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NORTHEAST WASTE MANAGEMENT ALLIANCE (NEWMA)

Annual Report FY 1993

A.N. Goland and E. Kaplan

November 1993

Prepared for the:
Waste Management Demonstration, Testing, & Evaluation Division
Office of Technology Development
U.S. Department of Energy
Washington, DC 20585

DEPARTMENT OF APPLIED SCIENCE
DEPARTMENT OF ADVANCED TECHNOLOGY
Environmental Waste Management Technology Center

BROOKHAVEN NATIONAL LABORATORY
Upton, Long Island, New York 11973

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NORTHEAST WASTE MANAGEMENT ALLIANCE (NEWMA)

ANNUAL REPORT

A.N. GOLAND, AND E. KAPLAN

DEPARTMENT OF APPLIED SCIENCE
DEPARTMENT OF ADVANCED TECHNOLOGY

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Environmental Waste Management Technology Center
Department of Advanced Technology
Brookhaven National Laboratory
Associated Universities, Inc.

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NORTHEAST WASTE MANAGEMENT ALLIANCE (NEWMA)

ANNUAL REPORT
FISCAL YEAR 1993

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EXECUTIVE SUMMARY

Funding was provided to Brookhaven National Laboratory in the fourth quarter of FY93 to establish a regional alliance as defined by Dr. Clyde Frank during his visit to BNL on March 7, 1993. In collaboration with the Long Island Research Institute (LIRI), BNL developed a business plan for the Northeast Waste Management Alliance (NEWMA). Concurrently, informal discussions were initiated with representatives of the waste management industry, and meetings were held with local and state regulatory and governmental personnel to obtain their enthusiasm and involvement.

A subcontract to LIRI was written to enable it to formalize interactions with companies offering new waste management technologies selected for their dual value to the DOE and local governments in the Northeast. LIRI was founded to develop and coordinate economic growth via introduction of new technologies. As a not-for-profit institution it is in an ideal position to manage the development of NEWMA through ready access to venture capital and strong interactions with the business community, universities, and BNL.

Another subcontract was written with a professor at SUNY/Stony Brook to perform an evaluation of new pyrolitic processes, some of which may be appropriate for development by NEWMA.

Independent endorsement of the business plan recently by another organization, GETF, with broad knowledge of DOE/EM-50 objectives, provides a further incentive for moving rapidly to implement the NEWMA strategy. This report describes progress made during the last quarter of FY93.

1. Background

During March 8-9, 1993, the Deputy Assistant Secretary of the DOE's Environmental, Restoration, and Waste Management Program attended a workshop at BNL to discuss the Alliance concept as it pertained to the Northeast. It was decided to bring together the diverse talents now existing in the Northeast to trigger the emergence of a highly competitive waste management industry, first locally, then on a regional basis, and finally, nationally as well as internationally.

A meeting of NEWMA was held on May 7, 1993, at the SUNY/Stony Brook Campus under the sponsorship of the Long Island Research Institute (LIRI). Attendees included representatives of the waste management industry and the Commissioner of Waste Management for the Town of Brookhaven (the largest political entity on Long Island, with a population in excess of 400,000). Several key needs of the industry were defined which spanned the gamut of waste stream separation, recycling and reuse, incineration, and landfilling. Several applicable technologies were identified which could serve as initial examples for technical and economic evaluation by NEWMA. Plans to implement NEWMA under the LIRI umbrella were also discussed.

Informal ties were initiated with several companies in the waste management industry. Included were those with innovative technologies suitable for evaluation by NEWMA (e.g., destructive distillation), those supplying data required for technical and evaluations, and those providing technical and consulting services to the industry as a whole.

DOE funding for the Northeast Waste Management Alliance (NEWMA) began in the last quarter of FY93. Therefore, accomplishments described in this report cover only that period of time. Earlier discussions were of a preliminary nature, and do not constitute work officially contracted by DOE/EM-50.

2. Organization

From the outset, the intent of this program has been to implement the philosophy established by the Office of Technology Development regarding the formation of regional alliances that would accelerate the creation of a vigorous and competitive waste management industry. A rapid start toward achieving that goal was made by utilizing existing organizational structures on Long Island to establish NEWMA. The Long Island Research Institute, a not-for-profit organization, was identified as a ready-made vehicle for coupling the activities of Brookhaven National Laboratory, the State University at Stony Brook, and other academic institutions in the Northeast with relevant new industrial technologies in the waste management field. Accordingly, a subcontract was awarded to LIRI to began the task of moving the Alliance forward towards the goal of commercializing waste technologies that will address the urgent environmental needs of the DOE.

The involvement of LIRI as a joint participant cannot be overemphasized. LIRI was established originally with a single-minded goal: commercializing technologies developed by its sponsoring organizations(i.e., BNL, SUNY/Stony Brook, Cold Spring Harbor Laboratory, Cornell University North Shore Medical Center). By initiating its activities with NEWMA, LIRI is expanding its horizons to include technologies developed at other federal labs and at

universities and industrial facilities. In addition, LIRI can facilitate the commercialization process by providing access to venture capital funds.

3. Fiscal Year 1993 Progress

3.1 NEWMA Business Plan

As mentioned earlier, activities at BNL in response to Dr. Clyde Frank's visit in March of this year began shortly thereafter in an informal manner. Discussions were held frequently between Laboratory management and staff and the designated future Program Manager, Peter Ritzcovan. These discussions included site visits, and were instrumental in establishing guidelines from which were drawn the key elements of a business plan.

The Draft Business Plan was circulated in EM-50 during late spring of FY93, and was ready to be executed when funding began in July of 1993.

3.2 Strategic Plan

An outline for a strategic plan to follow the general precepts of the business plan was developed. The first step in the strategic plan was the attainment of a secure funding commitment from the Office of Technology Development for FY94 and subsequent years. This was an obvious prerequisite for serious negotiations with industrial firms offering potentially significant new technologies. That commitment has not yet been made by EM-50.

3.3 Subcontracts

Concurrently, with the development of a strategic plan, a subcontract with the Long Island Research Institute was negotiated by Brookhaven National Laboratory to enable LIRI to start its tasks as coordinator of the NEWMA. This contract will be in place shortly after FY94 begins, but LIRI had already made its services available to the DOE on a pro bono basis during FY93 by chairing several meetings, participating in the planning process and making its headquarters available for discussions with potential industrial technology candidates.

A consulting appointment was initiated for Dr. Sheldon Reaven, a professor in the Department of Technology and Society at SUNY/Stony Brook. Dr. Reaven is an internationally recognized expert in environmental and waste management issues. He has already played an invaluable, pro bono role in the formation of NEWMA. Dr. Reaven is performing a preliminary assessment of selected major technology options for NEWMA with respect to their (a) potential for resulting in significant improvements in regional waste management, (b) potential for addressing DOE environmental restoration and waste management needs, (c) integration with existing waste management/environmental infrastructures and regulations, and (d) readiness for commercialization in the context of regional, national, and global market potential. His first technology focus will be pyrolitic processes.

3.4 Preparation of Technical Task Plan

The Business Plan and the LIRI subcontract are based on the premise that a Technical Task Plan for NEWMA has been accepted by EM-50. Accordingly, such a plan was prepared and submitted for approval during this period. It will be resubmitted in FY94 as a continuation of the FY93 activities.

3.5 Meetings with Industry, Academic, and Government Representatives

Informal meetings with representatives of companies that possess new technologies such as destructive distillation were arranged through the auspices of LIRI, and were held at LIRI headquarters in Setauket, New York.

Specifically, significant liaisons were developed with a Fortune 500 company serving the waste management industry. This company operates various facilities(e.g., waste-to-energy, recycling, etc.), provides consulting services to other waste management companies, and has assisted NEWMA in developing its business and strategic plans.

In addition, NEWMA is working with a company that provides important technical and economic data to the entire waste management industry. This effort is identifying the data needs of NEWMA, and planning an activity to establish the necessary knowledge base.

Discussions were also conducted with faculty at the State University at Stony Brook, New York, and elsewhere. A trip to Troy, New York was arranged in order to discuss NEWMA in relation to the recently established Brookhaven-Rensselaer Environmental Partnership (BREP). A Board of Directors consisting of three BNL and three RPI representatives was created to ensure continuity of interaction between the two entities.

Meetings were held with local, county and State officials to apprise them of the NEWMA program, and to seek their support, endorsement and pledges of cooperation. Positive responses in each instance illustrated the fact that these institutions recognize the immediacy of the waste management problem, and the innovative nature of the Alliance concept. Particularly encouraging were meetings with Mr. James Heil, Brookhaven Town Commissioner of Waste Management, and Mr. Ray Cowen, Regional Director of New York State Department of Environmental Conservation. Several discussions were held with each of them, leading to informal agreements that the Town of Brookhaven would permit use of a Town site at its landfill for various field evaluations, and that the NYS DEC will expedite its licensing process under the category of Research for such evaluation projects.

