FY 2003 ANNUAL REPORT

Natural Energy Laboratory of Hawaii Authority

An attached agency of the
Department of Business, Economic Development & Tourism
STATE OF HAWAII

MESSAGE FROM THE CHAIRMAN

Richard Henderson

This year has been highlighted most dramatically by change. Change in the State, change in our tenant mix, change in funding, and most significant – change in the economy. The Natural Energy Laboratory has been moving toward self-sufficiency for several years with a goal of self-sufficiency in 2009. World and State events beyond the control of anyone at the Board level, NELHA Staff level, or community level dictated a new and immediate change in the way in which NELHA operated to meet its fiduciary responsibilities. NELHA has been challenged to become self sufficient in the next two years. To make this change required immediate action in increasing operating revenues and reducing operating expenses by the NELHA Board. Those difficult and often controversial decisions were made and put into effect at the beginning of this Fiscal Year.

Today, NELHA is on track with its budget. New commercial business ventures from around the world have continued to locate at NELHA. Despite concerns of adverse economic impact those concerns have not been realized. Research and Development projects continue to be attracted to NELHA and the tenant base has increased to an all time high. To answer the question, “was the change successful”, yes it was. With that said, the Board and the Staff will go forward with a smaller work force, a reduced budget, and an increase revenue base. While not there yet, we are on the road to self-sufficiency.

The “out of the box” thinking has increased the dynamics of NELHA. New companies, worldwide business investors, and the public marketplace have put added emphasis on the combination of science and technology. NELHA remains a model for aquaculture development, while refocusing on alternative energy development. Simultaneously, new commercial opportunities such as the Deep Sea Water – Drinking Water companies who have developed a marketplace for bottled drinking water have put a new face on the process of taking science and technology into the competitive marketplace and ultimately to the consumer. The NELHA Gateway DER Center has completed the design phase and actual construction is imminent. Prospective tenants for the new center await completion and the start of new energy projects.

The Board of Directors looks forward to this new future for NELHA and the State of Hawaii.

Sincerely,

Richard Henderson
Chairman of the Board

MESSAGE FROM THE EXECUTIVE DIRECTOR

Jeff L. Smith

This past year has been pivotal for NELHA. Challenged both by the necessity for NELHA to become self-sufficient within a very short time frame and simultaneously challenged as a State entity in a year with severe fiscal restraints.

To grow fiscally while reducing spending is challenging. The process calls for new out of the box thinking and conservation of materials and assets – balanced with reliability and dependability to our customers. The staff of NELHA was challenged this past year, and they responded admirably. The daily process of thinking before acting, putting forth new ideas and concepts, and working hand in hand with other State and Federal agencies has helped achieve the new goals. This smaller force of professionals has proven that growth and development can continue, despite fiscal restraints. I am proud of the team, what they have accomplished to date, and what they can do in the future.

The future appears bright for NELHA. Our current tenant base has expanded with current tenants growing and new tenants executing subleases and adding new infrastructure. Visits and meetings with new prospective tenants are a weekly occurrence at NELHA, where in days past few new prospective tenants were conveying interest.

Relationships and partnerships with our neighbors has improved and solidified on the island and within the State. Support for aquaculture and energy projects has increased as awareness has increased through outreach efforts of the Staff and the Board of Directors. The public and our elected officials are now seeing the results of the many years of support they have provided. As Hawaii becomes an even greater attraction for hightech and biotech development NELHA is beginning to show its true potential as an asset for the State.

The Staff and I look forward to the future challenges, and the further development of the Natural Energy Laboratory of Hawaii Authority.

Sincerely,

Jeff L. Smith
Executive Director

NELHA MISSION STATEMENT:

To develop and diversify the Hawaii economy by providing resources and facilities for energy and ocean-related research, education, and commercial activities in an environmentally sound and culturally sensitive manner.

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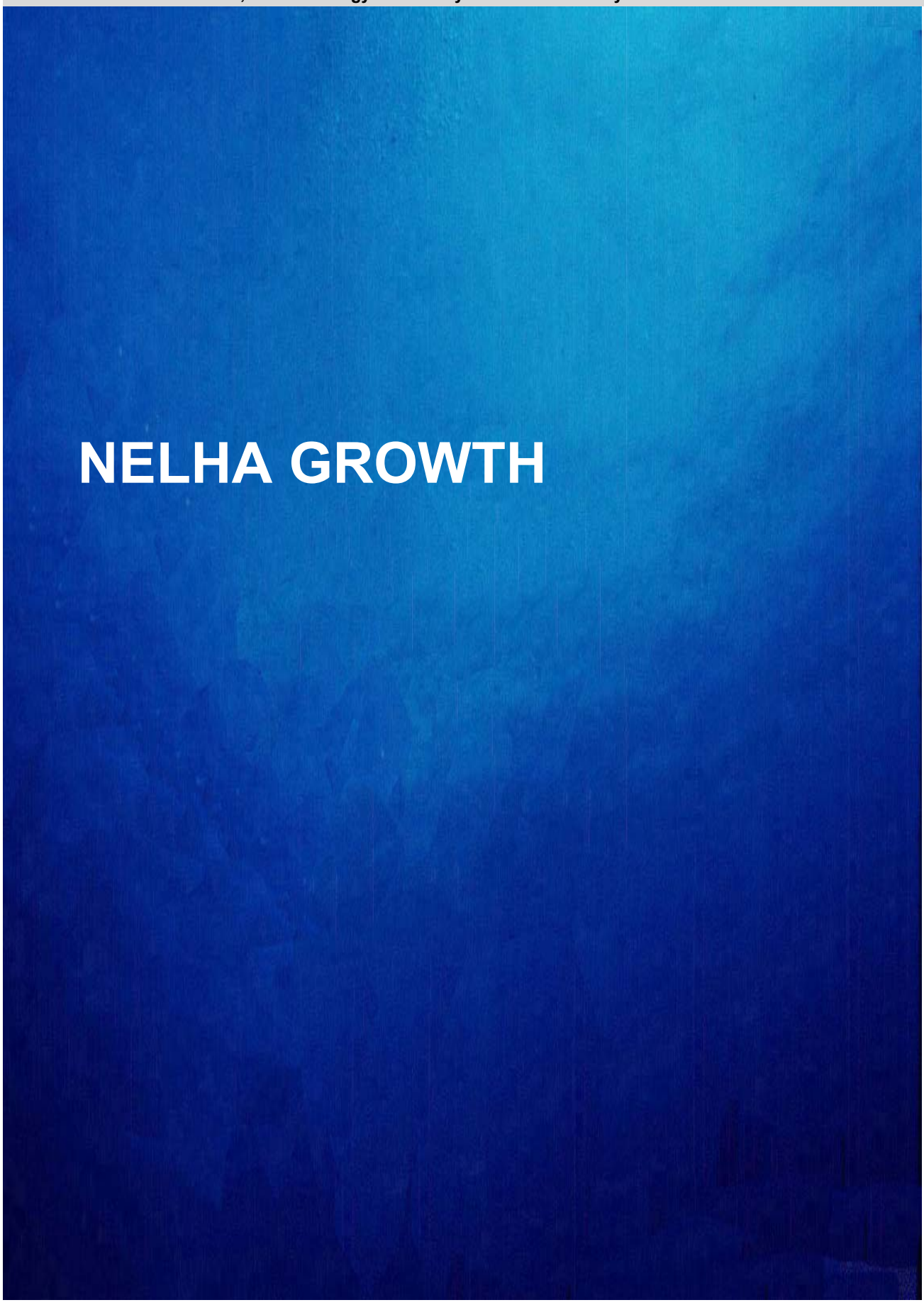


NELHA GROWTH

PROGRESS

THE NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY (NELHA) is a state agency which administers an 870-acre ocean science and technology park on the Island of Hawaii. Its primary focus is in bringing economic development and diversification to the West Hawaii community by attracting a variety of research, education, and commercial projects to become tenants and invest in development at this coastal island setting. NELHA's many assets include unique support facilities and infrastructure, pristine natural resources, and leasable land. Its dual-temperature seawater system is the only one of its kind in the world and sets NELHA apart from all other technology parks. Together, these assets have created a prime setting for innovation and new industry development.

The NELHA story now spans 29 years. The visionary state leaders who created NELH in 1974 invested in foundations for research and development of ocean-related resources, and over the next three decades, the state built an economic development center at NELHA on those foundations. Much has been accomplished, yet much remains to be done in the years ahead to ensure NELHA's success as an economic development center for West Hawaii.

During FY 2003, 34 projects in various stages of research, demonstration, or commercialization were active. These included commercial, education, and research projects in areas such as alternate energy, aquaculture, marine biotechnology, cold water agriculture, and other areas. There were 206 employees at Keahole Point with 18 employed by NELHA and the balance employed by tenants. Of these, 185 positions were privately funded.

As noted by Governor Linda Lingle in May 2003, NELHA is "an extraordinarily unique and valuable asset in West Hawaii." Acknowledging that it has much unrealized potential and is truly a diamond in the rough, state administration put into motion new legislation that would both challenge and transform NELHA as never before, pushing it further along on the path to financial self-sufficiency.

As a result, FY 2003 brought new fiscal challenges to NELHA during a time of statewide belt-tightening and administrative change. For the first time, the Hawaii State Legislature adopted a withdrawal of NELHA General Funds over a three-year period and also transferred $200,000 of NELHA Special Funds to state General Funds effective July 2003. This stepped up the urgency for NELHA to reach its long-term goal of self-sufficiency since General Funds comprised nearly half of the NELHA operations budget.

NELHA had already been decreasing General Fund dependency by an average of 6% per year, so the legislative action necessitated a new look at how to reduce expenses and increase revenues. NELHA reduced certain services to tenants, reduced scheduled repair and maintenance projects, increased attention to streamlining and making creative use of existing resources, and sought new ways to increase the revenue stream. By examining expense structures and increasing efficiency of operations, NELHA was able to reduce operating expenses for FY03 dramatically. The NELHA Board also established a new rate structure, new fees for services previously uncharged, new minimum rents, and approved a royalty policy for water bottling companies, among other revenue-generating measures. By the end of FY03, General Fund expenditures were reduced to 29% of total operations, with 71% funded by NELHA's Special Fund. (Table 1 and Figure 1)

Table 1. PROPORTION OF SPECIAL FUND (SF) AND GENERAL FUND (GF) OPERATIONAL SUPPORT

FY	SF%	GF%	FY	SF%	GF%
91	0%	100%	98	44%	56%
92	0%	100%	99	47%	53%
93	0%	100%	00	56%	44%
94	29%	71%	01	59%	41%
95	2%	98%	02	60%	40%
96	36%	64%	03	71%	29%
97	31%	69%			

Meanwhile, the Governor urged NELHA to look ahead and reexamine its role as a business incubator, and to look at new approaches to marketing both in the U.S. and abroad, and continue to find ways to develop essential infrastructure. During FY03, NELHA continued state-funded construction on the last phases of its newest seawater supply system, the onshore distribution pipelines. These will deliver seawater from two 55-inch diameter oceanic pipelines, one of them reaching an unprecedented depth of 3,000 feet. In addition, upgrades to the NELHA freshwater system added a 12-inch diameter potable water main line to meet County of Hawaii standards and connect to the planned County transmission line at the Queen Kaahumanu Highway.

Using federal funds secured through the supportive efforts of Senator Daniel K. Inouye over the last several years, NELHA made significant progress towards completion of the first phase of the long-awaited NELHA Gateway project. In August 2002, groundbreaking ceremonies were held for the planned Gateway Distributed Energy Resources (DER) Center facilities. By June 2003, contracts were pending for commencement of construction of the main building and first laboratory module.

TENANTS ARE AT THE HEART of NELHA's economic development engine. FY03 brought accelerated growth in tenant developments utilizing deep seawater and marketing high value products to Asia. NELHA tenant Big Island Abalone Corporation earned the prestigious Governor's Exporter of the Year award for 2003, building on a fast-growing Japanese market for its highly prized fresh abalone. During the previous fiscal year, the company had earned the Governor's New Exporter of the Year award as it launched its gourmet abalone sales to Japan. Koyo USA Corporation, the first endeavor of Koyosya Co., Ltd. from Gifu Prefecture, Japan, to enter Hawaii and the U.S. market for the manufacturing of health products, initiated and implemented on-site development at NELHA in record time. The NELHA Board approved its proposal in January 2003, quickly followed by site development and building construction completion by June 2003.

In marketing activities, the NELHA Executive Director continued to be active in the West Hawaii business community through membership in the Kona-Kohala Chamber of Commerce, serving on its Board of Directors, and hosting numerous business interests from the U.S. and abroad at NELHA. In addition, the Administrative & Projects Manager/Gateway Manager continued to travel and provide outreach to various groups in Hawaii and in other locations to spread the word about the Gateway development plans and opportunities. Between July 2002 and the end of June 2003, the NELHA Gateway Manager made over sixty public presentations on the NELHA Gateway. Also, in September 2003, the Leasing & Tenant Relations Specialist participated in a DBEDT-sponsored trade mission to Japan to introduce Osaka and Niigata to NELHA and other Hawaii-based business opportunities. DBEDT had also led a trade mission to Korea in June 2003, with other NELHA staff representation.

Interest in NELHA by Asian companies continued to rise throughout FY03, particularly with regard to deep seawater resources. NELHA's Executive Director hosted numerous visitors, including several groups from Asia during FY03. A Korean media company produced and aired a major television report on deep seawater-based companies at NELHA, sparking additional interest in NELHA from Korean businesses. Follow-up visits to Hawaii were made by Japanese officials and business representatives from Niigata Prefecture in January and July of 2003, and a Japanese company from Gifu Prefecture became NELHA's newest tenant in January 2003. A Taiwanese group planned to visit NELHA in July 2003 as they explored interests to develop their own deep seawater-based facility in Taiwan.

NELHA staff, along with University of Hawaii, Big Island Visitors Bureau and County of Hawaii government staff worked together to represent the Big Island at the Hawaii's Sister Summit 2002 conference in Honolulu, July 8-9, 2002.

