RETURN TO 1998 ROD AR INDEX

13.4.29

Superfund Records Center
SITE: NEWBEDFORD
BREAK: 13.04
OTHER: 47608

Sea Change, Inc.
60 Spring Street
Marion, MA 02738
(508) 748-9655
Fax:(508) 748-0193

Cleaning Up the Twentieth Century

22 November 1997

David Dickerson
Project Manager, Phase II, New Bedford Harbor
Environmental Protection Agency
JFK Federal Bldg.
HRS-CAN3
Boston, MA 02203-2211

Dear Dave,

Attached is a copy of the report prepared by Sea Change on our Program #1, the panel that evaluated employing Confined Disposal Facilities for storing contaminated sediments in Phase II of the New Bedford Harbor clean-up.

If you need any more information, please let me know.

Sincerely,

Diana

Diana Cobbold
Executive Director

Enclosure

SDMS DocID 47608

Sea Change, Inc. Panel
Confined Disposal Facilities
November 14th, 1995
New Bedford Whaling Museum
New Bedford, Massachusetts

William Brack, Esq.--Barker Steel, Inc.--Panel Moderator, Board of Directors, Sea Change
Dr. John Farrington--Dean of Graduate Studies and Associate Director for Education at Woods Hole Oceanographic Institute, Board of Directors, Sea Change
Mr. David Dickerson--U.S. Environmental Protection Agency, Project Manager for Phase II of the remediation of New Bedford Harbor

PANELISTS

Dr. Phil Brown
Medical Sociologist
Brown University

Dr. Brown holds a Ph.D. from Brandeis University in sociology. He is currently a lecturer at Harvard Medical School, and a Professor of Sociology at Brown University. One of Dr. Brown's current research projects is Environmental Justice and Environmental Health, an analysis of race and class differences in toxic exposures and Superfund cleanups. He has written numerous books and articles published on environmental health, including No Safe Place: Toxic Waste, Leukemia, and Community Action, with Edwin J. Mickelson; and "The Toxic Waste Movement: A New Kind of Activism" with Susan Masterson-Allen.

Ms. Cecelia Donovan
Technical Advisor and Project Manager
Environmental Dredging Program
Maryland Environmental Services

Ms. Donovan holds an M.S. in Technology Management from the University of Maryland Graduate School. Since 1985, she has been the project manager with Maryland Environmental Services for environmental dredging projects with a monitoring focus. Ms. Donovan has been associated with major projects such as Hart-Miller Island Dredged Material Containment Facility, Pooles Island G-West Unconfined Placement Area, Poplar Island Habitat Restoration, and C&D Canal Approach Channel environmental investigations. In 1985, Ms. Donovan was in charge of PCB testing and removal at the U.S. Naval Academy. Ms. Donovan has prepared numerous reports including one in 1995 regarding Poplar Island Beneficial use Monitoring Framework (Habitat Creation/Island Restoration with Dredged Material).

Dr. Timothy Ford
Environmental Microbiologist
Harvard School of Public Health

Dr. Ford holds a Ph.D. in Aquatic Microbiology from the University of Wales in the United Kingdom. He is currently an Assistant Professor of Environmental Microbiology at the Harvard School of Public Health, and has written over 50 articles in his field of expertise. Of particular note is an article published in 1995, in *Environmental Science Technology*, titled "Multivariant

Statistical Examination of Spatial and Temporal Patterns of Heavy Metal Contamination of New Bedford Harbor Marine Sediments." Dr. Ford served as chairman on the American Academy of Microbiology Scientific Colloquium, "Global Issues in Microbiological Water Quality for the Next Century," in Guayaquil, Ecuador in April of 1995. In 1993, his book, Aquatic Microbiology-An Ecological Approach, was published.

Dr. Philip Gschwend
Geochemist
Ralph M. Parsons Laboratory
of Water Resources and Hydrodynamics

Dr. Gschwend holds a Ph.D. in Chemical Oceanography from Woods Hole Oceanographic Institute, and, since 1981, has been a professor of Civil and Environmental Engineering at the Massachusetts Institute of Technology. Among awards he has received, most recently is the Bose Award for Excellence in Teaching from the School of Engineering at M.I.T. Dr. Gschwend has co-authored a text book on Environmental Organic Chemistry and has had numerous articles published in scientific journals since 1977. Currently in press is an article entitled "Comparison of the *in situ* and desorption sediment-water partitioning of polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs)" to be published in *Environmental Science Technology*.

