STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

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OFC OF ENVIRONMENTAL QUALITY CONTROL

NOV 13 2000

Ref.PB:EAH

CDUA File No.: OA-2989B

MEMORANDUM

TO: Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control

FROM: Dean Y. Uchida, Administrator

SUBJECT: Environmental Assessment (EA) Notice of Determination: Finding of No Significant Impact (FONSI) for Cates International, Inc. Finfish, Open Ocean, Net Cage Aquaculture Farm Two Miles Offshore of Honouliuli, Ewa, Oahu

The Department of Land and Natural Resources, Land Division, has reviewed the comments received during the 30 day public comment period, which began on April 23, 2000 and the subject EA. The proposed farm is not part of a larger operation, nor is an expansion of the four net cages proposed for the farm contemplated. In addition, no other ocean aquaculture is currently proposed within the surrounding area of the proposed farm. We have determined that the subject project will not have significant environmental impacts and hereby issue a Finding of No Significant Impact (FONSI) for the subject project's EA. Please publish this determination in a future OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form and four copies of the final EA. My staff will e-mail a completed publication form to your office shortly.

The applicant proposes to develop a Pacific Threadfin (moi) finfish commercial aquaculture farm consisting of four 50 foot tall, 80 foot diameter, submerged net cages moored approximately 2 miles offshore at Honouliuli, Ewa, Oahu pursuant to the provisions and controls for the lease of state marine waters contained in Chapter 190D, Hawaii Revised Statutes (HRS). The net cages would be submerged 40 feet below the surface and their mooring system would extend over approximately twenty-eight acres. Other native marine fish species would be introduced for culture as feasibility and market demand are established.

The existence of the cages would be noted on nautical charts of the area. Also, according to the applicant, deep draft vessels do not approach the area near the proposed cages due to the presence of shallow submerged reefs. Therefore, since the proposed cages would be submerged 40 feet below the ocean surface, they are not expected to significantly impact surface ocean transport.

The submerged fish cages are not expected to noticeably impact subsistence, recreational or commercial fishing or other ocean activities within the area, except that any bottom or trap fishing or diving use within the twenty-eight acre farm area would be partially curtailed by the presence of the submerged cages and mooring lines. However, according to on site observations conducted and reported by the applicant, ocean use activities have not been observed in the area of the proposed farm. The operators of the net cage presently used to experimentally grow moi in the general area of the proposed farm have noted divers and fishermen who occasionally collect fish about the cage. These activities have not been extensive and have occurred only as a direct result of the experimental cage acting as a fish aggregation device.

The net cage presently used to experimentally grow moi in the general area of the new proposed farm is to be removed in early 2001 when research is completed. Water quality and benthic habitat monitoring during the operation of the nearby experimental net cage has not shown significant water quality or benthic environment impacts due to cage aquaculture activities. During phase I of the experiment, a temporary increase in the level of dorvilleid worms inhabiting the benthos was observed. The level returned to normal as overfeeding was controlled in phase II. We would not necessarily consider any reasonable possible increase in the level of native dorvilleid worms at the proposed farm site to constitute a significant environmental impact, however, at the proposed farm we understand that fish farm feeding will be controlled and that the surrounding benthic habitat will be monitored and that appropriate action will be taken to prevent any impacts to the area's benthic habitat.

According to the applicant, the native fish species grown in the proposed submerged net cages will only be bred from wild caught broodstock. Therefore, any release of the first generation native fish from the cages or possible spawning of the first generation native fish within the cages is not presently expected to significantly impact wild native fish stocks. In addition, the proposed farm, including the net cages and the net cages' mooring lines, will have no foreseeable significant impact upon protected marine species, should protected species enter the farm area.

The applicant proposes to monitor the surrounding cage environment in terms of impacts on nearby water quality, coral reef marine life, benthic habitat and in water ecology. The applicant proposes to also monitor the ocean cultured native fish for disease and the submerged cages and mooring lines for signs of wear and to take action to halt the spread of any disease and to discourage partial or complete cage breakaway. Response protocols are currently proposed for diver emergencies, ocean condition emergencies, disease outbreaks, the complete failure of the mooring system and theft or vandalism.

Should you have any questions, please contact Eric Hill of our planning staff at 587-0380.

c. Oahu Board Member
DAR/DOBOR/DOCARE/MARINE PATROL
DOT/DOA/DAG(LTD)
NMFS Honolulu Laboratory/USFWS Pacific Island Ecoregion/UH Sea Grant
Hawaii Aquaculture Association, P. O. Box 1039, Waialua, HI 96791
American Fisheries Society – Hawaii Chapter, P. O. Box 22085, Honolulu, HI 96823
Oceanic Institute, 41-202 Kalanianaole Highway, Waimanalo, HI 96795
Cates International Inc., P. O. Box 335, Kailua, HI 96734

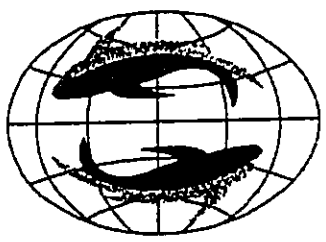
2000-11-23-OA- FEA - Cates International

FINAL ENVIRONMENTAL ASSESSMENT

* (OFFSHORE FISH FARM) *

COMMERCIAL OPERATION

Mamala Bay, Oahu, Hawaii



Prepared for:

Department of Land and Natural Resources
Land Division

and

U.S. Army Corp of Engineers
Honolulu Engineer District

and

Department of Health
Clean Water Branch

and

Office of Environmental Quality Control

Prepared by:

Cates International, Inc.
P. O. Box 335
Kailua, HI 96734

November 1, 2000

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Project Summary

The demand for seafood worldwide is rising at a rate of roughly 1.5 million metric tons per year, while the sustainability of offshore catches is falling. Due to this escalating shortfall, offshore aquaculture farming has already become a viable and environmentally sound means to meet the demand in many countries around the world, such as Scotland, Ireland, and collected Mediterranean countries. Here in the United States seafood is ranked the number two import, second only to oil, while our own offshore fish catches continue to decline. Evidence of support by our own local government for the development of open ocean aquaculture was established in July of 1999, with the passage of a revised version of Chapter 190D of the Hawaii Revised Statutes, Ocean and Submerged Lands Leasing that permits aquaculture leases.

In an effort to join other nations in the offshore fish farming industry the Hawaii Offshore Aquaculture Research Project(HOARP) was the first U.S. experiment to successfully grow 40,000 pounds of the native **Pacific Threadfin** (*Polydactylus sexfilis*), locally known as Moi, with little to no measurable environmental impact, in a completely submerged deep water net cage. Results from the HOARP and model calculations indicate that a larger commercial scale operation is both economically viable and environmentally sound.

Cates International, Inc. the local company that provided operational and technical support for the recent offshore experiment with the intent of future commercial development, has now applied for a 28 acre, 15 year term submerged lands ocean lease, and all associated permits and approvals to deploy a maximum of 4 net cages in waters 150 feet deep, 2 miles off Ewa Beach, Hawaii. A regimented monitoring and reporting program will ensure constant compliance with State and Federal water quality standards. Each cage has a rated potential of producing 150,000 pounds every eight months. The operation will begin with 2 cages stocked with Moi and increase production as market demand dictates, provided that conformance with environmental standards can be maintained.

Unsatisfied international market demand for Moi is currently is in excess of 10,000 pounds per week. A rapid increase in demand is expected once a constant year round supply is available. The introduction of Moi to international markets presents an economic opportunity for the State of Hawaii to develop a large new industry.

Project Description: Setting submerged aquaculture net cages approximately 2 miles offshore of Ewa Beach, Hawaii in a water depth of 150 feet to commercially farm native species of finfish.

Consultation with Agencies and Community

Federal Agencies: National Oceanic Atmospheric Administration (NOAA)

National Sea Grant Office

U S Department of Commerce

U S Coast Guard - Marine Safety Office

U S Department of the Army
Army Corps Engineers

U S Navy - Pearl Harbor Operations

U S Department of the Interior
Fish and Wildlife Service

State Agencies: Office of the Governor
Governor Benjamin Cayetano

University of Hawaii
Sea Grant College Program
Hawaii Institute of Marine Biology

Department of Agriculture
Office of the Chairperson
Aquaculture Development Program

Department of Commerce and Consumer Affairs - Export Assistance Center

Department of Business, Economic Development and Tourism-
Hawaii Coastal Zone Management Program

Department of Land and Natural Resources
Office of the Chairperson
Division of Land
Division of Boating and Ocean Recreation
Division of Aquatic Resources

Department of Health
Office of the Director
Clean Water Branch
Office of Environmental Quality Control

City and County Agencies:
Department of Planning and Permitting
Fire Department

Community: Ewa Beach Neighborhood Board

Hawaii Aquaculture Association

Hawaii Operational Safety Team

Local Business: Oceanic Institute
Pacific Ocean Producers
American Divers
Sea Engineering
China Air
Canadian Air
Japan Airlines
Honolulu Fish Company
Diamond Head Fish Company
Garden Valley Isle Fish Market
United Fishing Agency
Ishimoto Fish Company
Dow Distribution Seafood

Accepting Authority: State of Hawaii, Department of Land and Natural Resources.

Land Use Designation: Conservation District, Submerged Lands, Subzone (R)Resource.

Water Classification: Department of Health Class A

Tax Map Key: N/A

Area of Proposed Use: A rectangular land area located on the seafloor 2 miles offshore of Ewa Beach, Hawaii. The outer limits of the mooring system total 28 acres. The inner limit of the total area occupied by four cages is 0.46 acres.

Anticipated Time Frame: Commence deployment of cages on approval of all applicable permits and signed ocean lease agreement, estimated to be September 2000. Expiration date proposed: September 2015.

Anticipated Determination: Finding of No Significant Impact(FONSI)

Applicant: Cates International, Inc., a private corporation, P.O. Box 335, Kailua, Hawaii 96734.

Funding Source: Private principal investment and commercial loan.

Required Permits: Conservation District Use Permit
CDUP - DLNR

DA Permit - Department of the Army

DBEDT-Office of State Planning
Coastal Zone Management Program
CZMP Approval

DOH-Clean Water Branch
*NPDES/ZOM - upon production exceeding 100,000 lbs.in one year.

Aquaculture License- Division of Aquatic Resources, DLNR

Current Status: Environmental Assessment Required

- submittal of all required permits and approvals: status pending.

Distribution List:

U S Coast Guard: Marine Safety Office
U S Department of the Army: Army Corps Engineers
U S Department of the Interior: Fish and Wildlife Service
U S Navy: Pearl Harbor Operations
Office of the Governor: Governor Benjamin Cayetano
University of Hawaii: Sea Grant College Program, Hawaii Institute of Marine Biology
Department of Agriculture: Office of the Chairperson,
Department of Aquaculture: Aquaculture Development Program
Department of Commerce and Consumer Affairs: Export Assistance Center
Department of Business, Economic Development and Tourism: Hawaii Coastal Zone Management Program
Department of Land and Natural Resources:
Office of the Director,
Division of Land(additional 20 copies),
Division of Boating and Ocean Recreation,
Division of Aquatic Resources
Department of Health: Clean Water Branch, Office of Environmental Quality Control
City and County of Honolulu: Department of Planning and Permitting
Ewa Beach School and Public Library

Significance Criteria: Listed below are the areas of reference within this document that addresses each of the "significance criteria" as listed on page 16 of the *Environmental Guidebook*, Office of Environmental Quality Control, 1997. Each significance criteria is italicized before sited Draft Environmental Assessment reference.

(1). *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;*

1.) Comment: **The project will not change or destroy any natural or cultural resource in any way. Any minor change or effect to the environment (i.e. sand displacement under the anchors) would quickly revert to the natural condition upon termination of the project.**

25-29.
: Section 7. Relationship between Local Short-term Uses of the Environment an Maintenance and Enhancement of Long-term Productivity pages 38,40.
: Appendix A. Monitoring Program.

(2). *Curtails the range of beneficial uses of the environment;*
Comment: "Exclusivity" is not requested or required by the applicant. However, certain deep water activities, such as bottom or trap fishing, may be curtailed by the presence of the cage and mooring apparatus.
Ref: 4.a.4. Long-term Impacts on Ocean Activities. page 26.

(3). *Conflicts with the States long term environmental policies or goals as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;*
Comment: No conflicts with the State's long term environmental goals exist in this project, as it is consistent and compliant with land use policies.
Ref: 1.b.1. Consistency with Land Use Policies, Plans, and Permitting, page 5.
: 3.f. Ocean Activities, page 24.
: Section 6. Relationship to Land Use Policies, page 36,37.

(4). *Substantially effects the economic or social welfare of the community or State;*
Comment: Effects of social impact are non-existent. Effects of economic impact are expected to only enhance the economic picture with the development of a new industry.
Ref: 2.k. Impact on Local Markets, page 14.
: 2.l. Demand Rationale, page 14.
: 4.a.6. Impact of Economics and Facilities, page 27.
: Attached correspondence from "Japan Airlines" and "Opihi Adventures"

(5). *Substantially effects public health;*
Comment: Public health will not be effected given the substantial evidence of minimal discharge to the surrounding water.
Ref: 4.a 2. Probable long-term Impacts, page 25.
: Section 5. Environmental Monitoring Program, page 31-35.
: Appendix A. Monitoring Program, pages A1-A4
: Appendix C. Report from Dr. Marlin Atkinson, pages C1-C-2.

: Table 2.HOARP Net Cage Environmental Results, WS-2.

(6). *Involves substantial secondary impacts, such as population changes or effects on public facilities;*

Comment: Secondary impacts in the future may include facility development of a hatchery and feed mill, which would be beneficial to industry growth economics of the State. No change in population is expected.

Ref: 2.i. Facility Use, page 14.

(7). *Involves substantial degradation of environmental quality;*

Comment: No substantial degradation of environmental quality will occur; regimented schedules of monitoring and reporting will insure constant compliance.

Ref: 1.a. Purpose and Need, page 4, last paragraph.
: 4.a.2 Probable Long-term Impacts page 25.
: Section 5. Environmental Monitoring, pages 31-35.
: Appendix A. Monitoring Program
: Appendix C. Report from Dr. Marlin Atkinson
: Table 2.HOARP Net Cage Environmental Results, WS-2.

(8). *Is individually limited but cumulatively has considerable effect upon the environment or involves commitment for larger actions;*

Comment: The project alone has no known cumulative effects on environmental issues and measures are built in to insure compliance and non- cumulative impacts. Commitment for larger actions is not foreseeable.

Ref: 1.a. Purpose and Need, page 4, last paragraph.
: 3.e Marine Life, page 22.
: 3.e.1.Pelagic Fish and Sharks, page 23.
: 4.a.2 Probable Long-term Impacts, page 25,26.
: 4.a.5. Irreversible Commitments, page 27.
: Section 5. Environmental Monitoring, pages 31-35.
: Appendix A. Monitoring Program
: Appendix C. Report from Dr. Marlin Atkinson

(9). *Substantially effects a rare, threatened or endangered species, or its habitat;*

Comment: No rare, threatened, or endangered species will ever be displaced, disturbed, harassed or injured. Common visits may and have occurred, nothing indicates any negative or harmful action has or will ever occur.

Ref: 3.d. Proximity to a Coral Reef, page 22.
: 3.e. Marine Life, page 22,23.
: 3.e.3 Endangered and Protected Species, page 23.

(10). *Detrimentally affects air or water quality or ambient noise levels;*

Comment: Significant evidence shows that water quality will not detrimentally be affected. Future monitoring will insure that increased production will always be compliant to standards.

Ref: 1.a. Purpose and Need, page 4, last paragraph.
: 4.b.1. Discharges, page 29.
: Section 5. Environmental Monitoring, page 31-35.
: Appendix A. Monitoring Program
: Appendix C. Report from Dr. Marlin Atkinson
: Table 2.HOARP Net Cage Environmental Results, WS-2.

(11). *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion prone area, geologically hazardous land, estuary, fresh water, or coastal waters;*

Comment: No effects to the sensitive areas of the coastline will occur. Project location is well beyond sensitive areas in a150' depth, nearly 2 miles offshore. Regular monitoring, reporting and response measures will insure compliance.

Ref: 2.a. Site Selection, page 10.
: 3.a. Wind and Sea, page 20.
: 3.a.1 Waves, page 20.
: 3.a.2. Currents, page 20.
: 3.b.1. Hurricane, page 21.
: 3.b.2. Tsunami, page 21.
: 3.c. Features on the Sea Floor, page 22.
: 3.d. Proximity to a Coral Reef, page 22.
: Appendix B. Mooring System.

(12) *Substantially effects scenic vistas and view planes identified in county or state plans or studies; or...*

Comment: All apparatus and equipment is submerged, except for the visiting service vessel, therefore scenic views will not be effected.

Ref: 4.c. Changes to Scenic Views and Landscape, page 29.

(13) *Requires substantial energy consumption.*

Comment: The project requires little energy consumption that is limited to fuel for the service boats, and ice making at harvest.

Ref: 2.g. Operational Plan, page 12.
: 2.h. Service Schedule, page 13.
: 2.i. Facility Use, page 14.

Meetings: Documented below is a partial list of meetings regarding this project. Given the large organizational task of applying for a first time submerged lands permit, there have been numerous informal face to face, and phone contacts that would be impractical to document.

Jan. 28, 2000 "Agency Scoping Meeting", organized by Aquaculture Development Program Manager to discuss general project and permit issues, attended by representatives of: DLNR-Planning, DLNR- Ocean Rec. Div., Army Corp of Engineers, National Marine Fisheries, Oceanic Institute, UH Sea Grant College Program, DOH-Clean Water Branch.

Feb. 2, 2000 "Agency Scoping Meeting", organized by Aquaculture Development Program Manager to discuss general project and permit issues, attended by representatives of: DLNR - Div. of Aquatics, UH Sea Grant College Program.

Mar. 13, 2000 "Project Presentation" to Governor Benjamin Cayetano and Chief of Staff.

Apr. 24, 2000 "Moi Strategic Alliance" group meeting to discuss marketing of Moi attended by representatives of: Hawaii Aquaculture Association, Japan Airlines, Oceanic Institute, Aquaculture Development Program.

June 8, 2000 "Ewa Beach Neighborhood Board" presentation at monthly meeting.

June 21, 2000 "DLNR Public Hearing", public comment.

Cates International, Inc.
(C I I)

NET CAGE SITE

FIG. 1

Enhanced Photocopy of
NOAA Chart # 19004 3/91

Cates International, Inc. (CII)
PROPOSED SITE

PROXIMITY
to
Hawaii Offshore Aquaculture Reasearch Project
(HOARP)

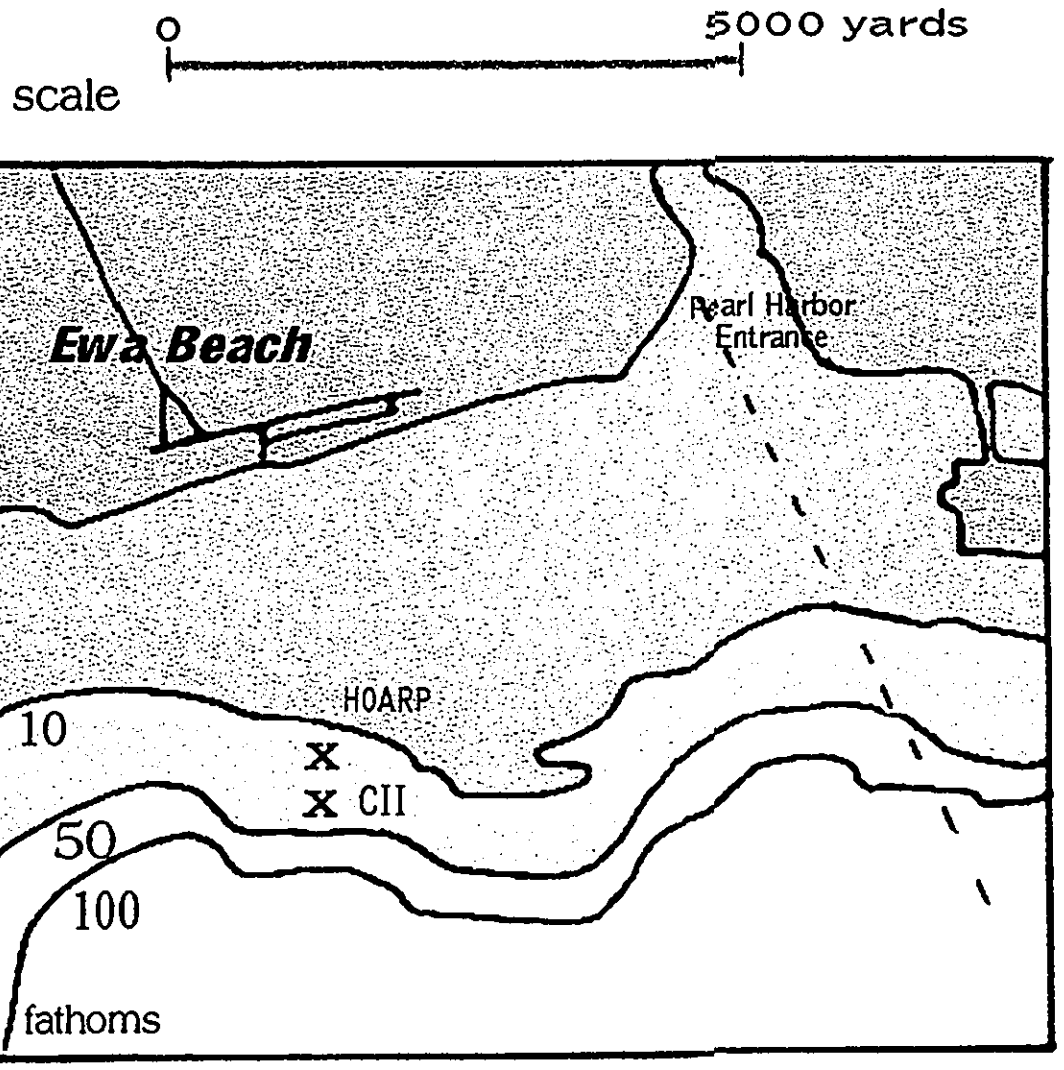


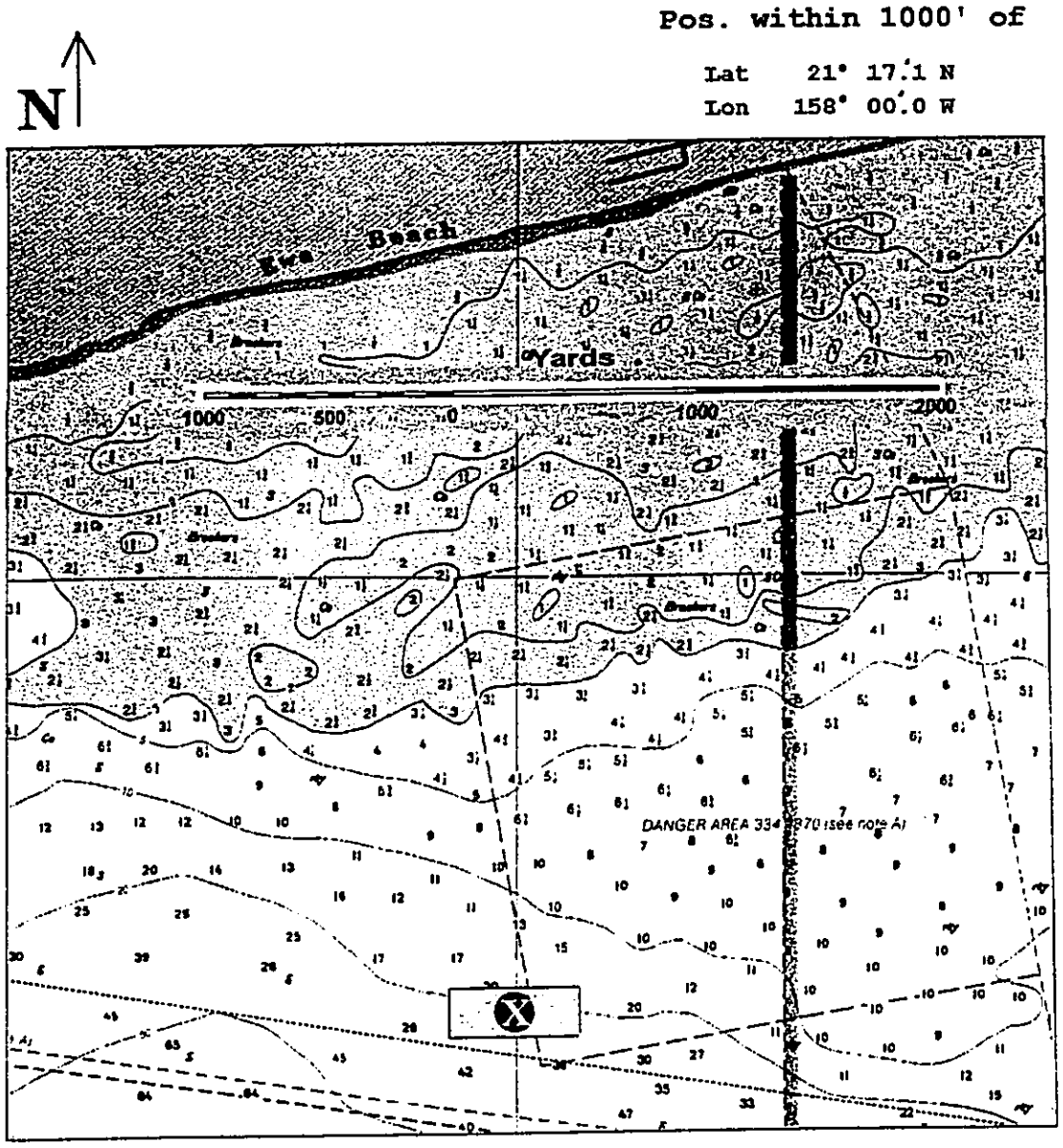
FIG. 2

Separation between HOARP
and CII : 650 feet

Scale drawing from NOAA
chart # 19357

Pos. within 1000' of

Lat 21° 17.1 N
Lon 158° 00.0 W



NOAA Chart 19362
12th Ed. June 1, 1996

Soundings in Fathoms

FIG. 3

SECTION 1. PERMITS, LAWS, CONSISTENCY ISSUES

1.a. Purpose and Need: The demand for seafood worldwide is rising at a rate of roughly 1.5 million metric tons per year, while the sustainability of offshore catches is falling. Estimated demand in the year 2025 will be 162 million metric tons. When compared to the estimated total world fishery production of 70 to 90 million metric tons for the year 2025, the expected short fall is staggering. In the United States seafood is ranked the number two import, second only to oil.