3.6 Related Activities

3.6.1 Meetings with EM-50 Managers

The visit to BNL by Clyde Frank in March was followed by several trips to DOE Headquarters by the principal investigators and BNL management. Dr. P. Palmedo, President of LIRI accompanied them on some of these trips in order to emphasize the key position that his organization holds in the NEWMA plan. Discussions were held with Clyde Frank, Kathleen Hain, and Gary Voelker on separate occasions, but the future of NEWMA was not

firmly established at these meetings although Dr. Frank encouraged us to continue our efforts.

3.6.2 New organizations

During this period BNL personnel participated in the establishment of several other entities that can be regarded as potential allies for NEWMA in the future.

BNL and Rensselaer Polytechnic Institute entered into an agreement to establish a partnership for the purpose of working on selected environmental problems. The combined expertise and facilities of the two institutions are viewed as a major asset for investigations of complex environmental problems. In addition, the important goal of training a new generation of students in environmental matters will be pursued.

A second, and related event, was the establishment of the Northeast Partnership for Environmental Technology Education (NEPETE). The Chairman of this organization is a BNL scientist who has brought together representatives from many community colleges to take the initial steps in this important project. Similar to Partnerships in other regions of the U.S., the Northeast Partnership will seek to strengthen environmental curricula in community colleges throughout the northeast, and will work with the other Partnerships to create a knowledgeable labor pool that can meet the needs of a growing domestic environment and waste management industry. The existence of such a work force is essential to the DOE's plans for accelerating the cleanup of its sites by increasing its reliance on this industry.

3.6.3 Conferences

The principal investigators participated in several relevant conferences during the fiscal period.

An important symposium was organized at BNL by Leon Petrakis and Allen Goland under multiple sponsorship of Congressman George Hochbrueckner (the prime mover), BNL, LIRI, the University at Stony Brook, and the Long Island Association. It convened on September 20, 1993, to address problems and opportunities in waste recycling, and was attended by members of industry, government and academia. P. Ritzcovan and J. Short represented DOE/EM. Each had an opportunity to hold private discussions with some of the seventy attendees during a day long series of panels, question and comment periods and informal breaks. E. Kaplan, P. Palmedo and A. Goland participated in the panel presentations, and a record of the proceedings was preserved on audio tape.

Three other important meetings were attended by one or both of the principal investigators. In May, E. Kaplan, A. Goland and P. Palmedo participated in the Annual Meeting of the Solid Waste Association of North America (SWANA) which was held on Long Island. Key industrial figures attended as did important members of regulatory agencies. This afforded the PIs an opportunity to make some useful contacts, and arrange future discussions. For example, subsequent meetings with Ray Cowen, Regional Director of the NYS Department of Environmental Conservation trace their origins to this meeting.

On August 17, 1993, E. Kaplan and A. Goland participated in a planning meeting at

Polytechnic University in Brooklyn, N.Y. concerning the Paris-New York City joint program on waste management problems. Members of the NYC Department of Sanitation were present also, and discussions touched upon possible future interactions between members of this very active group headed by Polytechnic's Professor Ilan Juran and NEWMA.

On September 2, 1993, A. Goland attended a multiagency meeting of Public Environmental Technology Export Stakeholders. This was the third of three such meetings held around the country to permit an exchange between governmental officials and representatives of the environmental industry who have had real experience in coping with foreign competition in overseas situations. The message that came through loud and clear was that this industry needs government assistance to strengthen its competitive position. Clyde Frank was one of the panelists, and was presented with arguments that must have reinforced his convictions regarding the Alliance concept. Finding and commercializing new environmental technologies, an Alliance such as NEWMA should place the environmental technology exporters in a much stronger position than they are in today.

Finally, E. Kaplan and A. Goland maintained contact with the EM-50 Strategic Laboratory Council (SLC) through its BNL representative, Frank Salzano, and by participating in many of the weekly conference calls of the SLC.

4. Expenditures

	(000)
Direct Salaries	$ 52.7
Matls, Supplies, Travel, etc.	$ 4.2
Indirect expenses	$ 7.8
G&A etc	$ 33.2
Subcontract commitments	$ 180.0
Total	$ 277.9

5. Fiscal Year 1994 Anticipated Progress

A full narrative of anticipated progress in FY94 is presented in the Technical Task Plan that is being prepared for submission. The key tasks to be accomplished during that fiscal period are:

1. Completion of a strategic plan for the NEWMA,

2. Establishment of formal relations with waste management industrial partners,

3. Evaluation and selection of technologies for initial field demonstrations, and

4. Preparation of field demonstration sites (e.g., Town of Brookhaven landfill and municipal recycling facility; Brookhaven National Laboratory; other locations in the Northeast).

Appendix 1 - Brochure Describing the Long Island Research Institute

WHO WE ARE

The Long Island Research Institute was founded by three of Long Island's major research centers -- Associated Universities' Brookhaven National Laboratory, Cold Spring Harbor Laboratory and the State University of New York at Stony Brook -- to promote beneficial uses of their own and other regional scientific and technical resources. North Shore University Hospital-Cornell University Medical College subsequently became our fourth participating institution. With financial support from the New York State Science and Technology Foundation and our participating institutions, we pursue innovative ways to transfer technology, bridging the gap between publicly supported basic research and private entrepreneurial initiative. In addition to fostering collaboration between industrial and scientific investigators, LIRI analyzes technology, development, and environmental strategies for industry, government, and financial institutions.

TECHNOLOGY COMMERCIALIZATION

Whatever form the project takes LIRI coordinates every phase of it from technology evaluation through business plan formulation and management team organization to obtaining seed and investment capital.

Working with experts from the scientific and business communities, our staff identifies promising technologies, evaluates their market potential, and devises commercialization strategies. Where direct licensing is not appropriate, we may structure joint ventures for development and commercial exploitation. If the product calls for a new enterprise, the Institute facilitates its creation.

The Institute has established cooperative relationships with sources of venture capital to finance the technology commercialization process and to provide management support to new ventures.

CONTRACT RESEARCH

All Institute projects are conducted with objectivity and confidentiality.

Drawing upon the region's scientific talents and facilities as well as our own staff, we carry out applied research and policy-oriented studies for public and private organizations. In addition to stimulating cooperative research between industrial and scientific investigators, we assess technologies and development strategies for industry, government and financial institutions and address technical and public policy questions affecting the region's economy and environment.

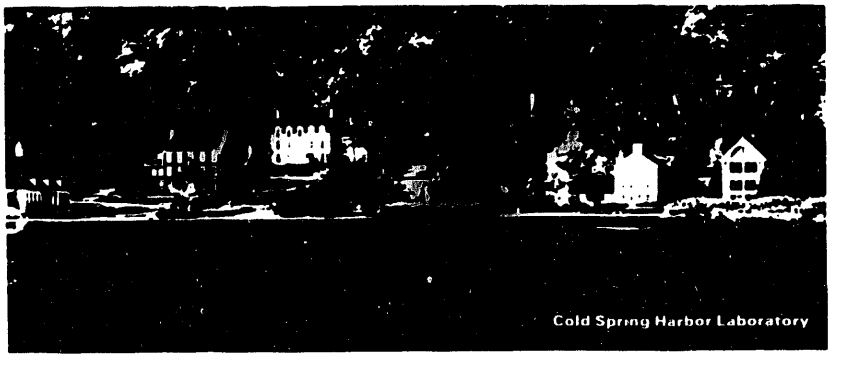
RESOURCES WE DRAW UPON

Long Island's research institutions employ over 2,000 researchers who conduct more than $450 million annually in sponsored research. While LIRI works with all significant researchers on the Island, our primary sources of technologies and expertise are our four participating institutions.


Brookhaven National Laboratory

Established in 1947, Associated Universities' Brookhaven National Laboratory is one of the nation's most comprehensive multidisciplinary laboratories, conducting basic and applied research in the physical, biomedical and environmental sciences and in selected energy technologies. Operated for the U.S. Department of Energy, Brookhaven's annual budget is over $350 million and its facilities, including unique world-class research instruments, are valued at over $2.2 billion. It employs about 3,300 men and women, and each year attracts a comparable number of external investigators from this country and abroad.

Directed by Nobel Laureate James D. Watson, Cold Spring Harbor Laboratory, a private non-profit institution, is one of the world's preeminent molecular biology research centers. It has a research staff of over 200 Ph.D.'s, M.D.'s and graduate students and an annual budget of approximately $33 million. Its pioneering investigations of the chemistry of proteins and nucleic acid, nuclear signal transduction, and the biochemical basis of cancer have already generated important commercial products and companies.


