, and fish tissue samples have been collected and analyzed as part of the remedial investigation process. Samples have been analyzed for a comprehensive list of inorganic, volatile organic, and semi-volatile organic substances, as well as for pesticides, PCBs, radionuclides, ammonia, phenols, and cyanide. Elevated levels of mercury, silver, copper and PCBs were generally detected at locations exhibiting depositional characteristics, that is, where the Peconic River widens within the Laboratory boundary. The concern with respect to the Peconic Estuary watershed is elevated concentrations of metals in Peconic River sediments and other co-located contaminants including radionuclides. No significant off-site migration of site-related contaminants was found aside from one depositional area just outside the Laboratory boundary on Suffolk County-owned property.

A Baseline Risk Assessment was prepared to evaluate potential risks from exposure to contaminants in the absence of remediation. The baseline risk assessments conducted for Operable Unit V were reported in the Final Operable Unit V Remedial Investigation Report (May 27, 1998) and the Final Operable Unit V Plutonium Contamination Characterization and Radiological Dose and Risk Assessment Report (January 31, 2000), in which the risk assessment also includes all radiologic data included in the Remedial Investigation Report. The results from the combined studies are reflected in the proposed remedy. An Ecological Risk Assessment was also performed to determine if any contaminants posed an unacceptable risk to ecological receptors. Ecological receptors include any plants and animals that could be exposed to contaminants now, or in the future.

In the spring of 2000, the Department of Energy released a plan proposing a remedy for Operable Unit V at Brookhaven National Laboratory (BNL). This Proposed Plan provided a description of site concerns and discussion of completed investigations, a summary of risk assessments performed, evaluations of remedial alternatives, and recommendations for the preferred alternative. This area includes BNL's Sewage Treatment Plant and the headwaters of the western branch of the Peconic River.

The proposed remedy included excavating Peconic River sediment containing copper, mercury, and silver at concentrations above cleanup goals. PCBs and DDD are largely co-located with the elevated metals, and will be cleaned up during remediation of the metals. Radionuclides, mainly cesium-137 and low levels of plutonium, are below acceptable levels established by the United States Environmental Protection Agency (15 millirem/year above background), but will also be removed during sediment cleanup where they are co-located with the elevated metals. The sediment will be dewatered and shipped to a licensed off-site disposal facility. The proposed remedy also

includes a localized removal of soil at the Lab's sewage treatment plant and additional monitoring and characterization of contaminants in groundwater.

Soils in the sand filter beds and adjacent berms at the Sewage Treatment Plant (STP) contain elevated levels of mercury, silver, chromium, lead and radionuclides. A best management practice, localized removal of soil contamination, is proposed to remove high levels of mercury and cesium-137. This removal of contamination will reduce the potential for leaching and subsequent migration to groundwater and the Peconic River and will reduce potential risks associated with cesium-137 in soils. Soils from the sand filter beds and berms exceeding cleanup goals would be removed through excavation. Excavated portions of the sand beds would be replaced with sand or gravel, and excavated areas on the berms would be backfilled with clean fill, compacted and graded. Excavated materials will be disposed of in a licensed off-site disposal facility.

Low levels of volatile organic compounds (VOCs), primarily trichloroethene (or trichloroethylene, TCE) were detected in groundwater both on and off site. The highest concentration of TCE found on site was 32 parts per billion (ppb), and off-site levels had a maximum of 8.5 ppb (the drinking water standard is 5 ppb). These values are reported in the Remedial Investigation Report. A more recent sampling in 1999 found a maximum TCE concentration on site of 17 ppb and a maximum off-site concentration of 8.2 ppb. Tritium was found with maximum levels about 1/10 of the drinking water standard of 20,000 picoCuries per liter (pCi/l).

To be sure that the health of the residents located downgradient of OU V is protected, homes and businesses in the OU V area were offered public water in 1997. Outpost monitoring wells have been placed along the predicted path of the groundwater and additional monitoring data will be collected. If future monitoring data suggest a need for a groundwater remedy, the OU V remedy will be modified.