As we continue to deplete native stocks and pressure our offshore capture fisheries, an alternative to capture fisheries is needed. A means to meet the high demands at commercially significant levels can be realized by expanding the use of ocean resources for aquaculture.

Evidence of such has already been realized by the leaders in offshore aquaculture technology and production in countries such as Norway, Australia, Japan, and Ireland.

The commercial development of offshore aquaculture in the United States has been impeded in recent history by the lack of demonstrated feasibility in critical areas. These issues included engineering of containment structures to with stand open-ocean conditions, adequate rates of species growth and survivorship in containment structures, and efficient offshore production management have now been demonstrated.

Here in Hawaii, the Hawaii Offshore Aquaculture Research Project(HOARP), conducted by the University of Hawaii Sea Grant College Program and Oceanic Institute, has been testing new culture technologies, viability, and environmental impact of an offshore net cage stocked with native fish. Phase 1 completed in November of 1999, produced 40,000 pounds of **Pacific Threadfin** (*Polydactlyus sexifilus)*, locally known as Moi.

Nutrient analysis of the surrounding water and samples taken from the bottom reveal no measurable impacts from feed or effluent from the Phase 1 cage project as reported in the draft project reports.

Evidence of the technical viability and market demand created by the success goals of HOARP has pointed to the opportunity for Hawaii to join other nations in offshore aquaculture production.

Evidence of environmental impact from cage aquaculture farming in concentrated near shore shallow waters and inland waterways gave way to the quest for offshore technology development. By moving the farm 2 miles offshore, away from sensitive marine communities, and into deeper water, with constant flushing by natural ocean currents, aquaculture can now co-exist in harmony with the natural ocean environment.

To mitigate concerns of typical surface net cages found elsewhere in the world, the team of Cates International, Inc. has developed the net cage system to operate completely submerged at minimum depth to the surface of 40 feet. No visible apparatus, buoys or structures appear on the surface. This is an innovation in technology used no where else in the world.

This proposed project intends to apply for a commercial ocean lease from DLNR with the intent of placing up to four net cages in an 28 acre area 2 miles off Ewa Beach, to produce native species of finfish for wholesale production.

1.b. Consistency with Regulations

1.b.1. Consistency with State Land Use Policies, Plans and Permitting: The proposed project is located in a Conservation District, Submerged Lands, Subzone (R)Resource, D-1, and will require a Board permit. The objective of the resource subzone is "to develop, with proper management, areas to insure sustained use of the natural resources of those areas"(HAR 13-5-13). Submitted in this report is a monitoring plan for water quality and bottom sampling analysis that will be implemented to constantly insure that State water quality standards are not impaired to a significant degree.

An excerpt from the State's Environmental Policy (HRS 344-3-1),states "…by safeguarding the States unique natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain conditions under which humanity and nature can exist in productive harmony, and fulfill the social, economic and

other requirements of the people of Hawaii." This project is consistent with this and other general aspects of the policy.

Chapter 190D-21 of the Hawaii Revised Statutes as amended and signed into law by Act 176, July 1,1999, specifically addresses ocean leasing for the development of marine activities. Included in the definition of a "marine activity" is "mariculture" and "aquaculture". Section 190D 21,HRS,(a) states: "The board may lease state marine waters [and submerged lands] for marine activities upon compliance with section 171-53 and with the concurrence of the director of transportation…"

The proposed project is consistent with the general aspects of the Coastal Zone Management Program objectives and policies as stated in Chapter 205A-2, Hawaii Revised Statutes.

Submerged lands are also designated as ceded lands. Ceded lands are held in trust by the State. The appropriate use of ceded lands remains an unresolved issue, although Section 190D clearly gives the authority for such decision to the Board of Land and Natural Resources.

1.b.2 Consistency with Federal Discharge Regulations: There is a requirement under State and Federal law to regulate the discharge from concentrated aquatic animal production facilities. These regulations are codified in 40CFR in sections 122.24, 123.25 and 124.52. Fish farms, presumeably including offshore cages, are in general considered to be point sources subject to the National Pollution Discharge Elimination System (NPDES) permit program. However, there are several other factors that need to be considered before determining that a NPDES permit is required. First, the facility must have a production capacity of greater than 100,000 pounds per year per point source. Second, there must be evidence that the water quality standards for the water body are being exceeded. Finally, there must be a case by case determination by the regulating authority that the facility is a significant contributor of pollution to waters of the United States.

We believe that the CII facility is exempt from the NPDES provisions for the following reasons:

(1) There is no requirement for a NPDES permit so long as the production is limited to less that 100,000 pounds per year per point pollution source. (see 40 CFR 122 Appendix C b.2.). Initial production limits of each of the two initial cages will in all likelihood not exceed this limit.

(2) The open ocean water quality standards for the State of Hawaii will not be exceeded (See Section 5 for further discussion). The HOARP experiment has provided data for water quality changes both inside the cage and immediately outside the cage (see Table 2. p.WS-2) These measurements were for approximately 40,000 fish. Even if the cage were stocked to its maximum capacity (150,000 pounds of fish) the discharge should be no more than 4 times the maximum observed at the HOARP site. This discharge level would still be with that permitted for offshore waters in Hawaii.

(3) Although 40CFR Section 124.52 permits the States to require a permit on a case by case basis, we believe that 40CFR Section 122.24 (c) (2) which states "(2) A permit application shall not be required from a concentrated aquatic animal production facility designated under this paragraph until the Director has conducted on-site inspection of the facility and has determined that the facility should and could be regulated under the permit program" should apply. Our monitoring program, enunciated in Appendix A. should demosntrate whether or not we should or should not be subject to the NPDES long before any permanent damage is done. But we cannot be required this data withour having a facility operating at its normal capacity.

(4) Finally, the discharge from other facilities within 4 miles of the CII facility is hundreds of times greater than the maximum possible discharge from the CII facility and these permitted discharges are not degrading the water quality at the CII site to a significant degree. (see Table 3.p. WS-3 CII data)

We therefore request that a determination be made that the CII operation can begin operations without a NPDES permit, and continue to operate without such permit, so long as the environmental monitoring data show that the project is not exceeding the water quality standards for the State of Hawaii.

Here is the 122.24 section:

Sec. 122.24 Concentrated aquatic animal production facilities applicable to State NPDES programs, see Sec. 123.25).

(a) Permit requirement. Concentrated aquatic animal production facilities, as defined in this section, are point sources subject to the NPDES permit program.

(b) Defintion. Concentrated aquatic animal production facility means a hatchery, fish farm, or other facility which meets the criteria in appendix C of this part, or which the Director designates under paragraph (c) of this section.

(c) Case-by-case designation of concentrated aquatic animalproduction facilities.

(1) The Director may designate any warm or cold water aquatic animal production facility as a concentrated aquatic animal production facility upon determining that it is a significant contributor of pollution to waters of the United States. In making this designation the Director shall consider the following factors:

(i) The location and quality of the receiving waters of the United States;

(ii) The holding, feeding, and production capacities of the facility;

(iii) The quantity and nature of the pollutants reaching waters of the United States; and

(iv) Other relevant factors.

(2) A permit application shall not be required from a concentrated aquatic animal production facility designated under this paragraph until the Director has conducted on-site inspection of the facility and has determined that the facility should and could be regulated under the permit program.

1.c. Proposed Action:

- Set sea cages moored together as a single unit with a system of danforth type anchors and a central cement block weight for each cage. Two cages will be set initially. Subsequently, two additional cages will be added for a maximum of four cages at the proposed site, all moored together as a single unit.

- Stock cages with "Pacific Threadfin", (Polydactylus sexfilis), a native species locally known as Moi. Introduce other native species as feasibility and market demand are established.

- Conduct daily operations, such as stocking, feeding, harvesting, maintenance and environmental monitoring with personnel equipped with SCUBA gear from one or more service vessels.

SECTION 2. PROJECT DESCRIPTION

2.a. Site Selection: Careful consideration was given to many factors in choosing the site including prevailing weather conditions, ocean current, proximity to shore facilities, water quality, proximity to a coral reef, marine animal and plant habitat, depth, bottom profile, vessel traffic, fishing activity, and recreational and tourist use.

2.b. Proximity to HOARP: The proposed project site for CII is roughly 650 feet away, due South from the HOARP net cage. Reasoning is that the CII site is close enough to share data from water quality and benthic analysis, and operational experience from Phase 1 research effort. The positioning of the CII site, however, is out of the prevailing East to West current stream, into deeper water, preventing mixture of effluents from the two different sites.

2.c. Sea Cage Description: The sea cages chosen for the proposed project, *Sea Station 3000*, are manufactured in the US by Net Systems of Bainbridge Is., WA. They are designed to withstand severe storm conditions evident by reports from net cage users in the Philippines where they have withstood hurricane conditions.

A single cage is bi-conical in shape with a frame of steel tubing. The size is 80 feet wide by 60 feet tall, and an internal volume of 92,000 cubic feet. In the center is a vertical buoyant cylinder that keeps the net upright. The cage frame is covered with a tight mesh netting of "Spectra" fiber, an extremely strong, UV resistant synthetic material used in many marine applications. Entry of personnel is by zippered openings in the mesh. The anchor system employs a central cement block weight, and a series of danforth type anchors.

The "danforth" style was designed to obtain a high degree of holding power with a minimum of weight. The anchor holds very well in sand and mud, less successfully in gravel and rock. The flukes of the anchor bury themselves into the bottom under applied strain, and often work the anchor below the seabed (see Appendix B. and Fig.8).

Each anchor weighs 5,000 pounds. The cement block is 3 feet by 4 feet by 4 feet. Chain and rope mooring lines

sized to meet strength rating specifications lead from the outer frame of the sea cage to the anchors. A pennant connects the center of the cage to the concrete block on the bottom. External apparatus outside the net cage is a small submerged buoy connected to the feeding hose. All components of the system are totally submerged to a minimum depth of 40-feet.

2.d. Area of Submerged Land Required: Total area of submerged lands of the outer perimeter of the mooring system for the fully implemented four cage project is 28 acres. It is a rectangle that measures 782 feet by 1564 feet. It is oriented with the long sides parallel to the coast line. This is the best position in relation to the prevailing ocean currents. The center of the rectangle is in position Latitude 21 degrees 17.1 minutes North, and Longitude 158 degrees, 00.0 minutes West. The distance from shore is roughly 2 nautical miles. The depth at the center is about 150 feet.

The submerged land area covered by the sum of the four suspended net cages is 0.46 acres. The land area covered by the mooring apparatus of the four cages system is 468 sq. feet, or 0.01 acres.

2.e. Species selection: The species chosen for the initial commercialization of offshore aquaculture is the **Pacific Threadfin** (*Polydactylus sexfilis)*, locally known as Moi. According to Dr. Clyde Tamaru, University of Hawaii, Sea Grant, Aquaculture Extension Specialist, Moi are indigenous to Hawaii and studies indicate that the fish from around the islands are of one genetic stock. Moi are currently being grown for release for stock enhancement purposes and thus an accidental release of fish from the cage would have no adverse genetic impacts on wild populations.
Previously, a defect of the operculum (outer plate that covers the gill) was present in some of the cultured Moi and was proved to be a result of nutritional deficiencies (see letter from Dr. Ako in Correspondence Section, Part 2.) To date, no indications of disease have been detected in cultured Moi grown in the offshore cages. A constant observation for any indications of such will be in effect (see Comments From Dr. Helsely, Correspondence Section, Part 2.). As of today, Moi is the only marine species in Hawaii that is currently being cultured in numbers sufficient for commercial production. Further research and development of culture technologies will eventually allow

the introduction other native species to offshore aquaculture.

2.f Construction Plan: The components of the cage frame and netting will be partially pre-assembled in a suitable sheltered site near land. The cement mooring blocks will be fabricated on shore and transferred to the site by a work vessel along with the anchors. Deployment of the mooring system is the first step of final assembly. The vessel is positioned individually over the exact location of each anchor and the anchor is then lowered. Final position (approximately 400 feet from the center of the cage in each direction), of each anchor is confirmed and repositioned if necessary. Anchors are set in relation to the prevailing East to West current. The cement blocks are lowered to the central position in the same manner. With the mooring system in place the assembled cage is then towed to the site.

Final assembly consists mainly of attachment of the mooring lines from the cage frame to the set components of the mooring system. Time frame for setting the mooring system is one day per cage. Time frame for final assembly of the cage at the site is one additional day per cage.

The cages will be moored in approximately 150 feet of water.

2.g. Operation Plan: Fish are raised and harvested in a six month cycle. Juveniles are grown in tanks on land supplied by a hatchery source at length of about 3 inches. They are then transferred from the shore tanks to the net cage at sea via tank truck and service vessel. Once transferred feeding operations begin on a daily basis. One of the areas of continued research is the optimal feeding frequency, feed formula for offshore species and conditions, and feed amount. Feed is a high cost item for the operation and reduction of the Feed Conversion Ratio or FCR is essential to economic viability. Operational staff from the HOARP developed a feed system using pumped sea water to "blow" the feed pellets through a 4 inch hose to the feed zone within the net cage. Refining this technique will be among of the developmental plans.

Harvesting operations are conducted in a similar way; the fish are pumped up through a flexible hose to the deck of the service vessel. The fish are then transferred to an

ice, seawater brine solution for transport to the shore facility.

2.g.1. Cage Maintenance: Cage maintenance is of two types: (1) inspection , and repair if necessary , of various cage components including the spar, ring, support cables, anchor system, and the net enclosure, and (2) cleaning of the net. The design life of all components, other than the net enclosure itself, is 15 years. All metal is heavily coated with zinc and this provides adequate protection from rust provided the zinc anodes are replaced on a more or less annual basis. The "Spectra"(see Appendix B.**ropes**:)lines used for the anchor and support systems is expected to have a comparable life, but due to mechanical wear and abrasion at the connectors, may need replacement or repair from time to time. For this reason, all anchor and support lines are inspected on a biweekly to monthly interval.

The netting in the cage enclosure is also made of "Spectra" and it is designed to have a service life of more than 5 years. When wear and tear becomes too great, it will be replaced. This operation takes one to two days and requires that the cage be empty and at the surface. The netting undergoes wear where it rubs against other cage components and these areas will need to be identified and repaired by patching from time to time. This minor repair and maintenance can be accomplished by divers while the cage remains submerged. It is also possible that it could be damaged by knives or sharks but no evidence of such damage is present on the HOARP cage after one year in the water. Even if such damage were to occur, it could readily be repaired by divers during their daily inspection.

Cleaning of the cage consists of water jet or stiff brush removal of algal and other marine growth material. This material interferes with the free flow of water through the cage and when it gets sufficiently dense, its removal is necessary. But the algal and animal life adhering to the netting of the cage is also food for the fish inside and outside the cage as is evidenced by the swarming of fish around the divers during the cleaning operations on the HOARP cage. Some of the marine growth does reach the seafloor and is seen for a few days by a slight darkening of the white sand beneath the cage. After a few days it disappears, having either been swept away by currents or having been eaten by the organisms living in the benthic

community. **No chemicals are used in the cleaning operation.**

2.h. Service Schedule: Operations will require staff to service the site daily. One 45 ft. or smaller, vessel with a crew of 2 to 3 personnel will spend an average of one to 4 hours per day at the site. SCUBA gear will be used regularly for daily maintenance, safety inspection of the cage and mooring system, environmental data collection, and feeding operations.

2.i. Facility Use: Shore facilities needed for the proposed project include warehouse storage space, staging area for wholesale distribution, and dock facility for the service vessel. Estimated storage space for feed, maintenance equipment, and packaging supplies is less than 1000 sq.ft. All will be easily accommodated in one of the heavily industrialized port facilities areas of Honolulu Harbor. Storage and dock space will be used year round. Staging areas for wholesale distribution of harvested fish will occur throughout the year on a more or less weekly basis. A single cage harvest is anticipated to last for 6 weeks, depending on market orders, or less if orders are high. Harvest of each cage will occur twice a year.

2.j. Production Estimates: The maximum capacity of a single net cage is roughly 150,000 pounds per harvest. The initial start-up phase of the project the target maximum production will be 75,000 pounds per net cage per harvest. Environmental data from the site, and market demand will be determining factors in the increase of production.

2.k. Impact on Local Markets: Moi is farmed locally in smaller intensive land based operations on Oahu and the Big Island. Local supply to small Oahu markets is not targeted in this project. Due to the high output of the sea cage farm, target markets will be limited to minimum orders of 500 pounds.

2.l. Demand Rationale: The primary intent of this project is to create a stable supply of Moi that will be available to buyers on a year round basis. Our goal is to primarily satisfy markets external to Hawaii. Presently, there is an unsatisfied test market demand of 500 lbs. per week in one small city in Japan. The full potential of this small city alone is in excess of 10,000 lbs. per week according to verbal comments from a representative of Japan Airlines

(see attached correspondence). In other cities in Japan, large and small, the markets can not be further developed until a stable regular supply of Moi is available.

Additionally, we have entered into discussions with suppliers to and Mainland China and Western Canada where a large latent demand for fish of this type has been discovered. A local fish distributor has identified a market in Mexico that has resulted in a current standing order for 10,000 lbs. per week, year round once production commences.
CII has been had close interaction with the of the State of Hawaii Department of Agriculture, Office of the Chairperson and the Aquaculture Development Program, in the development of the technical aspects of the proposal and in the identification of market demand. The Department agrees with our assessment that there is a very large latent demand in Pacific Rim countries for fish with fat content of cage cultured Moi, provided that an assured year round supply is present. This is further substantiated by the attached letters from Japan Airlines and Opihi Ventures (see Correspondence Section, Part 2.).

The most compelling rationale for commercial scale production of Moi is that maximum production of the initial two cages can only produce about 500,000 lbs. per year, or about 10,000 lbs. per week. Even before production begins CII has orders for twice the amount of fish that the initial two cages can produce.