Cold Spring Harbor Laboratory

The University at Stony Brook, a graduate center of the State University of New York, has a research staff of over 1,600 and annual support totalling $72.4 million for organized research and sponsored programs. Among the principal areas of investigation with commercial potential are: advanced materials sciences, biotechnology, medicine, computing and information technologies, electronics and instrumentation, and environmental technologies. Stony Brook's regional development endeavors include the Small Business Development Center, and the Center for Regional Policy Studies, which conducts research on public policy issues.

University at Stony Brook

North Shore University Hospital - Cornell University Medical College

Long a leading medical care and teaching facility, North Shore University Hospital-Cornell University Medical College has rapidly become a nationally recognized biomedical research institution. Its Boas-Marks Biomedical Science Research Center, established in 1986, houses approximately 250 researchers who are spearheading medical advances in areas such as AIDS, cancer, infertility, and genetic illnesses and disabilities.

Long Island's research institutions encompass an array of gifted investigators working in a broad range of commercially relevant and socially beneficial fields of science and technology. Their programs cover most of the areas defined by national panels as essential to national security and economic competitiveness. These research assets are complemented by Long Island's industrial strengths in information technologies, instrumentation, and advanced manufacturing, and are enhanced by such specially designed supportive facilities for fledgling enterprises as the Long Island High Technology Incubator on the Stony Brook campus.

A RANGE OF TECHNOLOGY OPPORTUNITIES

The scientific talent and technical facilities used in LIRI's technology commercialization and contract research activities derive from existing programs at our participating institutions. These are some of the resources currently being developed.

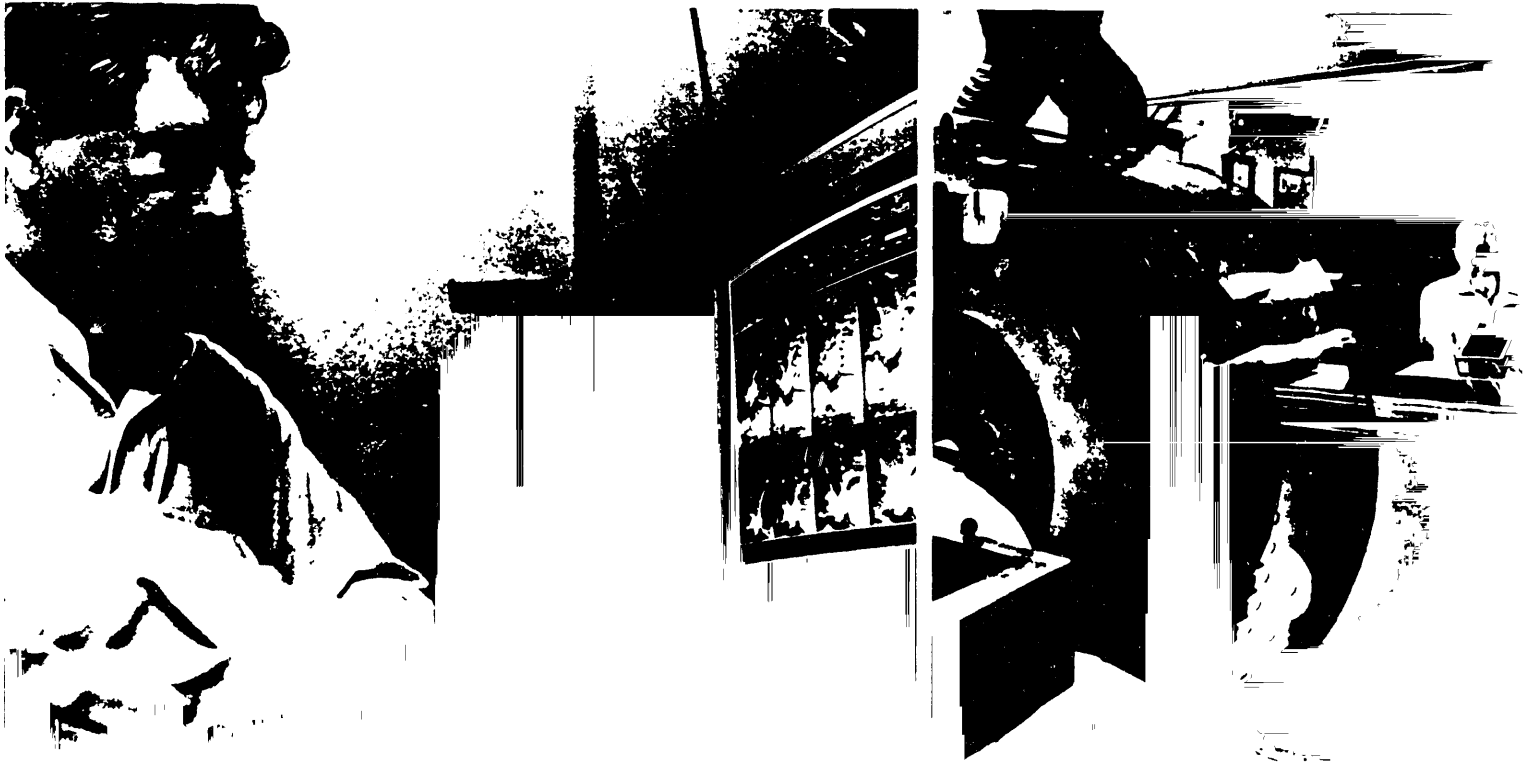
BIOLOGY AND BIOTECHNOLOGY

arious investigations of cellular and molecular mechanisms in humans, plants and animals show commercial promise. Brookhaven's molecular studies utilize such unique facilities as the Scanning Transmission Electron Microscope and the High Flux Beam Reactor for gene engineering to detect and prevent Lyme disease.

Stony Brook's Center for Advanced Technology in Biotechnology nurtures early phase collaboration between researchers and private industry. Cold Spring Harbor scientists are studying cell replication mechanisms as a means of suppressing cancer growth, genetic regulation of the HIV virus, chromosome changes associated with the human aging process, and genetic sources of plant disease resistance.

MEDICAL SCIENCES AND TECHNOLOGY

ong Island's medical scientists are investigating the causes and characteristics of various diseases and developing important new diagnostic methods and therapies. Cold Spring Harbor's Neuroscience Center employs molecular methods to study the development and functioning of the nervous system. Stony Brook University Hospital conducts basic and clinical research into the cellular and molecular mechanisms of AIDS and Alzheimer's disease, and invents and tests a wide range of medical procedures and devices. Research on cancer treatment is carried out at Brookhaven's dedicated medical reactor. North Shore-Cornell biomedical researchers investigate new approaches to various medical treatments and therapies.



Brookhaven's shock tube photolysis apparatus is one of several novel techniques used to analyze combustion processes, a key to reducing air pollution.

Stony Brook researchers enter w
erosion measurements directly o
screen of a hand-held computer
environmental field software a
on-site analysis. This combinatio
technologies suggests a promis
market with environmental appl

Researchers conduct surface studies with Brookhaven's National Synchrotron Light Source to produce more efficient catalysts and semiconductor devices.

Stony Brook professor John Mur
with digital signal processing IC
potentially applicable to high de
TV, two-way visual communicat
voice/data transmissi

ENVIRONMENTAL AND ENERGY TECHNOLOGIES

nvironmental research on Long Island addresses such diverse issues as marine management, waste management, understanding of atmospheric conditions, and environmental health. Brookhaven's early leadership in the development of nuclear power systems and technologies to manage nuclear waste has broadened to include solar energy, energy storage and more efficient fuel combustion.

Stony Brook's environmental programs include research in biologically based pesticides and environmental controls, biomass energy alternatives, and recyclables. Its Marine Sciences Research Center, a national leader in coastal oceanography, pursues fundamental research and its application to socially beneficial environmental strategies.

MATERIALS SCIENCE AND TECHNOLOGY

egional materials science research uses exceptionally sophisticated facilities to develop new materials with industrial applications. At Stony Brook's Center for High Pressure Geophysics, scientists explore basic characteristics of super-hard materials and develop applications for composite, superconducting, and "smart" materials and for thermal spray techniques. Brookhaven's National Synchrotron Light Source is the world's largest facility for research using x-rays, ultraviolet and infrared radiation, and its High Flux Beam Reactor is used for a variety of materials studies.

INFORMATION TECHNOLOGY AND SOFTWARE

he increasingly complex requirements of scientific research have stimulated computer scientists' efforts to develop commercially promising new technologies. Stony Brook's Computer Science Department -- ranked among the best in the nation -- is particularly strong in operating systems, computer networks, data bases, artificial intelligence, software engineering and computer architecture. It conducts specialized research in network computing, image processing, 3-D graphics, and robotics vision.