During the public comment period on the proposed plan, the community raised numerous concerns with the proposal to remove contaminated sediments from the Peconic River. The concerns included wetland restoration considerations; the exact extent of the contamination, particularly in the county park east of BNL; and other technologies. After considering all of the public comments, DOE has made a determination to work with the community to develop additional information regarding the best clean-up approach to the contaminated river sediments. DOE, EPA and DEC will make a final decision on the clean-up for the contaminated soil at the STP and the groundwater. The decision will be formalized in a document called the Record of Decision (ROD). Attached to the ROD will be a Responsiveness Summary, which will summarize public comments and DOE responses to those comments. Following final remedy selection, these documents will be available for public review. Finally, the public will be kept informed during the remedy implementation phase.

After DOE works with the community to resolve the concerns related to the sediment clean-up, a new Proposed Plan will be issued for public comment on the portion of the OU V remedy related to the Peconic River sediments.

Sample Management Approaches to Address Management Concerns

Harbor Protection Overlay Districts

The Town of East Hampton, recognizing that those who own property bordering on the Town's Harbors (including flag lots, flag strips, and flag access strips) derive many benefits from proximity to these waters and have a special responsibility to help protect them, has established a Harbor Protection Overlay District (HPOD). All lots in this district are subject to special requirements for maintaining or protecting wildlife habitats, and surface water quality to protect aquatic life. This includes:

- Requiring new parking lots and driveways to have "unimproved" surfaces or be constructed of one or more of the following: poured concrete, hot plant asphalt, rapid curing cut-back asphalt or quartz gravel;
- Requiring that runoff from new paved roads, parking lots and driveways be managed on-site;
- Requiring that fuel tanks be double walled fiberglass if installed below ground or include specified containment provisions if installed elsewhere;
- Requiring that swimming pools: be constructed or installed with a system to reduce the use of chlorine, such as an ozonation, ionizer, or ultra violet disinfectant system; have drywells constructed for evacuation of water from the pool; not be drained anywhere but to the dry well; and not be cleaned by means of an acid wash unless the acids used are neutralized prior to discharge from the swimming pool, and
- Allowing the use of wood treated with copper chromated arsenate (CCA), ammoniacal copper quat (ACQ), or creosote in tidal waters only when it can be shown that no reasonable alternatives exist to using these treated woods exist.

National Toxic Substance Control Efforts

In developing management strategies for toxics, some actions occur at the national level, such as decisions regarding pesticide use and toxic substance bans. For example, among its provisions, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) authorizes USEPA to control pesticides that may threaten ground water and surface water. FIFRA provides for registration of pesticides and enforceable label requirements, which may include maximum rates of application, restrictions on use practices, and classification of pesticides as "restricted use" pesticides (which limits use to certified applicators trained to handle toxic chemicals). Under the Toxic Substances Control Act (TSCA) and FIFRA, the sale, use or distribution of certain toxic substances has been banned or reduced.

State Pesticide Program

Under the Pesticide Use Program, NYSDEC regulates the sale and use of restricted and general use pesticides in order to prevent the unsafe or excessive application of pesticides. This program is implemented through certification of pesticide applicators and backed up by examinations to ensure that only knowledgeable, qualified people are permitted to handle and apply these chemicals. A certification is required by commercial applicators if they handle and apply restricted or general use pesticides, and by private applicators (e.g., farmers) if they plan to use a restricted use pesticide. It has been estimated that 50% of the commercial pesticide applicators on Long Island may be operating without the required approvals. While pesticides have not been identified as impairing water quality or living resources, the potential for misuse or unintended off-site impacts exists, particularly from uncertified applicators. The NYSDEC is currently working with involved government agencies and other organizations to develop a Long Island Pesticide Management Plan that will further address pesticide use in the Estuary.

Pesticide Collections

In 1995, Cornell Cooperative Extension of Suffolk County conducted and "Agricultural Clean Sweep" to provide Long Island farmers and agribusiness associates (such as those involved with landscape and turf maintenance) with an opportunity to dispose of, in an environmentally sound manner, a variety of pesticide products that could no longer be used legally or effectively in current operations. The collected unusable/unwanted pesticides became the property of the contracted hazardous waste disposal firm and were properly disposed of in an environmentally sound manner. Participation was voluntary and free of charge. Waste pesticides were pre-registered only after the participants attended a training session which prepared them to safely transport their own pesticides. In this single 2 day collection 28,150 pounds of waste pesticides were collected from 76 participants.