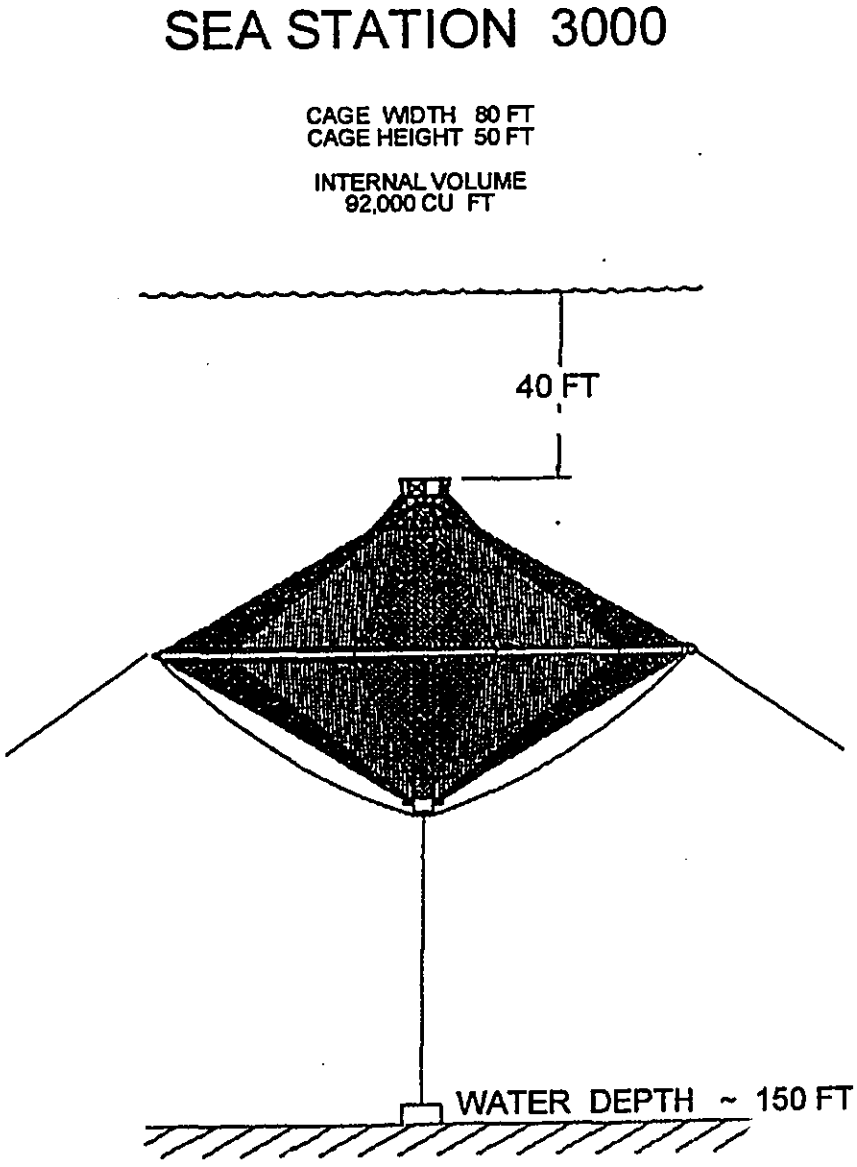


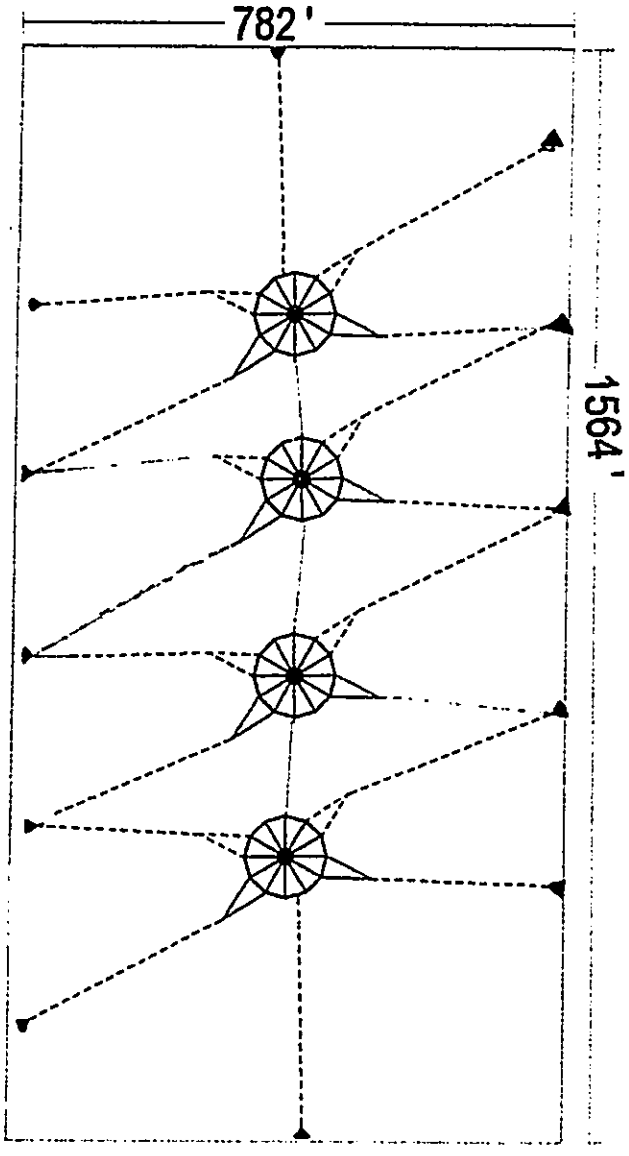
FIG.4

FOOT PRINT OF MOORING AREA

782' x 1564 '= 1223048 sq'

1ac.= 43560 sq' ∴

1223048 sq' / 43560 sq' = 28.08 ac.



Land Area covered by cages

1 cage = 0.115 acres

4 cages = 0.46 acres

Volume of a Cylinder
(represents bottom to surface, diameter of the net cage)

pi x (r 2) x l = vol.

3.1415 x (40')(40') x 150' = 753,960 cu'

= 21,349 cu.m

Volume of a Net Cage
(represents interior fish growing space)

2600 cu.m each

Production capacity rating

150,000 lbs. per harvest

FIG. 5

CII PRODUCTION PHASES

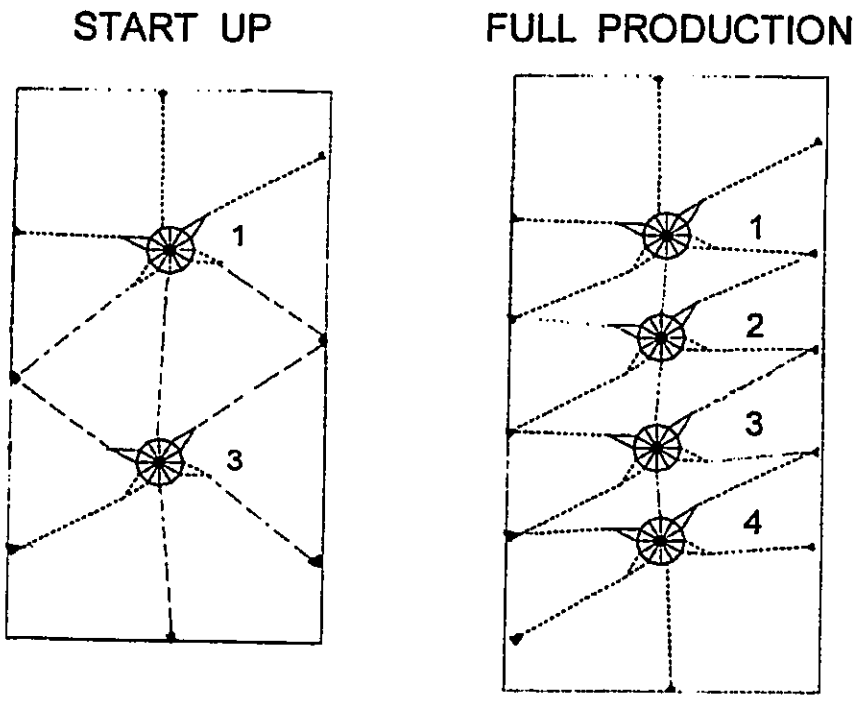
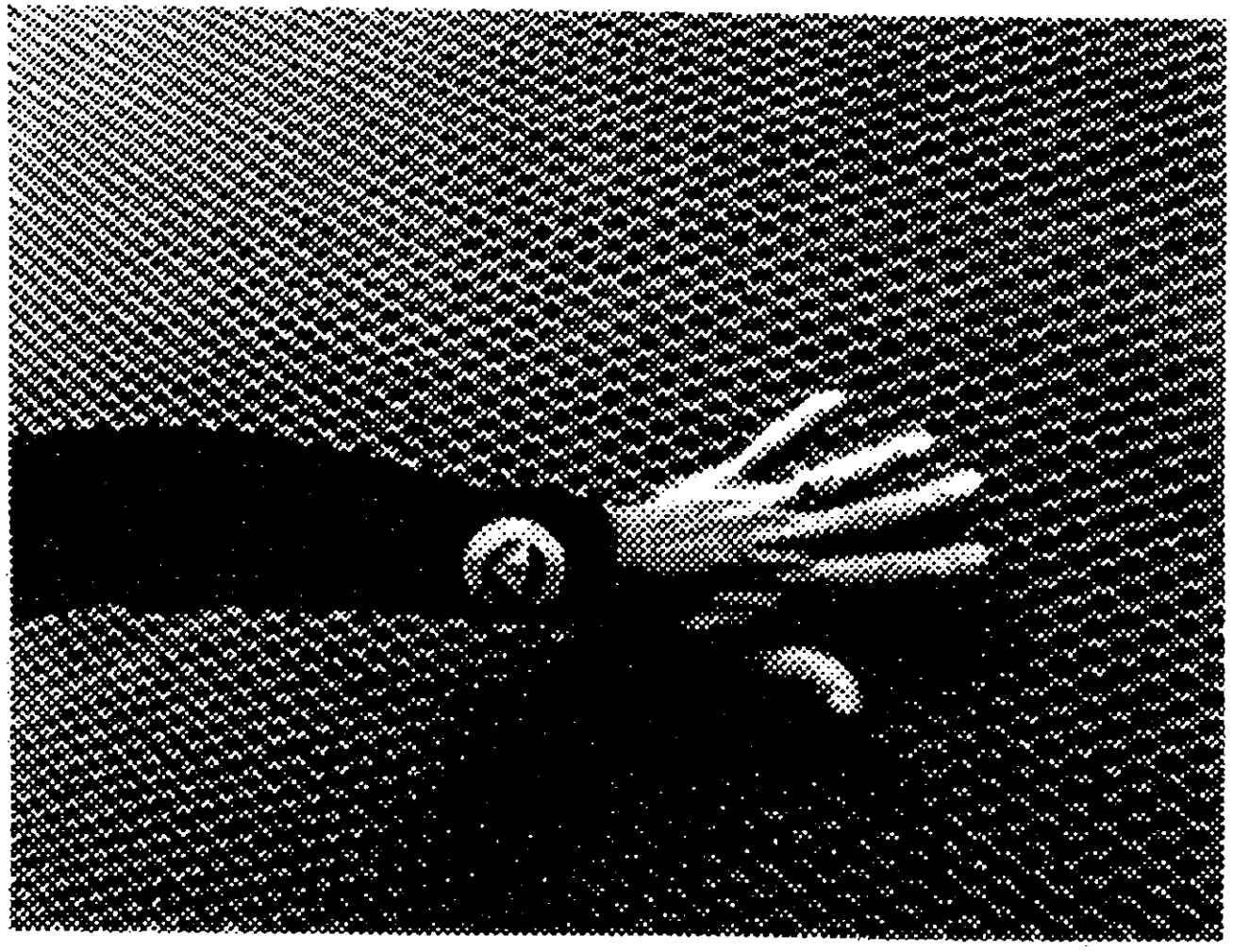


FIG. 6

FIG. 7



TIGHT "SPECTRA" NETTING FIG. 7

SECTION 3. ENVIRONMENTAL SETTING

3.a. Wind and Sea: The prevailing Northeast trade winds throughout the Hawaiian Island chain are a primary factor in the surface waves and wind driven currents at the site are persistent throughout most of the year. Kona wind conditions from the Southwest and Southeast also exist, but much more infrequently. On Oahu the Koolau and Waianae mountain ranges provide shelter to reduce the intensity of winds and seas generated by the trade winds making the near shore coastal waters of the South facing shores more conducive to the operational activity of net cage aquaculture.

3.a.1. Waves: Though other submarine factors can cause waves on the surface, the principal cause is wind. Wind can generate two types of waves. "Sea", caused by prevalence and intensity of wind in an immediate area, and "swell" the wave that continues on without relation to local winds. Where the wave will "break" to form surf is in direct relation to the size of the wave and the depth of the rising bottom.

On the typical South shores of Oahu, and particularly off Ewa Beach, the prevailing breaking surf has had no effect on the bottom at 150 feet, moreover, wave motion was not observed to limit operations during the HOARP Phase I operations and is generally insignificant in the area of the sea cage at depths between 40 feet and 60 feet.

3.a.2. Currents: The variable oceanic currents in the vicinity of the Hawaiian Islands are believed to depend mostly upon the velocity and direction of the wind. The tidal currents are generally weak and are influenced by winds and oceanic movement.

The waters along Oahu's South facing shore experience a general pattern of East to West current in the range of 0.5 to 3 knots. During the semi-diurnal tidal changes, twice per day, the velocity diminishes, and in some areas reverse or rotate in a circular pattern (see Figs. 12,13 Circulation Map, p. WS-6,7).

At the proposed CII site, little influence has been observed or felt from the ebb and flow of the tidal currents in Pearl Harbor. The experience of the HOARP operational team is that the East to West current dominates

at a velocity of 0.5 to 3.0 knots. The net cage is designed to withstand a sustained current of 4.0 knots.

3.b. Severe Weather

3.b.1. Hurricane: Hurricanes are characterized by short wave length, high amplitude waves. Waves of this characteristic tend to do most damage in water shallower than 50 feet, although considerable water motion continues to be persistent at greater depth.

Although the South East facing shore of Ewa Beach has historically sustained less damage during tropical storms and hurricanes than other areas of the Islands, it should not be assumed that any exposed coast of Hawaii can be considered protected. Furthermore, there is speculation that massive water movement or turbidity currents can occur during storms and hurricanes. Measurements of previous storms and hurricanes indicate that scouring of the surface substrate in waters deeper than 20 feet can occur. The Army Corps of Engineers has reported substantial movement of sunken objects between 20 and 100 feet. Below 100 feet little or no damage was observed, most likely due to the rapid decrease water in motion with depth from this type of wave.

The holding power of the net cage mooring system is designed to withstand storm surge of extreme proportion (see Appendix B.).

3.b.2. Tsunami: Severe horizontal surge has been reported by vessels moored offshore during tsunamis in the past, particularly in waters less than 100 feet deep. In the case of a very large tsunami it is expected that damage will occur. It is conceivable that the anchors could drag, and the cage could be damaged to the extent that fish could be released. It is important to note, however, that the average reoccurrence rate of tsunami for Hawaii in the last 200 years is once in 11 years and no tsunami of significant height has occurred since 1964.

The mooring system addresses horizontal and vertical surge of extreme proportion (see Appendix B.). In the event of a tsunami watch or warning, all personnel will be evacuated, and all systems will be secured.

3.c. Features of the Sea Floor: The sea floor off Ewa Beach in the proximity of the CII sea cage site area can be described as a gently sloping sandy bottom at an approximate slope of 12 to 1. That is, for every 12 feet of distance seaward the depth drops one foot. A team of divers inspected a circular area emanating from the center of the proposed site to a radial distance of 1800 to 2000 feet in all directions. Within that area, there exist a few pieces of discarded scrap metal that are attracting small marine communities and ornamental fish. At about 100 feet to the North of the center, a few shells of crabs (species unidentifiable) were observed, none living. A small patch of eel beds (8 feet by 2 feet) were sighted 850 feet to the East of the center at a depth of 90 feet. As of yet, no other species of marine animals or plants have been observed in at the site.

3.d. Proximity to a Coral Reef: Observations from the same inspection above are that from the center of the site the distance to the nearest coral reef is 1800 feet to the North North West, or roughly a quarter of a mile shoreward. Coral heads sit on top of a ledge that rises sharply from a bottom depth of 85 feet to a depth of 50 feet. The height of the escarpment is roughly 30 feet. The coral heads can be estimated to cover about 8% to 12% of the total area at the top of the escarpment, and the percentage of coral cover increases gradually further in towards shore. Numbers of reef fish are less concentrated around the coral in comparison to the fish attracted to the scraps of rubble in deeper water.

3.e. Marine life: During daily routine operations of the HOARP net cage experiment from April 1999, to November 1999, SCUBA divers were able to observe and report of the presence of marine life in the vicinity of that site, roughly 650 feet away from the proposed CII site. A great deal less marine life has been observed over the sandy bottom. The HOARP net cage system has attracted marine communities to the cage itself, to the external apparatus at the bottom of the cage, and around the four anchors. Green sea turtles have been observed visiting upon occasion. The typical behavior suggests that they are in a natural co-existence with the net cage and use it as a temporary resting place.

No green sea turtles have been observed at the CII site, although they can be expected to come by from time to time.

Spinner dolphins in numbers of approximately 10 to 30 transit the site, but do not linger.

3.e.1. Pelagic fish and sharks: During the HOARP Phase I experiment a number of pelagic fish and sharks were observed during feeding and maintenance operations. These included ono, tuna, and sandbar sharks. These fish did not 'live' at the cage for they were rarely seen for more than a few hours, or a few days at most, before they moved on. From these observations one could say that the cage acted as a temporary waypoint in their travels rather than as a permanent home. Thus it is unlikely that a cage culture operation that adequately monitors its feeding program and that removes all dead or injured fish from the cage vicinity will become an attractive nuisance relative to sharks or other pelagic fish.

The only fish that took up permanent residence around the cage were broomtails, palani, opelu, and amberjack. A few marine ornamentals were observed near the anchors on the seafloor.

3.e.2. Natural Predators: There is no evidence that sharks have attempted to feed on the fish inside the cage at the HOARP site. No damage to the mesh netting has occurred in the 12 months that the cage has been deployed.

3.e.3. Endangered and Protected Species: In Hawaiian waters there are three species of marine animals declared threatened or endangered and are under Federal jurisdiction. The endangered hawksbill turtle (*Eretmochelys imbricata*) is infrequently observed in Hawaiian waters. The green sea turtle (*Chelonia mydas*), a threatened species, commonly occurs in the near shore areas of Hawaii, and is known to feed on selected species of macroalgea.

Green sea turtles have been observed at the HOARP site on occasion. The turtles behavior suggest that they are naturally co-existing with the net cage and are neither disturbed, encumbered, or excited in any way.

Populations of the endangered humpback whale (*Megaptera noaeangliae)* are known to winter in the Hawaiian Islands from December to April. Whales have not been observed in the vicinity of the CII site or at the HOARP site.

The Hawaiian Monk Seal(*Monachus schauinslandi)*is an endangered rare species. The small population generally inhabits the outer islands to the Northwest, sightings are rare in the main Hawaiian Islands, and none have been seen at the HOARP site.

In discussions with officials from the National Marine Fisheries Service, the conclusion is that the tension mooring system, small size of the mesh netting, and the taut mesh covering of the net cage will not hamper activities of any of the above mentioned species.

3.f.1. Current Ocean activities: During daily routine operations at the HOARP site, (650 feet shoreward of CII proposed site), more than 200 days of observations were made of users of the area, i.e. fisherman, recreational boaters, and transiting vessels. Findings of these observations indicate that fishing and trapping occurred only over the coral reefs, which were approximately ½ mile shoreward of the proposed CII site. Transiting fishermen and recreational boaters in route to other areas have been the only vessels to approach the site.

3.f.2. Past Uses: CII has requested comment by both written correspondence and verbal discussion regarding the historical and current use of these waters by boating groups, fishing groups, and Native Hawaiian fishermen that are regarded as local authorities. The only comments we received regarding past uses have been verbal discussions of the historical prevalence and breeding activities of native Moi along the entire Ewa coastline. In the past Moi was abundant and fed many local families of fisherman. Today they have been fished out and are nearly non-existent.

SECTION 4. IMPACTS AND MITIGATION MEASURES

4.a. Impacts

4.a.1 Probable Short-Term Impacts: Impact to the sea floor bottom in the area under each anchor and under the concrete block weight will be unavoidable. Marine organisms inhabiting the sand near the surface will be displaced. The area for each anchor is 35 square feet. The area for the concrete block is 16 square feet. Some disturbance to the bottom will occur when the mooring lines are being positioned. As the net cages are put into position, the connecting cables that run to the anchors will be payed out along the sea floor. Careful attention will be given to the assembly procedures will prevent any unnecessary dragging and disturbance of the sea floor marine communities.

4.a.2. Probable Long-term Impacts: The areas of concern for long-term environmental impact are the effect of effluent released into the sea and the cumulative effect of unconsumed feed deposits on the sea floor.

As the fish in the cage are fed, feces and other metabolic wastes are excreted. It can be expected that these wastes will dissipate in one of three ways. Some will be consumed in the water column and produce a "bloom" of phytoplankton and zooplankton. These become a source of food for other marine animals. Some will fall to the bottom and become a food source for bottom dwelling marine animals, and some will be carried away by the current and diluted to a point that is lost within the variability of the ocean.

It can be expected that the unconsumed feed that falls through the cage would be eaten by fish outside the cage. This may raise a concern that the attracted abundance of fish will become a nuisance to the natural marine community. However, it is economically detrimental for the feed to be "wasted" on fish out side the cage due to the high cost of feed. Therefore, it is in the interest of the operator to be as efficient as possible in assuring that all of the feed is consumed within the cage.

Impact monitoring of the water quality in and around the sea cages and benthic sampling of the sea floor under and around the cages will be conducted on a continual regimen (see Section 7.). This will determine whether or not

production increases can take place and be used to determine if a better means of ecological management is available. Care will be taken to assure that all discharges are within the limits designated by the State of Hawaii and the Federal Government to assure that water quality standards are met.

Regular inspection of the biological communities that become attracted to the cages will be monitored for any potential imbalance that may effect nearby communities.

Additionally, approval has been given for a study of how the sea cages at the CII site act as a Fish Attracting Devise (FAD). The study will be conducted by students and staff of the U H Zoology Department, funded initially through the Sea Grant College Program. The study should be able to show not only the recruitment to the cage, but patterns of seasonality as well. These studies may also be able to establish whether or not the recruited fish become permanent residents of the cage environment or become prey for large predators.

The study will commence upon deployment of the cages and terminate about a year later. Details on the scope of this study, and the interim and final reports will be made available as part of the CII reports to DLNR.

4.a.3. Long-term Impacts on Ocean Resources: The intent is for the system to remain moored in the same spot for the duration of the lease. If it were moved, however, the lasting impact would be limited to the minor disturbance of the surfical sand where the anchors had been placed. All evidence of these impacts would most likely be removed during the first major storm event after the removal of the anchor system. A benefit of the proposed system is that it is not permanently attached to the sea floor, such as a pier or imbedded mooring, but rather "anchored" to the bottom in much the same way as a vessel. This implies that the entire system could be moved or removed if necessary for any environmental reason.

4.a.4. Long-term Impacts on Ocean Activities: Typical inshore ocean activities, such as swimming, surfing, reef fishing, and reef walking, are unlikely to be impacted at all due to the distance from shore and submerged location of the proposed net cages.

Other ocean activities that commonly occur further offshore, such as recreational boating, fishing with troll lines or nets, paddling, and canoeing may be impacted by the presence of the service vessel. The extent of the impact, however, will be limited to an alteration of course to avoid the stationary service vessel. In the event of submerged fishing gear dragging over the site it is highly unlikely that system will create a fouling hazard due to the 40 foot depth of the net cages.

Other activities such as trap fishing, and bottom fishing will be impacted to the extent of the physical presence of the anchors, mooring lines and cages. The ability to conduct such activity directly at the site will be hampered by the possibility of the user's gear fouling on the net cage or mooring apparatus. However, given the vast and relatively identical ocean area in the immediate vicinity, user conflict is unlikely.

Careful consideration to the use of area was given in site selection. None of the above mentioned activities have been observed to be present by the operational staff of HOARP, 650 feet from the proposed CII site, since April of 1999.

4.a.5. Irreversible commitments: A discussion of irreversible commitments is limited to the displacement of the marine organisms directly under the anchors on the sandy sea floor. The minimal effects of the discharge of fish effluent and unconsumed feed into the passing natural currents and onto the seafloor are likely to be temporary impacts that will end and rapidly be self corrected at the termination of operations (see Appendix A.).

4.a.6. Impact of Economics and Facilities: The economic impact created by the proposed project can only be predicted in general terms, and will be a function of production levels and product demand. In the start up phase of the project, CII will employ 2 people. Upon full scale production of four cages, the number of employees may be as high as 10 to 12. Conversations with local wholesale fish distributors conclude that Moi is very popular with their clients and that getting enough of the product to meet the demand in the past has been difficult(see correspondence attachments).

There will be a period of market testing that will determine the immediate demand and destination of the product. Though a single harvest could be as much as 150,000 pounds this level of production is not envisaged during start up and could only be justified if in fact anticipated market orders meet anticipated. As stated previously, target wholesale orders are to be a minimum of 500 pounds. The current local market and price of Moi are not expected to be adversely effected.

Development of a continuous supply of a product is generally beneficial for the market. Cage culture provides an ideal means of stabilizing the "feast or famine" type of production that is characteristic of all wild harvest fisheries. Thus the presence of a substantial "farmed fish" component could be a stabilizing rather than destabilizing economic event. Moreover, cage culture enables the development of a long-term stable export market and this should benefit all segments of the fish producing community.