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The meeting at which the decision was taken to form the Long Island Research Institute was held at Cold Spring Harbor Laboratory on September 9, 1991. The participants were, from left to right: Nicholas Samios, James Simons, Leo Guthart, Walter Kissinger, James Watson, Jerry Schubel, John Marburger, Morgan Browne, Robert Hughes and Philip Palmedo.

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Andrew Walker
Director,
Long Island Chapter
The Nature Conservancy

Appendix 2 - NEWMA Business Plan

BUSINESS PLAN

for the

NORTHEAST WASTE MANAGEMENT ALLIANCE

AUGUST 1, 1993

Brookhaven National Laboratory
Upton, N.Y. 11973

Long Island Research Institute
Setauket, N.Y. 11733

THE NORTHEAST WASTE MANAGEMENT ALLIANCE

BUSINESS PLAN

1. Executive Summary

The Northeast Waste Management Alliance is a new form of partnership whose goal is to increase the economic, commercial, and environmental effectiveness of solid waste management (SWM) in the Northeast region of the U.S., through implementation of new technologies. This goal will be achieved by bringing together the relevant talents and expertise now existing in the Northeast to trigger the emergence of a highly-competitive waste management industry, first locally on Long Island under the umbrella of the not-for-profit Long Island Research Institute (LIRI), then regionally, and finally nationally as well as internationally.

The Alliance has already identified potential candidates in the waste management industrial sector. The next step will be to evaluate each technology prior to the establishment of a field program to demonstrate its merits. This validation and verification process will take place with each industrial partner. A concurrent economic analysis will take place shortly after the beginning of the field program, which, together with technical evaluations, will form the basis for decisions relating to the ultimate commercialization of the technology.

2. Background

2.1 The Waste Management Problem

Perhaps the most important, long-term environmental problem facing the Northeast during the next decades is what to do with the massive amounts of municipal and industrial waste generated daily. This region of the country has the highest population density, consumes more energy than any other part of the nation, and produces more waste while possessing fewest sites for their disposal. While the Northeast may be the best region for addressing this problem, the problem of municipal and industrial waste is a rapidly-growing concern in the rest of the country and throughout the world. Thus, competitive, effective solutions arrived at in the Northeast can form the basis of world-wide commercial activities.

The strategy addressed in this plan is the redefinition of solid waste as a resource, and conversion of this resource into marketable products by a viable commercial industry.

2.2 Concept of the Alliance

In October 1992, in response to a request from the Department of Energy, the National Laboratories formed the Strategic Laboratory Council (SLC) to carry out integrated planning to guide future investments in technological solutions to environmental restoration and waste management problems facing DOE and the Nation. An important SLC recommendation was the establishment of The Alliance, a new organization to facilitate interaction among DOE Laboratories, industry, and universities. The objective was to create an environment for cooperative development in key technology thrusts and cross-cutting technologies.

During March 8-9, 1993, the Deputy Assistant Secretary of the DOE's Environmental, Restoration and Waste Management Program attended a workshop at BNL to discuss the Alliance concept as it pertained to the Northeast. With the environmental and waste management problems discussed in the previous section as a background, it was decided to bring together the diverse talents now existing in the Northeast to trigger the emergence of a highly-competitive waste management industry, first locally, then on a regional basis and finally, nationally as well as internationally.

A meeting of the Northeast Waste Management Alliance (NEWMA) was held on May 7, 1993, at the SUNY/Stony Brook Campus under the sponsorship of LIRI. Attendees included representatives of the SWM industry, including a firm which is perhaps the preeminent source of information to the SWM industry, as well as the Commissioner of SWM for the Town of Brookhaven (the largest political entity on Long Island, with a population in excess of 400,000). Several key needs of the industry were defined which spanned the gamut of waste stream separation, recycling and reuse, incineration, and landfilling. Several applicable technologies were identified which could serve as initial examples for technical and economic evaluation by NEWMA. Plans to implement NEWMA under the LIRI umbrella were also discussed.

LIRI will bring together publicly supported basic research with private entrepreneurial initiatives, with a goal of facilitating the commercialization of technologies that will be evaluated and developed. The participants will come from private industry, Federal laboratories, academia, government agencies at all levels, and the DOE.

3. The Alliance

3.1 Mission

The Alliance aims at the creation of an internationally competitive waste management industry for the United States. To realize that vision, a new form of partnership will combine the expertise and resources of government, the scientific and technical capabilities of the research community, and the financial and entrepreneurial resources of the private sector.

To accomplish this mission, NEWMA plans to eliminate or reduce many of the problems which prevent the germination of successful technology-bearing companies (i.e., "decontamination of the playing field"). These problems include loss of flow control, contradictory or unreasonable regulations, lack of cooperation between the public and private sectors, and siting problems due to questionable health/ecological risk perceptions.

NEWMA further plans to reduce the Region's reliance on landfilling by introducing new technologies. This engenders emphasis on the 'recover' portion of the hierarchy referred to in the SWM industry as "Reduce, Reuse, Recycle, Recover, Dispose." This is a controversial subject because, generally speaking, "Recover" means waste-to-energy. Much of the controversy surrounding waste-to-energy focuses on the perception that it is always better to recycle than to recover. The Alliance will evaluate this commonly held opinion, and bring the environmental entities participating in the Alliance into the discussion. In some cases, after serious evaluation and elimination of mere opinion (i.e., biases), enlightened thinking may show that recovery is a better environmental (and cost effective) solution than recycling.

3.2 Strategy

The overall strategy is to identify the needs of private industry and to upgrade the technological capability of the private sector. This will be accomplished by by taking advantage of the research and development capability of Federal laboratories (BNL in particular) and academia, with support and facilitation of the U.S. government, using the implementation capability of private industry, and venture capital from financial institutions.

Each of the participants in the NEWMA will perform a well defined set of functions. LIRI will be the coordinating organization. During the initial phase of the project, attention will be focused on Long Island, and LIRI will provide management and guidance from the pre-competitive stages of a project through its early commercial development. Various participants will work together at different times in this process. Some functions will be ongoing throughout the lifetime of a project as they are typified by long lead times. However, the expertise accessible to the participants will ensure rapid decision-making, e.g., in the early validation of a proposed technological advance. Other participants come from waste management professional organizations, as well as environmental groups. See Appendix A. The functions of the participants are outlined in Section 6 below.

Partnerships will be established with industries whose technologies relate to solid waste management issues defined by the enterprise, and which require facilities for controlled field evaluations. These technologies will be evaluated for their technical success and ultimate profitability. As technologies are commercialized a cash flow will be established through patents, licensing, and other arrangements. These funds will be fed back into the organization with the goal of making the enterprise a self-supporting operation.

At several recent meetings discussions have been held with representatives from the waste management industry to identify critical problems which might be solved by the application of new technologies. Criteria for candidate technologies include their flexibility and safety (i.e., can they be applied to waste management problems with a minimum of change or retrofit?), as well as their being technically and economically effective. Examples of problems and associated technologies which are deserving of the NEWMA's attention (including barriers to their development) are discussed in Section 7.

Access to real-time, up-to-date, high quality data relating to the SWM industry will be required. For example, in order to site or specify an appropriate SWM technology, information is necessary on waste flow, waste characteristics, legal background (e.g., what kinds of regulations are in place), flow control status, other technologies in place in an integrated system, participants (e.g., companies, public sector entities, individuals), NAAQS/PSD status, suitability of technology to situation, demographics of area, geographics of area, political aspects/considerations, funding requirements, funding availability, appropriate financing instruments, etc. Another activity involves the ability to simulate different waste management scenarios, based on various assumptions. Additional activities will focus on the 'flow' of waste, the type and composition of various waste stream components, and the current disposition of various waste forms. This information will be useful for both technical and economic evaluations of various candidate technologies.

4. The Market

4.1 Structure

The U.S. produces more solid wastes (both municipal and industrial) on a per capita basis (and in absolute terms) than any other nation. According to a recent EPA publication, approximately 180 million tons of municipal solid waste alone was produced in 1988, and the per capita production of solid wastes in the densely populated areas of the Northeast was estimated to be almost twice the national average.[1]

As the amounts of solid waste increase, the number of acceptable disposal options appear to be decreasing (for a variety of reasons, including economic, environmental, and political). This has resulted in a large and growing interstate traffic in solid wastes. It has been reported that in 1989, 43 states and the District of Columbia exported some solid wastes for disposal elsewhere.[2] New York and New Jersey are the most aggressive solid waste exporting states, accounting for more than 50% of the total interstate

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1. U.S. Environmental Protection Agency, "Characterization of Municipal Solid Wastes in the United States: 1990 Update," PB90-215112 (June 1990).

2. Schubel, J.R., and H.A. Neal, Garbage and Trash, Can We Convert Mountains into Molehills?, Monograph Series of the New Liberal Arts Program, Research Foundation of the State University of New York at Stony Brook (1992).

traffic in solid wastes in 1989 (neither state imports such waste)[3] Trucking waste long distances is uneconomical, wasteful of energy, and less attractive as a long term solution as fewer sites become available to accept wastes from elsewhere.