At the Suffolk County Pesticide Collection Project conducted on July 10, 1999 in Riverhead and on July 12, 1999 in Huntington, a total of ninety-nine 55 gallon drums of unwanted and unusable pesticide was collected for appropriate disposal. This $75,000 program was funded by Suffolk County in connection with an Environmental Benefit Project associated with an enforcement action by the NYSDEC. Among the pesticides turned in were such outlawed agents as DDT and aldicarb (Temik). Working in cooperation with DEC, two trade groups sponsored the event: the Professional Certified Applicators of Long Island, Inc., and the Nassau/Suffolk Landscape Gardeners Association, Inc.

Nonpoint Sources Addressed in the Coastal Zone Act Reauthorization Amendments of 1990

In the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), Congress recognized that nonpoint source pollution is a key factor in the continuing degradation of many coastal waters and established a new program to address this pollution. In enacting CZARA, Congress called upon states to develop and implement State Coastal Nonpoint Source Control Programs, which must be

approved by both the U.S. National Oceanic and Atmospheric Administration (NOAA) and USEPA. Congress gave the USEPA the responsibility to develop technical guidance for state development of such programs.

Under CZARA, USEPA specified "management measures" for three categories of nonpoint source pollution that may potentially contribute toxics to the Peconic Estuary: agriculture, urban areas, and marinas and recreational boating. "Management Measures" are defined in CZARA section 6217(g)(5) as "economically achievable measures for the control of the addition of pollutants, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives."

Table 6-1. Toxics of Concern in the Peconic Estuary System*

Contaminant	Measured Levels and Area of Impact	Potential Sources
Polychlorinated Biphenyls (PCBs)	ER-L[a] exceeded for sediments in Meetinghouse Creek; elevated levels in freshwater fish at BNL (on-site only); Statewide consumption advisories in place for lobster and crab hepatopancreas, snapping turtles, and waterfowl; local consumption advisory in place for striped bass, bluefish, and American eels	Potential sources are outside of the Peconics, aside from evidence of historical discharges from BNL.
Mirex	Statewide consumption advisory in place for waterfowl	Statewide problem
Chlordane (banned from use in the 1980s)	Statewide consumption advisory in place for waterfowl	Statewide problem
DDT[b] (banned from use in the 1970s)	ER-Ls exceeded for sediments at Upper Sag Harbor Cove, East Creek, and Meetinghouse Creek	Agricultural areas containing residual DDT
Aldicarb (an insecticide which is no longer in use)	Does not exceed State water quality criteria for toxics; widespread groundwater contamination along North Fork; detected in surface waters of East Creek and other North Fork Creeks	Agricultural areas containing residual Aldicarb
MTBE (methyl *tert*-Butyl Ether)	Does not exceed State water quality criteria for toxics; detected in surface waters of Sag Harbor Creek near Havens Beach, Peconic River, and other surface waters	Octane booster in gasoline
PAHs	ER-Ls exceeded for sediments in East Creek, mouth of Peconic River, Upper Sag Harbor Cove, and Meetinghouse Creek	Atmospheric deposition from the burning of fossil fuels, road runoff, and boat wet exhaust.
Arsenic	ER-Ls exceeded for sediments in six sites (Great Peconic Bay, West Neck Bay, Fish Cove, East Creek, Mouth of the Peconic River, and Meetinghouse Creek)	Pesticides and stormwater runoff; treated lumber
Copper	Elevated levels in Peconic River sediments at Brookhaven National Laboratory (BNL)	Brookhaven National Laboratory
Lead	ER-Ls exceeded for sediments in four sites (West Neck Bay, East Creek, Upper Sag Harbor Cove, and Meetinghouse Creek)	Primarily historic anthropogenic sources such as lead additives in gasoline

Contaminant	Measured Levels and Area of Impact	Potential Sources
Mercury	ER-Ls exceeded for sediments at two sampling sites (West Neck Bay and Meetinghouse Creek); elevated levels in Peconic River sediments at Brookhaven National Laboratory (BNL)	Stormwater and urban runoff; Brookhaven National Laboratory
Silver	ER-Ls exceeded for sediments at two sampling sites (Mouth of Peconic River and Meetinghouse Creek); elevated levels in Peconic River sediments at BNL	Stormwater and urban runoff; Brookhaven National Laboratory
Radionuclides	Water, sediment, and fish samples taken from Peconic River outside BNL contain measurable levels of radioactive materials; however, observed concentrations are well below State established criteria	Brookhaven National Laboratory[c]