Although our current intent is to raise Moi, at some time in the future, consideration may be given to the introduction of new native species. How this may impact local markets of that species at that time can only be predicted in terms of supply and demand at that time. It is CII's intention not to adversely impact any local market, but, contrarily, to enhance marketability of all fish, farmed or captured, from Hawaii. An example of the type of fish that would be considered in the future would be one that has no market, due to toxicity in native stocks, or has been severely depleted due to over fishing and is therefore imported to the State of Hawaii. These two examples stress the rationale for identifying a suitable new cage culture species. Other factors including cost of production, compatibility with existing operations, and the possible effects on current local markets would also have to be considered.

Facilities use on land will be limited to storage space of approximately 1000 square feet, dock space for two service vessels, and a staging area for wholesale distribution during the 4 to 6 week harvest periods. All will be accommodated in the industrialized area of Honolulu Harbor.

4.b. Mitigation Measures

4.b.1. Discharges: Concern for the effects of effluent discharge will be mitigated by the daily observation and routine sampling as provided for in the environmental monitoring program. To further mitigate the possibility of nutrient load from unconsumed feed, and to insure economic efficiency, every effort will be made to develop more efficient methods of feeding, hopefully reducing waste to near zero. Moreover, routine observations of the seafloor and visual observation of the water column beneath the cage will be made to make sure that most feed is being consumed in the cage.

4.b.2. Destruction and Removal: Even though the mooring system has been designed with holding power sufficient to exceed the forces that could be caused by severe weather or tsunami (see appendix B.), an insurance policy will be in effect to cover the cost of removal of the net cages in the event of catastrophic damage (storm, tsunami or entanglement with another vessel), or any other unforeseen reason that would necessitate the prompt removal of the cages and all of its associated equipment including financial failure.

4.c. Changes to Scenic Views and Landscape: No part of the net cages will obstruct views at the surface because the entire system is submerged except during installation or repair when a small portion may be visible for a few hours at a time. The only possible change to the scenery will be the daily presence of a service vessel over the site, operating from 1 to 8 hours per day. Since other vessels are occasional in the area, this does not constitute a significant change from the normal condition for a Hawaii coastal environment.

4.d. Alternatives Sites and/or Methods: Alternative sites might include relocation a short distance either to the East or West of the proposed site. A short move of a ½ mile or less to either the East or the West could be conceivable. Moving a greater distance would be difficult given the proximity to sewer outfalls in either direction, the increased vessel traffic and ocean use to the East, and the decrease in weather protection towards the West. The proposed location is also the most favorable due to the availability of environmental data from HOARP in assessing the cumulative effects of offshore aquaculture.

An alternative method would be to tow a single cage behind a vessel and remain "underway" for the duration of the operation. While this option is possible, it would require an increased in operational expense that would make the project economically unfeasible.

4.e. Intentional Release Policy: In the interim time period between the printing of the Draft and this Final version of the Environmental Assessment we have been asked by certain local fisherman to release some of our cultured fish into the wild in an effort to restock the area. Though this might be viewed as a positive attempt to enhance fishing in the area, the chances of survival for adult fish is very remote. Cage reared fish never learn to hunt or hide and quickly die for lack of such natural skills. Though smaller fish would have a higher chance of survival, to release them into the wild may have an effect on native stock populations and therefore carry a burden of responsibility. Given that the intent of this project is to raise fish for harvest and consumption, no fish will be released for the purpose of stock enhancement or any other purpose.

4.f. Accidental Breakaway: CII will be able to confirm on a daily basis that cages have not broken away from their mooring due to daily feeding, maintenance and observational visits of the operational staff. If in the event a cage does break away an "Emergency Response Protocol" (see Appendix D.) that includes notification of key safety officials will be put into immediate effect.

Section 5. Environmental Monitoring Program

Several previous monitoring programs have been undertaken in the general vicinity of the CII project site and the City and County of Honolulu is currently monitoring the water quality in the Mamala bay area. Thus, there is an abundance of background data that goes back many years.

More recently the HOARP Phase I cage culture program acquired data on water quality and benthic biota at a site a few hundred yards shoreward of the CII project site. In addition CII has conducted its own water quality and benthic biota baseline study at six stations in the immediate vicinity of the CII project site.

Summaries of the specific requirements and the specific findings of the HOARP and CII studies are given in Tables I, II, and III. All observations at the HOARP site and the CII site are within the Dept. of Health criteria given in Table I although several of the NH4(ammonium) readings are near the specified limit for "dry" coastal waters. The CII site should be considered a "wet" site for 50 to 100 million gallons per day of fresh water exits from Pearl Harbor (approximately 2 miles away) and an additional 62 million gallons a day is discharged by the Sand Island sewer outfall (approximately 4 miles away). Thus the average flux is substantially more than the 3 millon gallons per day per mile of coast, the criteria for the wet vs. dry distinction. However, the 'wet' and 'dry' criteria seem to not be meaningful in this case since the measurements are in the open ocean more than a mile from shore. Moreover, the anchored cage in the general current regime of the open ocean provides adequate water flux to make the 'wet' criteria the applicable criteria.

Most of these observations (all of the CII observations) are for ambient ocean conditions and these ambient conditions are generally above those expected of normal sea water. Using NH4 as an example, the CII data has a geometric mean of 2.31 micrograms/liter while the standard is 2.0 micrograms/liter. A similar pattern in NH4 concentration has been observed by Brock (personal communication, 2000) from data from 1496 points from 327 stations taken from all island in the chain. These yielded geometric means of 3.87 micrograms/liter for developed coasts and 4.28 micrograms/liter for undeveloped coasts. The considerable variability in the results of these

studies appear to be related to both depth in the water column and location. This variability at the CII site is most readily explained by surface discharges from the Pearl Harbor estuary and perhaps includes a component from the discharges from two sewer outfalls in the bay (Sand Island discharges at a depth of 240 feet 4 miles to the east of the CII site and Honouliuli discharges at a depth of 220 feet 1.5 miles west of the CII site).

Cage culture of fish is known to produce changes in water quality in confined water bodies with the primary impact being increases in the NH4 concentration, increases in turbidity, and accumulation of waste (both excess feed and feces) beneath the cages. These impacts are virtually absent in more open water conditions where circulation is greater. The results from the HOARP Phase I experiment clearly demonstrate that no impact is present, either to the water quality or the benthic biota, if feeding rates are adequately monitored. This is due to the dilution and mixing of the discharges from the cage by persistent current present at this site. A similar current condition is present at the CII project site and similar results can be expected.

At the CII project site background NH4 concentrations have been measured between 0.6 and 7.3 micrograms per liter with an average of 2.31 micrograms/liter. These background values are within the range measured else where in Mamala Bay although the 7.3 micrograms/liter is higher than any value measured at the nearby HOARP site. Turbidity is generally low, again characteristic of the regional water quality.

Theoretical mixing studies made for the HOARP site by Dr. Marlin Atkinson (attached here as Appendix C.) can be readily applied to the CII site since the water depth, current regime and baseline water conditions are essentially the same between the two sites. These studies, made to assess the possible impact on the nearest reef to the site, indicate that the maximum increase in NH4 that can be expected even under low current conditions of 0.1 knots (0.05 meters/second) for a fully stocked cage (150,000 pounds) are less than 1.0 microgram per liter at the nearest reef to the CII site which is will within the background variability at the site or within the bay. Thus it is very unlikely that the presence of a cage culture

operation at the CII site will have any measurable impact on water quality at the reef nearest to the CII site.

Table IV (p. A-5)presents a mass balance model for the planned HOARP experiment, the actual HOARP results, and the planned mass balance model for the CII operation (one fully stocked cage used in the model). Modeling has been done for one fully stocked cage, since the other cages would vary from empty to three quarters full at any given instant and it is only the fully stocked cage, just before harvest begins, that provides the maximum potential impact. As this cage is harvested, it's feed ration is reduced and the next cage would assume a greater role. But in reality, only one cage is potentially of concern at any given instant of time.

To further validate the site, an initial zone of mixing model has been attempted for the CII site using current velocities observed at the HOARP site. These results are given in Table V (p. A-6). To make these calculations the cage was considered to be shedding eddy vortices from the corners of the diamond cross-section. These eddies are local features but provide an 'effective mixing cross-section for the cage' that is about four times that of the cage itself. To these local mixing events, a general eddy diffusion component, generally characteristic of the upper mixed layer of the ocean and comparable to that used in the Atkinson model, was added. These two turbulent elements, and the observed currents, were then used to calculate the expected NH4 rise that would follow feeding at a position 200 feet downstream of the cage. Since the initial two cages will be separated by about this same distance, they can be considered separate point sources for this calculation.

The results shown in Table V strongly support the contention that no significant rise in the ammonium content will occur as a result of feeding the fish in the cage. At a distance of 200 feet (2.5 cage diameters) the model ammonium concentrations will be essentially that of the ambient background and it is unlikely that any adverse environmental effect could occur as a result of the added ammonium discharge from the cage at moderate currents. All of the model concentrations are less than those permitted by the Water Quality Standards (Table 1., p.WS-1)) for dry coasts except those for the lowest current and it is acceptable under the wet coast criteria. This suggests

that feeding would only have to be adjusted or delayed during extremely low current conditions.

Although other compounds are discharged from the cage as well, their concentrations are not as near the water quality standards as is ammonium. Thus, since the ammonium standard can be met, it is very likely that all other critical standards can be achieved. It is worth noting, that the model production calculation can also be used to calculate an estimate of the loading of the seafloor from feces and uneaten feed. Using sinking rates of 0.04 meters/second for feces and 0.4 meters per second for food (numbers taken from the literature from other impact studies) the maximum loading under various current conditions are given in Table VI. It should be emphasized that these are maximum rates for a fully loaded cage and that the average rate will be considerably less than half of this amount assuming some of the feed and feces is consumed be between the cage and the seafloor.

To assure the public and the regulatory agencies that operations at the CII site are not producing any deleterious impacts on either the seafloor or the water of Mamala bay, CII proposes to adhere to a regular water quality and benthic biota monitoring program. The details of this program are given in Appendix A. This program will include water quality measurements downstream of the cage made every three months starting whenever the biomass in one of the cages exceeds 40,000 pounds. This threshold has been chosen based upon the HOARP results where no measurable discharge or impact was recorded for 40,000 pounds of fish. In addition to episodic water quality measurements, CII will sample the seafloor beneath the cages and near the anchor nearest to Pearl harbor (our reference station) to assure ourselves, and the cognizant regulatory agencies, that no significant change has occurred. Finally, as part of our daily and weekly inspection activities, we will record any visible changes in bottom character that may be noticed. Should anything unexpected be noted, appropriate regulatory agencies will be notified.

Our reasoning for this level of caution is that we are forerunners in this enterprise and we wish to assure both ourselves and the public that the culture of fish in cages in Hawaii can be done in a sustainable way that is both environmentally and culturally compatible with the Hawaiian

way of life. We believe that routine monitoring of the discharge from the cage, particularly NH4 and turbidity, is essential to accomplish this goal.

SECTION 6. RELATIONSHIP TO LAND USE POLICIES

6.a. Conservation District: The proposed project is located in a Conservation District, Submerged Lands, Subzone (R)Resource, D-1. The objective of the resource subzone is "to develop, with proper management, areas to insure sustained use of the natural resources of those areas"(HAR 13-5-13). Submitted in this report is a monitoring plan for water quality and bottom sampling analysis that will be implemented to constantly insure that State water quality standards are not impaired to a significant degree.

6.b. State of Hawaii Environmental Policy: An excerpt from the *State's Environmental Policy (HRS 344-3-1), states* "…by safeguarding the States unique natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain conditions under which humanity and nature can exist in productive harmony, and fulfill the social, economic and other requirements of the people of Hawaii." This project is consistent with this and other general aspects of the policy.

6.c. Chapter 190D HRS: Chapter 190D-21 of the Hawaii Revised Statutes as amended and signed into law by Act 176, July 1,1999, specifically addresses ocean leasing for the development of marine activities. Included in the definition of a "marine activity" is "mariculture" and "aquaculture". Section 190D 21,HRS,(a) states: "The board may lease state marine waters [and submerged lands] for marine activities upon compliance with section 171-53 and with the concurrence of the director of transportation…"

6.d. Coastal Zone Management Program: The proposed project is in compliance with the general aspects of the Coastal Zone Management Program objectives and policies as stated in Chapter 205A-2, Hawaii Revised Statutes. In addition, the objectives as stated in chapter 205-A(b)(10)Marine resources; (A)"Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine resources; (B)Assure that the use and development…are ecologically and environmentally sound and economically beneficial." The proposed land use is in compliance as evident by the *monitoring program* (see Sect.5, and Appendix A.), and by the applied use of data from HOARP.

6.e. Ceded Lands: Submerged lands are also designated as ceded lands. Ceded lands are held in trust by the State. The appropriate use of ceded lands remains an unresolved issue, although Section 190D clearly gives the authority for such decision to the Board of Land and Natural Resources.

SECTION 7. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.a. Uses: The short-term usage in this context is the presence of the cage and its anchors in an area that previously was only occupied by water. When the cage is removed, there will only be water again and a few holes in the seafloor where the anchors were placed. The holes on the seafloor will rapidly fill with sand as part of the normal movement of sand on the bench where the anchors were placed (this process has already been observed beneath the cage at the HOARP phase I site). Thus no long-term change in productivity of the water at the site can be expected.

During the time that the cage is present, there will be an enhanced productivity in the water column due to the habitat provided by the cage and the anchor system. The fish species attracted to this habitat will primarily be herbivorous species along with a few carnivorous amberjack based upon the observation at the HOARP site. Most of the fish are open water near shore fish that find the cage an attractive habitat in an otherwise featureless area. The fish around the HOARP cage do not have the species diversity of reef fish and thus they probably did not come from the nearby reef but instead came from the open water environment adjacent to the reef.

The benthic biota can be effected in the short term by the presence of excess feed and fish wastes. Since these are a food supply for the benthic community, it is likely that the benthic community will adapt to this added food source while the cage is present even though efforts will be made to minimize the amount of feed reaching the seafloor. However, once the cage is removed, the source of food will also be removed and the benthic community will once again gradually revert to its former composition. The movement of bottom sediments observed during the HOARP experiment indicates that this recovery will be quite rapid.

Observations at the HOARP site suggest that the short-term use is beneficial to the open water fish community for habitat and a food source was provided. The benthic community showed changes in composition when excess feed was present that rapidly returned to the normal pre-cage condition when the food source was removed. Thus no long-

term adverse effects are to be expected to either the water column community or the benthic community.

7.b. Unresolved issues

7.b.1. Impact: One of the goals or the HOARP experiment was to define the impact of an offshore cage aquaculture system so that the results of the controlled experiment could be extrapolated to commercial quantities of fish. Unfortunately this goal to define the effective carrying capacity of Hawaii's offshore waters was not achieved. The experiment was unable to measure or quantify the impact in a way that could be extrapolated with confidence.

However, the very fact that the 40,000 pounds of fish in the HOARP cage did not produce a measurable impact can be used as some assurance to indicate that twice or even four times as many fish will not produce impacts on either water quality or benthic biota that are irreversible. Thus, although the carrying capacity of offshore Hawaiian waters still needs to be assessed, it can only be assessed by getting enough fish into the cage to produce a measurable effect that can be properly analyzed. Most likely, it will take a full-scale commercial growout to provide the necessary data.

Therefore, CII has already taken samples of water at several points around the site and samples of sand directly under the proposed cages to use as baseline(see Table 3. and Fig.10)for full-scale growout data. The implementation of a monitoring program(see Sect.5 and Appendix A.)during specific stages of the full-scale operation will then provide CII and regulators with the necessary information to properly assess impacts with the increase of biomass in the cages. Details of the findings will be reported to the Department of Land and Natural Resources.

7.b.2. Ceded lands: Although Chapter 190D HRS clearly gives the authority for issuance of a lease to offshore lands to the Board of Land and Natural Resources, the appropriate use of ceded lands remains an unresolved issue. This issue is not one that the applicant can resolve. Nevertheless, marine aquaculture is a permitted and encouraged use of offshore waters by both the State and Federal Governments.

While the issue of distribution of royalties of ceded land use may be a contentious issue between the State of Hawaii

and the Native Hawaiian Community, it is not an issue that can be resolved by the applicant.

7.b.3. Buffer Zone: This is an issue that is not addressed in either the State Laws or in the permit process for offshore ocean leasing. It is reasonable to request that for the purpose of evaluating clear environmental data, no other aquaculture sites should be located in close proximity to the cages of this proposed project, until it can be determined that cumulative adverse impacts are unlikely to occur.

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CORRESPONDENCE ATTACHMENTS

Part 1. Comment and response to Draft Environmental Assessment

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
236 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

GENEVIEVE SALMONSON
DIRECTOR

May 15, 2000

Dean Uchida, Administrator
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Attention: Sam Lemmo

Dear Mr. Uchida:

Subject: Draft Environmental Assessment (EA) for Cates International Fish Farm Commercial Operation, Offshore Ewa Beach

In order to reduce bulk and conserve paper, we recommend printing on both sides of the pages in the final document. In addition, we have the following comments to offer:

1. Contacts: In the final EA document all contacts (including agency meetings) and include copies of any correspondence.

2. Significance criteria: In the final EA please provide a short synopsis for the analysis of each item in the significance criteria in addition to the references already cited.

If you have any questions, call Nancy Heinrich at 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

c: Virginia Enos

LAND MANAGEMENT DIV. 18:808-587-0455 MAY 16 00 14:09 No.009 P.03

Cates
International, Inc.

P.O. Box 335, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Genevieve Salmonson
State of Hawaii-Office of Environmental Quality Control
236 S. Beretania St., Ste. 702
Honolulu, Hawaii 96813

July 14, 2000

Dear Ms. Salmonson,

As requested in your comment letter of May 15, 2000, additions will be included in the final Environmental Assessment. Below are comments relating to the additions:

1.Contacts: Documented in the final Environmental Assessment are some of the meetings regarding this project. Given the large organizational task of applying for a first time submerged lands permit, there have been numerous informal face to face, and phone contacts that would be impractical to document. All correspondence will be included in the Final EA document.

2. Significance Criteria: a brief discussion of each are added to the referenced section of the final Environmental Assessment.

Please contact us at any time if you have any other comments or concerns.

Yours truly,

Virginia Enos
Vice President

PHONE (808) 594-1888 FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

May 19, 2000

Ms. Virginia Enos
Cates International, Inc.
P.O. Box 335
Kailua, HI 96734

EIS# 391

Subject: Draft Environmental Assessment for Offshore Fish Farm Commercial Operation; Mamala Bay, Oahu, Hawai'i

Dear Ms. Enos,

Thank you for providing the Office of Hawaiian Affairs (OHA) the opportunity to respond to the above-referenced draft. The Office of Hawaiian Affairs has several concerns regarding this project:

1) On behalf of Hawaiian fishermen, OHA is concerned that Cates International, Inc. will be asking for exclusive use of the area.

2) OHA questions the impact that this project will make on the local sales market. There are already fishermen who catch Moi that compete with local aquaculturists who have small Moi fish ponds.

3) OHA recommends that a cultural assessment should be done regarding the historic use of these waters. OHA would like to be assured that this project will not infringe on the traditional and customary practices of Hawaiians.

4) There is the issue of ceded land revenues. Under state law, OHA is entitled to receive 20% if the revenues derived from the use of ceded lands, which includes submerged lands. OHA must be assured that it's pro rata share will not be reduced by any costs associated with commercial ventures on ceded lands.

Thank you for the opportunity to present our concerns. Please contact Aulani Apoliona, Policy Analyst, at 594-1756 if you have any questions.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

cc: Board of Trustees
Mr. WilliamAila
Mr. Daniel Pires
DLNR
U.S. Army Corp of Engineers
DOH – Clean Water Branch
OEQC

Cates
International, Inc.
P.O. Box 335, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Colin C. Kippen, Jr.
Deputy Administrator
Office of Hawaiian Affairs
711 Kapi'olani Blvd., Ste. 500
Honolulu, Hawaii 96813

Subject: Response to comments regarding the proposed Offshore Fish Farm
Draft Environmental Assessment

June 14, 2000

Dear Mr. Kippen,

Please allow me to individually address the topics of your stated concerns:

1). Exclusive Use - Cates International, Inc. (CII), is not requesting exclusive use of the area. We are only asking for privacy to pertain to the cages and contents. Please see the attached correspondence of May 8, 2000.

2.) Market Competition - After consulting with local fishermen, wholesalers, retailers, Moi farmers and their representative association (Hawaii Aquaculture Association), and the Aquaculture Development Program of the State Department of Agriculture, we have concluded that there is not a conflict. There is essentially no sale by capture fisherman of the very small amounts of Moi that are only seasonally available. The local commercial Moi farm industry is not able to meet today's demand for Moi, either locally or in the newly created markets external to Hawaii. These new, potentially large markets are the primary focus of this commercial venture.

3.) Cultural Assessment - CII has requested comment regarding the historical and current use of these waters by boating groups, fishing groups, and Native Hawaiian fishermen that are regarded as local authorities. The only comments we have received at this time have been verbal discussions of the historical prevalence and breeding activities of native Moi along the entire Ewa coastline. In the past Moi was abundant and fed many local families of fishermen. Today they have been fished out and are nearly non-existent. We have been asked by local Native Hawaiian fishermen of Ewa to release from time to time a few of our fish in effort restock this coastline. Since our stocks are spawned from parents born in the wild and thus have a genetic makeup equivalent to wild stock, we will consider the request upon the approval of DAR.

4.) Ceded Lands Revenues - CII acknowledges the issues between OHA and the State of Hawaii Land board regarding entitlement revenues to OHA generated from land use. It is, however, not the place or prerogative of the applicant (CII) to offer comment on this subject, and therefore we respectfully decline to do so.

Thank you for your careful concern.

Yours truly,

Virginia Enos
Vice President

Attachment

SIERRA CLUB, HAWAI'I CHAPTER

P.O. Box 2577
Honolulu, HI 96803
tel: 538.6616

Director: Jeffrey Mikulina
mikulina@lava.net
fax: 537.9019

Mālama i ka Honua

22 May 2000

Cates International, Inc.
Attn: Virginia Enos
P.O. Box 335
Kailua, HI 96734

RE: Cates International Offshore Fish Farm

The Sierra Club, Hawai'i Chapter, is concerned with the proposed Cates International Offshore Fish Farm operation off of Ewa, Oahu. The proposed fish farm operation is the first of its kind in the State of Hawai'i, and we believe that many uncertainties remain regarding the impacts of the operation. It is unclear how significant the impacts will be to the surrounding waters due to nutrient loading from feed and wastes, and the HOARP may not have provided a representative sample of impacts that the four CII nets at full operation will produce. Without any other projects in Hawaii waters for comparison, the precautionary principle should apply, and every potential impact must be understood before large-scale deployment occurs. Further, the Sierra Club, Hawai'i Chapter is concerned about the privatization of the ocean and the potential for vast parcels of submerged lands and water columns to be leased out for various fish farms or other commercial operations. The Chapter also testified with these concerns when the 1999 enabling legislation was proposed at the State Legislature.