By act of Congress and international law, ocean disposal is no longer an option. A recent United Nations regulation aims at the elimination of all dumping of plastics from ships at sea, and the limitation of garbage dumping (and the discharge of floatables) by ships between 12 and 25 nautical miles from shore.

Fully integrated resource recovery systems are becoming more attractive as a solution to regional solid waste management, as are environmentally benign manufacturing processes.[4] However, as discussed in a recent seminal monograph, "The options for ultimate disposal -- for that fraction of the municipal [and industrial] solid waste stream that cannot be eliminated through source reduction, reuse, and recycling -- are limited to two: landfilling and incineration."[5]

Several of these difficulties can be addressed by the application of new and innovative technologies.

4.2 Specific Market Focus

The Alliance will focus on specific, high-priority problems facing the SWM industry. It is important to note that the effort will not be one of finding applications for promising technologies, but rather the evaluation and ultimate commercialization of technologies which address important near and far term SWM industry concerns. These problems will be reviewed periodically through the mechanism of workshops sponsored by the NEWMA, as well as through input from several advisory groups to the LIRI technical management team.

4.3 Available Resources

The role of Alliance coordinator is a natural one for the Long Island Research Institute. LIRI was created by Brookhaven National Laboratory, the State University of New York at Stony Brook and Cold Spring Harbor Laboratory as a non-profit entity specifically to commercialize technologies from research laboratories and to foster productive interactions between research

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3. Moore, A., "Interstate Movement of Waste," statement presented to the U.S. Senate Committee on Environment and Public Works Subcommittee on Environmental Protection (18 June 1991).

4. Such fully integrated solid waste management systems are in operation in several cities. In Akron, OH, for example, an RDF combustion, recycling, composting, and landfilling operation is operating as a result of public/private partnerships. The recycled energy system (RES) produces steam, hot water, chilled water, and electricity. The recycling facility processes commingled ferrous metals, aluminum, glass, plastics, and paper. Dewatered sludge from these processes are sent to a composting facility. Only non-processible solid waste, ash from the RES, and residue from the wastewater treatment plant are sent to a sanitary landfill. See Kapper, R., et. al., National Waste Processing Conference, The American Society of Mechanical Engineers, Book No. 100201, pp. 299-311 (1990).

5. Schubel, J.R., and H.A. Neal, op. cit.

institutions and industry. LIRI's Board of Directors and its Scientific and Business Advisory Council already include senior representatives of the region's technical, industrial and financial communities. Furthermore, LIRI's senior management have extensive experience in managing large scale multi-disciplinary technical projects.

Private industry is the central resource of the Alliance. They bring critical management, commercialization, and marketing skills as well as technologies that have been tested in the field.

Several important resources at DOE National Laboratories provide important strengths to the NEWMA. The Environmental and Waste Management Center in BNL's Department of Nuclear Energy has recognized expertise in areas related to mixed wastes. These include materials development for containment, encapsulation, and in-situ establishment of barriers. Researchers have also developed new technologies in groundwater and air pollution monitoring devices. Researchers in BNL's Department of Applied Sciences have developed ultra-low concentration perfluorocarbon tracers, and are investigating the role of naturally occurring microbes in waste degradation and transformation, and advanced materials development for landfill containment and corrosion resistance.

BNL's Technology Transfer Division is presently positioning itself to take full advantage of the Clinton/Gore Administration's thrust in cooperative research and development activities (i.e., CRADAs). Each CRADA represents a cooperative program between personnel at National Laboratories with those from the private sector. It is anticipated that some field demonstrations of new technologies will be funded through the CRADA mechanism, or through indirect funding via LIRI.

Technologies under development at other National laboratories will be explored through existing databases presently in use by DOE technology transfer activities, as well as other contacts (e.g., the SLC described in Section 2).

Involvement of various academic institutions will provide the additional expertise needed to ensure success of the Alliance. Personnel at the Waste Management Institute at SUNY/Stony Brook have collaborated with BNL staff in areas related to bioremediation and materials development.

Rensselaer Polytechnic Institute (RPI) now offers courses in nuclear waste management, waste management and environmental planning and analysis in several departments of the school. Other activities such as the Fresh Water Institute and the Center for Multiphase Flow also have relevance to waste management issues. Recognizing that a new class of professionals will be required to monitor compliance, and to ensure safe handling and disposal of waste materials, RPI and BNL have initiated a partnership with industry to address waste technology research and education applications. This organizational framework will facilitate and coordinate multidisciplinary interactions and projects to meet the needs of several segments of society, especially the need to develop a pool of engineers and technologists trained in modern waste management.

The Department of Civil and Environmental Engineering at Polytechnic University (Brooklyn, N.Y.) offers a hazardous materials management program which includes site remediation, ground water pollution, hazardous and toxic waste management, and environmental health engineering. BNL has proposed several collaborative educational programs with Polytechnic University in FY 1994.

The Center for Nuclear Chemical Technology (CNTC) in the Department of Nuclear Engineering at the Massachusetts Institute of Technology has the largest faculty and body of nuclear engineering graduate students in the United States. The Department's mission includes applications of nuclear technology in industry involves areas of radioactive waste, chemical process technology, and fundamental issues underlying interactions of chemical environments and materials and how these interactions affect engineered as well as natural systems.

The Waste Management Institute at Cornell University's Center for the Environment deals with a wide range of waste management issues such as waste reduction, reuse, recycling, incineration, and landfilling. In addition, the Solid Waste Combustion Institute is a totally independent entity at Cornell University, established by the New York State legislature in 1987. It performs research and development activities related to combustion technologies. Other Cornell facilities include a biotechnology program in biodegradation and bioremediation, and a laboratory for environmental applications of remote sensing.

4.4 Other Alliance Advantages

A unique virtue/capability which the Alliance brings to SWM is an integrated, dispassionate, and single-minded focus. The SWM 'universe' has been struggling with divisiveness and controversy for many years. The Alliance will succeed by mounting a high-level, broad-based effort to quell controversy and replace divisiveness with cooperation, while creating competitive private industries at the same time. It is perhaps true that nothing short of an Alliance-magnitude effort will be capable of making progress in such a complicated, difficult field.

In developing this plan, we have drawn on the knowledge and advice of people from various levels of government, the research community, and the private sector. It has been clear that there is a wide recognition not only of the problems of the waste management industry in this country, but also of the potential for a new partnership such as described here. The involvement of all members of the SWM community is a central strategy of the Alliance and a critical advantage.

The existence and role of the Long Island Research Institute is a further advantage. LIRI is an operating not-for-profit organization which already constitutes an effective bridge between the research, business and financial communities. Early in LIRI's evolution, the importance of seed financing was recognized. A technology-oriented seed capital fund is being created to work with LIRI. That fund, and its relationships with the broader

U.S. and overseas venture capital community, will be extremely helpful to projects developed by the Alliance.

5. Alliance Tactical Action Plan

The Alliance create competitive commercial ventures through the following actions:

5.1 Development/Technology Selection

By the application of a set of preliminary evaluation criteria we have identified several candidate technologies for full scale Alliance evaluation. These are described in Section 7 below. Each technology will be evaluated for inclusion in the Alliance program by requesting expression of interest and qualifications from industries active in the particular field. Integral to the evaluation will be commercial, economic, and financial feasibility. That process will be complemented by a review of the regulatory situation, government attitudes, environmental constraints, as well as applicable scientific and technical resources in academic and government laboratories, particularly within the region. Health and environmental implications of the technologies will be given serious consideration at all levels of this process. Ultimately this process will result in one or more technologies to take through the next steps; the identification of the specific industrial, laboratory and/or academic partners: the budget for the next phase; and a business plan for full commercial implementation of the technology.

5.2 Demonstration

Typically, we expect that each selected technology will require a demonstration. The demonstration will be a combination of technology (and management) already existing in industry; scientific and technical expertise from BNL, Stony Brook, and other academic and research institutions; and relevant governmental agencies. The objective of the demonstration will be:

To transfer technology from the research institutions to the corporate partners;

To prove technical feasibility at a commercial scale;

To establish economic parameters as a basis for a "bankable" business plan;

To establish environmental acceptability and the basis for any required regulatory approval.

5.3 Commercial Enterprise Formation

The commercial enterprise that will exploit the technology may consist of the private sector participants in the demonstration. Other entities may also be involved. It may be a single, existing company; it may be a consortium of existing companies; it maybe a new commercial entity. (Structural relationships and institutional roles are discussed in the next section.)

Depending upon the industrial partners, this step may also include raising of private venture capital.