* Toxics of concern and potential sources are based on currently available information. Additional toxics of concern and sources may be identified in the future

[a] Under NOAA's effects range values for toxics in sediments, concentrations below ER-L (effects range-low) represent conditions in which adverse effects on bottom dwelling organisms would rarely be observed. Concentrations equal to and above the ER-L, but below the ER-M (effects range-medium) represent a possible effects range within which effects would frequently be observed.

[b] Concentrations of other organochlorine pesticides did not exceed ER-L concentrations in any of the tested sediments.

[c] Natural occurring radioactivity and fallout from atmospheric nuclear weapon tests also contribute to measurable levels of radioactivity, including areas not affected by releases from Brookhaven National Laboratory

Table 6-2. Summary of New York State Health Advisories for Chemicals in Sportfish and Game Applicable to the Peconic Estuary System

Species	Advisory	Potential Toxic(s) of Concern	Applicable Areas
Lobster and Crab	Do not eat hepatopancreas (also known as the tomalley, mustard, or liver)	Cadmium, PCBs, and other contaminants	All marine waters of the State
Marine Striped Bass, Bluefish, and American Eels	Limit consumption to no more than ½ pound per week	PCBs[a]	Peconic Bay, Gardiners Bay, and Block Island Sound
All Freshwater Fish	Limit consumption to no more than ½ pound per week	Multiple contaminants	All fresh waters of the State
Waterfowl: Mergansers	Do not consume	PCBs, mirex, chlordane, and DDT	Statewide
All Other Waterfowl	Skin and remove all fat before cooking; discard stuffing after cooking; limit to two meals per month	PCBs, mirex, chlordane, and DDT	Statewide
Snapping Turtles	Remove fat, liver, and eggs prior to cooking meat or preparing soup; women of childbearing age, infants, and children under 15 should avoid eating snapping turtle meat or soups made with their meat.	PCBs	Statewide

[a]The source of PCBs leading to this advisory is not in the Peconic Estuary system and, therefore, management actions addressing this concern are not included in this CCMP.

For additional and related information on these advisories, please consult the complete text of the New York State Department of Health (NYSDOH) Chemicals in Sportfish and Game, available from the NYSDOH or on the NYSDOH web site on the internet at http://www.health.state.ny.us

Pesticide Chemicals Detected in Suffolk County Wells in Two Recent Studies

Pesticide Chemical	*Pesticides and Their Metabolites in Wells of Suffolk County, New York 1998* (June 1999)*	*Water Quality Monitoring Program to Detect Pesticide Contamination in Groundwaters of Nassau and Suffolk Counties, NY* (June 1999)
Alachlor	X	X
Alachlor ESA	X	
Alachlor OA;	X	
aldicarb sulfoxide+sulfone		X
arsenic		X
atrazine	X	X
bis 2-ethylhexyl phthalate		X
cadmium		X
Carbaryl	X	
carbofuran	X	X
Cyanazine	X	
2,4-D		X
p,p,-DDE	X	
Deethylatrazine	X	
Deisopropylatrazine	X	
dicamba		X
1,2 dichloroethane		X
1,2 dichloropropane		X
1,3 dichloropropane		X
dieldrin	X	X
2,6-Diethylanaline	X	
dinoseb		X
ethylene dibromide (EDB)		X

Pesticide Chemical	*Pesticides and Their Metabolites in Wells of Suffolk County, New York 1998* (June 1999)*	*Water Quality Monitoring Program to Detect Pesticide Contamination in Groundwaters of Nassau and Suffolk Counties, NY* (June 1999)
endosulfan sulfate		X
EPTC	X	
ethofumesate		X
Hydroxyatrazine	X	
Lindane	X	
Linuron	X	
MCPP		X
metalaxyl		X
methomyl		X
metolachlor	X	X
Metolachlor ESA	X	
Metolachlor OA	X	
metribuzin	X	X
4-nitrophenol		X
oxamyl		X
prometon	X	X
propachlor		X
simazine	X	X
tebuthiuron		X
Terbacil	X	
Tebuthiuron	X	
tetrachloroterephthalic acid		X
1,2,3-trichloropropoane		X
Trifluralin	X	

* Because this study was intended to complement the SCDHS program, many pesticides that are commonly detected by the SCDHS (including aldicarb and its degredates) were not investigated in this study.