Dr. William Nicholson
Epidemiologist
Mt. Sinai Medical Center

Dr. Nicholson holds a Ph.D. from the University of Washington in Physics. He has been a professor at Mt. Sinai School of Medicine since 1977 where he has directed industrial hygiene studies, developed analytical techniques for measurement of pollutants in various samples and used statistical analyses to establish, when possible, the dosage and time dependence of disease. In his professional activities he is Assistant Editor of *American Journal of Industrial Medicine*, and serves on the Editorial Board of *Toxicology and Industrial Health*. Dr. Nicholson's report to the Industrial Disease Standards Panel in Ontario, Canada entitled "Occupational PCB Exposure and Various Cancers: Human Health Effects and Carcinogenic Risk Potential of PCBs" was published in 1987.

Mr. Keith D. Tate, P.E.
President
BayLand Consultants & Designers, Inc.

Mr. Tate is the founder of a firm with the primary focus of land/water interface issues within the Chesapeake Bay watershed. He is a graduate of the University of Maryland in Civil Engineering. Mr. Tate's firm is involved in dredging and materials management including planning, engineering, design, environmental assessments, and facility support. His firm is founded on the principal that integration of engineering and environmental sciences is essential to successful projects. He has worked extensively with dredging and natural resources agencies in finding solutions to dredged material management issues, and was senior manager of the Hart-Miller Dredged Material Containment Area. In 1994, he presented a paper to the 28th International Navigation Congress in Seville, Spain, entitled "Management of Contaminated Dredged Materials from the Baltimore Inner Harbor." In April of 1995, Mr. Tate co-authored a paper entitled "Partnering is a Practical Dredging Benefit" presented at the 14th World Dredging Conference in Amsterdam, the Netherlands.

Dr. John Farrington welcomed the audience and panelists to Sea Change's discussion of the Confined Disposal Facilities (CDFs) proposed by the Environmental Protection Agency (EPA) for the remediation of New Bedford Harbor. He emphasized Sea Change's commitment to providing independent scientific information to the public and to facilitating communication between scientists and communities in order to help communities make more informed choices on environmental issues.

Dr. Farrington turned the proceedings over to **William Brack**, who introduced the panelists: **Dr. Phil Brown**, a medical sociologist from Brown University; **Dr. Philip Gschwend**, a geochemist from the Massachusetts Institute of Technology; **Dr. Timothy Ford**, a Microbiologist from the Harvard University School of Public Health; **Ms. Cecelia Donovan**, an environmental engineer from Maryland Environmental Services; **Mr. Keith Tate**, a civil engineer, and the president of BayLand Consultants and Designers, Inc., based in Maryland; and **Dr. William Nicholson**, a professor at the Mt. Sinai School of Medicine. **Mr. Brack** turned the podium over to **Mr. Dave Dickerson** of the Environmental Protection Agency (EPA), and project manager for Phase II of the remediation process, who provided the audience with some brief background regarding the New Bedford Harbor clean-up.

Mr. Dickerson emphasized that the levels of Polychlorinated Biphenyls (PCBs) and metallic elements present in the sediments in New Bedford Harbor are among the highest in the nation--4,000 and 5,000 parts per billion (ppb) respectively, with another half pound of contaminants entering the harbor each day--and pose a significant threat to both human and environmental health. **Mr. Dickerson** outlined post-dredge options for the City of New Bedford, including the CDF alternative, which was the subject of the panel.

After **Mr. Dickerson** provided this overview **Mr. Brack** introduced the first topic of discussion regarding alternative treatment technologies in the form of a question:

What are the advantages and drawbacks of placing the dredged material in a containment facility modeled after the Hart-Miller island facility in Maryland's Chesapeake Bay?

Mr. Tate was the first to answer this question. He prefaced his description of Hart-Miller island, which has been in service since 1984, by emphasizing that New Bedford Harbor is very similar to Chesapeake Bay in that both are cherished natural resources and ports of call, the maintenance of which are vital to their regions' respective economies. **Mr. Tate** went on to discuss Hart-Miller's physical attributes. The facility, which borders Hart and Miller islands, is a 12,000 acre containment site, which is surrounded by a dike of dredged sand which is six miles in diameter. The dike is armored on the Chesapeake side with rock and other geo-textiles designed to

withstand the forces of the water in the bay. The facility is divided into two areas: the north cell, with an area of 800 acres, and the south cell, with an area of 300 acres. The facility has the capacity to hold 60 million cubic yards of dredged material. In three years, half of this capacity has been used up. **Mr. Tate** went on to say that once the facility was filled, it would be converted into a wildlife refuge.