5.4 Commercial Implementation

In the final phase, the commercial implementation of the technology, both at the demonstration site and elsewhere, will be in the hands of the private sector. There may be good reason, however, for a continuing role for the research community in this phase. One of the shortcomings of the environmental management industry in the U. S. is the lack of a strong research program. Thus far it is for the most part a "low tech" industry. Thus, the model of the National laboratories and the universities acting as the basic research arm of a U.S. waste management industry (at least during a transition period) is appealing. It is particularly so because waste management is also "low tech" internationally and a governmental-industry partnership designed to create a U.S. high technology waste management industry could have very significant commercial implications for the country.

The evolution of the project structure is shown in Figure 1. As indicated there, there is an evolution of a project from within the rather complex, but nurturing Alliance framework to a commercial entity indicated in Phase III by "Company A." The latter may be a pre-existing company or new company created by the Alliance or a joint venture of some sort.

6. Alliance Structure

As discussed above, the Alliance brings both new technical resources and a new organizational approach to the solid waste management problem. (Figure 2) The structure designed for the Alliance is intended to bring together effectively all of the elements required to overcome critical institutional and technical barriers. It is a structure that will evolve over time as specific initiatives of the Alliance progress. Figures show the current Alliance organizational structure.

The major participants, and their roles in the Alliance are:

1. Alliance Board of Directors

   - Formulates Alliance priorities
   - Approves projects
   - Facilitates high level government and industry interaction

2. Alliance Coordinator - Long Island Research Institute

   - Evaluates technology/project commercial viability
   - Provides overall management and coordination
   - Provides fiscal management
   - Stimulates participation in Alliance entity
   - Designates and supervises Program Managers of individual Alliance projects
   - Structures cost sharing and private sector investment in projects/commercial initiatives.

3. Alliance Advisory Board

   - (Drawn from all participating entities)
   - Advises on Alliance policy and projects
   - Mediates environmental/technical controversy
   - Facilitates networking between Alliance entities

4. U.S. Department of Energy

   - Provides funding of enterprise start-up
   - Provides near term co-funding of individual enterprise projects
   - Encourages state and local governments to strengthen as initiate low-cost loans and no-cost grants.
   - Creates favorable climate for enterprise in other federal agencies
   - Coordinates Executive Branch participation in Alliance projects

5. U.S. EPA

   - Identifies high priority problems/needs

- Facilitates regulatory acceptance of Alliance objectives
- Works with state and local agencies to resolve regulatory anomalies
- Provides co-funding for technology development
- Facilitates appropriate regulatory changes
- Regional EPA Office works closely with the new entity to anticipate regulatory barriers to rapid commercialization
- Advises entity management on environmental policy
- Makes available relevant EPA expertise overcome perceived obstacles to progress.

6. Private Industry

- Proposes new technologies/ideas to Alliance
- Implements projects based on new or improved technologies
- Provides incubator for new technology and company growth
- Provides feedback to Alliance on technology performance
- Provides portion of project funding via cash or "in kind" services
- Provides flow back to Alliance from successful projects

7. National Laboratories, BNL acting as coordinator

- Perform independent technical evaluation of proposed technologies
- Supply technologies for Alliance projects
- Develop data bases required by Alliance
- Conduct research in support of Alliance projects and commercial entities
- Supply facilities for project demonstration and supporting projects
- Conduct environmental technology training programs with academic collaborators.

8. Academia

- Provides research and general academic expertise
- Coordinates education and retraining within Alliance objectives
- Participates in technology evaluations
- Provides general peer review

9. Environmental Organizations

- Participate in policy formation
- Participate in health and ecological risk evaluations
- Participate in technology assessments
- Participate in siting assessments

10. Municipal Agencies

- Provide guidance for needed research
- Provide guidance for Alliance policy making
- Identify high-priority environmental/work management problems
- Lobby state government in support of Alliance objectives
- Facilitate regulatory acceptance of Alliance objectives
- Facilitate siting of test programs and projects
- Provide sites for test programs and projects
- Facilitate presentation of project goals to constituents
- Facilitate permitting of Alliance projects

11. State Agencies/Government

- Identifies high priority SWM needs
- Represents economic development interest of states
- Facilitates regulatory development and/or changes
- Facilitates test program siting and implementation
- Facilitates permitting
- Co-fund projects that accelerate commercialization

12. SWM Professional Organizations

- Provide guidance for needed research
- Inform Congress & White House in support of Alliance objectives
- Provide formal review of technology evaluations

13. SWM Industry Organizations

- Provide guidance for needed research
- Assist Alliance in evaluating of technologies
- Provide guidance for Alliance policy making
- Inform Congress & White House in support of Alliance objectives

In order to facilitate efficient and rapid start-up of the Alliance, it is expected that a private sector SWM consulting firm will be hired to support LIRI in the early project phases.

7. Specific Technical Foci

The first step in identifying the initial technologies for the Alliance was to establish a set of relevant criteria. These criteria were:

1. The significance of the problem addressed by the technology as perceived by major actors (public, government, scientific, community, etc).

2. The potential for major contributions by the application of new science or technology.

3. An Alliance undertaking (e.g., a demonstration project) can make a difference and is practical.

4. The application is economically and commercially attractive (i.e., there is a large market for the targeted product as revised).

5. The technology has relevance to DOE's environmental management problems.

On the basis of the application of these criteria, the following technologies have been selected for initial Alliance consideration:

Incinerator Ash Recycling: Several technologies are already available for evaluation. Barriers to commercialization are health/environmental risk concerns, lack of acceptance by project owners/engineers who specify material to be used in construction (e.g., materials containing incinerator ash need ASTM or other "official" specification and/or approval). There is a need to evaluate offshore use of materials for massive development projects, as well as for road building.

Waste Stream Characterization and Handling Technologies (also known as front-end separation): There is a widely recognized but largely unmet need for better ways to identify, track, and physically sort discards and recyclables. Some potentially attractive technologies include: (1)

automated high-tech equipment for sorting recyclables at MRF's and transfer stations into materials-categories that can be selected as markets for recyclables change, (2) mobile truck-mounted automated waste stream samplers to provide economical, real-time auditing and monitoring services to business, industry, and government, (3) materials tagging and identification technologies allowing manufacturers to encode materials information in their products in ways that integrate with the sorting and auditing technologies outlined above, and (4) containers and ancillary devices to facilitate residential and commercial source-separation, integrated with purpose-designed commercial collection equipment and schedules, and commercial waste-reduction technology.

Waste-to-Energy Technologies: refuse derived fuel (RDF) systems [e.g., front end separation with combustion of appropriate fuel components (e.g., refuse derived fuel)] need design improvements, but may have great potential for superior environmental and cost effective performance.

While other thermal processing technologies may be promising (e.g., composting, wet oxidation, pyrolysis), they have a history which includes many significant failures. Early waste-to-energy facilities created controversy because they had very high profiles (e.g., they were newsworthy) and because some of them performed poorly. The poor performance was environmental, technical and economic. Several facilities had serious odor and other "public nuisance" problems. The most serious environmental issues associated with these facilities relates to air pollution, especially air toxics (e.g., dioxins, heavy metals). However, newer facilities perform better than most other combustion facilities (e.g., coal fired utility boilers, various kinds of industrial boilers). The improved performance of the newer waste-to-energy facilities has not been generally recognized by environmental groups.

The mass burn technology has become the predominant waste-to-energy technology. However, the RDF technology, which has suffered from performance problems typical of the first attempts at innovative technologies, nevertheless has the potential of being a more superior SWM technology than mass burn. The Alliance will select various RDF technologies for evaluation. There may be other waste-to-energy technologies deserving of Alliance evaluation as well (e.g., destructive distillation, pyrolysis, etc.) - but only after serious screening to ensure that the Alliance is not promoting an impractical SWM solution.

Bio-Technology: Technologies in this area which may be applicable to SWM are at the R&D level at this time. Nevertheless, biotechnology should be considered for the purpose of (1) bioremediation, (2) controlling gas emissions (e.g., H_2S can be oxidized), (3) breaking down of cellulose-based products, and (4) creating biologically-derived solvents for plastics. Long Island is a strong biotechnology center (i.e., Cold Spring Harbor, SUNY, BNL).

Landfills: Recognizing the existence of the large numbers of both operating and closed landfills, most of which leach, two important technological goals include: (1) "shrinking" existing landfills by exploiting their resources, and then to restore the land for useful, beneficial purposes, and (2) diversion of wastes that otherwise would be destined for landfills in and beyond the Northeast.