The Sierra Club, Hawai'i Chapter appreciates the concept of reducing our burden on fisheries, but that does not appear to be the goal of the proposed project—it will only satisfy unmet or yet-to-be established markets. We also appreciate the proposed monitoring program described in Appendix A and will encourage the BLNR to make this a condition for permit acceptance.

We ask that the following issues be better discussed in the final Environmental Assessment.

1. Will the nets, anchors and lines underwater impact the navigation or mobility of the Humpback Whale? Is there a possibility that green sea turtles would become entangled by the apparatus or otherwise injured?

2. Will any genetically altered fish or aquatic species be used at the fish farm operation? The risk of a genetically altered aquatic species escaping and devastating native fish in nearshore waters is too great to allow the use of genetically altered species at the site.

3. The impacts of the surface operations—such as the daily visits and the corresponding impacts due to fuel spills or interactions with marine species—have not been adequately disclosed.

4. What type of feed will be used in the operation? Will feed that escapes from the net or feed that is spilled affect the behaviors of natural species in the area of the operation? Will surrounding fish become dependent on the new source of food?

5. Will the increased concentration of species in the area due to the wastes and food supply surrounding the nets increase the number of sharks visiting the Ewa Beach coastal area?

6. The particulate loading onto the seafloor on page A-6 examined the impacts of only a single net. With all four nets in close proximity, the cumulative impacts of all four nets should be considered in this analysis.

7. Much of the analyses referred to in the Draft Environmental Assessment (concentrations, attractive nuisance issues, etc) are based on the singular nature of the proposed operation. If more fish farm operations are proposed in the future, many of these impacts will be exacerbated. How will future fish farm operations be sited? Is there an upper limit to how many operations or leases will be made available in any given area? What controls on the privatization of ocean resources will be in place before the State begins this venture?

We appreciate the opportunity to offer these comments and look forward to your response.

Sincerely,

Jeff Mikulina
Director, Sierra Club, Hawai'i Chapter

cc: Office of Environmental Quality Control
DLNR – Land Division

Cates
International, Inc.
P.O. Box 355, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Jeff Mikulina- Director
Sierra Club, Hawaii Chapter
P. O. Box 2577
Honolulu, HI 96803

June 14, 2000

Dear Mr. Mikulina,

Thank you for submitting to us your letter regarding the proposed Offshore Fish Farm. I am pleased to have the opportunity to answer and discuss your questions and concerns.

We share many of the same concerns regarding ocean use issues including impacts from aquaculture, depletion of native stocks and accidental release of genetically altered species.

I would like to respond to your letter by first stating that since this is the first request for a commercial permit and ocean lease, we are working closely with many State and Federal agencies to proceed in the most environmentally responsible manner. National attention has been given to this project and it is therefore imperative that we proceed with a high level of caution and respect for the natural ocean environment.

Since the release of the Draft Environmental Assessment of April 10, 2000, additions to the environmental monitoring program and an implementation of a response protocol have been added. (See attachment)

To specifically address your other concerns of the amount of possible impact due to nutrient loading from feed and wastes, we will be closely monitoring any changes to the benthic comminutes, aggregation of marine life to the outside of the cages, and water quality at the site. We are bound at all times not exceed water quality standards set forth in our various permits. Additionally, data from the

first year of operation and 100,000lbs of production will add to the evaluation of possible impacts from the increased production compared to the 40,000lbs of production of HOARP Phase 1. If it is found that this level of production increases impacts from nutrient loading, such as benthic biota changes, or water quality degradation beyond regulated or acceptable limits, production will immediately be decreased to conform to required or acceptable limits.

We are thrilled that the Sierra Club, Hawai'i Chapter shares our appreciation of the concept of reducing our burden on fisheries, and it is absolutely the goal of this project. The successful market introduction and market building of a non-capture, farmed seafood product will satisfy those markets that would otherwise be supplied with captured stocks, increase the acceptance of all farmed marine products, and thereby reduce the heavy pressure and depletion of precious natural ocean stocks.

As per your request, the following is a discussion of the stated concerns:

1. *Will the nets, anchors and lines underwater impact the navigation or mobility of the Humpback Whale? Is there a possibility that green sea turtles would become entangled by the apparatus or otherwise injured?*
Response: In a scoping meeting on January 20, 2000, attended by John Naughton of National Marine Fisheries, the issue of endangerment to Humpback Wales was raised. It was determined that no hazard existed to either the Humpback Whale or the green sea turtle. An analogy could be made to the presence of a clustered set of anchor lines in a roadstead, such as the Lahaina Maui roadstead. No reports have been made of adverse mobility of whales or entanglement by turtles.

2. *Will genetically altered fish or aquatic species be used at the fish farm operation? The risk of genetically altered aquatic species escaping and devastating native fish in nearshore waters is too great to allow the use of genetically altered species at the site.*
Response: We are in complete agreement and will not use any genetically altered species. Our brood stock is captured locally. No species other than natural native species will be used.

3. *The impacts of the surface operations....*
Response: The vessels used for daily service operation are less than 47' in length, typical of those used for charter dive boat operations, and are relatively small compared to any other "work" vessel. The possibility of fuel spill is extremely remote given that there will never be a fuel transfer at the site, obstructions that

could puncture a fuel tank are non-existent in the area, and grounding would be impossible in 150' of water. As far as interactions with marine species, our personnel will be instructed in proper procedures relative to interaction with protected species. It can be expected that marine species will be seen at the site from time to time but there is no reason, purpose or operational hazard that would in any way attract or cause adverse interaction.

4. *What type of feed will be used? Will feed that escapes.....Will the Surrounding fish become dependent?*
Response: The feed used is in pellet form composed of approximately 79 % "by-catch", that is recycled byproduct from fish processing, 8 % fish oil, and 12 % wheat. It is highly ineffective economically to allow any feed to escape from the net. Feed is the single highest cost factor in production, and economics will dictate that the most effective measures are taken to reduce escape. However, some amount of feed may escape and will either be consumed by fish outside the cage, or it will dissolve. The surrounding fish are likely to become dependent on the cage as a food source, in the same way that any other object in the water inevitably attracts marine communities as it is a source of food or shelter.

5. *Will the increased concentration of species in the area ....increase the number of sharks visiting the Ewa Beach coastal area?*
Response: An increased concentration of species, again, can be expected as with any Fish Aggregating Device (FAD), but not because of the minute amounts of escaped feed, or from the fish effluent that will be subject to great amounts of dilution before escaping from the net. Sharks have been a concern many times in the past with various other FADs and yet no evidence exists that FADs increase the number of sharks in our local waters. Sharks exist in all Hawaiian waters and have been reported in the area of Ewa Beach on numerous occasions. At the HOARP site, neither the number of sharks nor the frequency of sightings have increased in the past 14 months since the cage has been in the water.

6. *The particulate loading on the seafloor...*
Response: Please see Additions to Environmental Monitoring Program regarding reporting and response.

7. *Much of the analyses referred to in the Draft Environmental Assessment...are based on the singular nature...."*

Response: Please see Additions to Environmental Monitoring Program regarding reporting and response. As far as responding to future submerged lands use, limits, controls and privatization, these issues should instead be directed to the landowner and not the lease applicant.

Our goals for today and the future will always reflect the greatest respect for our natural ocean environment. Please feel free to contact me if you have any further questions or concerns.

Yours truly,

Virginia Enos
Vice President

attachments

LIFE OF THE LAND

Ua Mau Ke Ea O Ka 'Aina I Ka Pono

Hawai'i's own local Community Action Group
Protecting our Fragile Natural & Cultural Resources
through Research, Education, Advocacy & Litigation

May 9, 2000

Cates International, Inc.
P. O. Box 335
Kailua, Hawai'i 96734

Attention: Virginia Enos

Aloha Ms. Enos:

I am writing in response to your Draft Environmental Assessment for a Fish Farm off the 'Ewa coastline.

- The proposed project is based on the experiment to successfully grow 40,000 pounds of Moi. What measurements or assessments of the environmental impacts will be made to incrementally increase the capacity up to 150,000 pounds?

- Since submerged lands are ceded (stolen) lands, the Office of Hawaiian Affairs (OHA) MUST be included in the process. Who is their contact at OHA?

- How will fish waste be handled? Will it affect other species? Will it effect Uncle Walter's limu project? How will any effect on water quality be mitigated?

- How will Hawaiian gathering rights be affected? How will these effects be mitigated?

- What about sharks? Will the cages attract sharks to the area? If so, how will that be mitigated?

- Will the cages bring different species into the area? Will these threaten our native species?

- What will be the overall effect to the marine ecosystem? How will that be mitigated?

* 76 North King Street * Suite 203 * Honolulu, Hawai'i 96817 * phone: 533-3454 * fax: 533-0993 *
* email: <lifeofthelandhotmail.com> *

- Which agency has oversight to assure compliance with permit conditions and ecosystem protection?

- What types of permits are needed? Will the public be included in the permit process?

- What is the economic opportunity to the state this project is supposedly to bring? Will the income generated by this project stay in Hawai'i's economy or will it be exported? What is the projected economic benefit to Hawai'i?

- What community groups or individuals have your contacted and included in your discussions?

- Are you aware of Uncle Walter Kamanaha's limu planting project at 'Ewa Beach? How will this project affect the limu project? Will the waste from the fish farm have a negative effect on the limu project?

- Will water quality be compromised? How will this be mitigated?

- How will the 'Ewa community or the Leeward Community benefit from this project?

- Will any surf spots be impacted from this project? Will it bring sharks to the area with surfers?

- How will this project affect local fishers - both in boats and shoreline fishers?

- Have there ever been diseases in fish farms elsewhere? How would that be contained and mitigated? How would the rest of the marine ecosystem be protected?

Mahalo for this opportunity to comment.

Sincerely,

Kat Brady
Assistant Executive Director

Cates
International, Inc.
P.O. Box 335, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Kat Brady
Life of the Land
76 N. King St., Ste. 203
Honolulu, Hawaii 96817

June 14, 2000

Dear Ms. Brady,

We are please that you have taken the time to express your valid concerns regarding our proposed fish farm off Ewa Beach. Since there are several, please allow me to address each one in the following general format. They have been grouped together by similar topic.

Environmental

Measures to assess environmental impacts of increased production include a stringent monitoring program and reporting program that will make increases in production dependent on positive new data.

Please see the additional supplement on "Benthic Analysis and Video Monitoring" and the "Response Protocol" in the Final EA. This supplement includes schedules and reporting procedures.

Fish wastes will be diluted to minute proportions; given the vast volumes of seawater that will constantly be exchanged by natural ocean currents. Water quality will be monitored continually, and at no time will State or Federal standards be exceeded. If it is found that water quality is being degraded, production will be decreased or halted.

Regarding the concern about fish disease, this type of event is highly unlikely. Moi was chosen for their hardiness and adaptation to cage culture. Historically, farmed fish get disease when they are stressed. Conditions that cause stress (overcrowding, not enough oxygen, too much effluent, heat, ice, and handling) do not exist in the offshore environment. However, disease outbreak is addressed in the above mentioned "Response Protocol".

It is expected, however, that any fish wastes would become a source of food for the microorganisms that exist naturally. If there is an effect on Limu planting nearby, it will be an enhancement of nutrients that may encourage Limu growth.

The cages are expected to bring additional marine life to the area in the same manner that any object placed in the water eventually attracts marine life. They are not expected to become a threat to existing communities given that the site is nearly barren. They may, however, favorably increase fish populations for local fishermen.

Regarding the issue of shark attraction, any large object placed in the ocean in an otherwise barren area will attract the curiosity of a passing shark. Sand bar sharks have been observed "passing by" the HOARP facility. However, in the last 14 months of observation, neither the frequency nor the number of sightings has increased. It is very reasonable then to say then that the nearest surf spot (more than a mile away) will not be impacted by an increase of sharks due to presence of these cages.

Land Use

OHA has been included in the comment process; contact for our project is Aulani Apoliona. Correspondence from their agency is included.

CII has requested comment regarding the historical and current use of these waters by boating groups, fishing groups, and Native Hawaiian fishermen that are regarded as local authorities. The only comments we have received at this time have been verbal discussions of the historical prevalence and breeding activities of native Moi along the entire Ewa coastline. In the past Moi was abundant and fed many local families of fishermen. Today they have been fished out and are nearly non-existent. We have been asked by local Native Hawaiian fishermen of Ewa to release from time to time a few of our fish in effort restock this coastline. Since our stocks are born in the wild and could otherwise do no harm, we would be happy to oblige this request.

Cates International, Inc. (CII) is not requesting exclusive use of the area. We are only asking for privacy to pertain to the cages and contents. Please see the attached correspondence of May 8, 2000. Our position is that fishermen should be free to use the area as before.

Permits

Permit applications being processed with this project include a Conservation District Use Permit, Army Corp of Engineers Work Permit, Special Management Area Compliance Letter, Coastal Zone Management Compliance Letter, an EPA- NPDES (water quality) Permit, and an

Aquaculture License. State agencies charged with insuring compliance include the Department of Land and Natural Resources, Department of Health, and Department of Agriculture. Terms of the ocean lease will require compliance and reporting of the adopted monitoring program to the DLNR.

Public Involvement and Opportunity

The public is invited to comment at the Public Hearing of June 21. Recently, groups contacted concerning this project include the Ewa Beach Neighborhood Board, OHA, University of Hawaii Urban Planning Dept., Ho'omau Ke Ola, Waianae Harbormaster, Keehi Boat Club, Waianae Boat and Fishing Club. Correspondence has been reproduced as provided.

The expected economic opportunity for the State of Hawaii is primarily the creation of a new industry. This opens opportunities for other new business development such as a fish feed mill and hatchery. Local Moi wholesalers will benefit from distribution, new jobs will be created by our own expansion and more will follow with further development of the industry. All revenues will stay in Hawaii, many being generated from foreign income.

Thank you for your careful concern.

Yours truly,

Virginia Enos
Vice President

Cates
International, Inc.
P.O. Box 535, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Timothy E. Johns - Chairperson
Department of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

Subject: Surface Markers for Submerged Cages, CDUA, File No. OA-2989B

June 8, 2000

Dear Mr. Johns:

In compliance with Section 190D-23, subsection (a)(10)(A,B,C) we are requesting that the State limit the requirement for marking and identifying the net cage sight at the surface.

The reasons are to protect the security of the site, to limit vandalism and theft, to deter attraction by unauthorized personnel, to deter additional fish aggregation to the surface, to avoid a surface obstruction for mariners, and to avoid an eyesore that would detract from the natural landscape. Since no obstruction exists between the surface and a depth of 40 feet the cages will not, otherwise, be a hazard to surface navigation or other recreational users of the area.

Given that the site is nearly 2 miles offshore, the recommended and prudent alternative for marking the site is to use standard references for all mariners namely "NOAA Nautical Charts", "US Coast Pilot #14", "Local Notice to Mariners" and any other publication referencing the navigable waters off Ewa Beach.

If in the unlikely event a recreational diver were to accidentally discover the site, signs could be permanently posted beneath the surface directly on the net cage with a "no trespassing" or similar warning.

Thank you for your consideration.

Yours truly,

Virginia Enos -Vice President

C: Captain G. Kanazawa -USCG/ Marine Safety Office

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
2550 Campus Road • Crawford 317 • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

May 23, 2000
EA: 00197

Ms. Virginia Enos
Cates International, Inc.
P.O. Box 335
Kailua, Hawaii 96734

Dear Ms. Enos:

Draft Environmental Assessment
Ewa Beach Offshore Fish Farm
Mamala Bay, Oahu

The applicant is proposing to lease 28 acres of submerged ocean lands over a 15 year term for the development of offshore commercial aquaculture of the native Pacific Threadfin (Moi), *Polydactylus sexfilis*. The proposed action requests approval for a maximum of 4 underwater net cages, in waters up to 150 feet deep, 2 miles off Ewa Beach, Mamala Bay, Oahu. Each cage will have the potential of producing 150,000 pounds of Moi every eight months.

This review was prepared with the assistance of Edward Laws and Mark Merrifield, Oceanography; and Jolie Wanger, Environmental Center.

General Comments

The content of the document generally follows a logical sequence of information and adequately addresses most of the concerns regarding potential impacts to the benthic habitat of the excess feed and waste products. It also details the studies made regarding the strength of the mooring facilities and seems to validate the mooring methods that are being proposed. Editorially, the draft document contains many typographical mistakes including some that preclude adequate evaluation of the procedure being proposed. For example, on page 34, there is a reference to the frequency of water quality measurements downstream of the cage being made "every two starting whenever...." In this case the missing time frame can be deduced from the information in Appendix A, but there are many more cases of words being omitted, phrases being in reverse order, or other writing errors. Since the final EA is a legal document to satisfy Chapter 343 requirements, a careful editing of the final document should be encouraged.

Specific Concerns

Consistency with Federal Discharge Regulations

According to the DEA, federal regulations (40CFR sections 122.24, 123.25, and 124.52) require a NPDES permit from concentrated aquatic animal production facilities if the facility has a production capacity of more than 100,000 pounds per year, per point source. Since the production capacity being proposed will clearly exceed this threshold level, the request (p. 7) that the facility be allowed to operate without an NPDES permit, so long as the environmental monitoring data show that the project is not exceeding the water quality standards does not appear to be an option. The DEA states (p. 14) that "the maximum capacity of a single net cage is roughly 150,000 pounds per harvest" and the plan is to harvest twice a year for a total of some 300,000 pounds per year. While the initial start-up phase of the project is targeted for only 75,000 pounds per net cage, per harvest, the two harvests per year would still exceed the 100,000 pound limit by 50,000 pounds." Implementation of the cage facility should require an NPDES permit and continued operation should be contingent on the results of a monitoring program, conducted as a part of the NPDES permit process, showing no adverse environmental effects. Furthermore, with an NPDES permit, the monitoring program will have credible oversight.

Our reviewers do not believe the proposed facility will cause a significant water quality problem, however, the analogies made to the Sand Island and Honouliuli sewer outfalls are not entirely appropriate. Those outfalls discharge in roughly 70 meters of water, specifically so that most of the effluent is trapped below the pycnocline. This is not the case for the proposed cages which, would not be located anywhere near that depth, and nutrients would not be trapped below such a layer.

Site Selection

We note that the area given for the proposed 28 acre rectangle (p. 11) puts the shoreward boundary approximately 1.3 miles offshore. What would be the boundaries of the NPDES/zone of mixing (NPDES/ZOM) permit cited on page PS-4 relative to the requested 28 acre parcel?

Submerged Land

We note that the issue of use of submerged (ceded) lands remains an unresolved issue for this particular project. This issue should be resolved prior to approval of the project. Will the required lease be for the use of "State marine waters" or "submerged lands" or both?

Potential Impacts to Shipping and Navy Operations

Potential impacts of the submerged cages to boat traffic, such as oil tankers, navy ships, or submarines, should be considered. Will the cages be considered a "potential hazard to navigation" ? The proximity of the cage area to the entrance to Pearl Harbor and the transit of oil tankers to the Barbers Point mooring facilities pose possible sources of hazards to the cages or

the cages to the vessels. Has the Coast guard been consulted about these plans and will the cages be listed on the Coast Guard's "notice to mariners?

Changes in Benthic Community

Mention is made of the need to monitor changes in the benthic community particularly beneath the cages. We suggest that this monitoring include systematic mapping with video images of the benthic areas in the immediate vicinity of the cages. Equipment suitable for this task can be obtained for a modest investment or can be contracted. Such a record, when combined with ground truth sampling, would benefit decision making with respect to permitting such operations in the future.

Currents

The description of the currents at the site is fairly simplistic and doesn't take into account recent measurements. The conclusions drawn in this section, however, would not be altered substantially if a more realistic view of the current field were provided.

A strong relationship between wind forcing and sub-surface currents around Hawaii has not been verified. For example, extensive field observations by Hamilton et al., conducted in Mamala Bay during the 1990's, showed a spatially complex flow field which pointed to the probable importance of offshore eddies that impinge on the coastal zone causing small-scale flow structures (*Hamilton, P., J. Singer, and E. Waddell, Ocean current measurements. Final Report MB-6. Mamala Bay Commission, 1995).* An east to west drift is probably prevalent at the HOARP site as noted, but not characteristic of the more extreme currents one would encounter.

Tidal currents are not always "weak" along the south shore of Oahu and in some areas they can be the dominant source of variability. For example the semi-diurnal tidal currents off Barbers Point and Diamond Head have been measured at +/- 20 and 40 cm/s respectively (Hamilton et al., 1995). Interestingly, the HOARP site is located in a region of relatively weak horizontal tidal currents, but just inshore of a region of very energetic vertical tidal motions attributed to internal tides. Peak to peak vertical displacements of 150m in 250m water depth have been recorded by Petrenko et al. over a semi-diurnal tidal cycle. (Petrenko et al., 2000). (*Petrenko, A.A., B.H. Jones, T.D. Dickey, and P. Hamilton, Internal tide effects on a sewage plume at Sand Island, Hawaii, Cont. Shelf Res., 20, 1-13, 2000*). It is not clear what effect these motions have on the shallower HOARP site. Strong vertical tidal motions would likely impact the mixing estimates put forth by Dr. Atkinson. It is unlikely, however, that a 4 knot current would occur in this region.

Consultations

The DEA cites many federal and state agencies, communities, and local businesses as being consulted. However, only two letters referencing this consultation were noted in the DEA. Were there any other responses, by telephone or e-mail that were not included?

Conclusions

As described in the DEA, the potential impacts of this project appear to be reasonably well defined and sufficiently benign to warrant a finding of no significant impact. However, because the proposed project is relatively unique in Hawaiian waters, and because the magnitude of the operation is substantial, careful monitoring of the water quality and operations under the monitoring provisions of an NPDES permit should be a required component of the marine use permit. The final EA should also address the issue of ceded land and leases of marine waters vs. submerged lands.

We appreciate the opportunity to provide comments on this DEA and look forward to your responses.

Sincerely,

Jacquelin N. Miller

Jacquelin N. Miller, Ph.D.
Associate Environmental Coordinator

cc: OEQC
Sam Lemmo, DLNR, Land Division
James Moncur, WRRC
Edward Laws, Oceanography
Mark Merrifield, Oceanography
Jolie Wanger, Environmental Center

Cates

International, Inc.

P.O. Box 335, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Jaquelin N. Miller. Ph.D. -
Associate Environmental Coordinator
UH Environmental Center
2530 Campus Rd., Crawford 317
Honolulu, Hawaii 96822

June 14, 2000

Dear Ms. Miller,

This response was prepared in part with the assistance of Dr. Charles Helsley, principal investigator of HOARP and former UH Sea Grant director.

NPDES Requirement.

The respondent assumes that an NPDES permit is required. A fish farm that produces more than 100,000 pounds per year is classified as a concentrated aquatic animal production facility. However, it is only required to have a NPDES permit if it is determined to be a significant contributor of pollution. Under 40CFR section 122.24 paragraph (1) it is stated that "**the Director may designate any warm or cold water aquatic animal production facility as a concentrated aquatic animal production facility upon determining that it is a significant contributor of pollution to waters of the United States.**"

Several local factors are to be considered in making this determination including location, nature of the facility, nature of the pollutants, and other relevant factors. Finally, section 122.24 states in its concluding paragraph that "**(2) A permit application shall not be required from a concentrated aquatic animal production facility designated under this paragraph until the Director has conducted on-site inspection of the facility and has determined that the facility should and could be regulated under the permit program.**"

The bold print portions of the above two paragraphs are taken as direct quotes from 40CFR section 122.24. The key issue is that the facility may be designated as a facility requiring a NPDES permit and that the permit shall not be required until an on-site inspection determines that the facility "should and could be" regulated under the NPDES program. CII has proposed that a Temporary Waiver of the Permit be granted while data is gathered to establish the formal zone of mixing for the facility. Monitoring will be carried out whether a formal NPDES permit is in place or not, for it is assumed that monitoring will be required and necessary. Also, CII will not

produce more than 100,000 pounds in the first year unless either the waiver has been granted or the NPDES permit has been issued.