Ms. Donovan was the next to speak, providing insight into the differences between the New Bedford Harbor and Baltimore harbor contamination. Unlike New Bedford Harbor, the Baltimore Harbor contamination consists mostly of metals, and lacks the PCBs which are present at high levels in New Bedford. The Hart-Miller facility also lacks the impermeable liner which any facility in New Bedford would require.

Ms. Donovan went on to discuss the monitoring which takes place at Hart-Miller. Monitoring of Ph levels and metallic levels in the effluent is needed, as well as biomonitoring twice a year. Biomonitoring exposes aquatic organisms to effluent from the facility to see if there are contaminants in any of the discharge. The benthic populations (those organisms which live in the mud and sand on the bottom--e.g. clams) are also monitored to see if they are being impacted, and the sediments on the outside of the facility are also checked.

Ms. Donovan also discussed the advantages and drawbacks of an island facility vs. a shoreline facility, which has been proposed for New Bedford. She emphasized competing interests and environmental tradeoffs--in a shoreline facility, coastal property values will drop, but an island facility may impinge on a fishing dependent economy like New Bedford's. **Ms. Donovan** than touched on the ecological value of a shallow water habitat vs. upland marine habitats, and stated that these are the types of tradeoffs which the people of New Bedford must carefully consider in making a decision.

Dr. Ford asked **Ms. Donovan** if the high amount of water--100,000,000 gallons per day--which is treated at Hart-Miller would be feasible for a facility in New Bedford Harbor. **Ms. Donovan** replied that this would be too high an amount given the presence of high levels of PCBs, and that the design of any facility in New Bedford would have to take this critical difference into account.

Dr. Ford also asked about the liner which would be required in New Bedford. **Mr. Dickerson** stated that, in a New Bedford facility, there would be impermeable cap and interior dike slope liners, but none on the bottom. He explained that the existing sediments on the bottom are impermeable on their own, and that, as the sediments which are pumped in settle, they will condense, and approach the impermeability standards for a CDF.

Dr. Ford asked about monitoring within the Hart-Miller facility, and Ms. Donovan replied that there are monitoring wells in the dike in order to see what is happening within it.

Mr. Brack then introduced the next topic of discussion:

What would be the advantages and drawbacks of a confined aquatic disposal facility (CAD) in New Bedford Harbor similar to that in Boston Harbor?

Mr. Tate explained that for a CAD, a virgin area is dredged, and the clean

sediment is placed in a CDF. The resulting trench in then filled with contaminated material, and is capped with the clean sediment which was initially situated in the CDF.

Mr. Brack asked the panelists to discuss some of the issues for treatment, disposal and dewatering of the dredged contaminated material.

Mr. Tate pointed out that in a CAD, remote monitoring is required, since the facility would be under water, and that a CDF would be more predictable day to day, since it is easier to monitor--one can actually see what is going on inside the facility. **Dr. Gschwend** added that if the contaminated sediments were going to be moved to a virgin area, that there would be some inevitable spillage which would have a short-term negative affect on the environment, and that any decision should take this into account.

Dr. Ford commented that a CAD would obviously require much more dredging than a CDF. He went on to add that there are a number of unknowns regarding the clean sediments which would be used to cap the contaminants in a CAD. These include questions concerning how the organisms within the clean sediment would interact with the contaminants; **Dr. Ford** also stated that there is no model which can be used to determine how quickly the contaminants might permeate the cap.

Dr. Gschwend pointed out that benthic "stirring", or movement within the sediments, serves to expedite the release of PCBs. In a CDF, the release would be into the air, while in a CAD the release would be in the water, not only placing the contaminants back in the water, but into an area which would have previously been uncontaminated.

Mr. Brack asked if there were any other issues concerning the siting of a possible CAD. **Ms. Donovan** replied that the facility would need to be in an area with little or no "scouring"--natural activity which would serve to wash away the cap--and that the facility would need to be placed in an area where the water currents were such that the opposite would be happening. She also pointed out that any facility would change the hydrodynamics around it, and that any siting proposal would have to take this into account.

Mr. Brack then introduced the next topic:

What are the comparative health and environmental risks of either leaving the contaminated sediments in place, as against placing them in a CDF?