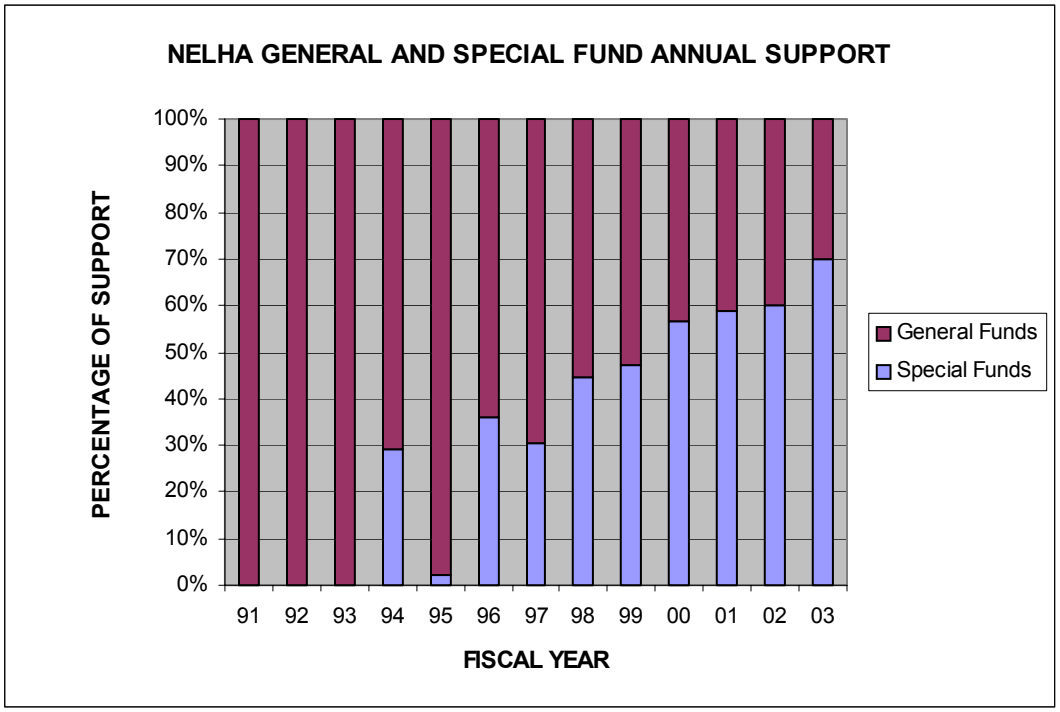


FIGURE 1. NELHA GENERAL AND SPECIAL FUND ANNUAL SUPPORT.

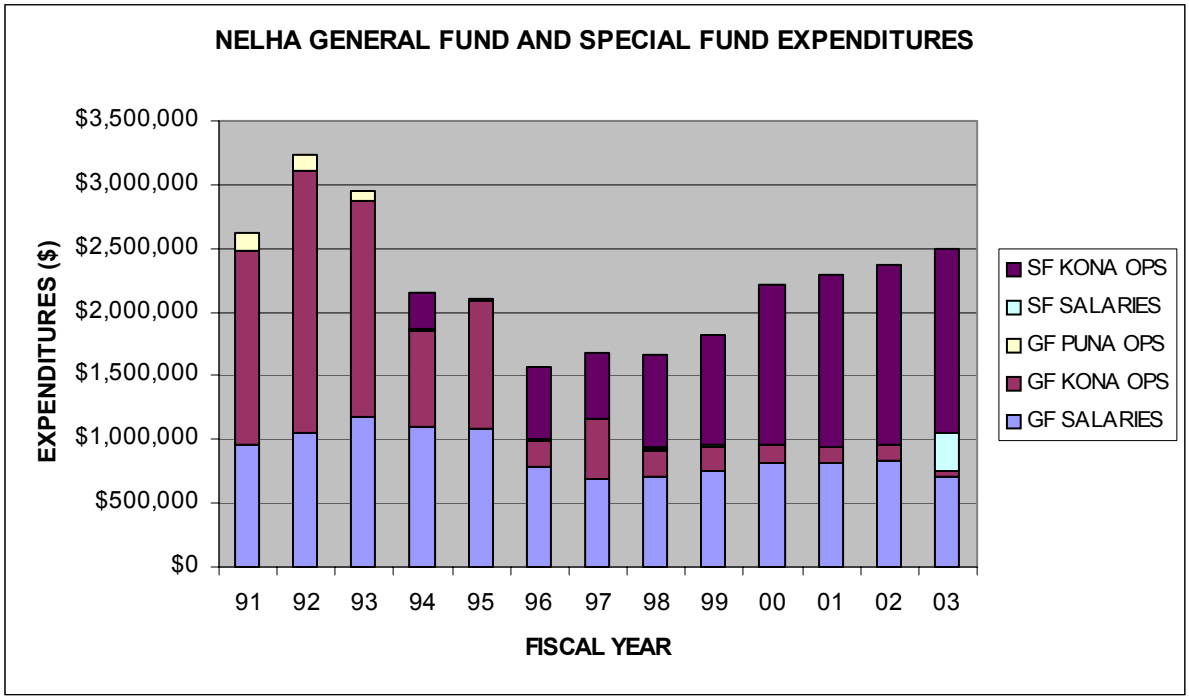


FIGURE 2. NELHA GENERAL AND SPECIAL FUND EXPENDITURES. NELHA's operational dependence on General Funds (GF) has been progressively decreased since FY94 as Special Fund support has increased. In FY95, due to a legislative oversight, NELHA was not granted authority to expend its Special Funds, resulting in a larger proportion of GF support for that one year. NELHA's long term goal is to be supported solely by Special Fund revenues of land and percentage rents from its tenants.

ECONOMIC HIGHLIGHTS

THE FIGURES SPEAK FOR THEMSELVES. NELHA tenant growth and activities continue to demonstrate the value NELHA's role in the Hawaii economy. Unlike many other government projects which demand a one-way drain on tax dollars each year, NELHA yields measurable returns to the state in terms of revenues, jobs, and economic activity. The less than $1 million of General Funds annually appropriated for NELHA operations yields in recent years has yielded more than three times that amount in taxes alone.

Most importantly, activities generated by NELHA and its tenants together provide approximately $40 million per year in total economic impact, calculated using standard economic multipliers. In the area of job creation, in FY03 NELHA and its tenants provide livelihoods through direct employment for 206 Kona residents. Of these jobs, 185 positions were privately funded. The many innovative tenant business enterprises ship unique and valuable products to destinations around the world each year. New products include health and nutritional supplements, fresh seafood, and new production technologies.

The NELHA story is a success story, continuing to evolve and bring new economic development and diversification to West Hawaii and this island state.

HISTORICAL PERSPECTIVES

CREATED ON THE HEELS OF A NATIONAL ENERGY CRISIS in 1974, NELHA has evolved through multiple stages over its 29-year history from a research support facility to the successful business development park that it is today. The Hawaii State Legislature first established it as a state corporation, named the Natural Energy Laboratory of Hawaii (NELH), on 322 acres of land at Keahole Point, adjacent to a new state airport facility, both accessed by a newly developing coastal highway. The initial function of the NELH facility was research support, focusing on the development of alternate energy and related technologies, specifically centered around the ocean thermal energy conversion (OTEC) process. Facility and project funds were administered through the Research Corporation of the University of Hawaii.

RESEARCH PROJECTS BEGAN in the ocean offshore of Keahole Point, in 1976 with a buoy-mounted biofouling and corrosion project and in 1979 with the world's first net power-producing OTEC plant, "Mini-OTEC," on a barge specially outfitted for the project. To develop the onshore facilities, it took six years of permit applications and extensive environmental impact studies before NELH obtained a master lease for 322 acres of coastal property from the state's Department of Land and Natural Resources (DLNR). This enabled the new agency to construct its first buildings in 1981 to house administration, operations, a power center, and a laboratory. A dual-temperature seawater system using 12-inch diameter pipelines was installed, accessing Class AA ocean waters from depths of 45 feet, and installing the world's first deepwater pipeline to access water from 2000 feet. Onshore OTEC-related and aquaculture research projects quickly ensued.

BY THE END OF THE FIRST DECADE of its existence, research and demonstration activities had firmly established NELH as the premier location for OTEC development and revealed the tremendous economic potential of other seawater-based industries. As a result, in 1984 the Hawaii State Legislature took the next logical step, authorizing commercialization at the state facility and turning NELH into a business development park. The first commercial tenant signed on in 1984 and would soon be followed by other entrepreneurial interests.

TO ACCOMMODATE THE ANTICIPATED NEED for more commercial space, in 1985 the Legislature created the Hawaii Ocean Science and Technology (HOST) Park on an adjacent property where commercial projects spawned by NELH research activities could grow and mature. The state's High Technology Development Corporation (HTDC) initially administered HOST Park, starting with 421.120 acres of land which was soon augmented to 548 acres. In addition to over 350 acres of leasable lands, HOST Park assets included a landscaped front entrance, a seawater system installed on NELH property, and a public beach park.

Groundbreaking ceremonies for the planned NELHA Gateway DERCenter were held on August 27, 2002. Senator Daniel K. Inouye (fifth from left) has been instrumental in providing support for this facility which will demonstrate renewable and distributed energy technologies and bring new energy research, development, and commercialization initiatives to West Hawaii.

IN 1990, NEW LEGISLATION MELDED NELH AND HOST PARK into one entity and created the Natural Energy Laboratory of Hawaii Authority (NELHA) to oversee operations, maintenance, development, leasing, and administration for the combined 870 acres, including all infrastructure, facilities, tenant leased property, and public beach park. NELHA was also reorganized as a state agency and administratively attached to the Department of Business, Economic Development and Tourism (DBEDT).

IN THE DECADE OF THE 1990'S, NELHA BLOSSOMED in the coastal desert of Keahole, inaugurating a new era of business development for the state of Hawaii. At the beginning of the decade, NELHA operating funds were supported 100% from state General Funds. During the 1990's, NELHA began growing its Special Fund through the collection of ground rents and fees for services from the new tenant businesses it was nurturing.

IN THE NEW MILLENNIUM, NELHA's tenants continue to mature and implement commercial development plans for facility construction along with production and marketing of new high-value products for the global market. New business startups continue to join the NELHA community, investing heavily in Hawaii's economy by developing productive facilities in the lava desert. NELHA's income from base rents is becoming more secure as tenants make long-term commitments through long term subleases. As established tenant businesses realize significant profits from sales of their high-value products, they have begun to pay percentage rents to add to the NELHA revenue stream. By FY03, Special Funds provided 71% of NELHA's operational support, and General Fund dependence had been reduced to 29%.

TO FURTHER BOOST NELHA'S REVENUE STREAM, focused development of the NELHA Gateway Project including the NELHA Gateway Distributed Energy Resources (DER) Center and the NELHA Gateway Ocean Resources and Commercial Activities Center continued in earnest. These projects will create new venues for research, education and commercial development in renewable energy, ocean sciences, marine biotechnology, and other areas, and grow new profit centers to boost NELHA's overall financial growth.

NELHA TODAY IS A SUCCESSFUL WORK IN PROGRESS and an economic model for other communities around the world. What began as an innovative setting for research and development in ocean science and technology has launched a new era of economic development and diversity for Hawaii and its people.

OUTSTANDING RESOURCES

A unique complement of natural and logistical resources at Keahole Point gives NELHA a decided advantage over other locations and other business development parks.

• INSOLATION is consistently high at NELHA, with the rate of incoming natural sunshine ranked above that of any other coastal site in the United States. Rainfall is correspondingly low, less than 15 inches per year, maximizing days of clear, cloudless skies.

• PROXIMITY TO AN INTERNATIONAL AIRPORT allows tenants to export fresh product directly to Asian markets, as well as those of the continental United States and other countries. The Kona International Airport at Keahole expansion plans include an international terminal and a closer working relationship with NELHA and its tenant companies as traffic to the Big Island and particularly West Hawaii increases.

A professional diver works on a pipeline in waters at Keahole Point during early years of NELHA's development

• LOCATION at Keahole Point is an ideal setting for an ocean science facility primarily due to its steep offshore bathymetry and narrow band of coral reef, characteristic of the geologically youthful Big Island. The steep bathymetry affords close proximity to deep ocean water, accessed within a mile from shore at Keahole Point. Contrast this to geologically older locations such as islands with more extensively developed reef systems or continental coasts where access to deep ocean water may typically be 50-100 miles from shore.

• A CONTINUOUS AND AMPLE SUPPLY of both warm and cold seawater is available at NELHA from the world's deepest and largest seawater pipelines. Two operating dual temperature pipeline systems and third under construction bring valuable natural liquid resources to shore for distribution in NELHA's seawater supply system.

• WARM SURFACE SEAWATER (SSW) is pumped onshore continuously, drawing from an inlet pipe located 600 feet offshore at a depth of 45 feet from the surface and 45 feet above the ocean bottom. The waters from which the NELHA SSW is drawn are rated Class AA in water quality and range in temperature from 76° to 82°F (24.5° to 27.5°C) year-'round.

• COLD DEEP SEAWATER (DSW) is continuously pumped from 2,000-foot depths via the world's deepest cold seawater supply pipelines and is distributed onshore through the largest seawater delivery system of its kind. The DSW is drawn from chilly deep ocean water resource less than a mile from shore at a constant 43°F (6°C), virtually pathogen-free and rich in the inorganic nutrients essential for plant growth.

• SEAWATER SYSTEM EXPANSION by addition of a new 55-inch diameter oceanic pipeline system is nearly completed, with a new pipeline, pump station, and distribution system to be online providing deep seawater from 3,000 foot depths by the middle of CY04. The deep seawater resource at those depths is reported to be ~4°C.

• THE LARGE TEMPERATURE DIFFERENCE ("DELTA T") BETWEEN SSW AND DSW brought onshore makes NELHA ideal for development of ocean thermal energy conversion (OTEC) technologies. Hawaii is one of the few locations in the developed world that is included in the broad band of oceanic waters in which these "delta T" conditions exist, circling the globe within about 23 degrees of latitude to the north and south of the equator.

• LOCATION WITHIN A STABLE POLITICAL CLIMATE is a plus for any business venture weighing options at sites around the world. Other places in the equatorial regions where warm and cold seawater might also be accessible tend to be in politically unstable settings in developing countries. The access to both cold deep and

warm surface seawater in one location, with a sufficient “delta T” to make energy production feasible through OTEC-related technologies, is not available elsewhere in a location as ideal as at Keahole.

• LOCATION WITHIN A FRIENDLY COMMUNITY is an added benefit to any business which establishes activities here. Schools, hospitals, and all the components of a highly desirable place to live are here in this community. An added plus is the Hawaiian “Aloha Spirit” which is alive and well in Kona, bringing not only thousands of visitors here again and again from year to year, but also new business ventures who make a conscious choice to include quality of life in their bottom line.

With all of these resources, NELHA offers its existing and potential tenants an ideal setting in which to explore and develop ocean-related research, business and education ventures.

RESOURCE APPLICATIONS

NELHA’s abundance of natural resources has provided fertile ground for the development of useful applications such as new ways to cool and heat, new ways to produce and save energy, new products to enhance the quality of life. For example, past research projects at NELHA have explored applications using the deep seawater (DSW) resource for energy production by ocean thermal energy conversion (OTEC), low cost energy-saving air conditioning, and thermally controlled environments for the culture of valuable crops through aquaculture and coldwater agriculture methods. The following section describes some of the applications for which cold seawater and other NELHA resources may be used, but this list is by no means complete. There are many other possible uses, some still waiting to be discovered.

A simple heat exchanger is at the heart of deep seawater-based cooling in the Research Compound.