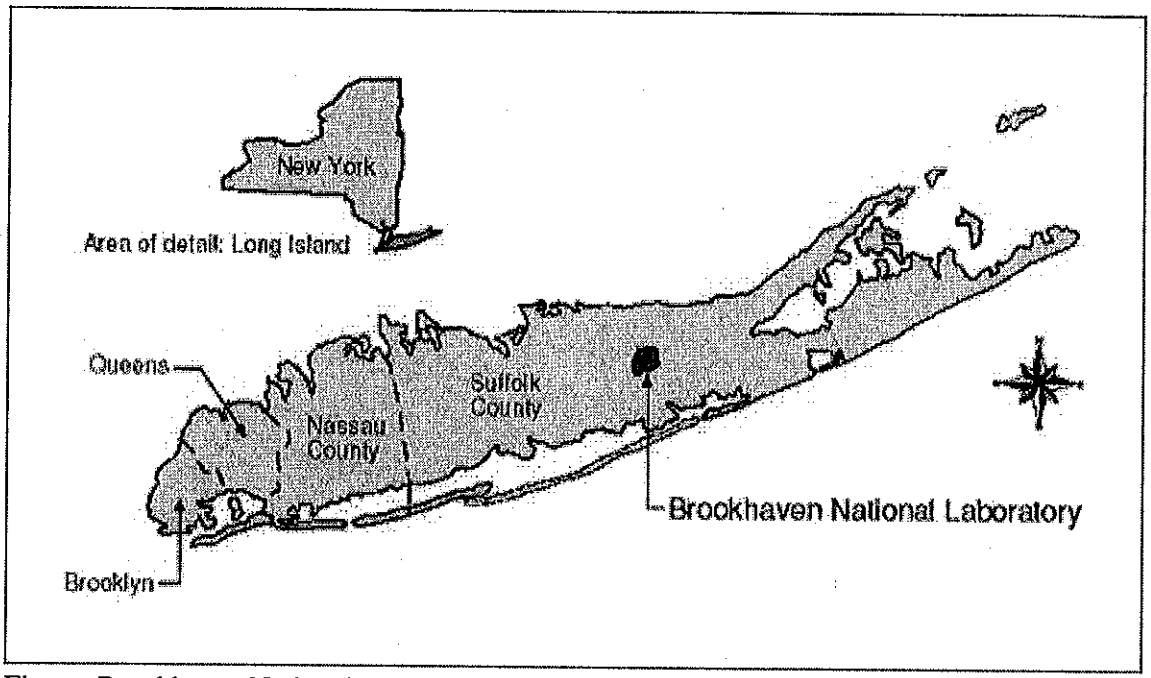

Figure: Brookhaven National Laboratory's location with respect to New York State and Long Island (from Proposed Plan for Operable Unit V: Peconic River/Sewage Treatment Plant, Brookhaven National Laboratory (BNL, February 9, 2000)