Zone of mixing boundaries

A Zone of Mixing (ZOM) boundary has not been established since the methodology applicable to sewer outfall (the CORMIX model) is not appropriate when a buoyancy term is not present. We have done model calculations using currents between 0.05 and 2 knots and believe that the ZOM will not extend beyond the lease line. We are hopeful that a study proposed by the University of Hawaii will be funded so that a more complete modeling effort can be made.

Submerged Lands

This is an issue between OHA and the State. CII will abide by the lease terms and, though aware of the issue, cannot be responsible for interactions between third parties.

Interaction with Shipping

The Army Corps of Engineers required that we be 40' below the surface so there was no impact on 'navigable waters'. Several branches of the Coast Guard have been consulted previously, regarding the area of proposed operation and will again be notified when the lease boundaries are established. At this time all appropriate notifications to mariners will be announced and published. Observations made daily for more than one-year show that there is virtually no commercial or military traffic at the site. Most observed traffic passes about a mile further offshore.

Benthic Community

The bottom at the site is sandy and subject to scour during storm and strong current events. It is the infauna that is most sensitive to changes in nutrient flux and thus it is the fauna that will be monitored. Monitoring of surface features subject to rearrangement during strong current and storm events will not produce useful data for either this site or other potential sites.

Currents

Additional data will be gathered at a nearby site (the HOARP site) during the Phase II experiment and can be directly adapted to the CII site. We have noticed, during service runs to the HOARP site that there is generally a current that sets the service vessel to the west *throughout the 6-month period of observation. We unfortunately used the term weak to mean all* currents less than 1 knot. There are tidal currents in the area that get up to 0.5 knot as the reviewer noted. However, the strong internal wave currents were not observed by the divers during the HOARP Phase I operations. Perhaps this is because they don't get up into the less than 50-meter portions of the shelf or perhaps they have large amplitude, but low current velocity. In either case, their presence will assist in mixing and, since no adverse interaction has been noted at the HOARP site, it is likely that they will not be a problem a few hundred meters away.

Consultations

Consultations with all the agencies mentioned were face to face but did include follow-up phone calls in many cases. The only additional information that was requested was documented in the DEA.

Conclusions

We agree that there is need to proceed in a cautious way. But one must also proceed at a commercially viable scale. This requires 2 to 4 fully stocked cages. Anything less is not economically viable. Thus, we have chosen to expand to the minimum commercially viable level and have imposed upon ourselves a monitoring requirement that will supply the regulating agencies with sufficient information to be assured that the operation is not an environmental problem. We are willing to comply with the monitoring requirements of an NPDES permit once those requirements can be established. But we do not believe that we will be able to establish the requirement without a commercially viable cage culture operation being in place. Thus, we need to get the operation going and then adjust the monitoring to fit the operation rather than monitor everything everywhere which is both uneconomic and unnecessary.

Thank you for your comment letter and for your careful concern. Should you have any other questions we are available for further discussion.

Yours truly,

Virginia Enos
Vice President

CORRESPONDENCE ATTACHMENTS

Part 2. Additional comment and letters of supporting issues

Cates
International, Inc.
P.O. Box 335, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Timothy E. Johns - Chairperson
Department of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

Subject: Exclusive Use Issue, CDUA, File No. OA-2989B

May 8, 2000

Dear Mr. Johns:

The issue of exclusivity for commercial activities in State waters is often contested by proponents of non-exclusivity for all Hawaiian waters. Though it may or may not be the position of the State of Hawaii to require full or partial exclusivity under the terms of either a submerged lands use permit or an ocean lease, Cates International, Inc. is not requiring or requesting exclusive use of any part of the submerged lands (sea floor) or ocean surface.

However, we do request that our offshore farm net cages and mooring apparatus be regarded as private property and treated with the same respect as a fish, crab, or lobster trap. That is to say that we are only asking for privacy rights to the cages and contents. This issue was mentioned, but not discussed at length in the Draft Environmental Assessment of April 10, 2000.

Though the specific terms of exclusivity are likely be addressed in future discussions of our ocean lease application, we felt that this declaration of our position on exclusive use be stated prior to the scheduled public hearing of June 21, 2000.

Yours truly,

Virginia Enos -Vice President

C: Mr. Colin C. Kippen, Jr. – Office of Hawaiian Affairs
Ms. Kat Brady – Life of the Land

Cates
International, Inc.
P.O. Box 335, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Timothy E. Johns - Chairperson
Department of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

Attention: Eric Hill - Planner

Subject: Boating and Fishing Groups, CDUA, File No. OA-2989B

June 1, 2000

Dear Mr. Johns:

As per your request in the "Notice of Acceptance..." letter of May 24, 2000, this is to inform you of the boating and fishing groups contacted. On June 1, 2000 all were sent a copies of the above letter, a Draft Environmental Assessment, and cover letter inviting comment to be returned before June 21, 2000. The groups are listed below:

1. Waianae Boat and Fishing Club – Ed Nelson
2. Waianae Harbor Master – William Aila
3. Keihi Boat Club - Commodore

Yours truly,

Virginia Enos -Vice President

EWA NEIGHBORHOOD BOARD NO. 23

c/o NEIGHBORHOOD COMMISSION • CITY HALL, ROOM 400 • HONOLULU, HAWAII 96813

June 16, 2000

Ms. Virginia Enos
% Cates International, Inc.
P.O. Box 621
Honolulu, Hawaii 96809

Subject: Moi Fishery off Ewa Beach, Hawaii

Ms. Enos,

At the June 8, 2000 Ewa Neighborhood Board No. 23 meeting, the following motion passed unanimously with the following recommendations to be considered.

"The Ewa Neighborhood Board No. 23 supports Cates International, Inc. proposed Moi Fishery project that will operate 2 miles off Ewa Beach with the following conditions to be noted.. Ewa Neighborhood Board No. 23 does not support the Exclusive Use Issue (CDU, File No. OA-2989B) and requests that Cates International, Inc. consider providing a percentage of moi harvested for the local market, therefore enabling the community to benefit from this project. Percentage is to be based on what the market can bear."

This request was made from the community due to the fact that moi is a seasonal catch and many in Hawaii has never had the opportunity to enjoy the taste of this native Hawaiian fish.

We would also like to thank Cates International, Inc. for taking the time to present their project to Ewa Neighborhood Board No. 23 and the community. Your in-depth explanation of the project and your honest answers to the Board and the community was greatly appreciated.

Ewa Neighborhood Board No. 23 and the community look forward to working with you in making this project a success and you being a good neighbor to our community.

Sincerely,
Mary Ann Miyashiro

Mary Ann Miyashiro
Chair, Ewa Neighborhood Board No. 23

JAL CARGO

Japan Airlines
Regional Office, Hawaii
999 Bishop Street, Suite 1800
Honolulu, Hawaii 96813
Fax Number: (808) 544-8285

March 31, 2000

To Whom It May Concern:

Japan Airlines has been helping to promote Moi since late 1998; and has come up with a marketing strategy to utilize our smaller Japan gateway cities before penetrating into our three larger gateways. This strategy is based on Moi production increasing in the very near future.

Japan can purchase Moi on a steady basis. Moi has excellent prospects for acceptance into the Japan market because of its oily content. However, in order to market this product successfully, there has to be an adequate supply of Moi throughout the year. Currently, JAL is exporting Moi to our smallest destination city in Japan. We had been led to anticipate some kind of decent volume from the farmers at commencement of this project, only later to find out that there is but a very minimal supply. We are just barely holding on to the consignees at this one Japan destination.

Since the current demand for Moi can hardly be met, we feel that Cates International, at this time, would be the company capable of increasing the production of Moi and help Hawaii export this product successfully. If this project is a success, which we believe it will be, it will also help in opening up markets for many other Hawaii products.

Sincerely,

Gilbert Kimura
Regional Sales Manager

Opihi VENTURES

P.O. Box 1202 • Kaneohe, Hawaii 96744 • Phone: (808) 235-5235

March 31, 2000

To whom it may concern.

Re Exporting Moi from Hawaii

I have been raising Moi since 1995 and am a charter member of the HAA. I have been actively promoting Moi to the California area and Japan for nearly 2 years. Finally, last September, a small company in Northern Honshu became interested and actually purchased some. Since then our sales cannot meet the demand. We can only supply 25% of the orders. Another city close by heard about this Moi and inquired with a 200 kg per week order. This was turned down politely due to inadequate stock.
The major farms(only two) have met with production problems leading this most embarrassing situation.
In spite of this inadequate supply, I am going to 5 cities in Japan this year to promote Moi and other Hawaii products. Japan Air Lines is assisting in this effort and has been a supporter to promote Moi. I do this with the hope of having a share of the upcoming Moi from the cage culture experiment administered by the Sea Grant/Oceanic Institute people. This will be used to promote Moi into areas where the product is relatively unknown.
I am not certain of the out come but our experience with this product and its performance gives us optimism:

1. Low introductory price
2. An adequate supply from Cates International(CI) as a backup.

The existing land based farmers can barely meet the current demands for this fish. Cates International will be a most welcome player in the realm of Moi. The additional Moi supply will allow for a greater expansion expeditiously. Should CI become operational, I see no major impact on current producers and no reason why this project should be stopped/delayed. If there are questions to this letter, please free to contact me

Sincerely,

Dennis Yee, Opihi Ventures

Cates
International, Inc.

P.O. Box 335, Kailua, Hawaii 96734 USA • Phone: 1 + (808) 262-0267 • Fax: 1 + (808) 262-0804
e-mail: info@catesinternational.com

Mr. Randall Fujiki - Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

May 20, 2000

Attn: Eileen Mark - Branch Chief of Land Use Approval
Subject: Offshore Fish Farm, SMA approval.
DLNR CDUA File no.: OA-2989-B

Dear Mr. Fujiki,

This is a request for a letter of determination of exemption, or compliance with a Special Management Area regarding our proposed offshore fish farm.

Please see the attachments that include a summary of the intended project and location of submerged lands area. I am available to provide you with any additional information if necessary.

Yours truly,

Virginia Enos - Vice President
Cates International, Inc.

Attachments

JUN-13-00 TUE 10:18 PLANNING & PERMITTING FAX NO. 8085278743 P.01

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4414 • FAX: (808) 527-6743 • INTERNET: www.co.honolulu.hi.us/planning

JEANNE MIRRE
DIRECTOR

RANDALL K. FUJIKI, AIA
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

2000/CLOG-3179(ST)

June 8, 2000

Virginia Enos
Vice President
Cates International, Inc.
P. O. Box 335
Kailua, Hawaii 96734

Dear Ms. Enos:

Special Management Area (SMA) Inquiry
Conservation District Use Application (CDUA)
Fish Farm Commercial Operation
Manala Bay, Offshore of Ewa

We have reviewed your letter dated May 20, 2000, for the above-referenced project and find the following:

1. The sea cages will be located seaward of the shoreline; therefore, it is not within the SMA administered by the City and County of Honolulu pursuant to Chapter 25, Revised Ordinances of Honolulu.

2. No shoreline access or beachfront activities are proposed.

3. Although the precise location of shore bound facilities has not been specified, the necessary warehouse storage space, staging areas and dock facilities are planned within established industrialized port facilities at Honolulu Harbor.

Based on the above findings, an SMA Use Permit from the City and County of Honolulu is not applicable.

Should you have any questions, please contact Steve Tagawa of our staff at 523-4617.

Sincerely yours,

For RANDALL K. FUJIKI, AIA
Director of Planning and Permitting

RKF:lg
FORM DP-3 41212

Comments from Charles E. Helsley, Ph.D., former UH Sea Grant director and Principal Investigator of Phases 1 and 2 of the Hawaii Offshore Aquaculture Research Project (HOARP), related to generalizing disease recognition protocol:

(Reference to "Appendix D." is of the Final Environmental Assessment)

> "The problem is that diseases come in various guises and one's response has all gradations. There are harmless diseases, like an upset stomach in humans, that require essentially no response or perhaps just the omission of food for a few days to affect a cure. There also are infections bacterial diseases that will kill a few fish, particularly if they have a skin injury, but not be lethal to other fish or fish outside the cage, again perhaps the human analogy would be an disease for which antibiotics are prescribed such as a sore throat. Usually the fish get over these on their own. And then there are more serious diseases that are generally viral in origin that can result in high mortality. It is these serious incidents that are best dealt with by removal of the fish as defined in the Disease Outbreak section of Appendix D.
>
> Since disease is an overly broad term it is impossible to specify a specific protocol. Each outbreak must be assessed separately and, depending upon it severity, a specific solution found. Most likely a general protocol would not be correct for the specific problem being addressed. For example it would not be appropriate to remove all of the fish to a disposal facility when a simple removal of food would be sufficient to control the problem. And, since there is no cure for some viral diseases at present, the best procedure is to prevent the fish from being exposed by using very sterile facilities to raise the fish in the hatchery (a standard protocol in all hatcheries). However, once these fish are exposed to the natural environment it is possible that natural bacteria or viruses can infect them. In most cases, these infections are harmless or at least not serious enough to warrant any emergency treatment. But if and/or when they become serious then the only resort is to follow the protocol specified in Appendix D.
>
> Experience in the Phase I and Phase II HOARP experiments suggest that disease is unlikely to be a problem for mortality has been extremely low once the fish are in the cage. This is unlike the experience on land where limited water exchange produces conditions where disease organisms can propagate. At sea, the water exchange is extremely high and the organisms that cause disease have little chance of getting a foothold.
>
> Parasites are present throughout the marine environment and are the primary 'disease' that many fish culture systems have to address. In the salmon industry the primary problem is 'sea lice' a small crustacean that attaches to the gills of the salmon. In tropical waters, sea lice are not known to be a problem but it may be that other organisms are. However, no parasite problem has been observed in the HOARP experiments and as long as the residence time in the cage is relatively small, i.e. less than a year, and water flushing is large, it is unlikely to become a problem for parasites such as this take time to develop and the fish don't reside in the cage long enough to encourage this development. Moreover, most parasites have a larval stage that requires dispersal in water and thus they are removed from the cage before they can find a host to attach to.
>
> In short, the extremely high water flow passing the cage flushes disease organisms naturally resident in the sea away before they can become abundant enough to cause a disease. Thus, provided that the fingerlings come from a hatchery in which disease is carefully monitored and controlled, there is little likelihood of a disease outbreak. But if a serious infection should occur, removal of the fish is the only proper solution as stated in Appendix D."

UNIVERSITY OF HAWAI'I AT MĀNOA

College of Tropical Agriculture and Human Resources
Department of Molecular Biosciences and Biosystems Engineering

Sept. 26, 2000

Virginia Enos and Randy Cates
Cates International, Inc.

Dear Gini and Randy,

I submit the following in response to your request for information on possible catastrophic release of possibly genetically defective *moi* from a net cage.

The best available scientific information suggests that releasing aquacultured fish will have no effect on the wild population. There is an instance of accidental escape of 400,000 aquacultured salmon. In a short time, these fish disappeared. The best estimate is that released, aquacultured fish starved to death and/or were eaten by predators. Current studies show that aquacultured fish must be carefully trained if they are to survive in the wild. Yet other studies show that aquacultured males do not compete successfully against wild males in a natural spawning situation. Wild males are greatly preferred by females. In my opinion, the State of Hawaii is correct in not stopping the Oceanic Institute from releasing hundreds of thousands of *moi* into Hawaiian waters during stock enhancement research. These fish are from a diverse broodstock pool captured from the wild and are the same fish that you use.

We have done considerable work on the issue of gill operculum deformity and conclude that it is caused by a nutritional deficiency in the early larval stages of the fish. The operculum deformity problem arises from an old method we developed several years ago which we call "the old O.I. method" (Ako, H., Tamaru, C.S., Bass, P., and Lee C.-S., 1994. Aquaculture, 122:81-90). Bony tissue formation occurs in a collagen matrix. Vitamin C is required for collagen biosynthesis. It is our theory that a vitamin C deficiency in early larval life is responsible for gill operculum deformity. Our experiments support the theory in the following way. In 1996, 1997, and 1998 we obtained between 14.4 and 20.0 percent operculum deformity using "the old O.I. method"(figure attached). Enrichment of the food after day 8 in the lives of the *moi* larvae reduced operculum deformity to about 8%. However, providing a nutritionally complete diet from day 2 when the larvae first start feeding reduces deformity even more. We were able to conduct four trials to prove this point. With practice, staff can lower the deformity rate to between 0.13-0.15% (shown as the last two replicates in the figure).

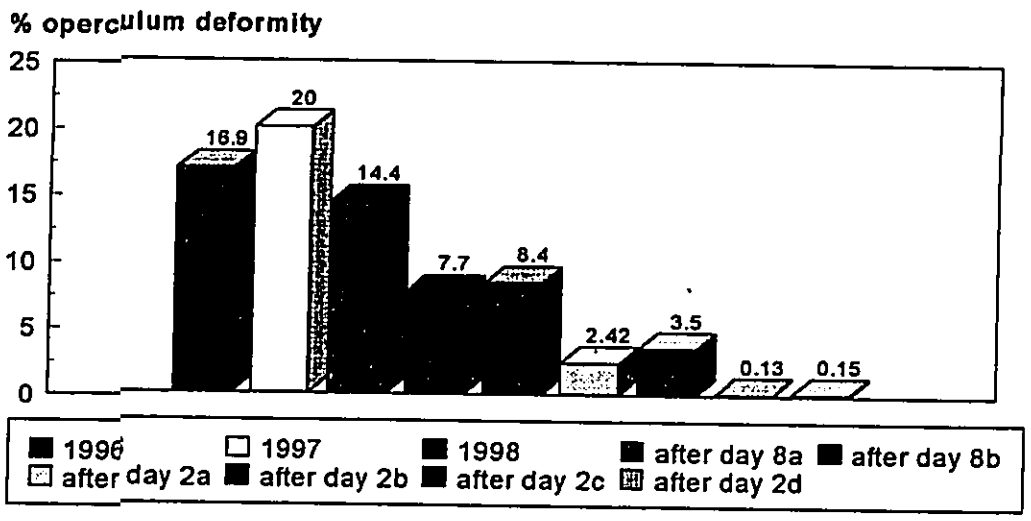
This work was presented to an international audience of peers and was well received (Sato, V T., Rosowski, J.R., Ako, H., Iwai, T. Jr., Banis, P., and Tamaru, C. and Alexander, S. Ako, H Sato, V.T., Iwai, T. Jr., Rosowski, J.R., and Tamaru, C. Presentations at the annual meeting of the World Aquaculture Society in Las Vegas, Feb. 15-19, 1998).

Respectfully submitted,

Harry Ako

Harry Ako, Ph.D.
Professor
Chair, Technical Committee, Center for Tropical and Subtropcial Aquaculture

1955 East-West Road, Agricultural Science 218, Honolulu, Hawai'i 96822
Telephone: (808) 956-8384, Facsimile: (808) 956-3542, E-mail: mbbe@ctahr.hawaii.edu, Web site: www2.ctahr.hawaii.edu


% operculum deformity
25
20
15
10
5
0
16.9
20
14.4
7.7
8.4
2.42
3.5
0.13
0.15
1996
1997
1998
after day 8a
after day 8b
after day 2a
after day 2b
after day 2c
after day 2d

Monitoring Program

Monitoring for the CII project will consist of three efforts: water quality monitoring, benthic ecology monitoring, and changes in in-water biomass as a result of the cages presence. Our principle premise is that the presence of the cage(s) will not have significant adverse impacts on any of these indicators of environmental health and all of the monitoring will be done to validate or refute that premise. We believe that the baseline data from this effort will be useful to regulators and the public in making decisions about future proposals for similar projects. Each aspect of the environmental monitoring program is outlined in detail in the paragraphs that follow.

The primary issue of concern is not the presence of the cage or the fish within it, but is the effects of the feed being provided to the fish on a daily basis. The feed can cause problems with the bottom biota if too much is delivered to the bottom as waste feed and the metabolism of the feed by the fish will result in increased levels of NH4 and particulate metabolic waste. Neither NH4 nor fish feces are issues of concern if managed properly for both are food sources for other marine organisms and thus will be recycled into the food web within the surrounding water. They only become issues of concern when the rate of introduction into the marine environment exceed the rate of uptake by the biota external to the cage. In this case excess food or feces could impact the benthic biota below the cage or, if the NH4, total nitrogen, or total phosphorus discharge were excessive, it is possible that it could impact the ecology of surrounding waters and reefs. For this reason our primary focus will be on these critical parameters: NH4 discharge, turbidity of the water, and changes in benthic biota. Total nitrogen and total phosphorus are not expected to be significant problems but will be monitored on a regular basis nevertheless.

Water Quality Monitoring

Water quality in the open ocean is best assessed by measurement of four critical chemical parameters and one physical parameter. These are (in order of decreasing importance) NH4, total suspended solids (TSS), total phosporus, and total nitrogen (N). Turbidity and

chlorophyl-A are also parameters that are useful and will be measured as ancillary observations. The feed being provided to the fish is protein rich and it is the metabolism of this feed by the fish that produces NH4 and particulate waste. Thus the monitoring program will be undertaken to establish the increase in NH4 and particulate waste as the water passes through the cage. As the water leaves the cage it should have a maximum NH4 and TSS content created by the fish in the cage. Thus the maximum concentration of any parameter should be just outside the cage. Dilution by turbulence and diffusion becomes significant as one moves further downstream. Moreover, uptake by marine biota outside the cage will also take place and may decrease the concentrations of NH4. This consumption may result in a local near cage phytoplankton bloom and this will locally increase the apparent turbidity of the water and will increase the chlorophyll-A content.

Monitoring for water quality will be made at four stations for each cage. The first station will be upstream of the cage to assess the chemistry of the incoming water. A second sample will be taken inside the cage between the spar and the downstream rim to assess the water quality seen by the fish in the cage. A fourth sample will be made near the rim some 10 feet outside the cage to assess the maximum change caused by the cage and the fish within it, and a final sample will be taken one to two cage diameters downstream of the cage to assess the combined effects of dilution and uptake by the biota external to the cage. In addition to these four stations for each cage, one additional 'control' station will be established above the NE corner anchor. This station has been chosen since it is well marked by the anchor, is generally both upstream and to the side of the cages, and it is between the cages and the nearest reef.

Measurements will begin four months after stocking the cage (the biomass in the cage and the amount of feed being consumed will be too low to produce a measurable effect before that time) and will continue on a three month interval thereafter if the biomass of the fish in the cage exceeds 40,000 pounds. (Measurements at the HOARP site during Phase I showed essentially no change in water quality for this fish concentration and there is little reason to take measurements when the demonstrated, and expected, result is a null measurement.) Parameters to be

measured are: NH4, NO2+NO3, PO4, TSS or turbidity, and Chlorophyll-A.