• DEEP SEAWATER AIR CONDITIONING. One of the most cost-effective small-scale applications is for air conditioning since traditional methods use energy-hungry technologies. A simple set up using a fan and an automobile radiator, substituting deep cold seawater for the traditional liquid coolant, can provide a surprisingly effective air conditioning unit for a small room. Saltwater-induced corrosion might limit its lifetime, but replacement with use of recycled parts would keep costs minimal. Ideally, a heat exchanger such as flat plate titanium models designed for long-term use would provide years of virtually maintenance-free service. Such models are currently in use at a growing number of tenant as well as NELHA facilities at Keahole. Natural coldwater cooling using this application of NELHA’s ample deep seawater resource in three NELHA buildings alone saves NELHA and the state of Hawaii up to an estimated $4,000 per month in electrical costs. Deep seawater is used to cool freshwater which is then circulated in the building’s cooling system. The seawater is then recycled for other uses, so the cooling capacity is obtained virtually ‘cost-free’ in an integrated deep ocean water system.

In 1993, the NELHA Hale He'ena Laboratory Building was built in the Research Compound, a mirror image design of the first Laboratory Building constructed in 1981. Unlike the first Laboratory Building, which was originally designed to use a traditional air conditioning system and later retrofitted for DSW cooling, Hale He'ena was engineered specifically to take advantage of the deep seawater cooling technologies developed at NELHA. The building was later nominated for engineering project of the year by the Kona-Kohala Chapter of Hawaii Society of Professional Engineers. The project set the standard against which all future deep seawater air-conditioning systems would be judged.

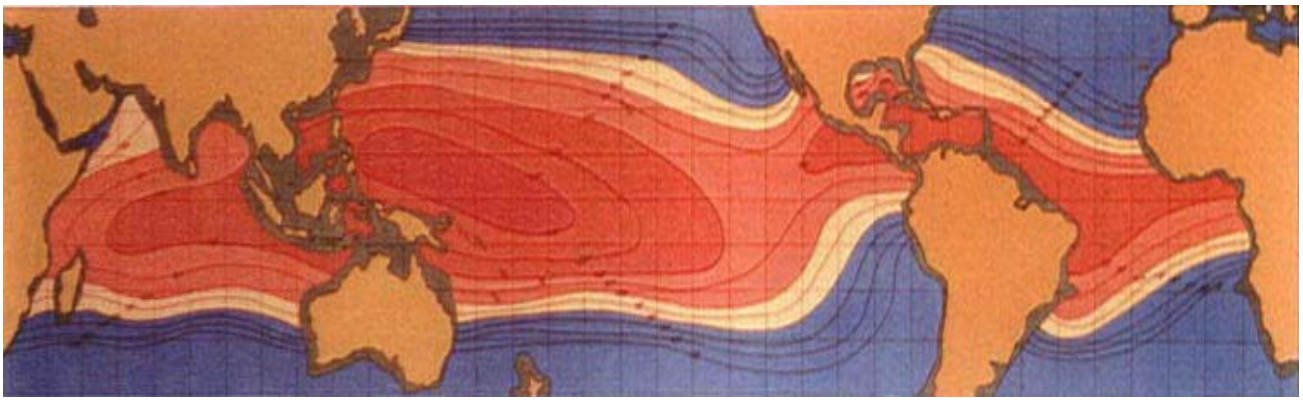
• INDUSTRIAL COOLING APPLICATIONS that use deep seawater to chill storage space can provide significant cost savings to traditional refrigerator or freezer technologies. Studies show that deep seawater air conditioning combined with industrial cooling has tremendous implications for improving economics and decreasing environmental impact of large scale coastal developments in tropical climates. This concept has excellent cost-savings potential especially when used on a large scale at a site where a cluster of coastal developments could be supplied with cold deep seawater from a central supply. For further cost savings, freshwater could be chilled using the deep seawater in a centralized heat exchanger, then circulated to a series of users via a closed loop to eliminate seawater-induced corrosion problems at user sites. The capital expended on such a project could be recouped over a relatively short period of time, making it extremely cost-effective.

• RENEWABLE ENERGY PRODUCTION from natural resources inspired the creation of the Natural Energy Laboratory of Hawaii in 1974. Ocean thermal energy conversion (OTEC), the use of ocean thermal differences to make electricity, had first been proposed in 1881, but it took the oil embargo of 1973-4 to catalyze political interest and commitment to support its research and development. Hawaii was an ideal setting since it is located within the tropical band of oceanic waters where the temperature difference ("delta T") between surface and deep seawater is sufficiently large to make OTEC an economically feasible energy production method. OTEC technologies, inherently large in scale, require correspondingly large scale seawater systems such as are located at NELHA. As a result, most of the world's major OTEC research projects have been located at NELHA since 1979.

Mini-OTEC, the world's first net power producing OTEC plant, was constructed and floated offshore of Keahole Point in 1979. The proof-of-concept demonstration system generated up to 52 kW of electricity and was hailed as a major breakthrough in ocean energy development. This successful project, a partnership between the state government, Lockheed Missiles and Space Co. and several other private companies, heralded the coming of a new wave of research and development based on cold and warm seawater resources. Since that time, the world's largest net power producing plant, rated at 210 kW gross, was built and tested at NELHA through a federally-funded research grant. It was preceded by a series of experiments testing components for the two main OTEC system types: closed-cycle and open-cycle OTEC. The next step in the R&D process will be a scaling up towards commercialization, developing pilot plant designs in the range of 1-10 MW.

Visitors can experience the "delta-T" of NELHA's special dual seawater supply firsthand in a fountain in the Visitor Area: icy cold next to tropically warm!

NELHA provides an ideal venue for research, development, demonstration and commercialization of a wide range of renewable energy technologies based on solar and other resources. As an island state with no indigenous fossil fuel resources, Hawaii actively seeks investments in practical, economical renewable energy technology development and application aimed at increasing the ratio of indigenous to imported energy resources. In FY02, Hawaii continued to rely on imported fossil fuels which supplied 89% of the State's total energy needs. Since energy is a key factor shaping Hawaii's economy, environment and standard of living, development of a self-sufficient, stable and environmentally friendly energy supply continues to be vital to assuring continued prosperity and a high standard of living for Hawaii's people.



Regions of Earth where the delta T between surface and deep seawater would allow OTEC and other deep seawater applications to be economical, indicated by the red, orange, and yellow coloration.

• DISTRIBUTED ENERGY RESOURCES (DER). According to the DOE's Energy Efficiency and Renewable Energy Network (EREN), DER includes a variety of small (from a few kilowatts up to 50 MW), modular power-generating technologies that can be combined with energy management and storage systems and used to improve the operation of the electricity delivery system, whether or not those technologies are connected to an electricity grid. DER devices can provide opportunities for greater local control of electricity delivery and consumption. On a broader scale, DER technologies are playing an increasingly important role in the nation's energy portfolio. They are aimed at more efficient use of energy and can be used to meet base load power, peaking power, backup power, remote power, power quality, as well as cooling and heating needs. DER technologies and resources offer a faster, less expensive alternative to the construction of large, central power plants and high-voltage transmission lines to meet the country's need for high-quality, reliable sources of electricity. NELHA and its planned Gateway DER facility will provide an ideal location for DER technology research, development, demonstration, and commercialization.

• SOLAR RESOURCES—The same intense sun that warms the surface waters around Keahole Point also provides a ready source of natural energy that can be converted into usable form through the use of photovoltaics, photobioprocessors, and other solar energy-dependent technologies. NELHA's Keahole Point location and low rainfall combine to make the site ideal for research and development of all solar technologies.

• AQUACULTURE PRODUCTS were recognized, early in the development of the NELH facility, as economically profitable co-products of the energy technologies being developed here. With its unique complement of logistical and natural resources, NELHA has become recognized as a premier location for aquaculture development. NELHA's abundant supplies of cold, clean, nutrient-rich deep seawater and warm surface seawater combine with the ideal weather conditions to provide optimum growing environments. Since the aquaculture industry is the fastest growing sector of the U.S. federal agriculture program, aquaculture is an attractive area for business development in Hawaii.

In 1979 the Mini-OTEC project at Keahole Point made world history as the first net power-producing plant to use the OTEC process, invented by French engineer Jacques D'Arsonval nearly 100 years before.

Many of NELHA's tenants are involved in aquaculture, growing various species of high-value marine or aquatic plants and animals. It is a relatively new industry that is growing in importance as world fisheries feel the increasing pressures of over-harvesting. There will be a greater need for alternative sources to replace or supplement the "wild" catch from the world's oceans in the future. NELHA's

unique resources are very well-suited for businesses that wish to capitalize on this market potential. From tropical reef fish culture in warm Keahole seawater to Maine lobster culture in Keahole deep seawater, any combination of temperature regimes may be used to create optimum growing conditions for plants and animals at no extra cost. This results in grow out system technologies that are more cost-effective than traditional chilling or warming technologies used by the industry elsewhere in the world.

High-value fresh abalone are being sent daily to international markets by NELHA tenant Big Island Abalone Corporation.

• MICROALGAE or microscopic plants grow extremely fast in the ideal conditions at NELHA. Over 30,000 different species have been identified worldwide, yet only a few have been commercially developed to date. Some of these are being cultured both in commercial production facilities and as experimental research ventures by businesses at NELHA. Products from microalgae include food supplements, pigments used in molecular medical tagging and cosmetic products, natural fertilizers, organic mosquitocides, cancer-inhibiting drugs, and many others. Microalgae can also be a vital link in the early stages of grow out of marine animals when larvae are microscopic. Companies such as Taylor Resources, Inc. and Coast Seafoods, Inc. culture large amounts of microalgae to feed clam and oyster spat which are sent after a few months to restock grow out areas located near company headquarters in the Pacific Northwest.

• MACROALGAE are larger marine and aquatic plants, also known as seaweed or sea vegetables. These can be used for food, medicinal resources, and other purposes. Like microalgae, macroalgae can be grown optimally at Keahole Point, and a number of businesses at NELHA are taking advantage of this opportunity. The low rainfall rate of about 15 inches per year greatly reduces the possibility of rainfall dilution of the growing medium in land-based ponds or tanks so that they can be left open to receive the free and ample sunshine year-'round.

• MARINE BIOTECHNOLOGY holds great promise for the companies at NELHA that choose to venture into this area. Both pharmaceutical and nutraceutical products can be obtained through the mass culture of a variety of marine organisms. Through life cycle manipulation, genetic engineering, and selective breeding, the production of both plant and animal species can yield a variety of useful products for commercial applications.

A vast market potential exists for a segment of the biotechnology industry based on the production of microalgae, microscopic one-celled marine and aquatic plants. Researchers point out that microalgae are the fastest growing plants on earth, able to double their weight daily in laboratory cultures, and exceeding the average growth of trees by a factor of 100. They grow optimally when provided with the natural resources of sunlight, water, carbon dioxide and nutrients. In turn, they can yield a vast array of high-value pharmaceutical and nutraceutical products, with applications to carbon dioxide mitigation, AIDS research, pharmaceuticals, drug discovery, food supplements, and even alternative energy.

NELHA's sunny location is ideal for growing microscopic plants that yield valuable commercial products.

A growing market demand for healthcare products created by the aging of the generation of "baby boomers" nationwide is providing new opportunities for products that can boost and maintain health and help combat the ravages of time. The few microalgae of the 30,000 known species that have been explored in drug discovery research have yielded compounds potentially useful in the treatment of cancer, HIV, and degenerative diseases. For example, a naturally occurring pigment, astaxanthin, obtained from certain microalgae species, is believed to improve human health and immunological support, as well as survival and fertility in fishes, poultry and livestock. Even the roughest estimates of market potential for astaxanthin are impressive. Reliable sources value the annual market at more than $185 million, growing at 8% per year. Emerging markets in poultry and livestock feeds could add another $125 million. World market price is $2,500 per kilogram. Near-term markets for microalgae products in general are estimated in excess of $3

billion per year. For the long term, some estimate these figures may exceed $10 billion per year.

Increasing efficiency is an important element of maintaining market competitiveness for commercial production based on both open pond and closed photobioreactor systems. NELHA provides an ideal location for the development of these technologies, and NELHA-based companies such as Aquasearch Inc. (recently reorganized as Mera Pharmaceuticals, Inc.) and Cyanotech Corporation are already reaping the benefits of their research and development successes in these areas.

Grapevines can be grown using deep seawater "cold-ag" methods which allow manipulation of growing seasons to maximize crop yields ten-fold over traditional methods.

• COLDWATER AGRICULTURE is a new area of development in which cold deep seawater is used to cool soil temperatures to create unique microclimates in a subtropical coastal setting. Test crops at NELHA's Keahole facility have demonstrated immense potential in the manipulation of growing conditions to increase and improve yield and shorten growing times for both temperate and tropical plants. The late Hawaii State Senator Richard Matsuura used the term "blue-green revolution" to describe this new field of agriculture which combines "blue" (ocean) and "green" (agricultural) technologies. He likened it to the "green revolution" of agriculture which increased local production of land-based crops in underdeveloped countries such as India and Thailand several decades ago. NELHA tenant Common Heritage Corp. is capitalizing on this potential, assisting third world countries to develop sustainable coastal communities by adapting integrated seawater systems to support food, water, and energy production.

NELHA's seawater-based laboratory facilities are available for rent by groups such as these ichthyologists studying laparoscopy during a workshop.

• DEEP SEAWATER-DERIVED PRODUCTS have recently been making a splash on the Asian international market. Intense interest in the mystique of deep seawater and any associated products, originally generated by activities in Japan, has spread to Hawaii. Asian countries have great interest in NELHA's unique pristine deep seawater resource and any products derived from it. These include desalinated drinking water packaged as bottled water or made into various types of beverages, mineral water, and mineral salts and associated products. All are key to a new industry at NELHA based solely on the deep seawater itself.

NELHA TENANTS

NELHA's tenants are the key to its success. It takes expertise plus a good dose of persistence, tenacity, and resourcefulness to make a new entrepreneurial venture succeed. NELHA tenants' stellar record speaks volumes for the NELHA model and the business acumen of the long time tenants who maintain steady business activity from year to year.

During the reporting period, 18 NELHA tenants were fully commercialized, seven were engaged in pre-commercial research, four were involved in basic research, and four were providing educational or community services. Of these 34 active tenants, 28 were from the private sector. By the end of FY03, five more new projects were preparing to join the NELHA community as tenants.

Percentage rent revenues collected by NELHA decreased slightly from the previous fiscal year, but were projected to rise again significantly for FY04. Note that tenants report by calendar year, so fiscal year figures only reflect what was collected during the reporting period. Several new tenants were in transition or preparing to transition into full commercial production for the coming year.

During FY03, NELHA's 34 tenants were leasing 227 acres or 31% of all its leasable lands. Of the 870 acres under NELHA's jurisdiction, 43% was occupied by tenants and NELHA infrastructure at the end of FY03. Approximately 70 more acres of NELHA lands were slated for new development during FY04 by six commercial tenants.

The following section, arranged in alphabetical order, provides a brief description of each tenant's activities at NELHA.