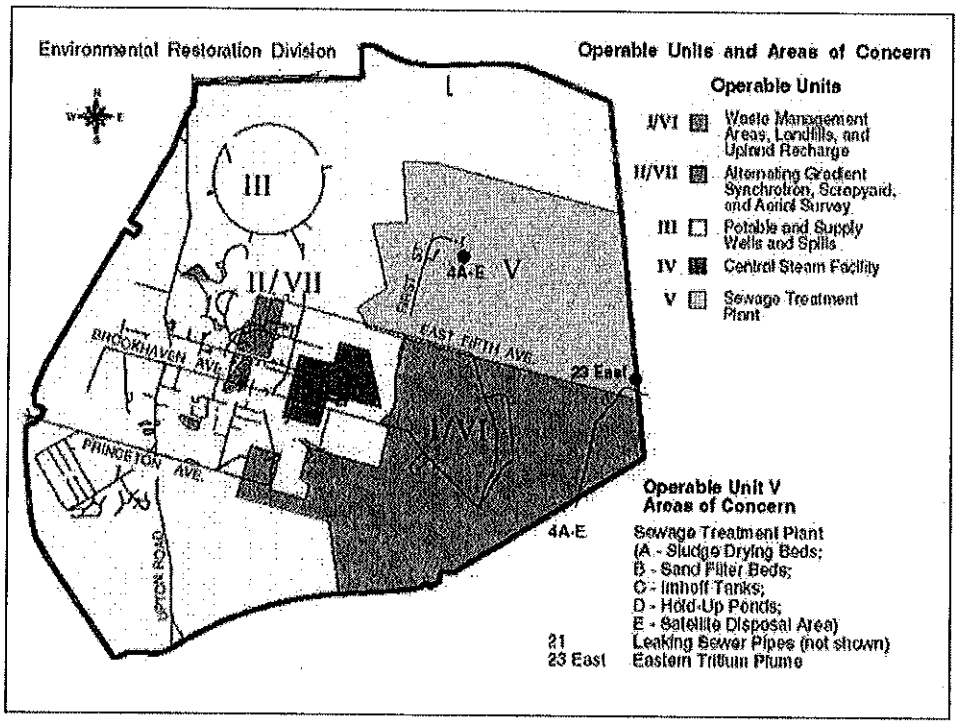

Figure: Brookhaven National Laboratory's six operable units and OU V Areas of Concern (From Proposed Plan for Operable Unit V: Peconic River/Sewage Treatment Plant, Brookhaven National Laboratory (BNL, February 9, 2000)

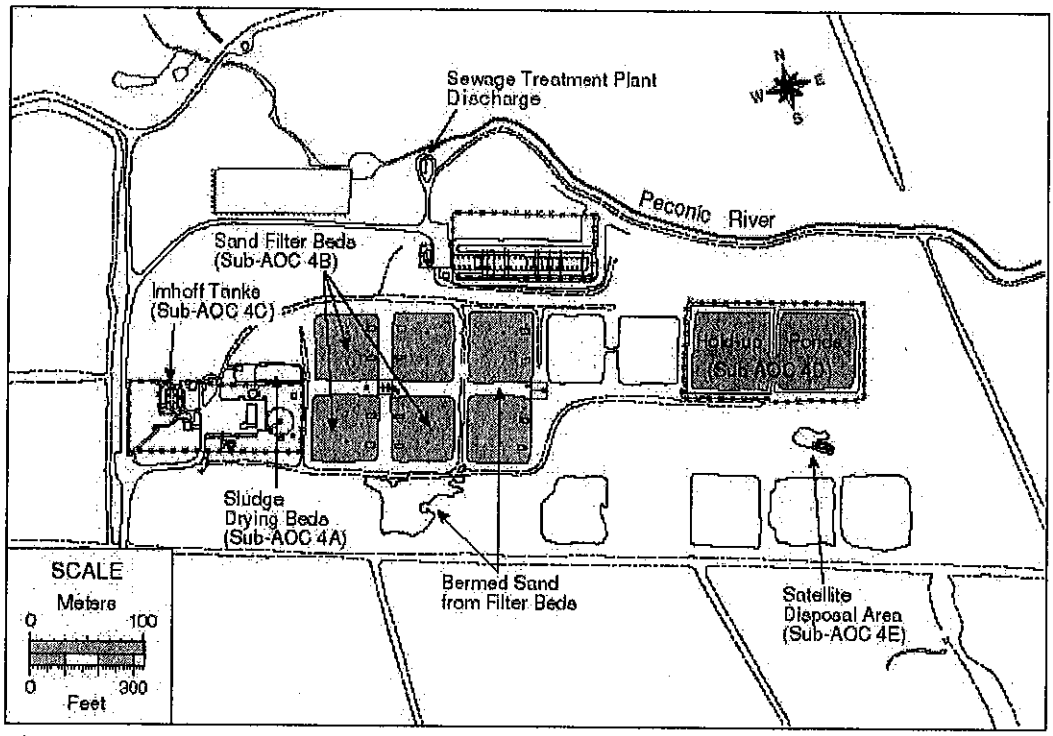

Figure: BNL's Sewage Treatment Plant (AOC 4) and the Sub-Areas of Concern within the plant (From Proposed Plan for Operable Unit V: Peconic River/Sewage Treatment Plant, Brookhaven National Laboratory (BNL, February 9, 2000)