Mr. Brack prefaced the discussion of this topic by stating that the question assumes that the guidelines for assessing risks are universal, which is not the case. He asked **Dr. Brown** to elaborate on how risks are assessed by an agency vs. a scientist vs. a citizen.

Dr. Brown stated that sociologists study the effects which events have on society as a whole, and make assessments regarding these affects. He emphasized that the socio-psychological and cultural effects which any remediation and containment would have on the communities surrounding the harbor is a key issue which needs to be addressed. **Dr. Brown** pointed out that feasibility studies for such projects have traditional risk assessment guidelines, and are hypothetical. **Dr.**

Brown said that this is a problem, and that studies of similar situations needed to be done; he pointed to an office fire in Binghampton, New York, which released PCBs into the air at levels similar to those in New Bedford Harbor, as one example.

Ms. Donovan discussed the environmental and human risks of leaving the contaminated sediments in place. If people were willing not to come in contact with the contamination through eating fish or swimming, the risks would be low. **Ms. Donovan** went on to say, however, that the environmental risks would be far greater. The PCBs in the water would continue negatively to affect the marine ecosystem, primarily by causing reproductive problems in organisms. **Ms. Donovan** added that a CDF would allow maintenance of the harbor's ecology.

Dr. Nicholson stated that the cancer risk for people eating fish contaminated with PCBs is higher, along with an increased risk of retarded growth. Eating contaminated fish also raises the cancer risk for pregnant women and their fetuses, and has been shown to cause low birth weights.

Dr. Brown discussed fish consumption estimates, pointing to a University of Michigan study which showed that the amount of fish which people actually consumed in the state was three times the estimated amount. He also pointed out that statistics show that minorities eat more fish, which pointed to a strong environmental justice component.

The panelists then addressed specific questions which had been submitted to them by members of the public. The questions fell into seven categories, as follows:

1) Comparative Risks
2) Bioremediation
3) Leakage
4) Health
5) Future Risks
5) Design
6) Monitoring and Maintenance

Time constraints did not permit the panelists to address each question which had been submitted, and some had already been addressed in the preceding discussion.

COMPARATIVE RISKS

1) In general terms, what would be the risks to human health and the environment if the proposed sediment action levels--10 ppm PCBs north of the Coggeshall Street Bridge and 50 ppm elsewhere--were significantly raised (for example to 500 ppm)?

Dr. Gschwend said that the risk would multiply by ten with this increase, and that the benthic communities would be affected, which would, in turn, affect "stirring". He went on to say that the second order effects would be difficult to predict. **Dr. Ford** agreed, saying that one could only make assumptions concerning what s specific increase in the level of PCBs would do. He also said that the effects of lowering the levels would be equally difficult to predict but that lower levels would

mean a healthier environment.

2) What do you believe are the current risks to public health and the environment of the contaminated cove between Sawyer Street, Coffin Avenue, and Belleville Avenue—presently proposed for CDF #1?

Mr. Brack explained that the cove itself is being proposed as a CDF, so none of the contaminated sediment which exists there would have to be moved.

Mr. Tate said that access is much easier in an island facility, and that it would be much more complicated in the cove.

Ms. Donovan pointed out that leaving the sediments in place would cost much less.

Dr. Nicholson asked **Mr. Dickerson** if the sediment on the bottom of the cove was impermeable.

After **Mr. Dickerson** replied that the sediments were indeed impermeable by CDF standards, **Mr. Brack** asked if there was any benefit to a liner on the bottom of the cove.

Ms. Donovan replied that a liner would be less permeable, but would cost much more, and **Mr. Tate** added that the construction of a liner at the bottom of the cove would be extremely complicated, and may not be feasible.

3) Will not using the already contaminated cove for CDF #1 require the disposal of a significant amount of contaminated material (PCBs and heavy metals) into much cleaner sediments below the I-95 bridge? Would this result in significant negative impacts on public health and the environment?

Mr. Dickerson said that if the cove was not used, the contaminated sediment would have to be moved to a cleaner spot, as the cove has the highest levels of PCBs. The area below the I-95 bridge is a productive clam bed, **Mr. Dickerson** added.

Ms. Helen Waldorf of the Massachusetts Department of Environmental Protection (MADEP) was called up to the podium, and she explained that the wetlands near the Coggeshall Bridge are indeed valuable, and would be impacted if a CDF were to be placed there. She emphasized that the cove was the area which the DEP had deemed the least ecologically valuable.