BIG ISLAND ABALONE CORPORATION

The Big Island Abalone Corporation (BIAC) capitalizes on global demand for fresh abalone products and its expertise and experience in abalone culture and production. The NELHA Board first approved BIAC's proposal in FY97, allowing the company to commence pre-commercial research phase activities in early FY98. BIAC is commercializing the closed culture of abalone, focusing on production of high-value Japanese northern abalone for the Asian market on the first ten-acre increment of its planned 60-acre aquafarm.

Michael Buchal, BIAC President, Governor Linda Lingle, and BIAC sponsor Victoria Hasty of First Hawaiian Bank at the 2003 Governor's Exporter of the Year awards ceremonies.

During FY 03, BIAC forged ahead with its commercial development on its newly completed 10-acre state-of-the-art abalone aquafarm in the HOST Park, now the largest single abalone production facility in the world outside of China. With a design capacity of 100 tons/year, BIAC's aquafarm has performed exceedingly well, growing inventory rapidly.

The company has over 1 million *Ezo awabi* abalone in stock and began shipping this highly prized species to market in the first quarter of 2002. Proprietary production methods have made the BIAC nursery one of the highest yielding in the world. The company launched sales of its new "Souvenir Six Pack" with JALPAK, a major travel agent, to allow visitors to carry home live abalone in an insulated carry-on box. BIAC ships both *Ezo* and red abalone to local, Asian and domestic US markets.

The company established a sales office in Nara, Japan, to actively sell live abalone in Japan. Main markets for FY03 were in Tokyo and Osaka, with sales are growing rapidly. In CY2002, the company exported 22 tons of live abalone to Japan from Hawaii which is about 26% of the total US export. CY2003 exports are anticipated to rise to about 60%. At this rate, BIAC will soon be the largest single exporter of live abalone to Japan among other countries such as Australia, South Africa, USA, China, Iceland etc. within the next couple of years. BIAC will continue marketing efforts in Japan, the prime market for this valuable and delicious product.

As one result of all its efforts, by the end of FY03 Big Island Abalone Corporation had been selected as the Governor's New Exporter of the Year for 2002 and would be well on its way towards earning recognition as the overall Exporter of the Year for 2003 for the State of Hawaii.

BLACK PEARLS, INC.

Black Pearls, Inc. (BPI) developed specialized hatchery technology for black-lip pearl oysters, *Pinctada margaritifera*, to allow production of valuable black pearls in Hawaii and the Pacific. BPI pioneered ocean leasing in Hawaii, to prepare the way for the state's first commercial pearl farming efforts. The company sought to obtain an ocean lease for a site on the island of Oahu that would be stocked with seed provided by the hatchery/nursery facilities at NELHA in Kona, and continues to work towards obtaining a lease, the first of its kind in Hawaii. Using its mobile hatchery methods, the company also operates a commercial pearl farm in the Marshall Islands, and has been working with established pearl farm operations in the Philippines to boost production. During FY02, BPI commenced development of its new commercial site in the NELHA Small Business Compound and engaged in transferring equipment and livestock from the Research Compound site to the new commercial facilities.

COAST SEAFOODS

A well-established oyster company originally incorporated in 1946 in Washington state, Coast Seafoods Company has become the largest oyster company in the U.S. Coast Seafoods operates a nursery at NELHA to provide an economical way to grow bivalve spat year-round. The organisms are shipped to Hawaii immediately after settling from the last swimming larval stage, when they are about 1 mm in size, then given a "Hawaiian grow out vacation" in the sunny climate of the NELHA facilities. Three and one half months later, they are returned to headquarters in the Pacific Northwest for final planting and grow out in the ocean.

At the company's Keahole Point facilities, clam and oyster seed production is the focus, with additional work to research further improvements to the nutritional content of the algae fodder and to optimize processing techniques used to grow the oyster and clam seed. During FY 02 the company reported a number of advances in culture methods, including: successful spawning, larval rearing and settlement of shellfish larvae; introduction of new commercially important bivalve species and establishment of new market territory; adoption of continuous algal culture methods; introduction of new high quality algal culture methods for shellfish larvae; and introduction of successful oyster culture methods.

COMMON HERITAGE CORPORATION

Common Heritage Corp. (CHC) exists to further its mission of the "management of innovation for the benefit of the Common Heritage." To this end CHC maintains a demonstration site at NELHA that incorporates an integrated system of deep ocean water technologies for a state of the art "starter system" that can be applied in coastal communities around the world such as Haiti, the Cape Verde Islands, Curacao, Mexico, and others with access to cold deep ocean water.

CHC first dedicated its unique DOW demonstration system at NELHA on January 31, 1998, to celebrate its many significant world class breakthroughs in the use of coldwater technologies. The CHC facility has since

CHC keeps two rows of grapevines in different production cycles year-round by manipulating DSW flow in the heat exchangers installed in the mini-vineyard soil.

become known as the birthplace of the blue-green revolution. The integrated DOW demonstration system employs deep ocean water sequentially to air condition the CHC office, to generate fresh water by condensation, to supplement irrigation, to generate fresh water in a development model of a desalinization device called a "hurricane tower" (patent pending), to cool a chill house and its chill boxes and food preparation area, to provide cold for the coldwater agriculture of wine grapes, to provide cold for the coldwater agriculture of a wide spectrum of agricultural crops normally grown in nontropical climates, to provide cold for coldwater agriculture of superior tropical crops and landscaping of the facility, to provide cold and nutrients for the aquaculture of sea vegetables, to provide cold and nutrients for the aquaculture of "fruits de mer," and to provide cold for creature comforts (water fountains, coldwater showers, field tents, and other habitat comforts).

During FY03, CHC prepared to launch its first commercial venture and develop the required Final Proposal/ Business Plan for submission to the NELHA Board of Directors.

CYANOTECH CORPORATION

Cyanotech Corporation has specialized in developing and commercializing natural microalgae-based products at NELHA since 1984 and has become NELHA's largest and most productive tenant, with 90 acres currently in production. The well-established company produces a variety of high-value products for the nutritional supplement and immunological diagnostics markets in addition to microalgae-based products for the aquaculture feed/pigments and food coloring markets.

As NELHA's anchor tenant, Cyanotech's annual revenues are in excess of $15 million, derived principally from sales of products made from unique strains of the microalgae "Spirulina" for the vitamin and supplement market. As the world leader in microalgae technology, the company produces high-value natural products from microalgae, and is the world's largest commercial producer of natural astaxanthin from microalgae. Products include BioAstin® natural astaxanthin, a powerful antioxidant with expanding applications as a human nutraceutical; NatuRose® natural astaxanthin for the aquaculture and animal feed industries; Spirulina Pacifica®, a nutrient-rich dietary supplement; and phycobiliproteins, which are fluorescent pigments used in the immunological diagnostics market. Spirulina and BioAstin are sold directly online as well. Ongoing research is showing many health benefits of the microalgae food supplements.

In July 2001, Cyanotech was awarded U.S. Patent 6,258,855, "Method of Retarding and Ameliorating Carpal Tunnel Syndrome," based on the protective properties of BioAstin natural astaxanthin. In May 2002, Cyanotech reported that a double-blind, placebo-controlled clinical study of its BioAstin natural astaxanthin product by an outside research group showed improvement in the condition of patients with Carpal Tunnel Syndrome. Patients in the study using BioAstin reported a reduction in both the severity and duration of pain. According to a recent Occupational Safety and Health Administration (OSHA) study, an estimated three million Americans suffer from Carpal Tunnel Syndrome with total costs to the economy, including workplace disruption, estimated to exceed $15 billion annually.

In a move to better service its growing customer base in Japan, Cyanotech formed a Japanese business unit, Cyanotech Japan YK, with an office in Tokyo, commencing January 2002. Through this unit, Cyanotech will be able to economize on shipping, provide more timely delivery to customers and allow customers to conduct business in Japanese Yen rather than US Dollars. Of interest to Japanese as well as other aquaculture

interests worldwide, feeding studies in Japan have shown that NatuRose is more effective than synthetic astaxanthin, particularly for aquacultured species such as the popular finfish Sea Bream (or “Tai”), a major seafood product in Japan. NatuRose has also been shown to be very effective when used with other species of fish and land animals.

In April 2002, Cyanotech announced new clinical evidence suggesting that the use of Spirulina stimulates the human immune response to cancer. This is the second cancer study with Spirulina on humans and the first to suggest a possible mechanism. Japanese researchers at the Osaka Center for Cancer and Cardiovascular Diseases found that a hot water extract of Spirulina taken orally caused a statistically significant increase in both the number and the effectiveness of immune cells called natural killer cells.

Cyanotech currently markets its products in the United States and thirty other countries through a combination of retail, wholesale and private label channels. As evidence of its environmentally responsible philosophy, Cyanotech was the first microalgae company in the world to receive third party organic certification as an ISO 9002 Registered Quality System. The company incorporates natural production methods and resources as well as extensive recycling of raw materials and nutrients. The Cyanotech production system operates without the use of pesticides and herbicides, and does not create erosion, fertilizer runoff or water pollution. These methods make good economic as well as environmental sense, resulting in lower operating costs overall.

ENZAMIN USA

Enzamin USA, Inc. is a company with origins in Japan where it has a well-established product line based on *Bacillus natto*. This bacterial strain is derived from fermented soybeans, or *Natto*, a food item reputed to have many health benefits and popularized in Japan since the 17th century.

Enzamin site blessing at their 3-acre commercial lot took place on August 27, 2002.

In September 2000 the company received approval to commence pre-commercial research at NELHA to develop health drinks, health foods, dietary supplements and skin care products utilizing water and minerals derived from DSW. Enzamin has a previous record of success in the beauty care business with over $100M annual sales. It is a solid company with an excellent reputation and the financial ability to be a long term asset to NELHA due in part to its strong existing market and distribution network. It currently sells diet drinks, supplements and beauty aids I over 20 major spas and over 6,000 beauty shops. One advantage the company has is its broad base with many products which makes it less vulnerable to the whims of a fickle consumer market.

Research and development activities, including test marketing of new deep seawater products, continued during FY03. Funds are already available internally to accomplish pending commercial development plans.

To date, the company reported it spent approximately $1.9 million at NELHA and proposes to invest an additional $4 million to build a production facility in the HOST Park. The company is very excited about the opportunities available through the deep cold seawater and believes that they can be a very strong success story for NELHA and the State of Hawaii. Enzamin’s commercial development plan consists of two phases with construction on a desalination facility to be followed a period of test marketing to confirm that the market and customer acceptance is favorable. Subsequently Enzamin is prepared to rapidly implement expansion plans with completion targeted for the following year.

As the first step toward commercialization, Enzamin successfully negotiated a long term sublease with NELHA on a 3-acre site in HOST Park, and by January 2003 the sublease document had been signed by both parties.

Enzamin feels it can enhance NELHA's reputation by developing strong ties to the local community through such avenues as job creation as well as donating health products to hospitals, nursing homes, and other health facilities.

Ambassador docent Roy Damron explains NELHA's accomplishments to interested visitors.

FRIENDS OF NELHA

Friends of NELHA (FON) is a newly formed non-profit corporation whose sole mission is to support the education/outreach and public relations needs of NELHA. Most of its members are trained community volunteers who serve as NELHA "Ambassadors," making weekly presentations about NELHA to interested visitors. The West Hawaii Sea Grant Extension Agent from the University of Hawaii at Manoa, whose office is also located at NELHA and who has provided an outreach presentation for NELHA, supervises the docent training program.

The concept for a FON group is an outgrowth of NELHA's needs for outreach services. From 1999-2001, the demand for public education and special group presentations grew beyond the capacity of both Sea Grant and the NELHA staff. It became increasingly apparent that a volunteer support group should be established. With the help of the Hawaii Community College's Rural Development Fund, training courses began for the volunteers, who became the "Ambassadors" for NELHA. The Ambassadors also became the core cadre of the Friends of NELHA.

During the reporting period, 15 volunteer Ambassadors provided 89 presentations (400 hours), reaching 2461 adults and students. Other FON volunteer activities included building and maintaining exhibits, building teaching props, sign holders, tables for display and clean up of areas, including the bathrooms on visitor days. Total hours for these activities 210 hours or $3,150, not including materials and equipment donated by individuals. In addition, FON Ambassadors offered their time to support NELHA events upon request. In late 2002, preparations to open a FON Store at NELHA were completed. The store highlights tenants' products and provides visitors with an opportunity to purchase something related to NELHA. Storekeeper volunteers spend at least 4 hours per day, two days per week attending the store in conjunction with public presentations. Another FON volunteer provides bookkeeping services for free.

The FON Board of Directors meets almost monthly and individuals have provided uncompensated time on various projects including marketing, legal and financial assistance and guidance, research exhibit work and other tasks necessary for the emergence of this not-for-profit support for the NELHA facility. The total value of in kind time, materials, and equipment provided through the Friends of NELHA was conservatively estimated to be at least $16,000 for FY '03 and is tending to increase with each year.

GEORGIA INSTITUTE OF TECHNOLOGY

Dr. Jeanette Yen of Georgia Institute of Technology, formerly with the State University of New York at Stony Brook Marine Science Center, has been conducting research at NELHA periodically for many years. She focuses on the micro-processes involved in the feeding behavior of a type of deep seawater copepod. Living in all the oceans of the world, copepods are small marine crustaceans which form an important link in the oceanic food web, passing nutrients from single-celled plants (phytoplankton) to larger animals such as fish, for whom they serve as food.

Dr. Yen's research involves the study, on a microscale, of fluid dynamics involved in copepod feeding behaviors. She relies on the supply of experimental organisms obtained by straining the incoming deep seawater supply at NELHA. Obtaining specimens by this method of collection is more economical, less time-consuming, and less damaging to the organisms than the traditional method of collecting these types of organisms from research vessels.

HAWAII DEEP MARINE, INC.

Renting laboratory, office and outdoor space in the Research Compound, Hawaii Deep Marine, Inc. continued its R&D and test marketing activities during FY 03. Under a former name, Hawaii Deep Marine Water Production Plant LP, the company commenced seawater desalination in FY00 using state-of-the-art reverse osmosis (RO) technology. Test marketing activities commenced soon thereafter to optimize production methods and perfect products that could meet the high food and beverage standards in Japan.

Representative Suzanne Chun-Oakland visited HDMI facilities at NELHA in Fall 2002.

The Japanese consumer market has developed a fascination with deep ocean water due to research and development activities conducted in Kochi Prefecture and other locations in Japan. HDMI was established to tap into the growing beverage and health supplement market that is developing in Japan and Asia centered around the use of deep seawater.

The company continued to lease 4.5 acres of commercial space in the HOST Park, expeditiously grading the property in September 2000 in anticipation of the impending commercialization of its new business. New management and reorganization at the end of FY01 brought additional resources and expertise to serve the company's ambitious development plans. New product development continued in FY 03, with test marketing of new food grade products commencing in both Japan and Hawaii to eager consumer markets. The company anticipated developing its commercial property during FY04.