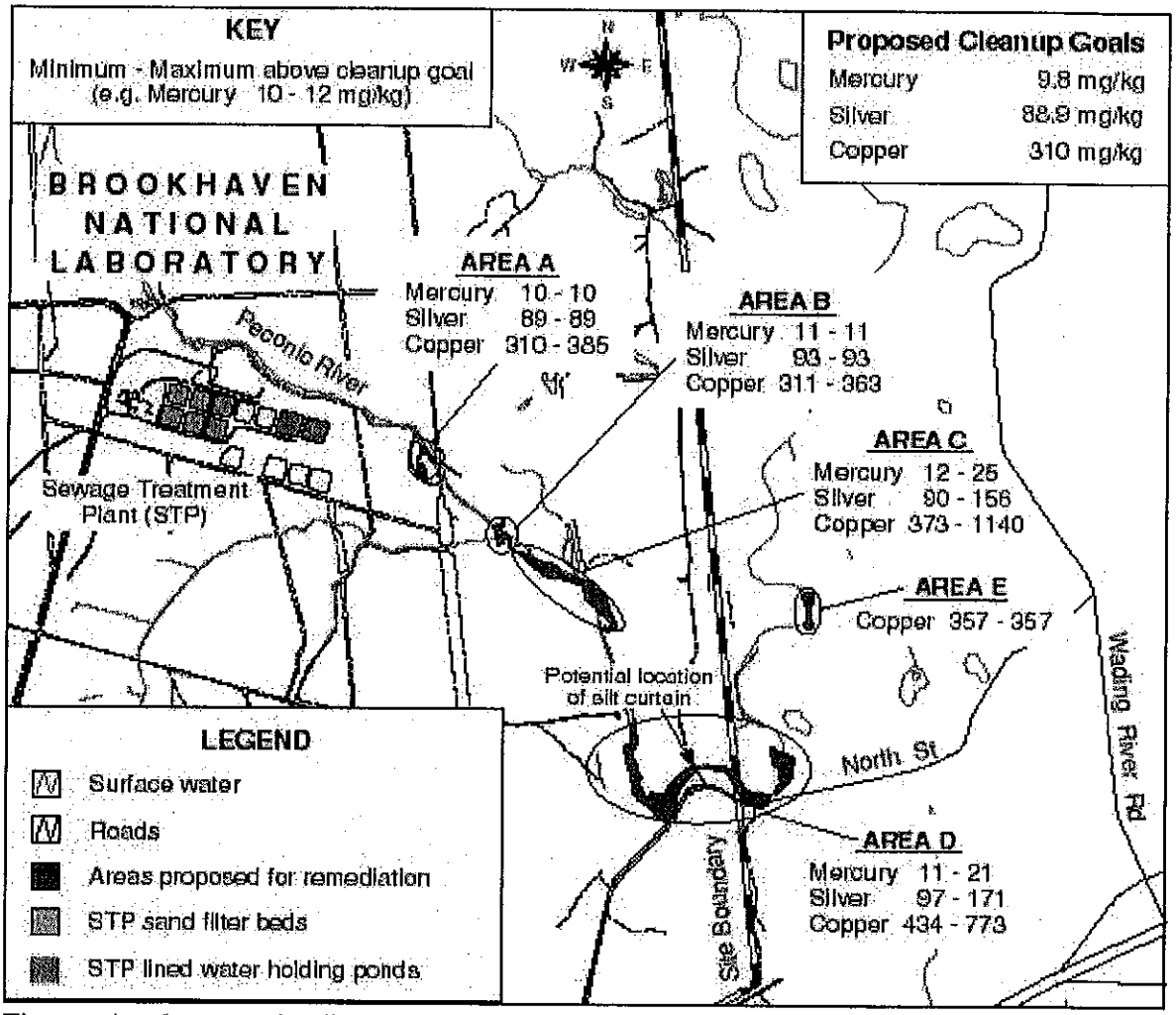

Figure: Areal extent of sediments contaminated or potentially contaminated with metals above toxicity-based cleanup goals. (From Proposed Plan for Operable Unit V: Peconic River/Sewage Treatment Plant, Brookhaven National Laboratory (BNL, February 9, 2000)