Benthic Ecology

The established , and probably the best, means of assessing impact on the benthic biota at the site is the measurement of the infauna (polychaetes, nematode, crustacean, molluscs, etc.) in the sand and mud of the seafloor at the site. At the HOARP site the infauna showed significant changes in abundance and species ratio when overfeeding was taking place. After the overfeeding ceased, the abundance and species ratio reestablished itself to the pre-cage conditions. Thus monitoring of this set of parameters will both indicate potential short term deleterious changes to the micro-infauna but will also indicate that feed is being wasted and thus feeding parameters need to be changed to increase the economic viability of the project (over feeding wastes money).

In-water Ecology

At present virtually no fish are present at the site. It is expected, based on the HOARP results, that fish, crabs, and other organisms will be attracted to the cage. In part this is due to the presence of an object in the water (the FAD effect). In part this is due to the presence of a new food source: algae growing on the cage, micro-crustaceans in the mesh of the cage and in the algae, waste food from the cage, and the feces and effluent from the fish in the cage. Clearly the presence of the cage establishes a new micro-environment that did not exist previously. We believe this micro-environment is beneficial to the Hawaiian ecosystem for it in essence establishes a refuge where fish and other biota can exist where there was no previous habitat.

But it is possible that this change has other currently unrecognized benefits or detriments. Thus we will attempt to make a qualitative assessment of the changing abundance of fish and other organisms at the site on a more or less weekly basis to document the changes taking place and to evaluate the long-term consequences of this colonization of the project site. We will do this by recording the first siting of new species in the daily dive logs, and by visual examination of abundance.

Appendix A.

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Table IV

Model calculation of Ammonium production for HOARP and CII Project.

			HOARP		CII
			Planned	Actual	Planned
Cage Volume	m3		3000	2640	2640
Maximum Density	kg/m3		10	7	25
Wt. of fish at harvest	pounds		66000	40000	145200
FCR			1.5	1.8	1.5
Total food fed	pounds		99000	72000	217800
Model	Percent		weight (lbs)	weight (lbs)	weight (lbs)
% of food eaten		87	86130	62640	196020 *
% of food wasted		13	12870	9360	21780 *
% uptake by fish		80	68904	50112	156816
% discharged as feces		20	17226	12528	39204
% to new tissue		30	20671	15034	47045
Model total fish weight (Wet)			66681	48495	151757
% to metabolism		70	48233	35078	109771
% of protein in metabosim		50	24116	17539	54886
% nitrogen in Protein		16	3859	2806	8782
Wt of N			3859	2806	8782
Wt of NH4 discharged			4961	3608	11291
Average daily discharge NH4 (6 months feeding)	Pounds		28	20	63
Peak daily discharge of NH4 assuming feeding rate is 3% of body weight per day	Pounds		99	60	226

*Assumes less feed is wasted - 90 % eaten

Table V

Calculation of maximum NH4 concentration in water outside the cage - CII case

Current(Kts)	Mass of water through cage in 1 hour	Ammonium Concetration (parts/billion)**
Cross section of the cage is 2000 square feet		
0.05	38,400,000	7.50
One knot equals 1.67 feet/second 0.1	76,800,000	5.30
0.5	384,000,000	2.37
Assume all NH4 is secreted by fish 1	768,000,000	1.68
in a 4 hour period. 2	1,536,000,000	1.19

**Includes dilution by eddy mixing; measurment made 200 feet downstream from cage.

Table VI

Calculation of particulate loading onto the seafloor - CII case
assuming all feces and uneaten feed settles to the seafloor

Current(Kts)	Distance traveled in feet	Particulate Load from feed lbs/day/sq ft	Distance traveled in feet	Particulate Load from feces lbs/day/sq ft
Worst case is 150,000 pounds of fish				
therefore 4,500 pound of feed per day 0.05	21	0.2651497	64	0.15909
450 waste feed per day 0.1	42	0.1325749	127	0.079545
810 pounds of feces per day 0.5	212	0.026515	636	0.015909
1	424	0.0132575	1,273	0.007954
2	849	0.0066287	2,546	0.003977

The above calculations are very conservative and assume no mixing or consumption outside the cage

Additions to Appendix A – Environmental Monitoring Program: the following supercedes previous schedules for benthic monitoring.

Benthic Sampling and Video Monitoring

Revisions to Draft EA

I. BENTHIC SAMPLING

a. Data: Representative bottom samples will be will be analyzed for organic loading by digestion procedures. Values will be given in percentages for carbonate, organic, and terrigenous sediment composition. Values will be compared to baseline collection data from a control area outside of the site to determine if nutrient loading from feed and effluent are contributing to changes.

b. Locations: Four samples will be taken within 10 meters of the perimeter of the cage directly beneath it. Sites will be at an equal distance from each other.

c. Frequency: Four times per year.

d. Reporting: Results of lab analysis will be forwarded to DLNR within two weeks of receipt by CII.

e. Response: If results from above data indicate excessive changes in the benthic composition, consultation will be made with DLNR to discuss taking action. Such action may require reducing levels or halting operations until samplings resume a closer comparison to baseline composition. Additional cages will not be deployed in the same area until approved by DLNR.

II. VIDEO MONITORING

a. Data: Underwater views of the sea floor will be recorded to monitor possible biological changes, such as increases of sea grass, or recruitment of marine animals.

b. Locations:

#1. A 25 meter transect line that parallels the shoreline at the top of the nearest escarpment, approximately 1800 feet to the north of the site. This is the location of the nearest to a coral reef.

#2. A 25 meter transect line approximately 100 meters downstream of the site.

#3, #4, Two 25 meter transect lines at equal distances from each other directly beneath the cage.

#5 A 25 meter transect line upstream of the site to act as a control site.

#6 Directly beneath the cage at the center mooring.

c. Frequency: Once per month, all locations.

d. Reporting: Copies of video will be forwarded to DLNR for evaluation and review.

e. Response : If evidence shows abnormal changes or excessive marine animal recruitment due to the effect of the cages, consultation will be made with DLNR to discuss taking action. Such action may require reducing levels or halting operations until samplings resume a closer comparison to baseline composition. Additional cages will not be deployed in the same area until approved by DLNR. No new cages will be deployed in the same area until approval from DLNR.

Mooring System

Anchors: The anchors chosen for the proposed project were chosen due to their superior holding power in the sand, ability to be removed without leaving a mark, and their availability.

Anchors are rated by their ability to hold fast to the seabed. The holding power ratio (HPR) is the ratio of holding force to weight. High holding power (HHP) is a rating given to a class of anchors so rated because they have the ability to develop an HPR of 14:1 or greater. The "danforth" type is a typical HHP anchor. Therefore, the HPR of each 5000 pound danforth anchor in sand is at least 70,000 pounds or 35 tons.

The typical ratio of the weight of ships anchor in pounds roughly corresponds to the displacement weight in tons by a factor of 1 to 1.5 pounds per ton. It can be rationalized, then that each 5000 lb. danforth anchor is designed to hold a vessel that displaces 5000 to 7500 tons. For comparison, a vessel of 5000 to 7500 displacement tons could be 250 to 300 feet in length.

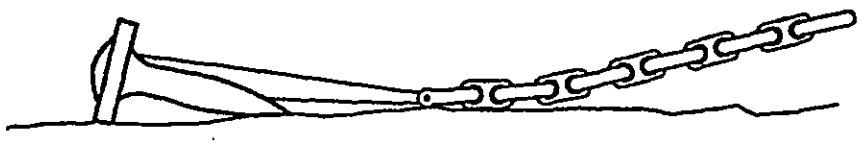
Chain: The first connection from the anchor is 30 feet of 1½" chain, rated with a breaking strain of 76 tons.

Ropes: The second connection from the chain to the net cage will be fiber rope. The transition from the traditional use of chain to a high performance fiber rope to secure the cages to the anchors is both practical and prudent. Other than the required 30 foot length of heavier chain, (to keep the angle of "strain" along the bottom horizontally in stead of at an angle up towards the net cage) the remaining attachment will be much lighter in weight and will not act as a downward force on the net cage. The new fibers used in the rope weigh much less than chain and are much stronger and stiffer than the conventional rope making fibers nylon, polypropylene and polyester. Example of such are aramid and "high-modules ployethylene (HMPE), (Allied "Spectra" and DSM "Dyneema"). Because they are much stiffer the ropes made of this new class of fibers are called high-modules fiber ropes.

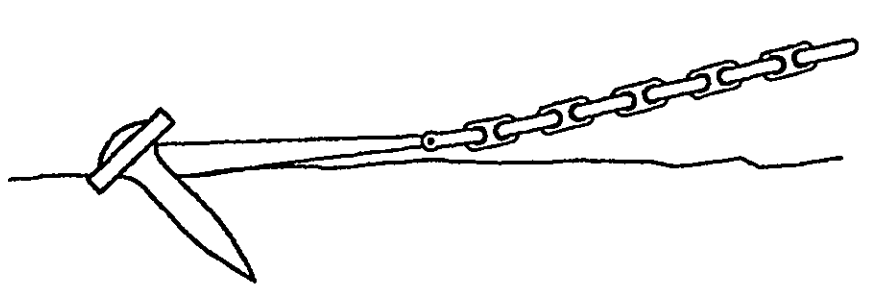
The rated breaking strain (BS) the "Spectra" lines used will exceed the HPR of the anchors making the entire system redundant in its holding capacity.

DANFORTH ANCHOR

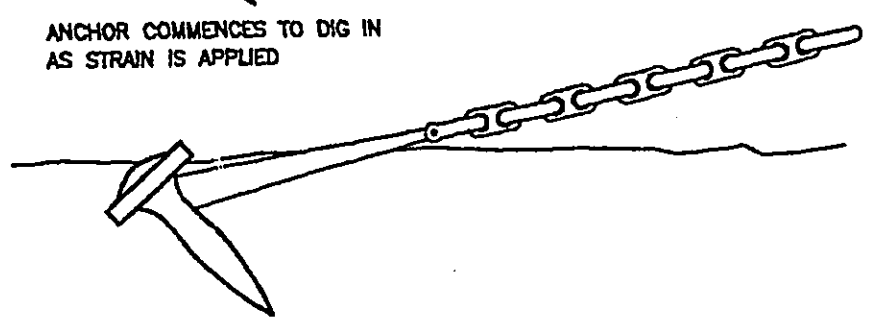
TAKING A STRAIN



ANCHOR LYING ON BOTTOM BEFOR ANY STRAIN IS APPLIED



ANCHOR COMMENCES TO DIG IN
AS STRAIN IS APPLIED



ANCHOR BURIED AS A RESULT OF STRAIN ON CHAIN

Fig. 8

HOLDING POWER OF THE MOORING SYSTEM

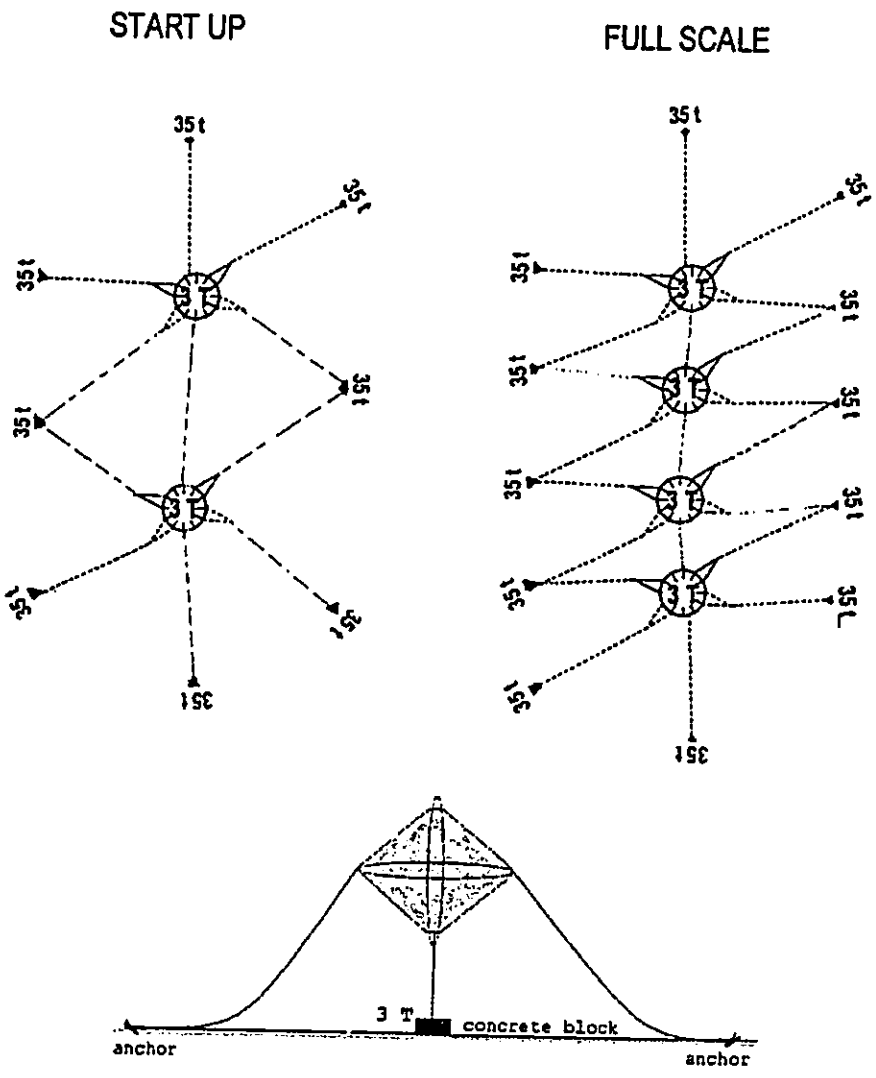


FIG. 9

Appendix C.

Report from Dr. Marlin Atkinson regarding issues raised by Dr. David Gulko of DLNR.

Marlin Atkinson Ph.D., is an authority on nutrient transfer in coral reefs and coral reef environment. He is a researcher on staff at Hawaii Institute of Marine Biology, and a member off the *International Society for Coral Reefs*. Dr. Atkinson also teaches two courses at the University of Hawaii at Manoa, "chemical oceanography" and "biogeochemistry".

This report was originally written in April of 1999, in response to concerns raised by Dr. Gulko of DLNR regarding the Conservation District Use Application(CDUA) submitted by Dr. Charles Helsley for the HOARP.

"DLNR's concern is for a reef about 1 km away (from HOARP, making the distance to CII site 650 feet further away in deeper water)in shallow water. The addition of N (nitrogen) from the cage is in such low concentrations that it will not effect those reefs. My reasoning is as follows:

This is just a brief write up of my assessment of the points made by Dr. Gulko. In one day, at a low current speed of 0.05 m per second, the volume of water passing by the cage will be in excess of 5,000 m. In the same time, from horizontal eddy diffusion, the water will mix with adjacent water over about 500 m ($L^2/D = 1$ day where D is 2.5 m^2 per second and 86400 seconds per day). It will also mix another 5 m in depth (very conservative estimate) so it will form a patch 20m x 500m x 5000m or 50,000,000 m^3.

Nitrogen (N) is the primary constituent of concern. The total waste byproduct from the feed is 54.8% of feed (13% feed, 17.4% feces, and another 24.4% as metabolized nitrogen); so 54.8% of 45,000 kg of feed equals 24,660 kg feed per 4 month period. Assuming 16% by weight is N as NH_4 (molecular weight = 18) and over 4 months, the average N load is 1827 mol N per day.

Thus over 1 day we will have a patch of N with 1827 mol N mixed in 50,000,000 m^3 of water or 0.037 mmol N per m^3. The standing concentration of water near Oahu is about 0.2 mmol NO_3 per m^3, 0.2 mmol NH_4 per m^3, and 5-10 mmol dissolved organic N per m^3, and about 0.07 mmol N per m^3 as phytoplankton. So roughly speaking, if all waste were as inorganic NO_3 and NH_4, the feed will increase the standing concentration of nutrients only 10%, which is barely detectable. The state DOH regulates discharge based on total N of which your waste is less than 1%. Phytoplankton can double in one day so there is sufficient N to increase the phytoplankton biomass about 50% before being further dispersed into the open ocean.

The maximum uptake rates of N into coral reefs , NOT sandy bottoms, as NO_3 or NH_4 (mass transfer limitation)is about 10 mmol N per m^2 per day. Our patch is roughly

2,500,000 m^2; giving a natural N uptake of 24,000 mol N; note the load from the cage is only 1,800 mol N per day, some 10 times less. Sand bottoms generally re-mineralize material so there is little concern for impacts immediately under the cage (Steve Dollar has a nice report, his PhD on how little effect there is in bottom biogeochemistry from the Sand Island discharge pipes).

DLNR's concern is for a reef about 1 km away in shallower water. The addition of N from the cage is in such low concentrations it will not affect those reefs.

As a means of comparison, the N discharge from the Sand Island discharge is about 5,000,000 mole N per day spread over a km of diffuser pipe, and the Barbers Pt (Honouliuli) is 100,000 mol per day spread over 500 m of diffuser pipe. Given there are about 80 diffuser ports in the Barbers Pt system, the amount of N discharged at the mariculture cage is about equivalent to 1 diffuser port on our ocean sewage discharge facility.

Finally, let me point out that the expected current speeds at the cage site can go 10 times higher than those used in this calculation, so the above is a very conservative estimate of the N impacts. Average current is along shore and the average speeds are likely to be a factor of 2-3 higher than 0.05 m per second used in this calculation. Also I included the particulate feed, waste and feces. These are probably eaten quickly by biomass external to the cage and thus in reality these should not be considered to be part of the waste stream budget.

A copy of the following pages will be reprinted in pamphlet form and permanently mounted on all CII operational vessels.

RESPONSE PROTOCOL
Emercency at the CII Site

I. Dive Emergency:

CALL 911 or Ch.16 Coast Guard and report emergency, standby for advice on transit destination and/or rescue assistance.
Estimated response time to site via boat or helicopter: 30 min.

RESCUE EMT: Pearl Harbor Navy MDSU,
Hail via 911 or VHF Ch 5. Distance from site: 2 mi.

CLOSEST HOSPITAL: Kuakini Hospital
Distance from site: 10 mi.

Call: 911/ 587-3425.

CLOSEST HYPERBARIC TREATMENT CHAMBER: Kuakini Hospital, Contact via 911/ 587-3425
Distance from site: 10 mi.

II. Natural Event: Hurricane, Tsunami, Storm, Earthquake

**WITHOUT Sufficient warning:*
1.Secure all dive operations, evacuate personnel and mobile equipment at the site.

**With Sufficient warning – time permitting:*
1. Secure openings in the cages
2. Submerge the cage if at the surface
3. Secure all operational equipment.
4. Secure dive operations
5. Evacuate personnel and mobile equipment
6. Notify DLNR Division of Aquatic Resources and US Coast Guard when all secure at the site.

III. Failure of the Mooring System

*Cage has broken away entirely and is adrift.

1. Call for salvage assistance for towage and/or removal if is aground.
2. Notify US Coast Guard.
3. Notify Dept. of Transportation Harbors Division.
4. Notify Ocean Marine Insurance Agency
5. Notify DLNR Division of Aquatic Resources.
6. Notify DLNR Division of Boating and Ocean Recreation.

IV. Disease Outbreak

1. Harvest all fish immediately.
2. Freeze at least 10 specimens or up to 100 lbs. for disease identification.
3. Transfer fish from site to authorized facility for disposal.
4. Notify DLNR Division of Aquatic Resources.

V. Theft or Vandalism

1. Check entire cage for damage, repair as necessary to prevent fish escape.
2. Record HA numbers and description of any vessel in the area.
3. Notify US Coast Guard.
4. National Marine Fisheries Services
5. Notify local fish market wholesalers and retailers.
6. Notify DLNR Division of Aquatic Resources.
7. Notify Hawaii Aquaculture Association.

EMERGENCY NUMBERS

Safety of a Person:
Call: 911 on cell phone
541-2450 USCG Search and Rescue
Ch. 16 / 5 VHF radio

Safety of Marine or Shoreline Environment:
Call: 541-2450 US Coast Guard
532-1000 Ocean Marine Insurance Agency
587-0100 DLNR Division of Aquatic Resources
587-1966 DLNR Division of Boating and Ocean Recreation
587-1930 Dept. of Transportation Harbors Division

Oil Spill:
Call: 522-8260 US Coast Guard
Ch. 16 VHF radio
587-0100 DLNR Division of Aquatic Resources

Salvage Assistance:
Call: 545-5190 American Marine Services

Marine Insurance:
Call: 532-1000 Ocean Marine Insurance

Endangered or Protected Marine Species Response:
Call: 983-5300 Nat. Marine Fisheries Service

Table 1. Specific criteria for open coastal waters based on Hawaii Administrative Rules, Title 11, Department of Health, Chapter 54, Water Quality Standards which apply to Receiving Water Limitations.

Parameter	Geometric mean not to exceed the given value	Not to exceed the given value more than 10% of the time	Not to exceed the given value more than 2% of the time
Total Nitrogen (µg N/L)	150.00* 110.00**	250.00* 180.00**	350.00* 250.00**
Ammonia Nitrogen (µg NH4-N/L)	3.50* 2.00**	8.50* 5.00**	15.00* 9.00**
Nitrate+Nitrite Nitrogen (µg [NO3+NO2]-N/L)	5.00* 3.50**	14.00* 10.00**	25.00* 20.00**
Total Phosphorus (µg P/L)	20.00* 16.00**	40.00* 30.00**	60.00* 45.00**
Chlorophyll a (µg/L)	0.30* 0.15**	0.90* 0.50**	1.75* 1.00**
Turbidity (NTU)	0.50* 0.20**	1.25* 0.50**	2.00* 1.00**

pH units - shall not deviate more than 0.5 units from a value of 8.1.

Temperature - shall no vary more than 1 deg.C from "ambient conditions".

Salinity - shall not vary more than 10% from natural or seasonal changes considering input and oceanographic factors.

Dissolved oxygen - not less than 75% saturation.

* "wet" criteria apply when the open coastal waters receive more than three million gallons per day of fresh water discharge per shoreline mile.
** "dry" criteria apply when open coastal waters receive less than three million gallons per day of fresh water discharge per shoreline mile.

TABLE 1.

HOARP NET CAGE

Conducted by Oceanic Institute

Environmental Results

	Pre Cage	Sea Cage	Post Cage
DO(mg/l)	6.12 - 9.05	6.2 - 6.4	6.1 - 6.8
Salinity (ppt)	35.10	35.10	35.10
Temp. (^{0}C)	25.9 - 26.3	24.5 - 26.2	26.2 - 26.5
Turbidity(NTU)	0.03 - 0.49	0.05 - 0.30	0.1 - 0.89
TSS (mg/l)	0.2 - 15.8	0.24 - 10.7	0.80 - 22.0
Chlorophyll (µg/l)	0.03 - 0.2	0.05 - 0.2	0.0 - 0.2
Nitrite (µM)	< 0.48	< 0.48	< 0.48
Nitrate (µM)	≤ 0.1	< 0.1	< 0.1
Ammonia (µM)	< 0.48 - 5.8	< 0.48	< 0.48 - 2.3
Orthophos. (µM)	< 0.12 - 0.33	< 0.12	< 0.12
Total Nitrogen (µM)	1.1 - 18.0	2.0 - 3.9	1.8 - 16.0
Total Phos. (µM)	1.5 - 2.8	1.0 - 3.0	1.3 - 2.3
Ash Comp. (%)	0.24 - 0.26	0.24	0.25 - 0.29
Water Samples	4/13/99	8/5/99	10/8/99

Table 2.