Waste distillation systems appear promising for their (a) economy, (b) ability to handle a large fraction of the waste stream [e.g., paper, plastics, organics (yardwastes, food), agricultural wastes, tires], (c) huge volume and weight reduction potentials (+95% and 80%, respectively), and (d) relatively benign environmental impacts. In combination with landfill metal 'mining' technologies, waste distillators can reduce the size of landfills. Cogeneration systems can be integrated with the distillators. (The distillators also are promising for on-site processing of institutional wastes.) New landfill methane generation and recovery techniques can provide cogenerated electricity or fuel for alternative vehicles. Waste heat from the distillators or methane systems can be used in greenhouses, aquaculture, and commercial heating. Bulk plastics- and ash-based secondary materials and composites can be used as landfill cover, leachate barriers, and general landscaping/infrastructure materials.

A large fraction of the waste stream now being sent to landfills out of the region could be accommodated by waste distillators, with significant savings compared to the cost of shipment or of incineration. Waste distillation technology is flexible, allowing integration with recycling programs and facilities so as to maximize the level of recycling compatible with changing markets and applications for recyclables.

8. Financial Analysis

It is premature to be able to analyze the financial aspects of the Alliance in any detail. If one considers the three phases of the Alliance indicated in Section 6, however, several observations can be made. First, as one progresses from Development to Demonstration to Commercialization, the financial stakes increase roughly an order of magnitude between phases. As indicated in Table 1, the balance between federal and private financial involvement shifts dramatically. One of the principal activities in Phase I is to analyze the prospective financial performance of each competing technology. A detailed project-specific business plan leading to private involvement will be developed in Phase II.

TABLE 1

Alliance Notional Financial Participation

	Financial Participation, %		
PHASE	DOE, EPA	INDUSTRY	PRIVATE CAPITAL
I Development	80	20[a]	
II Demonstration	50	40[b]	10
III Commercialization	5[c]	30	65[d]

Notes:

[a]In-kind participation

[b]In-kind and financial

[c]Related research support

[d]Dependent on industrial financial capability

APPENDIX A

Professional Organizations

The Air & Waste Management Association
The American Public Works Association
The American Society of Mechanical Engineers' Solid Waste Processing Division
The Association of State and Territorial Solid Waste Management Officials
The Solid Waste Association of North America

Industry Organizations

The American Paper Institute
The American Plastics Council
The Council on Plastics and Packaging in the Environment
The Glass Packaging Institute
The Institute of Clean Air Companies
The Institute of Scrap Recycling Industries
The Integrated Waste Services Association
The National Solid Wastes Management Association

Municipal and Government Organizations

The American Legislative Exchange Council
The Coalition of Northeastern Governors
The International City/County Management Association
The National League of Cities
The National Association of Counties
The U.S. Conference of Mayors (sponsors the Municipal Waste Management Association)
The National Conference of State Legislatures' Solid Waste Management Project
The National Governors' Association (sponsors the Committee on Natural Resources which focuses on SWM issues)

Environmental Organizations

The Sierra Club
The United States Public Interest Research Group
The Environmental Defense Fund
The Natural Resources Defense Council
The Audubon Society