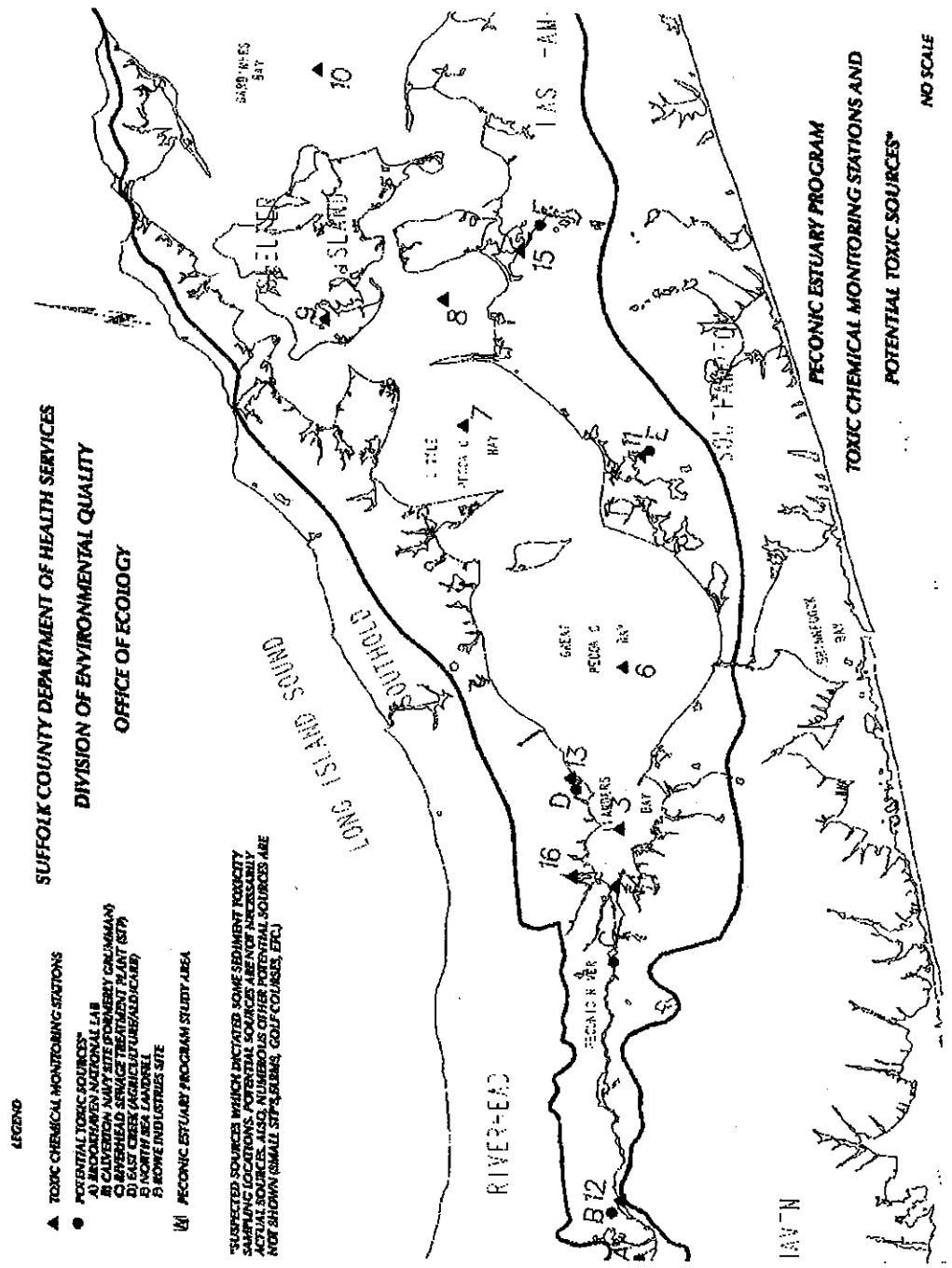

Figure: Toxic Chemical Monitoring Stations and Potential Toxic Sources

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