BIOREMEDIATION

1) What is the potential for bioremediation in the harbor in confined aquatic disposal facilities and CDFs?

Dr. Ford defined bioremediation as the introduction of microorganisms into a contaminated area in order to break down any toxic contaminants. He went on to say that, at this point, bioremediation techniques are not able to address multiple contaminants, a situation which exists in New Bedford Harbor. He also stated that microorganisms are very specific, and a different type would have to be introduced for every different type of PCB alone, of which there are 209.

Dr. Gschwend added that the PCB degrading bacteria takes decades, or even centuries, to develop naturally. He also added that a study of bioremediation on a Texas lagoon system did detect a drop in contamination, but extraneous variables had rendered the study inconclusive. He went on to say that all of the bioremediation studies which he had read had also been inconclusive.

Ms. Donovan stated that bioremediation did not look like a viable alternative now or in the near future.

2) What effects would bioremediation have on heavy metals?

Dr. Ford answered that the microorganisms would change the mobilization of the heavy metals, and makes them more soluble and more available for absorbtion by organisms in the ecosystem.

HEALTH

What human health effects would you expect if ambient air levels remain at the current level without completion of Phase II clean-up? What effects would be expected in the marine ecosystem?

Dr. Nicholson replied that the people of New Bedford were inhaling about one gram of PCBs per day. **Dr. Gschwend** asked **Dr. Nicholson** how the toxicity of PCBs which were inhaled compared to the toxicity when ingested orally. **Dr. Nicholson** replied that he wasn't sure, and didn't have data on hand which would enable him to calculate this.

FUTURE RISKS

How can we trust the assessment on what the dangerous levels of PCBs and heavy metals are when these assessments change over time?

Dr. Brown replied that a lot of distrust had been cultivated within the public in situations like this, and that the state and federal governments must work harder to make accurate information available. He went on to elaborate by saying that this distrust could be eroded by making information available by doing tandem studies between scientists, the public, and governments. Dr. Brown pointed to the Hanford Health Information Network, which had been involved with a radiation problem. The federal government approporiated a multi-million dollar grant to do just that. Dr. Brown gave this example to illustrate the idea that once citizens have the money to become involved at a higher level, and to hire the right experts, a higher level of trust will be cultivated.

MONITORING AND MAINTENANCE

How can the citizens of New Bedford be assured that there will be adequate future funds allocated for safe monitoring and maintenance programs for the proposed CDFs?

Ms. Donovan replied that the designers should begin now to determine which aspects of the project do in fact need to be monitored, and how often. They must estimate the monitoring costs, and learn to adjust the frequency of each specific monitoring according to the prevailing conditions, both within and outside the facility. She added that they must also find out what the sources of funding are, as well as where other funding might possibly come from.

Mr. Brack raised whether weather influences were taken into account in the design process.

Mr. Tate replied that this issue had come up in the design phase of the Hart-Miller facility. He said that the designers had to address the geophysical characteristics of the region -- to clarify, those disturbances which the facility might be exposed to in that specific area. He added that the damage which might result were the facility to encounter an earthquake would be minimal, as it is a flexible structure. He also mentioned that the hydrological aspects of the area must be taken into account for any facility in New Bedford.

QUESTIONS FROM THE FORUM

Mr. Brack turned to members of the audience for any additional questions.

A representative from the town of Acushnet asked about proposed CDF 1b, which would be 1700 feet long, and 400 feet wide, to be placed along the banks of the Acushnet River. The representative was concerned about the impact of the CDF on the flow of the river, as well as water displacement.

Mr. Tate replied that the narrowing of the river at this point would probably create more pressure and quicker water flow. He stated that this question should be addressed in the design phase, but that he could not make a prediction without a thorough site specific analysis. **Mr. Tate** added that this was analogous to the situation in the Baltimore Harbor, and that such a facility in New Bedford would probably have implications for the hydrodynamics of the entire harbor.

Ms. Carol Sanz from the Downwind Coalition asked how the Hart-Miller facility was accepted by the surrounding communities.

Mr. Tate answered that the design phase for Hart-Miller had begun in the sixties, but that community opposition to the facility had created a ten year stalemate. Finally, in the eighties, the court ruled that construction of the facility would move forward, and it was constructed in two years. He stated that citizen acceptance is the norm today.