HAWAII DEEP OCEAN WATER LLC

Hawaii Deep Ocean Water (HDOW) LLC has been conducting pre-commercial research and development since 1999 using NELHA deep seawater resources. The company maintains a small research lab at NELHA. A strong parent company based in Gifu Prefecture, Japan, for over 20 years provides support and a well-developed production, marketing, and sales system into which the new products are being introduced. HDOW has commenced test marketing of deep sea water beverages in Japan with promising results and is actively developing other novel products as well. Commercial production of the innovative products will be launched in the Spring of 2003 at a facility expansion site in Gifu in April 2003, with more activity in Hawaii to follow. The company plans to embark on its commercial production phase at NELHA in the next few years, with the intention of bringing a bottling plant to the HOST Park.

HIGH HEALTH AQUACULTURE, INC.

High Health Aquaculture (HHA) supplies certified Specific Pathogen-Free (SPF) broodstock to the world's shrimp hatcheries. They operate a first phase facility that includes basic infrastructure (water, air, electrical and security systems) and broodstock rearing tanks and a shrimp reproduction system. During FY00-01, the company continued to work on developing new stocks of certified Specific Pathogen-Free (SPF) stocks of *P. stylirostris* and *P. vannamei*. During FY02, the company completed build out on expansion acreage, doubling production capacity. The company's motto is: "Healthy shrimp are profitable shrimp."

INDO-PACIFIC SEAFARMS, INC.

Indo-Pacific Sea Farms' mission is to develop and commercialize innovative technologies for sustainable production of reef-dwelling organisms. IPSF's present research and development emphasis is on photosynthetic molluscs and cnidarians, primarily giant tridacnid clams and scleractinian corals. These photosynthetic-capable animals derive nutrition from their association with microscopic algal symbionts called zooxanthellae. The pristine seawater supply at NELHA provides an ideal environment for these organisms. Cultivation requirements for the plant-animal symbionts are similar to those of free-living microalgae and include ample tropical sunlight, warm surface seawater and a carefully controlled concentration of deep seawater to control temperature and supplement essential inorganic nutrients. IPSF uses no commercial feeds and produces no seawater pollution with this novel approach. IPSF products are currently in demand in the seafood and aquarium industries and also have potential biomedical applications.

Koyo USA Corp. signed a sublease for a commercial lot at NELHA in February 2002 and was already grading the construction site by June.

KONA BAY MARINE RESOURCES, INC.

Formerly known as Kona Bay Oyster and Shrimp Company, Kona Bay Marine Resources, Inc. (KBMR) produces blue shrimp as well as oysters and clams in a specialized symbiotic polyculture system. The KBMR culture system reduces labor required for operations while increasing product output. This makes a significant difference in projected business development costs and has contributed to their confidence about the future. During the reporting period, KBMR maximized production on its existing 2.5 acre commercial grow out operation and put into place plans for further expansion onto approximately 20 acres for their next stage of development in HOST Park while simultaneously negotiating a long term sublease with NELHA.

KONA COLD LOBSTERS LTD.

Kona Cold Lobsters Ltd. (KCL) utilizes the deep cold seawater supplied by NELHA to create a habitat for live Maine lobsters and live Dungeness crabs. KCL imports live lobsters and crabs from the natural fisheries and rejuvenates them in cold seawater holding pens for distribution throughout the Hawaiian Islands and select Asian destinations. KCL is therefore able to provide the freshest, most stable supply of live Maine lobster in the Pacific basin. Currently KCL services over 50 customers on five Hawaiian Islands, including supermarkets, restaurants, and resorts, meeting their specific size and quantity requirements on a daily basis.

KCL also has the expertise and experience to culture Maine lobsters in a multidisciplinary system that includes broodstock, husbandry, nutrition, pathology and habitat design. KCL has successfully bred and raised lobsters from egg to sexual maturity for over 20 years. Recovery of the lobster fishery after a long period of decline lowered market prices sufficiently to put production of a high-quality Hawaiian-bred Maine lobster on hold, but KCL maintains the capacity to become operationally independent of the natural fishery should environmental conditions change.

KONA UNIQUE FOODS

This entrepreneurial sole proprietorship planned to conduct pre-commercial research to develop new methods for creating unique food and beverage products using deep sea water resources.

KOYO USA, INC.

Koyo USA, Inc. is a new Hawaii-based company with backers from Gifu Prefecture, Japan. During FY03, the company built the first phase of a commercial production facility for deep seawater-based beverages and other products for export to the Asian market. Japan, A well-organized and highly motivated staff initiated and implemented on-site development in record time, starting with NELHA proposal approval in January 2003, followed by on-site development and building construction completion by June 2003. The initial products are being marketed to the mother company's existing broad-based distribution network in Japan. Plans for expansion of the new NELHA-based production facilities are already in the works.

MERA PHARMACEUTICALS (formerly AQUASEARCH, INC.)

Mera Pharmaceuticals has been a tenant at NELHA since 1995, when it was named Aquasearch Inc. Specializing in marine biotechnology, it has been a global leader in the development of proprietary, cost-effective, photobioreactor technology for commercial scale production of pure cultures of microalgal species, and in research and development of high-valued products derived from microalgae. Mera has capitalized on its new 3-acre Hawaii Research, Development and Production (HRDP) Facility, constructed during FY99, allowing its staff scientists to conduct R&D on new microalgae products on the lab bench and then ramping up from laboratory-scale culture flasks to fully computerized mass production, all in the same location. The cornerstone of the microalgae-based business and key to this versatility is the company's proprietary and economical photobioreactor technology, the Aquasearch Growth Module (AGM). Due to its research advances, AGM cultures yield ten-fold increases from previous production capacities.

A name change from Aquasearch, Inc. to Mera Pharmaceuticals occurred after a merger with the company of the same name was completed during FY03 to reflect the increased long term emphasis on pharmaceutical discovery and development.

During FY03, Mera Pharmaceuticals established a new identity and internal organization, emerging successfully from the involuntary bankruptcy proceedings, change in leadership, and reorganization of the previous fiscal year. Reorganization financing was in place or committed to allow the payment of creditors' claims in accordance with the reorganization plan. During FY03, the company continued to develop, produce, and market high value nutraceuticals and pharmaceuticals derived from aquatic plants to the global venue of international markets.

During FY03, NELHA tenant Moana Technologies LLC completed the major portion of construction of distinctive new blue and white research and development buildings at an 11.4 acre site at NELHA. These will house state-of-the-art shrimp broodstock culture facilities.

MOANA TECHNOLOGIES, INC.

Moana Technologies, Inc. received NELH Board approval in concept in April 2001 for an ambitious commercial project specializing in shrimp brood stock genetics using traditional breeding techniques. The new company came to NELHA with a strong technical team and solid financial backing. Project principals signed a Facilities Use Agreement for pre-commercial research space in the Fall of 2001. The new company developed a facility on Oahu which serves as a quarantine site to screen all genetic stock prior to introduction at the company's NELHA Keahole sites. During FY 03, the company continued with proprietary breeding operations and research at NELHA using certified disease-free shrimp stock. These animals are routinely transferred to the NELHA research site from Moana's Oahu quarantine facilities following strict biosecurity protocols. At NELHA, animal grow out cycles are closely monitored and access to the site is limited only to company personnel with biosecurity clearance. After receiving NELHA approval of its Final Proposal/Business Plan in July 2001, the company subsequently negotiated a long term sublease for an 11.4 acre commercial site in HOST Park and completed major construction activities during FY 03.

OCEAN RIDER, INC.

Ocean Rider, Inc. came to NELHA in 1998 from Harbor Branch in Florida. Citing the pristine quality of the seawater supply as the primary attractant, the company soon established an active pre-commercial research project in the NELHA Research Compound to optimize proprietary culture systems for the care and feeding of these exotic and beautiful animals. The company is developing proprietary breeding and grow out facilities and methods for the commercial production of seahorses, primarily targeting the live ornamental fish industry outside of Hawaii.

During FY 03, the company completed construction and continued to grow its commercial operations on a parcel in the NELHA Small Business Compound under a long term sublease. Sales of seahorses have continued to increase, and satisfied customers worldwide continue to report gratitude for the high quality services and products from this innovative company. To protect Hawaii's pristine natural resources, Ocean Rider does not sell its prized seahorses locally, but only to out-of-state locations around the world.

ONO TAKE, INC.

Ono Take, Inc. has been using deep seawater to create temperature-controlled environments for the cultivation of mycomedicinal mushrooms. The company specializes in production of the highly esteemed *shiitake (Lintinula edodes), reishi* (*Ganoderma lucidum*) and *maitake* (*Grifola frondosa*) mushrooms. These have long had a reputation in the Far East for support and enhancement of human immunological function. Scientific research suggests the active ingredient in these mushrooms, a polysaccharide compound identified as beta glucan D-fraction, may support healthy levels of macrophage and natural killer cells, inhibiting the growth of certain cancer cells, and may also support production of interferons. During FY00-01, Ono Take continued research and development to produce an encapsulated form of the mycomedicinal mushrooms for test marketing.

Ono Take uses deep seawater to maintain temperature-controlled microclimates preferred by the fruiting bodies of these fungi. Cold ocean water chills fresh water in a small heat exchanger, eliminating potential corrosion in the cooling system. They are able to cool down 12,000 cubic feet of culture room space from 80º to 70º F (ten degrees) using approximately 203Kgal/month of DSW (approximately $15 worth per month). DSW warms only 6ºF in the heat exchanger, allowing it to be recycled for other uses.

PACIFIC HARVEST, INC.

Pacific Harvest, Inc. (PHI) has established the largest Pacific threadfin (locally known as *moi*) aquafarm in the state at NELHA. *Moi* were so highly prized in ancient Hawaii that they were reserved for consumption only by royalty. In recent years, the natural fishery has been depleted, and commercial *moi* farming now has great market potential as a growing industry for Hawaii.

During FY 03, PHI operated grow out facilities and a hatchery/nursery to provide an independent source of juvenile finfish for use in-house and for sale to other companies. PHI continued to develop culture methods for other high value finfish, including *kahala* (amberjack), a highly prized species that, in nature, is plagued by parasites but can be cultured parasite-free. The company also continued research activities including work with *omilu, mahimahi* and marine ornamental finfish to broaden its capabilities for the future.

ROYAL HAWAIIAN SEA FARMS, INC.

Royal Hawaiian Sea Farms, Inc. (RHSF) has been in business at Keahole since 1987 and commercially produces *limu*, or edible sea vegetables. Sales of these popular nutritious delicacies have consistently reached over two tons per week. A pickled *ogo* (*Gracilaria*) product is being processed under the "Waimanalo Ko-Ko" brand. In addition to *limu*, RHSF also produces salt water tilapia (*Tilapia*) and milkfish (*Chanos*). Intensive applied research is being conducted to investigate the potential of commercially producing edible sea cucumbers (*Stichopus*), the Hawaiian limpet, *opihi* (*Cellana*), and warm water abalone (*Haliotis*).

TAYLOR SHELLFISH—KONA

Taylor Shellfish–Kona is a subsidiary of Taylor United, a family-owned company reputed to be the largest commercial shellfish producer in the U.S. Headquartered in Quilcene, Washington, since the late 1960s, Taylor achieves maximum marketing flexibility by operating a range of nursery and grow out locations for several varieties of shellfish.

One of these sites is a nursery at NELHA where both Manila clams (*Venerupis japonica*) and Pacific oyster (*Crossostrea gigas*) spat enjoy a "Hawaiian grow out vacation" during their early months of growth. The company's shellfish "seed" or "spat" start life in a hatchery in the Pacific Northwest. When only about 250 microns in size, soon after settlement from the swimming, or planktonic stage, they are brought to the Kona facility. After about three months of growth on screens and sand-filled raceways, they reach about 5-6 mm, and most are returned to Washington state for 1-4 years of grow out to market size in Taylor's facilities.

The NELHA nursery annually produces 100-120 million oyster seed and 200-300 million clam seed. Some of these are also sold to other oyster and clam farms around the world, including destinations as far away as South Africa.

The Kona nursery makes good economic sense to Taylor since the unique NELHA dual seawater supply enables the company to maintain the precise temperature regimes required by the delicate early stages of growth for very low cost, and Hawaii's winterless climate allows year-round productivity instead of only seasonal production. During FY03, Taylor Shellfish–Kona continued to work on developing an expansion of their facilities to meet growing market demand for their high quality products.

TURQUOISE TECHNOLOGIES, INC.

Turquoise Technologies, Inc. has installed an antenna on the administration building rooftop in NELHA's Research Compound to provide wireless Internet access to NELHA's tenants and clients in the Keahole area. This brings high speed Internet service to NELHA's properties without the need for costly underground cabling infrastructure. Many of NELHA's tenants conduct business over the Internet.

UNIVERSITY OF HAWAII—HAWAII INSTITUTE OF MARINE BIOLOGY

Dr. Mark Huntley of the Hawaii Institute of Marine Biology brought his research proposal for the study of oceanic 'jellies' (gelatinous zooplankton) to NELHA during FY 03. His work centers on a long-term objective to conduct studies on the life history, physiology, growth and population dynamics of tropical marine zooplankton. This work is anticipated to contribute significantly to scientific predictive capacities in tropical planktonic ecosystems.

Gelatinous zooplankton are important predators in marine ecosystems, but virtually no quantitative data exist regarding their physiology or population dynamics. Even the life histories of many species remain unknown. Understanding the biology of these gelatinous organisms is critical to our understanding of the dynamics of natural fisheries, impacted everywhere in the world oceans by overfishing. Increasing reports from around the world indicate that these voracious predators have actually displaced certain fish species in heavily fished ecosystems, and there is growing concern that their dominance may prevent the recovery of historically important fisheries.

Dr. Huntley's research activities will begin with an analysis of a time series of zooplankton samples from the Kona coast, establishment of a practical knowledge of the distribution and abundance of commonly occurring species, and commencement of a program to collect live animals and maintain them under controlled laboratory conditions for further study. NELHA is an ideal location for this project due to proximity and easy access to field populations of marine zooplankton, and opportunity for collaboration with existing NELHA tenants with marine science expertise.

UNIVERSITY OF HAWAII—INFRASOUND LABORATORY OF HAWAII

A unique project that collects and analyzes data from infrasonic signals (pressure disturbances whose frequencies are below the hearing range of the human ear) in the atmosphere became a NELHA tenant during FY00-01. Approved by the NELHA Board in August 1999, the Infrasound Laboratory of Hawaii ("ISLA") is a project of the Hawaii Institute of Geophysics and Planetology at the School of Ocean and Earth Sciences and Technology, University of Hawaii at Manoa.

Initially supported through U.S. Department of Defense funds, ISLA is part of an international network dedicated to monitoring compliance with the Comprehensive Nuclear Test Ban Treaty (CTBT). The CTBT seeks to eliminate the proliferation and use of nuclear weapons and to ensure complete global disarmament under strict international control.