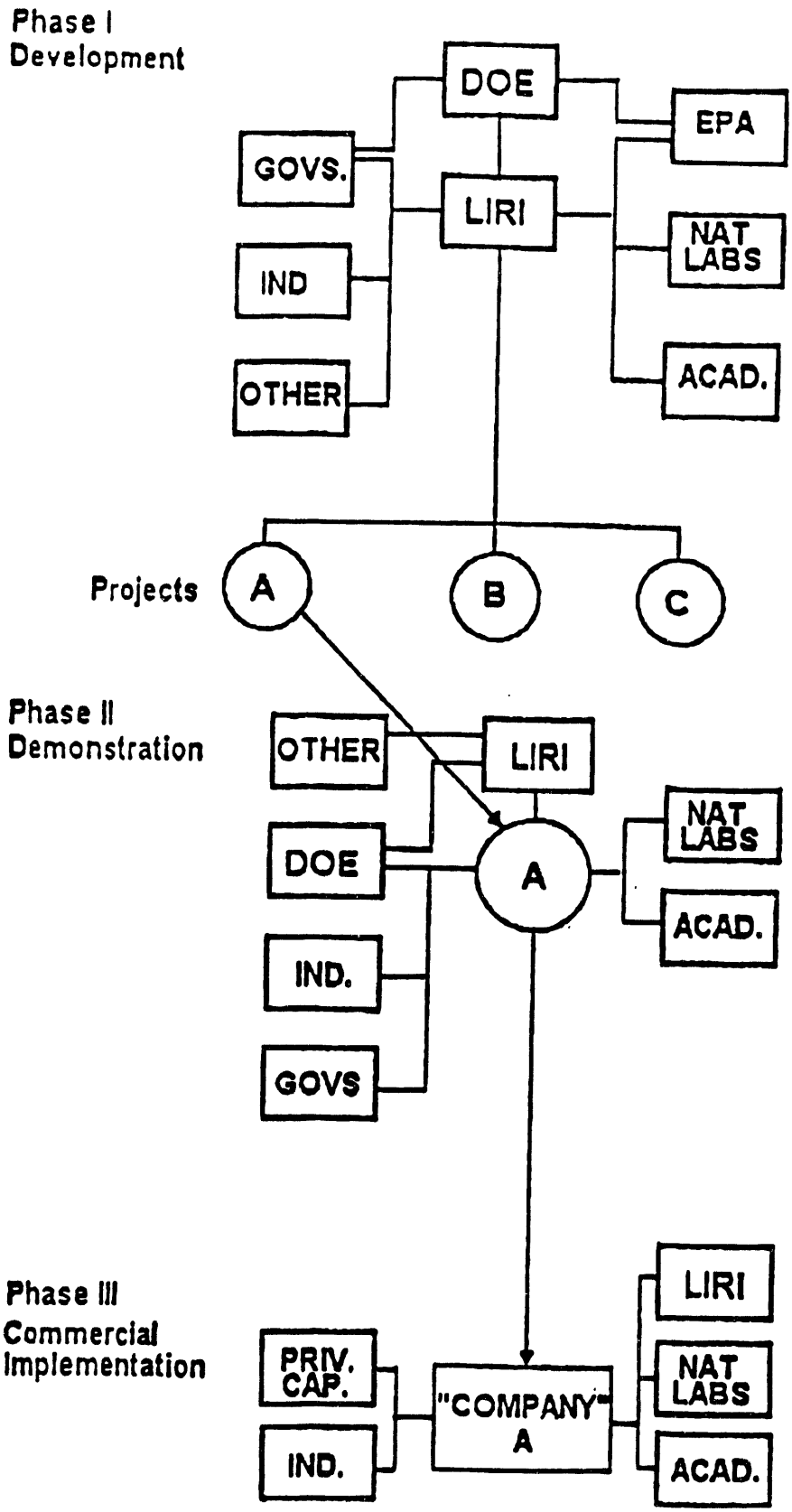

Figure 1 - Project Structure Evolution

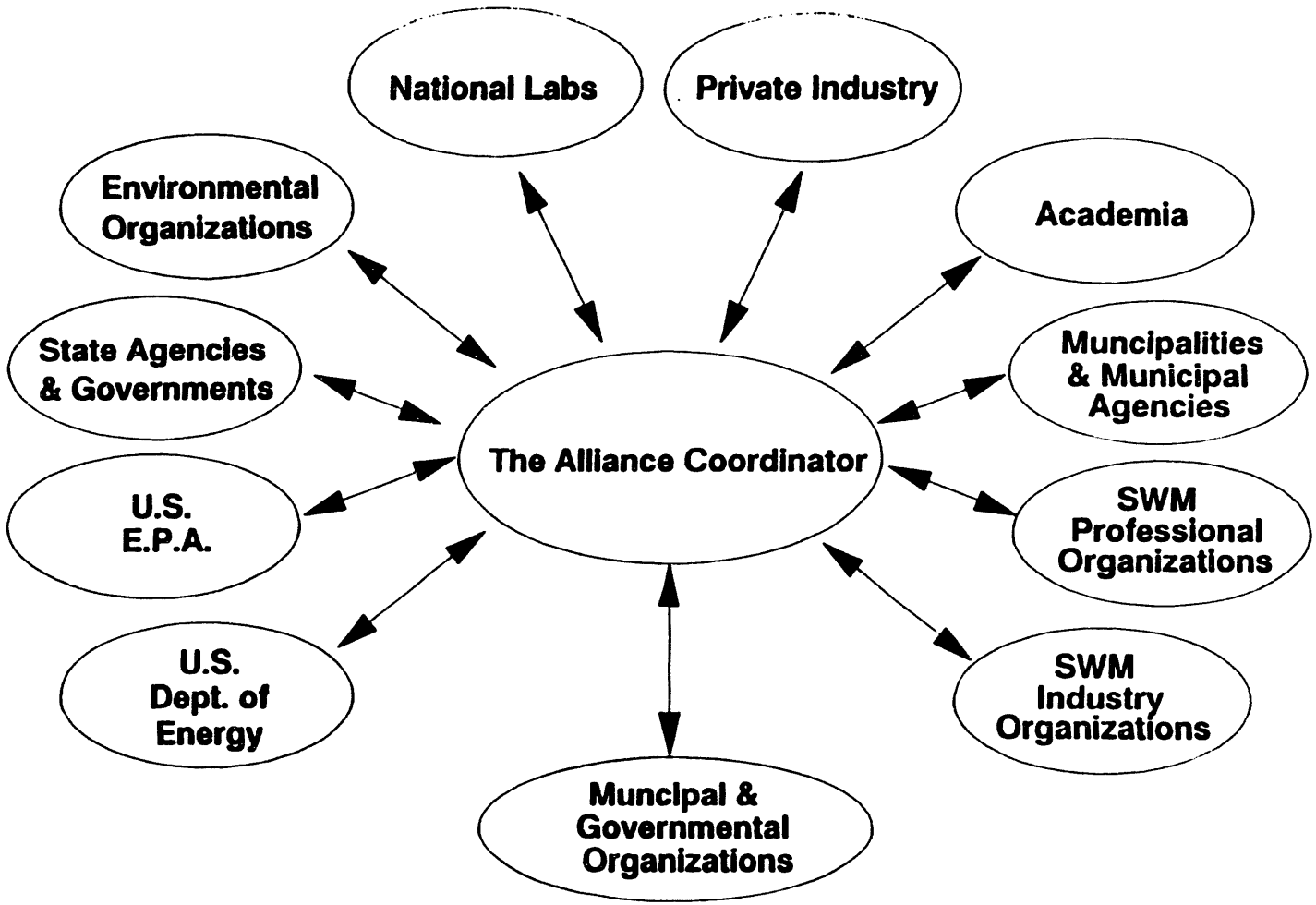

Figure 2 - The Alliance: Function of Elements

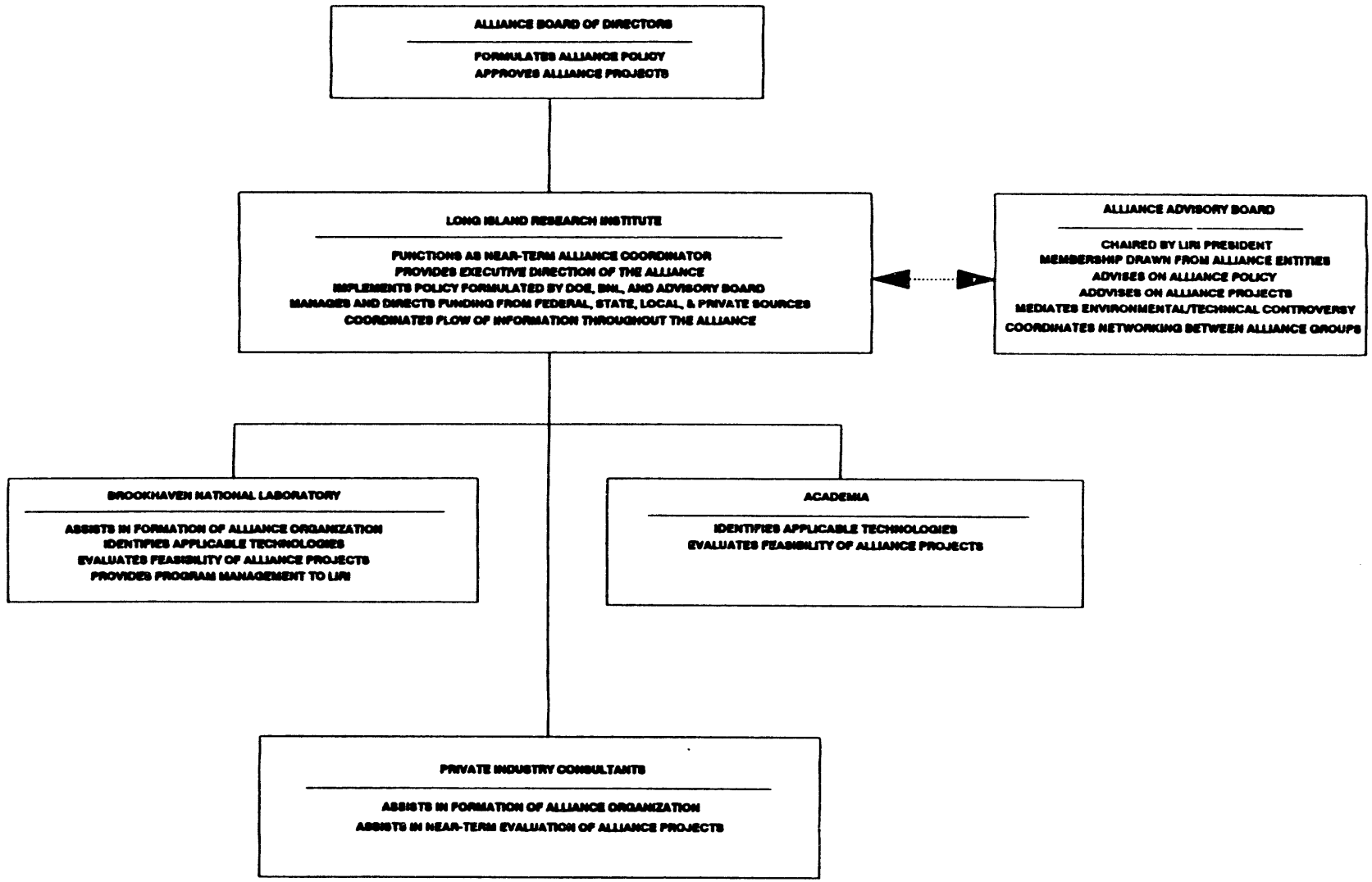

Figure 3 - Alliance Organizational Structure

Appendix 3 - -Agenda for BNL Recycling Symposium, and List of Attendees

AGENDA

CONFERENCE ON
"RECYCLING TECHNOLOGIES AND MARKET OPPORTUNITIES"

Brookhaven Center
Brookhaven National Laboratory
Upton, NY 11973

September 20, 1993

9:00 - 9:15 a.m.	Registration
9:15 - 9:30	Welcome - Dr. N. Samios, Director Brookhaven National Laboratory
9:30 - 10:00	***"RECYCLING: A LEGISLATIVE PERSPECTIVE"*** - Congressman George Hochbrueckner
10:00 - 10:30	Coffee Break/Discussion
10:30 - 12:00	**PANEL:** ***"RECYCLING TECHNOLOGIES AND GOVERNMENT PERSPECTIVES"*** *Moderator:* A. Goland, BNL *Panelists:* L. Swanson, SUNY; C. Clayton, SUNY; K. Carr, EPA; J. Heil, Town of Brookhaven; E. Kaplan, BNL.
12:00 - 1:30 p.m.	Lunch/Informal Discussion
1:30 - 3:00	**PANEL:** ***"RECYCLING: INDUSTRIAL PERSPECTIVE, NEEDS, OPPORTUNITIES"*** *Moderator:* D. Middleton, LIA *Panelists:* P. Kennedy, American Soil, Inc.; W. Ferretti, NYS Dept. of Economic Development; N. Roy, Glass Packaging Institute; R. Mullen, The Newark Group; A. Pascarella, American Plastics Council.
3:00 - 3:30	Coffee Break/Discussion
3:30 - 4:45	**PANEL:** ***"ISSUES CLARIFICATION, PROBLEMS, PROSPECTS, RECOMMENDATIONS"*** *Moderator:* J. Schubel, SUNY *Panelists:* P. Palmedo, Long Island Research Institute; S. Romalewski, NY Public Interest Research Group, Inc.; J. McGiffen, WTE Corp.; D. Allen, UCLA; R. Cowen, NYS DEC.
4:45	Conclusion

Appendix 4 - Agenda for Meeting at Polytechnic University, and List of Attendees

Ilan Juran, D. Sc.
Professor and Head

Department of Civil and
Environmental Engineering
(718) 260-3208

Polytechnic UNIVERSITY

Paris-New York Cooperative Urban Studies

From: Prof. Ilan Juran, Dept. of Civil Engineering, Polytechnic University

To: Solid Waste Management Research Group - RG II
See Attached List of Members

Date: 8-24-93

Re: Research Progress Meeting

The above meeting is scheduled for 10 AM-12 Noon, August 31, 1993 at Polytechnic University, Room 418, Roger Hall. We would highly appreciate if you could participate in this meeting. Thank you very much for your kind cooperation.

AGENDA

- Introduction, Objectives
- Progress - Preliminary Report (Knowledge Base)
- Discussion of Workplan
- Task Assignment
- Work Schedule

Sincerely,

Ilan Juran

cc: Ms. M. Bystryn, NYC DOS
Chairperson
Solid Waste Management Committee

Solid Waste Management Research Group (RG-II)

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