CII SITE WATER SAMPLES TAKEN 3/10/00

MARINE ANALYTICAL SPECIALISTS

Date: 03-18-00

Sample File: Cates0300.xls

Samples Received on 03-10-00

WATER QUALITY RESULTS

SAMP ID	PO4 (ug/l)	N+N (ug/l)	NH4 (ug/l)	Si (ug/l)	TOP (ug/l)	TON (ug/l)	TP (ug/l)	TN (ug/l)	pH (rel)	Salt (ppt)	Turb (ntu)	Chl-a (ug/l)	TSS (mg/l)
1-S	6.5	0.3	4.1	44.8	8.4	121.9	14.9	126.3	8.145	35.178	0.13	0.180	-
1-M	8.4	0.4	4.1	47.0	9.0	136.8	17.4	141.3	8.145	35.157	0.14	0.235	2.07
1-B	5.0	1.1	7.3	45.4	8.1	144.6	13.0	153.0	8.143	35.173	0.15	0.218	3.40
2-S	4.0	0.3	1.8	42.0	8.7	89.6	12.7	91.7	8.150	35.176	0.13	0.185	-
2-M	4.7	0.6	5.3	42.3	9.3	130.9	14.0	136.8	8.148	35.184	0.14	0.222	-
2-B	4.0	0.6	2.9	40.3	8.7	93.5	12.7	97.0	8.145	35.203	0.19	0.281	-
2-B Dup	4.3	0.4	3.6	44.2	9.0	115.9	13.3	120.0	8.145	35.183	0.14	0.264	-
3-S	3.7	0.3	1.7	48.4	10.9	108.8	14.6	110.7	8.145	35.180	0.13	0.214	-
3-M	3.4	0.4	0.7	41.2	9.3	101.8	12.7	102.9	8.143	35.187	0.16	0.222	-
3-M	3.4	0.3	0.6	40.9	9.9	103.0	13.3	103.9	8.144	35.186	0.15	0.220	-
3-B	4.0	0.3	1.0	38.4	10.5	92.3	14.6	93.5	8.145	35.177	0.18	0.239	-
4-S	3.7	0.3	2.0	55.4	10.5	92.5	14.3	94.8	8.150	35.178	0.13	0.218	-
4-M	3.4	0.3	2.1	42.8	11.5	102.8	14.9	105.1	8.150	35.192	0.20	0.269	-
4-B	3.1	0.6	1.8	43.1	9.9	95.6	13.0	98.0	8.148	35.197	0.24	0.361	-
5-S	3.7	0.3	1.5	49.3	9.0	97.2	12.7	99.0	8.148	35.187	0.14	0.197	-
5-M	3.1	0.3	1.5	42.3	10.9	95.3	14.0	97.2	8.147	35.206	0.16	0.285	-
5-M Dup	3.1	0.3	1.4	40.0	10.9	92.5	14.0	94.2	8.148	35.194	0.15	0.273	-
5-B	4.3	0.4	1.4	41.4	11.5	96.5	15.8	98.3	8.150	35.189	0.17	0.269	-
6-S	2.8	0.6	1.1	48.4	13.6	93.1	16.4	94.8	8.150	35.176	0.15	0.193	-
6-M	3.1	0.6	1.5	41.7	11.8	92.8	14.9	94.9	8.148	35.193	0.16	0.251	3.23
6-M	2.8	0.6	1.4	41.7	11.5	95.3	14.3	97.3	8.149	35.193	0.17	0.256	3.28
6-B	3.4	0.3	2.1	47.3	10.5	92.1	14.0	94.5	8.150	35.186	0.18	0.284	3.30

Test	Description	EPA Method	Analytical Precision
PO4	Orthophosphate - P	365.2	0.3
N+N	Nitrate plus Nitrite - N	353.2	0.3
NH4	Ammonia - N	350.1	0.4
Si	Silicate - Si	370.1	3.0
TOP	Total Organic Phosphorus	By difference	1.2
TON	Total Organic Nitrogen	By difference	5.0
TP	Total Phosphorus - P	365.4	1.2
TN	Total Nitrogen - N	351	5.0
pH	pH - relative acidity	150.1	0.002
Salt	Salinity	SM2520	0.002
Turb	Turbidity	180.1	0.01
Chl-a	Chlorophyll-a	SM10200	0.005
TSS	Total Suspended Solids	160.2	0.03

Analytical Notes:

Samples with the same ID are analytical replicates.

Samples with the same ID and "Dup" are duplicate sample bottle collections.

All Nutrients and chlorophyll-a results are in micrograms per liter (ug/l) or (ppb) units.

Other units are: parts per thousand (ppt); nephelometric turbidity units (ntu); parts per million (mg/l) or (ppm).

Table 3.

Table 3a.

From: Anthony Ostrowski
To: Enos, Virginia
Sent: Tuesday, May 09, 2000 11:00 AM
Subject: Benthic data

Gini,

Below are the results I promised on benthic data from your particular site. The values relate to organic loading at the site and samples are analyzed by digestion procedures. It gives an indication of how "clean" (my word) the site is. OI does not do inspect the material and identify species; this work is done by Julie Brock.

Values are in percent of sediment composition for carbonate (sand and shells), organic (living material), and terrigenous (from the land) for the sites sampled. I do not have the site identification. Randy should have this.

Station #	Carbonate (%)	Organic (%)	Terrigenous (%)
1	98.54	0.42	1.04
2	98.32	0.37	1.31
3	98.50	0.36	1.15
4	98.39	0.36	1.24
5	98.42	0.38	1.20
6	98.75	0.24	1.01

Results indicate that bottom is mostly sand and shells and that sites sampled are relatively uniform in this distribution.

Tony

Anthony C. Ostrowski, Ph.D.
Finfish Program Manager
41-202 Kalanianaole Hwy.
Waimanalo, HI 96795

Sample date 3/09/00

DIAGRAM OF SAMPLE LOCATIONS

Samples of 3/10/99 correspond to these locations around the CII site:

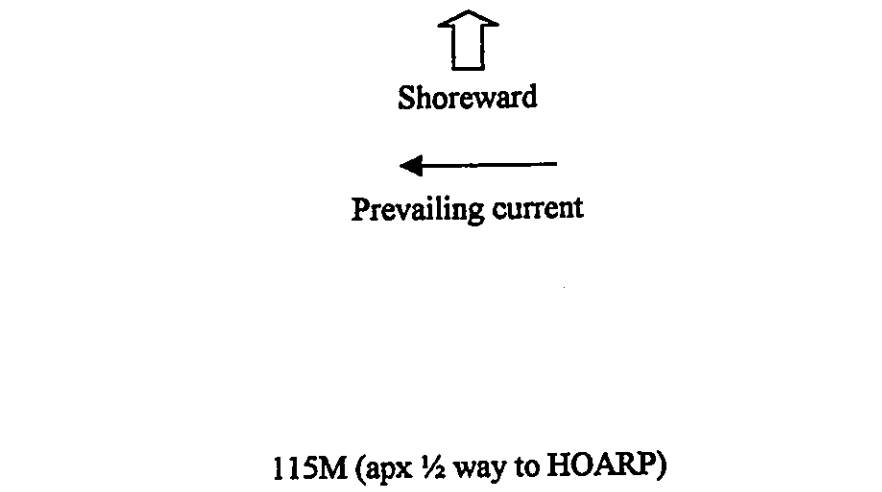


FIG. 10

FIG. 11

WS-5

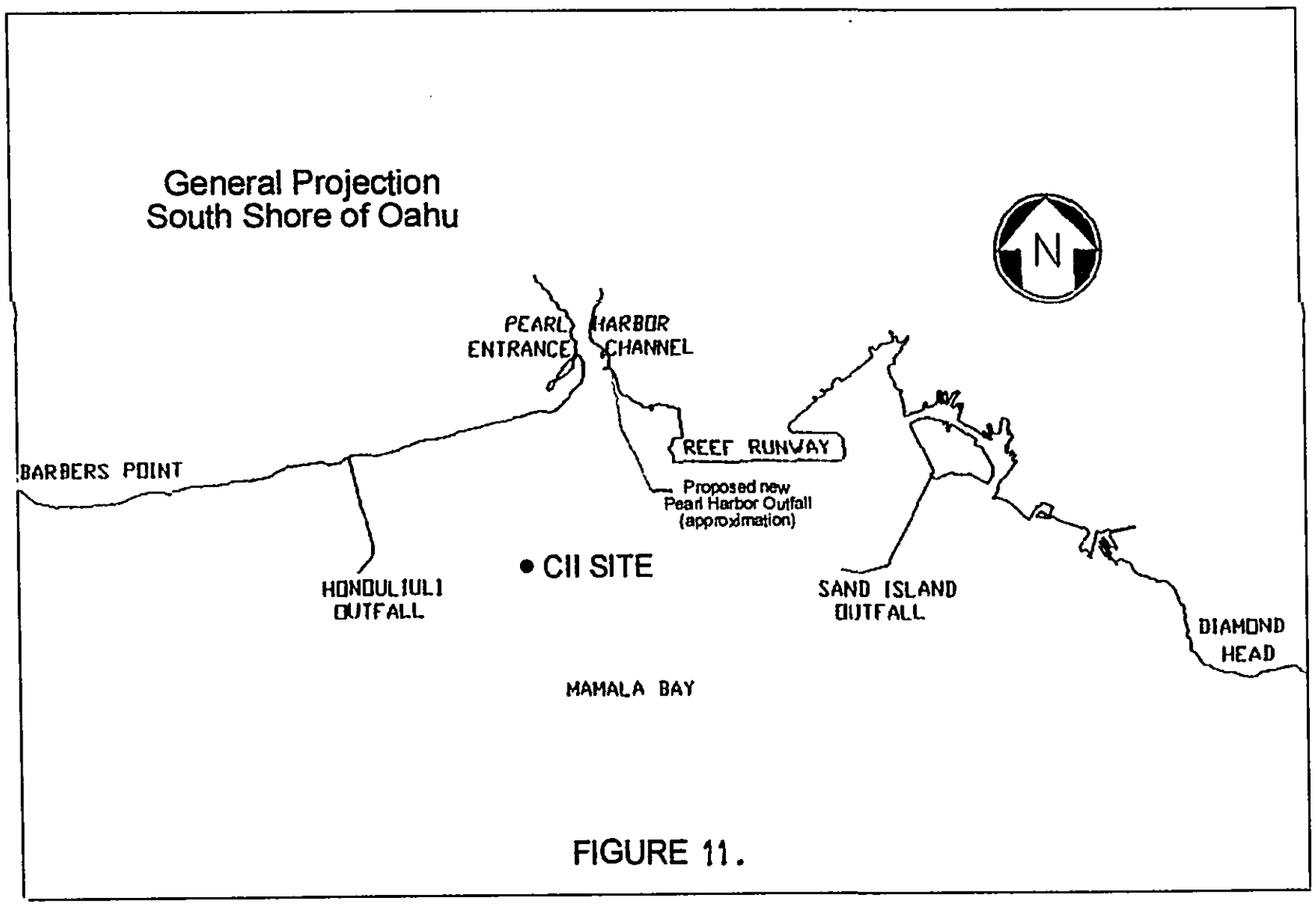


FIGURE 11.

Enlarged Legends on Preceeding Page

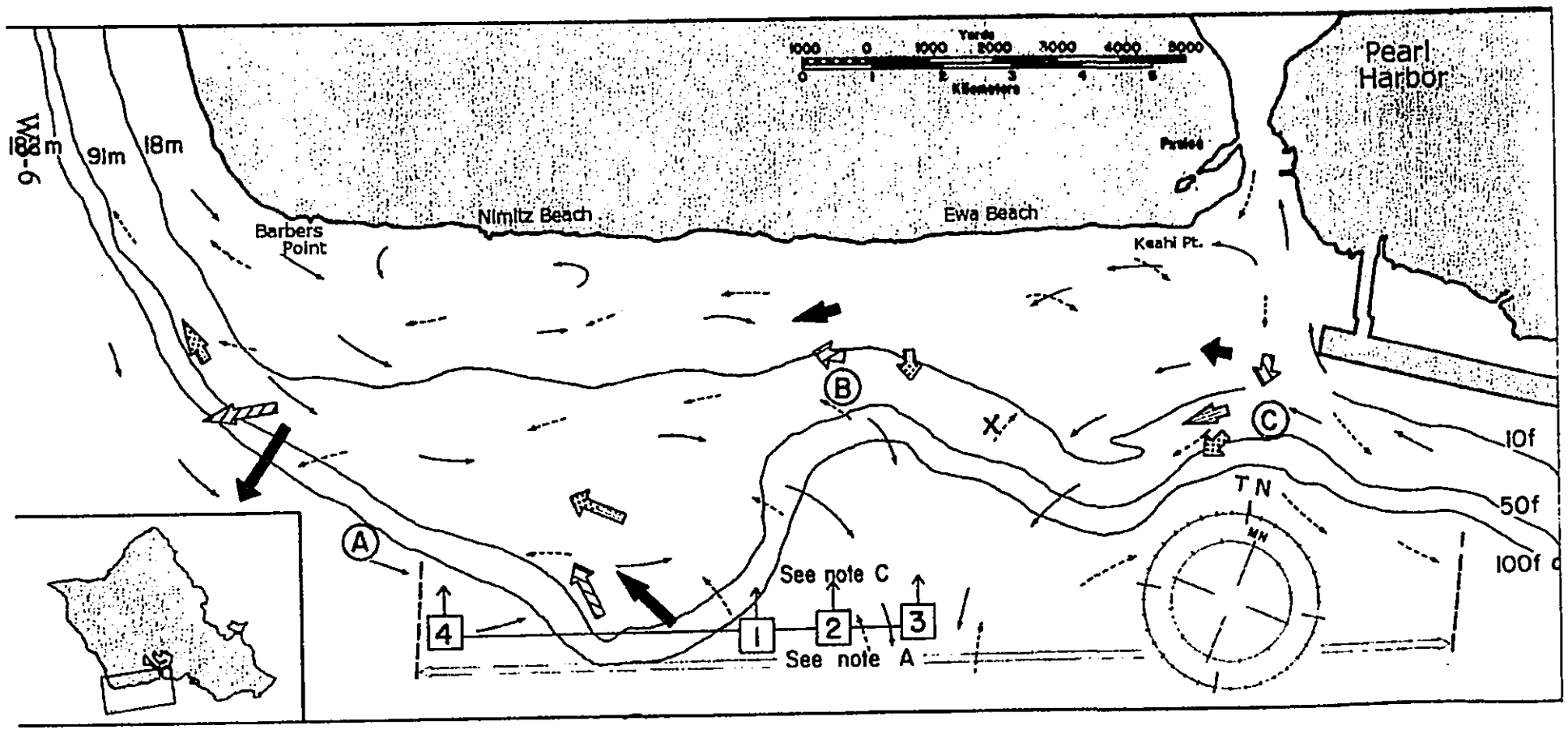


FIG. 12 CIRCULATION MAP

LEGEND

CIRCULATION	NET DRIFT		
	STRENGTH	OCCURRENCE	SEASON
FLOOD →	WEAK	VARIABLE	FEB-APR
EBB ----→	MODERATE	CONSISTANT	MAY-JUL
	STRONG		AUG-OCT
			NOV-JAN
			ALL SEASONS

Ⓐ Ⓑ Ⓒ Ⓓ CURRENT ROSE STATIONS AS APPLICABLE

NOTES:

A) Flood & ebb directions in this sector are shown for semidiurnal & mixed predominantly semidiurnal tides. Strong diurnal flooding flows move east & ebbing flows move west.

B) Net transports are as indicated seasonally.

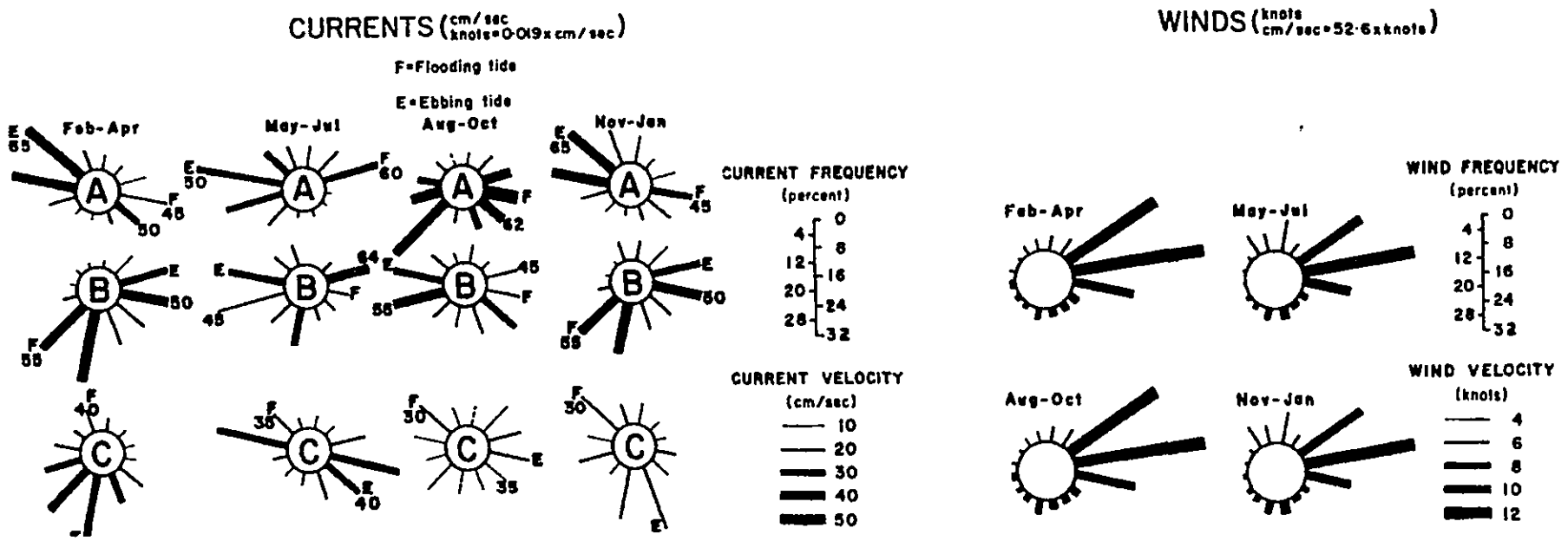
C) Strong semidiurnal & mixed semidiurnal tidal flows converge (flood) & diverge (ebb) in area:

1 Feb-Apr 2 May-Jul 3 Aug-Oct 4 Nov-Jan

WS-7

FIG. 13

(Legend for Fig.12)



CERTIFICATION

I HEREBY CERTIFY THAT THE MICROPHOTOGRAPH APPEARING IN THIS REEL OF FILM ARE TRUE COPIES OF THE ORIGINAL DOCUMENTS.

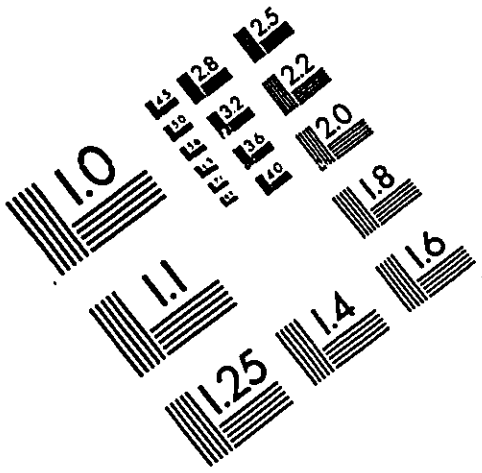
2004

DATE

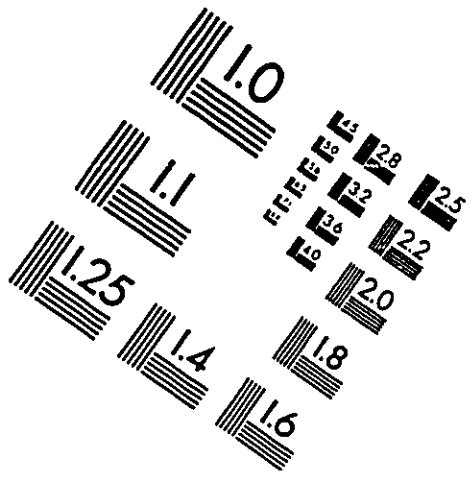
Joelle Kaai

SIGNATURE OF OPERATOR

TOP

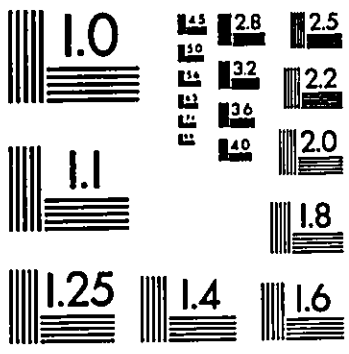


Film Identification



A & P International
612/854-0088 FAX 612/854-0482
8030 Old Cedar Ave. So., Ste. #215
Bloomington, MN 55425

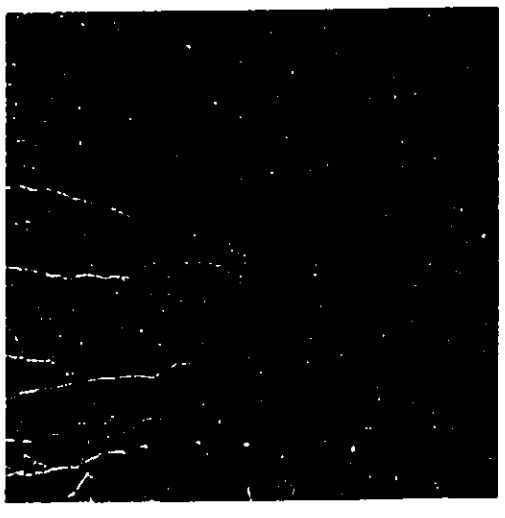
PRECISION[SM] RESOLUTION TARGETS

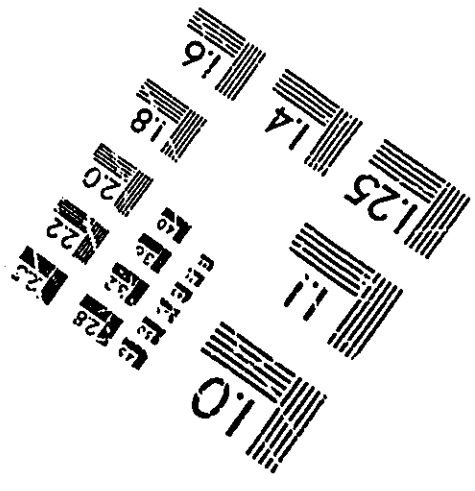


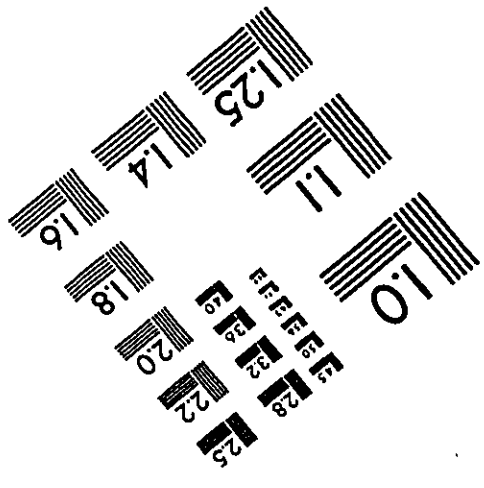
RIGHT

150 MM

6 ″







PL-3 8½"x11" PAPER PRINTED GENERAL TARGET

DENSITY TARGET