ISLA operates and maintains IS59, or KONA, a 4-element infrasound array located on the forested slopes of Mt. Hualalai. The array has exceptionally low ambient noise levels and acoustic detection thresholds and can detect low-frequency atmospheric sound waves generated by natural and man-made sources such as explosions, volcanic eruptions, meteorite impacts, and severe weather and thus may provide advance warning of potential threats to Hawaii.

ISLA can analyze various aspects of infrasonic wave propagation, source characterization, and event location. Ongoing research concentrates on infrasonic tracking of storms systems, modeling sound wave propagation over thousands of kilometers, characterizing the ambient infrasonic field in the Pacific, optimizing wind-noise-reducing systems, and ray-tracing of wave paths from atmospheric meteor entries.

UNIVERSITY OF HAWAII—SEA GRANT EXTENSION SERVICE

The national Sea Grant College Program supports an innovative program of research, education and extension services directed to the improved understanding, management, and use of marine resources of the state, region and nation. Sea Grant is a collaborative effort of the public and private sectors, utilizing federal, state and community support. The University of Hawaii at Manoa (UHM) has been a charter Sea Grant college since 1970, and, through its Sea Grant College Program in the School of Ocean and Earth Science & Technology (SOEST), maintains an Extension Service (SGES) office in West Hawaii at NELHA.

The Hawaii Sea Grant College Program serves a geographic area that includes the Hawaiian archipelago and the U.S.-affiliated Pacific islands. Sea Grant funds research in aquaculture, fisheries, shoreline processes, and education. Its Extension Service focuses on technology transfer, coastal resource management, environmental

education, sustainable economic development and capacity building and training. In the early days of NELH, it was Sea Grant that provided funding for the first aquaculture research projects which explored economically promising uses of deep seawater at Keahole during the 1980s. Results provided the evidence for launching the first NELH tenant aquaculture businesses. UH Sea Grant also funded the first coldwater agriculture experiments at NELH in the 1980's, opening up further terrestrial applications using deep seawater.

Sara Peck, UH Sea Grant's West Hawaii extension agent, continues to serve the community, guided by the following mission statement: "To build in the West Hawaii Community…Consensus, understanding and commitment to establish sustainable marine and coastal resource management along the Kona Coast." Thus, the Sea Grant program promotes responsible stewardship for the area's marine and coastal ecosystems using a multi-level, multi-generational education/outreach approach including the general public, schools, resorts, and collaboration with several agencies and NGOs.

Major accomplishments for FY03:

- In its fourth year, continuation of ReefWatchers, a volunteer marine resource monitoring program providing long term fish and invertebrate count data for Division of Aquatic Resources and University use. Approximately 45 volunteers were trained during FY '02, and five new monitoring sites selected.

- In its tenth year, continuation of ReefTalk, a free public education/information program providing eleven talks annually, alternated between the Kona and Kohala areas.

- In its fourth year, continuation of the West Hawaii Fisheries Council (WHFC), a community-based marine resource management effort, tasked with specific marine resource conservation goals by Act 306. The twenty-five members represent a diverse cross section of the West Hawaii community. In addition, Local Resource Councils in Milolii and Kohala were formed in order to provide an informational conduit between outlying areas and the main WHFC.

- In its third year, the ReefTeach program has expanded to include not only West Hawaii Explorations Academy students, but the Kona Girl Scouts and a cadre of adults. The goal of this program is to inform swimmers and snorkelers at Kahalu'u Beach Park about the importance of coral reefs, and suggests how people can be low impact reef visitors.

- Initiated the formation of Friends of NELHA, a not-for-profit corporation to support the education /outreach and public relations needs of NELHA. Please see "Friends of NELHA" for additional information about this program.

- Sea Grant continues to provide resource support for the West Hawaii Explorations Academy to ensure that the Aloha Kai, Wana Survey, and Snorkel Survey projects continue.

Sea Grant West Hawaii generates approximately $150,000 annually in federal, state, and private funding to maintain the current programmatic level. Funding and program partners include: Harold K.L. Castle Foundation, Hawaii Community Foundation, The Nature Conservancy, Pa'aPono Foundation, DBEDT/CZM, DAR, DOBOR, National Science Foundation, NOAA, NFWF, NMFS, The Kamehameha Investment Corporation, The Kona Reefers Dive Club, the Kona Underwater Photography Society, the Hawaii Island Recreation SCUBA Association, the National Park Service, and many others.

UH Sea Grant continues to provide for NELHA a public information/presentation program. The Sea Grant office allocated approximately 25% of staff time toward building the Friends of NELHA organization, providing training for volunteers, scheduling public presentations, fielding inquiries, marketing the presentations, and giving the presentations. Peck coordinated and taught two volunteer classes, and gave twenty-two presentations during FY '02, providing a total value from Sea Grant to NELHA of $14,480 including staff time, materials and equipment.

UNLIMITED HALIBUT CORPORATION

Unlimited Halibut Corporation is a Canadian-based company developing Hawaii's first coldwater halibut and black cod ("butterfish" or sablefish) aquaculture farm to service markets throughout the Pacific Basin with fresh product. The company is leasing a lot in the NELHA Small Business Compound for the first phase of its production facilities with long range plans for further expansion.

UWAJIMA FISHERIES, INC.

Uwajima Fisheries, Inc. (UFI) operates a facility at NELHA for growing *hirame*, a flounder highly prized by the Japanese for *sashimi* and *sushi*. Uwajima Fisheries markets their 1.5 to 2 pound *hirame* through a Honolulu distributor who supplies the Oahu *sushi* market. UFI manages the maturation and spawning of their broodstock for year-'round production of eggs. UFI also utilizes the NELHA surface and cold deep seawater for the semi-intensive polyculture of marine shrimp, milkfish and the edible seaweed, *Gracilaria spp.*, also known locally as *ogo, and* the popular finfish species Pacific threadfin (*moi*) for local markets.

U.S. COAST GUARD

Since December 2000, the U.S. Coast Guard has been operating a radio direction finding (DF) antenna on the NELHA Laboratory Building at Keahole Point to aid mariners in distress. NELHA is a perfect site due to its unobstructed views, low RF noise, and accessible power and phone lines. The DF antenna they installed is only 35 inches high and weighs approximately 14 pounds. The federal agency has plans to upgrade systems in the year 2005 and, although a site a NELHA may not be necessary at that time, in the interim it is a vital component to ensure mariner safety. NELHA provides electrical service and access for maintenance to the Coast Guard at no cost as a public service.

VERIZON WIRELESS

Verizon operates two roof-mounted antennas installed atop the NELHA administration building. During FY03, NELHA negotiated a new rental rate for a proposed antenna pole and small area adjacent to the Research Compound. Verizon planned to install three antennas of their own and reserved the right to sub-sublet space on the pole to other users on the condition that NELHA participate in rental negotiations with any secondary users. The antennas installed at NELHA allow Verizon to provide commercial wireless telephone service for Keahole and the surrounding areas of Kailua-Kona.

WEST HAWAII EXPLORATIONS ACADEMY—PUBLIC CHARTER SCHOOL

The West Hawaii Explorations Academy (WHEA) operates as a public charter school on a small site at NELHA, the first charter high school in the State of Hawaii since May 2000. Each year its student body, consisting of mostly juniors and seniors, spend a full academic year at NELHA working on projects related to the resources available at Keahole Point. WHEA student projects have included educational presentations to thousands of elementary, middle and high school students each year; a solar car prototype; design and construction of an electric car which placed first in the annual HELCO-sponsored Electron Marathon championship race; hydroponic and cold-water agriculture; and numerous aquaculture projects. During FY03, WHEA installed new photovoltaic system on its classroom rooftop to bring solar energy to life in its innovative curriculum.

WHEA students and adult colleagues work collaboratively on final stages of installation of new photovoltaic panels at the public charter school's NELHA site.

NELHA FINANCIAL OVERVIEW

STATEMENT OF OPERATIONS*

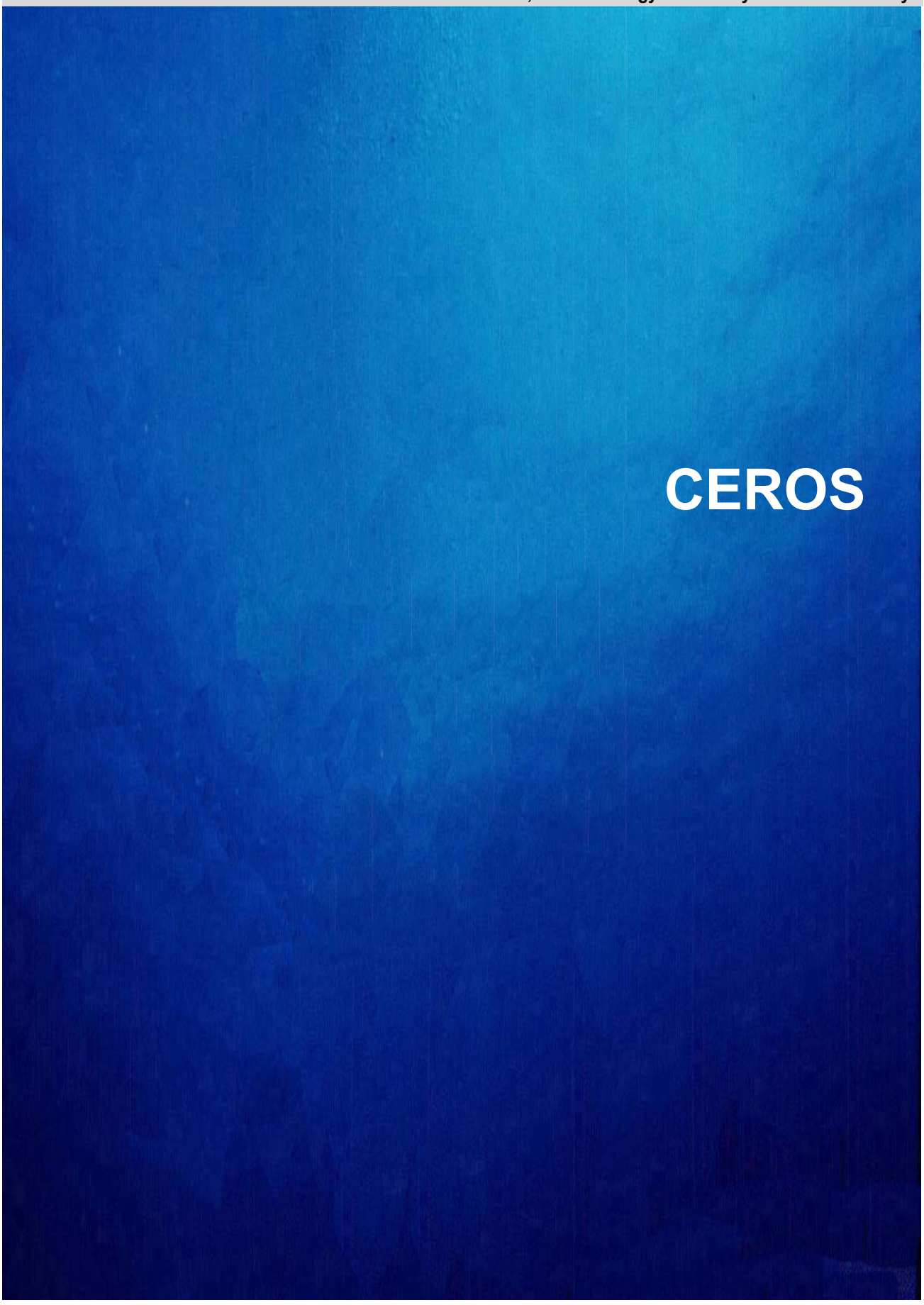
FY 03 (July 1, 2002 to June 30, 2003)

CATEGORY	REVENUES	EXPENDITURES
General Funds		
State Funds	$801,59900	
Subtotal	*$801,599.00*	
GF Salaries		$698,452.79
GF Kona Operations		$49,716.49
Subtotal		*$748,169.28*
Special Funds		
Land Use Fees	$534,504.06	
Reimbursables	$809,627.40	
Interest Received	$72,380.19	
Percentage Rents	$30,811.79	
Subtotal	*$1,447,323.44*	
Total Revenue	**$2,248,922.44**	
SF Salaries		$301,875.31
SF Kona Operations		$1,445,081.00
Subtotal		*$1,746,956.31*
Total Expenditures		**$2,495,125.59**

FINANCIAL POSITION

Special Fund Balance on July 1, 2002	$1,804,726.68
State General Fund Appropriations	$801,599.00
Special Fund Revenues	$1,447,323.44
Subtotal	*$4,053,649.12*
General Fund Expenditures	$748,169.28
Special Fund Expenditures/journal entries	$1,746,956.31
Unrequired G/F Returned to St Treasury/DBEDT	$30,641.72
Transfer to State General Fund from Special Fund	$200,000.00
Special fund transfer from prior years	$29,905.94
Ending Special Fund Balance on June 30, 2003	**$1,357,787.75**

**Does not include CEROS operations, salaries, or CEROS grants.*


CEROS

The National Defense Center of Excellence for Research in Ocean Sciences (CEROS)

New Ocean Technologies for Hawaii

CEROS is a unique technology development program between the State of Hawaii and the federal Defense Advanced Research Projects Agency (DARPA). CEROS demonstrates that the State can be responsive to the needs of the Department of Defense for state-of-the-art ocean technology. Complete information about CEROS is on the website, www.ceros.org.

CEROS is a State program entirely supported by federal funds. The program started in 1993, with $5 million appropriated for CEROS in the supplemental federal appropriation for the Department of Defense. Federal support for CEROS comes to the State through a Cooperative Agreement with DARPA, the principal technology development agency for the Department of Defense (the Internet was a DARPA project, for example). DARPA also provides technical and administrative guidance to assure that the program remains responsive to the needs of the federal defense establishment while helping the technical commercial base develop in Hawaii. DARPA has been an excellent partner in this task.

CEROS is in many ways a special federal/state partnership. CEROS started as a project of the High Technology Development Corporation (HTDC) and became part of the Natural Energy Laboratory of Hawaii Authority (NELHA) in 1996. HTDC and NELHA are among the State's "attached agencies" in the Department of Business, Economic Development & Tourism (DBEDT).

Attached agencies act as quasi-corporate entities within the State structure. The NELHA Board of Directors oversees NELHA operations and grants CEROS its authority to issue State contracts for technical development projects. The best depiction of the CEROS/NELHA relationship is as two separate programs joined by a common Board of Directors. NELHA has proven to be a good and appropriate "home" for CEROS.

From the start, DARPA sought an efficient CEROS organization to turn the federal funds, which are appropriated annually, into funded contracts in as short a period as possible. Thus, CEROS runs annual competitive solicitations for technical projects and handles the entire process from initial announcement (in October) to contract negotiation and commitment (usually in the following June). Since 1993, CEROS has funded 154 technical projects for about $59.78 million.