Ms. Donovan added that those who have worked on the project have worked very hard to maintain the facility, and to be completely honest with the surrounding communities about what is going on inside it. They have also worked to establish a pattern of communication and trust with the affected citizenry.

Another citizen asked if the builders of Hart-Miller had come across any high voltage power cables during construction, and if any would be placed in the sediments of the Acushnet River.

Mr. Tate replied that they had used power cables at Hart-Miller, and that they had been placed in trenches along the bottom, so that the hulls of large ships would not hit them.

Mr. Brack asked if the liner which would be used would be impermeable to PCBs.

Mr. Tate answered yes, but only if it could be shown with monitoring that no contaminants were leaking, which can be tricky--a lab is quite different from construction in the field. **Ms. Donovan** added that if there was any leakage, it would not be through the liner.

Mr. Brack asked if the levels were reduced to fifty ppb in the harbor, would this reduce health risks immediately?

Dr. Nicholson said that the levels in the fish would remain until a new generation was born, and the contaminated organisms died off. Referring then to sediment levels, **Dr. Nicholson** said that it is difficult to say, and that the only real way to tell would be to keep monitoring.

Mr. Brack asked if there were any health impacts resulting from the economic stresses which had resulted from the loss of the fishing industry.

Dr. Brown answered that there needed to be legislation to promote money for subsidizing the fishing industries. Fish could be imported and sold for rock bottom prices, which is only one example of many approaches which could help out the ailing industry.

Mr. Brack asked the panelists if CDFs could indeed guarantee the harbor's cleanliness.

Dr. Gschwend replied that there are still other sources of pollution which are contributing, and that the remediation of these PCBs would not solve the problem entirely. **Ms. Donovan** added that this project is a starting point for what should be a goal of far sweeping remediation and prevention of pollution. **Dr. Gschwend** went on to say that, in general, tabs must be kept on all sources of pollution.

Mr. Brack asked if there was such a thing as allowable leaching of PCBs from a CDF.

Dr. Gschwend replied that in this situation a variety of risks which are not each part of the PCB risk must be balanced, and that any plan ought to take into account how the risk associated with PCB exposure compares to other risks, such as smoking cigarettes. He also emphasized that this is not a problem in isolation.

CLOSING REMARKS

Mr. Brack then turned to the panelists once more, and asked for each to give some closing remarks.

Dr. Nicholson stated that he felt that progress towards CDFs, rather then CADs, was appropriate for reducing the risk of PCB exposure. He emphasized, however, that there were still a number of uncertainties regarding CDF implementation, and that careful monitoring would be needed to keep an eye on

leaching, as well as the PCBs which remained in the harbor.

Mr. Tate emphasized that, as an engineer, he looks at this project in the sense of building a facility. He emphasized that the real question here is whether or not a facility can be built which will help the people of New Bedford. He also emphasized that this is a "people" question--the engineering part is easy. **Mr. Tate** added that from his Chesapeake experience, he learned that interaction with the people who would be impacted is critical. He went on to say that CDFs are a workable option, because of their easy monitorability and maintenance.

Ms. Donovan said she felt that this process should be continued, because it helps to keep everyone involved and educated on the situation. She went on to say that a design which is acceptable to the surrounding communities is vital.

Dr. Ford stated that he didn't feel that there would be a significant reduction on public health risks if CDFs were implemented. He added that this dredged material did, however, need to go somewhere. He ended his comments with a question asking if there were any successful or unsuccessful incidents elsewhere of a CDF holding material this contaminated.

Dr. Gschwend prefaced his statements by pointing to Boston Harbor, where the situation there has improved substantially since sludge discharges into it were stopped. Although dredging and CDFs cost money, and are not perfect, he said that maybe they should be implemented anyway, and that, once this is done, things will begin to improve in New Bedford Harbor as well.

Dr. Brown emphasized four points, the first of which called for broader health risk assessments which take non-cancerous diseases into account, as well as the diversity of communities which exists in a city like New Bedford. Secondly, **Dr. Brown** called for a substantial federal appropriation to fund large studies and conferences to supplement the tunnel vision focus on simple remediation. He also called for the fishing industry subsidies which had mentioned earlier. He added that there needed to be further education on such issues, from grade school to college. **Dr. Brown** ended by saying that people need to "get holistic, and to make the environment as big as the environment really is."

Mr. Brack thanked the panelists and members of the forum, and the panel was adjourned.