The CEROS program operates on less than 8% administrative overhead (i.e. 92% of the federal funds go into the Core technical program). The CEROS personnel list is 4: Technical Director, Fiscal Assistant, Program Manager for Outreach and Administration, and Contracts and Grants Administrator. CEROS maintains a Projects Office at NELHA headquarters in Kailua-Kona and a Contracts Office in Honolulu.

CEROS point of contact: William A. Friedl, CEROS Technical Director, billf@ceros.org.

CEROS FUNDED PROJECTS

AQUACULTURE TECHNOLOGY, INC.

- Naturally Occurring Antibodies from Marine Algae *Chaetoceros* (FY94) ($171,485)
- Naturally Occurring Antibacterial and Antifungal Substances from Marine Algae *Chaetoceros*, *Nitzschia* and *Thalassiosira* (FY95) ($206,960)
- Continuous Production of Marine Algae *Chaetoceros spp*. In An Open System (FY97) ($440,000)

BAND, LAVIS & ASSOCIATES, INC.

- Application of Techniques and Comparative Effectiveness of Non-Toxic Anti-Fouling Surfaces to Immersed Nettings Used In Naval and Aquaculture Industries (FY97) ($225,483) [Subcontractor: Black Pearls, Inc. Holualoa, HI]

BBN TECHNOLOGIES

- Develop HYDROFIST: A Nonexplosive Means for Generating Intense and Focused Underwater Shock Waves (FY99, FY00) ($999,819; $800,000) [Subcontractor: Navatek Ships, Ltd. (a subsidiary of Pacific Marine), Honolulu, HI]
- Implement and Demonstrate ASW Targeting and Weapon Control Using Non –Organic Sensors: Netted Combat Control System (Netted CCS) (FY01, FY02) ($1,112,450; $979,901)
- A Proposal to Implement and Demonstrate a NetCentric Air-deployed, Portable Range (FY03) ($879,000)

BLACK PEARLS, INC.

- Probiotic Bacteria: The Key to Expanded Use of Deep Seawater in Tropical Aquaculture and the Solution to a Growing Industry Problem (FY97) ($121,392)
- A Continuous-Culture Closed-System Deep Seawater Photobioreactor for Microalgal Culture for Hatcheries and Pharmaceuticals (FY00) ($173,201)
- Developing a Sensitive, Sessile Monitor for Non-Point Source Heavy Metal Pollution for Tropical and Sub-Tropical Indo-Pacific Waters (FY01) ($138,097)
- Refining and Broadening the Use of Pearl Oysters as Sensitive Biomonitors for Heavy Metal Contamination (FY03) ($119,920)

COX ENVIRONMENTAL SYSTEMS

- Water Properties Miniature Optical Sensor Project (FY00) ($215,004)

CONCURRENT ANALYTICAL, INC. (formerly DETECTION LIMIT, Inc.)

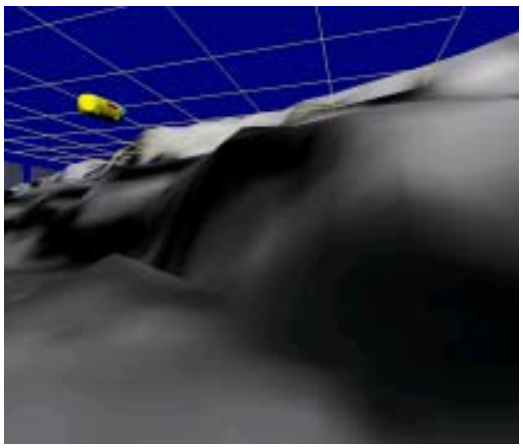
- Development of Fiber-Optic Chemical Sensors (FOCs) For Remote In-Situ Monitoring of pH and Carbon Dioxide in Seawater (FY93) ($236,700)
- Development of a Fiber-Optic Based Autonomous Buoy for *In-Situ* Monitoring of pH, pCO_2, Temperature, O_2, and Water Quality In Seawater (FY94) ($331,800)
- Solution Plus *In-Situ* Ocean Sediment Chemical Analyzer (FY96, FY97) ($320,000; $360,000)
- PCB Analyzer for Shallow Ocean Water (FY98) ($380,000)
- Automated SERS Immunoassay Detection System: Detection of an Aquaculture Virus and “Dog Nose” Sensor for TNT Detection (FY00) ($439,937)
- Improved “Dog Nose” Sensor for Real-Time Ocean TNT Detection and Quantification and Fish Virus Detection (FY02) ($350,000) [Subcontractors: Iowa State University Institute for Physical Research and Technology, Mike Bray Engineering]
- Improved Resolution in Fourier Transform Spectroscopy (FY03) ($352,443)

DYNAMICS TECHNOLOGY, INC.

- Analysis of synthetic Aperture Sonar Data for Geological Surveys (FY00) ($98,239)

EDWARD K. NODA & ASSOCIATES, INC.

- Hurricane Risk Analysis and Modeling of Coastal Flooding For the Hawaiian Islands (FY93) ($213,929)
- Modeling of Hurricane-Induced Coastal Flooding for the Hawaiian Islands (FY98) ($182,345)



OCEAN IMAGING CONSULTANT, INC. Virtual image of ROVer’s eye-view of ocean bottom bathymetry.

GATEWAY TECHNOLOGIES INTERNATIONAL, INC.

- Radar/Sensor Signal Processing Research of Shallow Water Surveillance Technologies (FY93) ($385,794)
- HIRADSIM Workstation Development Project - Continuation of Existing Work Advanced HIRADSIM Small Target - Time Domain - Maritime Radar Mode (FY94) ($250,000)
- Personal Emergency Lifesaving System (PELS) (FY98) ($240,920)

GUIDENET, INC.

- Using Software Agents to Acquire and Visualize Environmental Information for ASW Surveillance (FY98, FY99) ($305,000; $360,000)
- Workflow Paradigm for ASW by Reliable METOC Data and Tasks (FY00) ($397,050)

IBM/LORAL FEDERAL SYSTEMS; KEWALO BASIN MARINE MAMMAL LABORATORY

- Acoustic Analysis Tool Kit (FY93) ($432,000)

INNOVATIONS HAWAII

- Extended Source Apparent Motion (E-Sam) Lighted Signals for Protection of the Marine Environment (FY93, FY94) ($241,108; $177,180)

MAKAI OCEAN ENGINEERING, INC.

- Cost-Effective GPS-Based Sensor for Measurement of Heave, Pitch, Roll and Heading on Oceanographic Platforms with O.3 Degree Resolution (FY93, FY94) ($230,250; $235,000)
- Loop Avoidance Control during the Deployment and Retrieval of Submarine Cables (FY96) ($287,000) [Subcontractor*:* Knapp Engineering, Inc. (new name is Structural Solutions), Aiea, HI]
- An Automated Control System For Deployment of Small Diameter Cables and Towed Bodies—a Cable Lay Simulator (FY94) ($325,000)
- Design, Construction, and Operation of a Fifty Kilowatt Closed Cycle OTEC Plant and Application Of Results To The Design of a One Megawatt OTEC Plant (FY94) ($649,759)
- Internet-Enabled Engineering Tool for Dynamically Analyzing and Planning World-Wide Subsea Cable and Array Installations (FY98) ($379,985)
- Improving Flow from Deep Water Pipeline (FY00) ($388,950)
- Remote Monitoring and Expert Control of Submarine Cable and Array Installations (FY00) ($345,737)
- Computation of Submarine Towed array Shapes and Dynamics Based on Array Sensors, Indirect Current Sensing and In-situ Drag Coefficient Measurements (FY02) ($479,513)
- Real-time, Dynamic Modeling of Multi-Line Towed Array Systems (FY03) ($450,000)

MISSION RESEARCH CORPORATION

- Ocean Doppler Lidar (FY95) ($381,000)

NAVATEK, LTD.

- The Modification of a Whole Ship Design Synthesis Model to Accept Ship Designs Employing Advanced Lifting Body Technology (FY02) ($356,000) [Subcontractor: Band, Lavis and Associates, Inc., Severna Park, MD]
- Analysis of the Potential Benefits of Integrating a Lifting Body Bow to Large Ships (FY03) ($150,000)

NEPTUNE TECHNOLOGIES, INC.

- Diver Homing Device (FY95, FY97) ($200,000; $39,300)

NEXTWAVE ENGINEERING

- Snap-To Amphibious Footwear System (FY01) ($75,700)

NOVASOL (INNOVATIVE TECHNICAL SOLUTIONS, INC.)

- Temporally Enhanced Adaptive Multi-Spectral (TEAMS) System for Detection of Underwater Objects (FY01, FY03) ($34,953, $700,000)

OCEAN ENGINEERING CONSULTANTS, INC.

- Swath Motion/Structural Software Development (FY94) ($121,000)
- Swath Motion/Structural Software Development and Verification (FY95) ($168,000)
- Flow Simulation and Visualization for Swath Ships (FY96) ($161,372)
- SWATH Ship Software and Verification (FY00) ($164,954)
- SWATH Ship Motion Software (FY03) ($172,200)

CEROS FUNDED PROJECTS, continued:

PACIFIC MARINE, INC. Unique hull design of midfoil ship, visible as vessel is suspended from a crane over the ocean.

OCEANIC IMAGING CONSULTANTS, INC.

- The DiVRS (ROVer's) Eye Terrain Database Visualization as an Aid to Underwater Navigation (FY98, FY99) ($239,652; $275,482)

THE OCEANIC INSTITUTE

- Cultured Fish as Biological Indicators of Pollution (FY99) ($216,766) [Subcontractor: Associated Laboratories, Orange, CA]

OCEANIT LABORATORIES, INC.

- Low-Cost Prebuckled Cylindrical Pressure Hulls (FY93, FY94) ($342,800; $91,000)
- Computational and Physical Modeling of the Hurricane Tower Desalination System (FY97) ($150,000)
- Three-Dimensional Cloud Height Indicator for Marine Application (3D-CHIMA) (FY01, FY02) ($400,000; $360,390)

OCEANTEK, INC.

- An Ocean Bottom Span Analyzer for Survey Planning and Installations of Submarine Cables and Pipelines (FY99, FY03) ($188,000, $94,563)

OCEANTRONICS, INC.

- Submarine Electronic Charting System (FY99) ($95,000)
- Electronic Charting Display and Information System (ECDIS-N) for the Navy with Special Emphasis on Submarine Navigation – Phase II (FY00) ($98,000)
- Submarine Electronics Charting System – Final Phase (FY01) ($200,000)

ORINCON HAWAII, INC.

- Underwater Echolocation for Object Recognition (FY93, FY94, FY95) ($769,732; $652,685; $696,925) [Subcontractor: Hawaii Institute of Marine Biology, Kailua, HI]
- Advanced Real-Time Signal Processor (ARTS) and ASW Commanders Workstations (ADM-3) (FY95, FY96) ($862,095; $871,771)
- An Upgraded ARTS Processor for Maritime Patrol Aircraft Applications (FY98) ($373,000)
- Antisubmarine Warfare Commander's Workstation Upgrades and Advanced Real-Time Signal Processor for CTF-12 Applications (FY97) ($500,000)
- Submarine-Launched, Two-Way, Fiber Optics-Linked Communications Buoy (FY96) ($160,000) [Subcontractor: Sippican, Inc., Marion, MA]
- An Improved Acoustic Intercept Receiver for Submarine Applications (FY97, FY98) ($450,000; $560,000)
- An Integrated System for Detection, Classification, Localization, Tracking and Reporting of Submarine Contact Data (FY97) ($700,000)
- Situation Awareness System (SAS) Processor for Submarine Applications, Phase 2 and At-Sea Evaluation (FY 98, FY99) ($171,777; $775,864)
- Automation and Integration of Environmental Factors into ASW Tracking. (FY99) ($497,415)
- Mission Reconfigurable Signal Processing System (FY00) ($749,504)
- Passive Assured Access System (FY01) ($749,203)
- Theater-Wide Situational Awareness for Decision Wall (FY01) ($150,000)
- Safety-of-Ship System (FY02) ($350,000)
- Portable and Improved Mission Reconfigurable Signal Processor (PIMRSP) (FY02) ($440,000)

ORINCON DEFENSE

- Safety-of-Ship System Phase 2 (FY03) $585,996
- Combined Optical Acoustic Tracking System (COATS) (FY03) ($200,000)

PACIFIC ENVIRONMENTAL TECHNOLOGIES LLC

- Development of a Miniaturized Mass Spectrometer-Based Sampling System for In Situ Measurements of Dissolved Gas and/or Solutes in Marine Waters, and for Protein Characterization that leads to Microbial Identification (FY99) ($141,743)
- Capillary Electrophoresis-Mass Spectrometry and other Instrumental Enhancements for In Situ Measurement of Dissolved Gas and Solutes in Marine Waters, Atmospheric Gases and Aerosols and Large Organic Compound Identification (FY00) ($171,864)
- AQUASENSE: a Low-Power, High-Sensitivity, Portable Mass Spectrometer System for In Situ Measurement of Dissolved Gas and Solutes in Natural Waters, Atmospheric Gases and Aerosols, and Large Organic Compound Identification (FY03) ($153,690)

PACIFIC MARINE & SUPPLY COMPANY, INC.

- Tri-Strut Ship Research and Development (FY94) ($365,400)
- Design, Construction and Sea Trials of a 30-Foot Manned Test Model of a Midfoil SWAS (FY95, FY96) ($500,000; $280,000)
- CFD Code Validation and Improvement Using Large Scale Tests: Optimization of Design for High Froude Number Underwater Body Operating at Near Surface (Midfoil and Slice) and Subsequent Construction and Testing of Optimized Underwater Body (FY97) ($663,300)
- Development, Fabrication, and Demonstration of a Patentable Combination Propeller-Pump Jet Integrated Propulsion Pod with Boundary Layer Suction (FY98, FY99) ($300,000; $1,019,000)
- Large-Scale Producibility Demonstration of CEROS-Developed Three-Dimensional Lifting Bodies for Use in the U.S. Navy's Littoral Support Craft (LSC) Program (FY00) ($980,000)
- Flapping Foil Technology for Motion Stabilization of Novel High-Speed Vehicles (FY01) ($250,000)

RAYTHEON SYSTEMS (formerly HUGHES AIRCRAFT, formerly ALLIANT TECHSYSTEMS)

- High-Resolution Bottom-Penetrating Acoustic Sensors and Signal Processing Algorithms for Reduction of False-Alarm Probability in UXO Hunting (FY 94) ($980,766) [Subcontractors: University of Hawaii School of Ocean and Earth Science Technology (SOEST), INTECH, Inc., Sea Engineering, Inc.]
- High-Resolution Bottom Penetrating Synthetic Aperture Sonar Using Multi-Vertical Row Array and Subbottom Classifier Sonar (FY95) ($990,083) [Subcontractors: University of Hawaii School of Ocean and Earth Science Technology (SOEST), INTECH, Inc., Sea Engineering, Inc.]
- High-Resolution Bottom Penetrating Synthetic Aperture Sonar for Use in Buried UXO Hunting (FY96) ($982,087) [Subcontractors: University of Hawaii School of Ocean and Earth Science Technology (SOEST), INTECH, Inc., Sea Engineering, Inc.]
- Integrated Sensor System for Search and Classification of Subbottom Objects (FY97) ($753,008) [Subcontractors: University of Hawaii School of Ocean and Earth Science Technology (SOEST), INTECH, Inc., Sea Engineering, Inc.]
- Multi-Spectral, Interferometric Synthetic Aperture Imaging Sonar (FY98) ($550,034) [Subcontractors: University of Hawaii School of Ocean and Earth Science Technology (SOEST), INTECH, Inc., Sea Engineering, Inc.]
- Frequency Agile Sequential Transmission Synthetic Aperture Sonar (FastSAS) - Risk Reduction Technology Demonstration for NetTORP (FY99) ($119,976) [Subcontractors: University of Hawaii School of Ocean and Earth Science Technology (SOEST), INTECH, Inc., Sea Engineering, Inc., Honolulu Shipyard, Inc.]

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

- Effects of Underwater Noise on Marine Mammals Offshore Hawaii (FY93) ($246,324)
- Web-Based Processing for State-of-the-Art Large Aperture Multi-Dimensional (SLAM) Array (FY99) ($500,000)
- Web Based, Propagation & Noise Effects on Signal Processing (FY00) ($670,000)
- Web Based Simulation, Modeling and Signal Processing (FY01) ($399,868)

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION - Ship Technology Division

- Development and Demonstration of A 3-D Flapping Foil Motion Control System for Advanced Marine Vehicles (FY03) ($320,000)

SCIENCE & TECHNOLOGY INTERNATIONAL, INC. (formerly SETS Technology, Inc.)

- Hyperspectral Remote Sensing for Maritime Applications (FY93, FY94) ($691,800; 647,974)
- Dual Mode Fluorescence Imaging for Maritime Applications (FY95, FY96) ($794,976; $996,428; $100,000) [Subcontractor: SAIC, Woods Hole, MA]
- Grazing Angle Imaging Lidar For Organic Mine Countermeasures (FY96) ($698,227) [Subcontractor: SAIC, San Diego, CA]

CEROS FUNDED PROJECTS, continued:

SCIENCE & TECHNOLOGY INTERNATIONAL, INC. (continued from previous page)

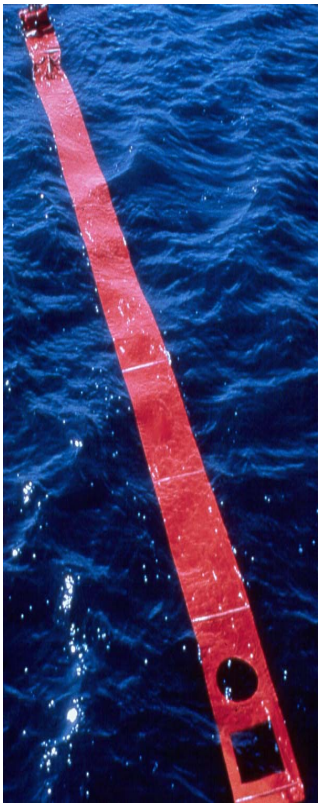
- Undersea Fanbeam Spectral Imaging (FSI) Risk Reduction Technology Demonstration (FY98) ($398,895)
- PAX River DFI Prototype (FY98) ($565,498)

SCIENTIFIC SOLUTIONS, INC.

- Implementation of an Ocean Acoustic Laboratory at PMRF (FY01, FY02) ($150,392; $500,000)
- Data Assimilation, Productization and Dissemination for the Ocean Acoustic Laboratory at PMRF (FY03) ($210,500)

SEA ENGINEERING, INC.

- Development of a Technique to Identify Pollutant Sources and Impacts in Coastal and Oceanic Waters (FY94) ($146,000)
- Development of a Broadband FM Sub-Bottom Profiler for Seafloor Imaging and Sediment Classification (FY93, FY94) ($292,000; $223,870) [Subcontractor: Precision Signal, Inc., Boca Raton, FL]
- Development of a 3-D, Forward/Aft Sweeping High Resolution Buried Object Imaging System (FY97, FY98) ($388,660; $421,200) [Subcontractor: Precision Signal, Inc., Boca Raton, FL]
- On-Site, Preliminary Analysis of Sediment Core Samples (FY97) ($102,650) [Subcontractor: Jet Propulsion Laboratory, California Institute of Technology]
- Development of an Ultra-High Resolution Non-Destructive Technique for Stress Detection for Marine Applications (FY98) ($319,154)
- Development of an Enhanced Resolution Filter for Improving Sonar Imagery (FY99) ($148,287) [Subcontractor: MultiSpec Corporation, Cherry Hill, NJ]



SeeRescue® CORPORATION. Rescue streamer deployed at sea for high visibility from afar.

SEE/RESCUE CORPORATION

- Life/Float the One-Person Survival Craft (FY98) ($70,000)
- Enhanced Sea and Land Rescue Visibility System (FY99) ($253,839) [Co-contractor: TerraSystems, Inc., Honolulu, HI]
- Compact-Inflatable-Mobile Survival Platform for Military/Special Forces and Commercial Applications (FY00) ($120,000)
- Emergency Supplemental Floatation System (ESFS) (FY02) ($45,007) [Subcontractor: Kaysam Worldwide, Inc., Totowa, NJ]

STRUCTURAL SOLUTIONS (KNAPP ENGINEERING)

- Low-Cost Prebuckled Cylindrical Pressure Hulls (FY93, FY94) ($414,450; $571,000) [Project partner: Oceanit Laboratories, Inc. (Honolulu, HI)]
- 3-D Finite Element Design of Cables (FY 96, FY97) ($145,000; $190,000)
- Smart Scuba (FY98, FY99) ($319,000; $312,000)
- A Probe for In Situ Characterization of Marine Carbonate Sands and Other Sediments (FY98) ($220,000)
- Modeling of Cable Fatigue (FY00) ($190,000)
- Experimental Investigation of Cable Fatigue (FY01) ($192,000)
- Structural Modeling of Synthetic Fiber Ropes (FY02) ($195,000)
- STARs - Computer-Aided Design of Synthetic Fiber Ropes (FY03) ($205,000)

SYNTHETIC TECHNOLOGY CORPORATION

- Bioactive Marine Isonitrile Compounds from Hawaiian Sponges as Models for Synthetic Nontoxic Antifoulant and Antibiotic Agents (FY 95) ($155,055)
- Bioactive Marine Isonitrile Compounds from Hawaiian Sponges as Models for Synthetic Nontoxic Antifoulant and Antibiotic Agents. Synthetic Analogs, Paint Formulations, and Mechanisms of Action (FY96, FY97) ($326,553; $300,033) [Subcontractor: Pacific Biomedical Research Center of the University of Hawaii]

TERRASYSTEMS, INC. (Acquired by Science & Technology International, Inc. in 2001)

- Development of an Underwater Video Camera for Optical Contrast and Range Enhancement Using Spectral Stretching

(FY96) ($247,323) [Subcontractor: Sea Engineering, Inc. Waimanalo, HI]
- Development of an Underwater Compositional Mapping (UCM) System (FY98) ($351,177) [Subcontractor: Sea Engineering, Inc. Waimanalo, HI]
- Enhanced Sea and Land Rescue Visibility System (FY99) ($253,839) [Co-contractor: SeeRescue Corporation, Honolulu, HI]
- vSAR: Video Search and Rescue (FY01) ($337,123) [Subcontractor 1: vSAR Corporation, Honolulu, HI; Subcontractor 2: ORINCON Corporation, Kailua, HI]
- Reconnaissance of Mines and Obstacles in the Surf Zone (FY01) ($34,999)

THERMAL ENERGY STORAGE, INC.
- Development and Testing of a Clathrate Desalination Research Facility (FY96) ($250,000) [Subcontractor: Makai Ocean Engineering, Kailua, HI]

TREX ENTERPRISES
- Development of a Sensor for Pesticide Monitoring Based on Porous Silicon Optical Biosensor (FY00) ($537,000)
- Porous Silicon Biosensor (FY01) ($499,826)

VARIAN ASSOCIATES
- Laser Heterodyne Imaging for Shallow Water Surveillance (FY95, FY97) ($299,674; $395,435) [Subcontractor 1: (FY95): Oceanit Laboratories, Honolulu, HI; Subcontractor 2: (FY97): Detection Limit Technologies, Inc. Honolulu, HI]

WEATHERGUY.COM
- Feedback Planning: Fundamentally Improving Undersea Warfare Acoustic Mission Planning Through Event Reconstruction and Analysis for U. S. Navy Maritime Patrol and Reconnaissance Force (FY03) ($332,595)

APPENDIX

INFORMATION FOR PROSPECTIVE NELHA TENANTS

NELHA continually seeks new tenant enterprises which have strong foundations backed by scientific rigor and solid practical plans for education/training, basic or applied research, and commercial production of high value products and associated services which can make significant market impact.

Applications for new tenancy must be reviewed and approved by the NELHA Board of Directors which sets policy and provides guidance for NELHA. The eleven (11) member Board consists of five (5) private sector directors (Governor's appointees including one each from the boards of two state agencies, the Hawaii Strategic Development Corporation and the High Technology Development Corporation) and six (6) public sector directors (representatives of the University of Hawaii's President and School of Ocean and Earth Sciences & Technology, the Aquaculture Development Program of the Department of Agriculture, the Department of Business, Economic Development and Tourism,and the Department of Land and Natural Resources, as well as the Mayor of the County of Hawaii).

Personnel in key staff positions at NELHA also participate in the application review process. These positions comprise the staff's Strategic Planning Board (SPB) and include: Executive Director, Scientific/Technical Manager, Administrative & Projects Manager/NELHA Gateway Manager, Operations Manager, Leasing and Tenant Relations Specialist, Engineering Projects Coordinator, and Fiscal Officer.

In addition, both NELHA Staff and Board members work closely with a number of government and private sector groups which provide information or assistance for conducting business in Hawaii. NELHA staff can assist applicants by making referrals to the appropriate divisions, offices or key individuals as needed.

NELHA master permits and environmental studies that are already in place allow tenants to implement development plans within a shorter timeframe than if they had to acquire these on their own as independent projects. These benefits add up to fewer up-front costs and serve to minimize time delays.

For commercial projects with initial pre-commercial research requirements, up to three years of initial R&D in the NELHA Research Compound are allowed. Short term, annually renewable leases are used during these early years before a commitment through execution of a long term sublease needs to be made. Upon commercialization, a long term sublease is executed. A percentage rent policy applies once a tenant business becomes profitable enough so that 2% of gross sales exceeds the base rent. However, during the first five years under a long term sublease, NELHA incentives allow tenants to earn and apply offsets against percentage rents through credits based on capital investments.

NELHA has evolved over nearly three decades to arrive at its present stage of development as an economic development agency, fostering new industry growth. It will be primarily through the successes of aggressive and well-placed leading edge entrepreneurial enterprises as well as innovative research and complementary education projects that this goal will be realized.

Any interested parties should contact the NELHA Executive Director or Leasing & Tenant Relations Specialist for application information.

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NELHA Board of Directors

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(Representing Evan Dobelle, President, University of Hawaii at Manoa)

Raymond Carr *(from February 2003)*
Economic Development Specialist
Research & Development, County of Hawaii
(Representing Mayor Harry Kim, County of Hawaii)
Peter Young *(until December 2002)*
Deputy Managing Director, County of Hawaii

Antonio Saguibo *(from June 2003)*
Hawaii Strategic Development Corporation Board of Directors
(At-Large, Governor's Appointee; term expires June 30, 2002)

Russell T. Yamane *(from June 2003)*
Kenneth T. Koike *(until May2003)*
High Technology Development Corporation Board of Directors

Marni Herkes
Kona-Kohala Chamber of Commerce
(At Large-Governor's Appointee; term expires June 30, 2003)

NELHA Board Committees

Research Advisory Committee (Statutory)

Donald Thomas , Ph. D., *Chair*
Center for the Study of Active Volcanoes
University of Hawaii at Hilo

John Corbin, *Secretary*
Department of Land and Natural Resources
Special Expertise: Aquaculture

William Fried
Technical Director, CEROS

Raymond Carr, Ph. D.
County of Hawaii Dept. of Research and Development

Commercial Activities Committee

Richard Henderson, Chair *(from January 2003)*
Tom Whittemore
John Corbin
Kenneth T. Koike (until May 2003)
Marni Herkes
Harry Yada
Greg Ogin (*Non-Board member; Clarke Realty)*

Science Development Committee

Bill Friedl, *Chair (Non-Board member; CEROS)*
John Corbin
Donald Thomas, Ph. D.
Maurice Kaya
Rick Rocheleau

RIGHT: Groundbreaking ceremonies for the planned NELHA Gateway Distributed Energy Resources Center on August 27, 2002. Tents provided shade from the Keahole sunshine for the gathering of West Hawaii community members, NELHA Board and staff, and Friends of NELHA.

ABOVE LEFT: Untying the maile lei at the construction site.

ABOVE RIGHT: Jeff Smith, NELHA Executive Director, Senator Daniel K. Inouye, and Jacqui Hoover, Gateway Manager.

LEFT: Preparing to turn the earth using traditional Hawaiian o'o digging sticks.

NELHA/CEROS PERSONNEL

(from July 1, 2002 through June 30, 2003)

NELHA

Jeff L. Smith, *Executive Director*

Robyn Blair, *Senior Secretary (until July 2002)*

Michael Bloomfield, *Operations Supervisor/Electrical Engineer*

Thomas Daniel, Ph. D., *Scientific/Technical Director (until March 2003)*

Donald DeSilva, *General Laborer*

Kimber Deverse, *Chemist III*

Monica Dunse, *Microbiologist III*

Georgette Espinueva, *Secretary III*

Ernest Galt, *Maintenance Mechanic II*

Rex Goatcher, *Vehicle/Construction Equipment Mechanic I (from August 2002)*

Karin Haleamau, *Groundskeeper II*

Gisela Hetherington, *Chemist III*

Jacqui Hoover, *Administrative & Projects Manager/Gateway Manager*

Sheryll Kaniho, *Fiscal Officer*

Barbara Lee, *Leasing &Tenant Relations Specialist*

Diane Minchew, *Senior Secretary (from December 2002)*

Anthony Mitchell, *Maintenance Mechanic I*

Jeff Nichols, *Engineering Projects Coordinator*

Eugene Pierce, *Electrician II*

Justin Pitts, *Utility Electrician (until May 2003)*

Jan War, *Operations Manager II*

CEROS

Bill Friedl, *Technical Director*

Jacquie Brewbaker, *Program Manager for Outreach & Administration*

Corinne Giles, *Office Manager*

Donna Mau, *Contracts & Grants Administrator (Honolulu office)*

NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY (NELHA)
HAWAII OCEAN SCIENCE & TECHNOLOGY (HOST) PARK
At Keahole Point

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