

CALIFORNIA COASTAL COMMISSION

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**STAFF RECOMMENDATION
REGULAR CALENDAR**

APPLICATION NO.: E-95-5

APPLICANT: Marine Forests Society

AGENT: Rodolphe Streichenberger, President

PROJECT LOCATION: The project is located on a 10-acre, sub-tidal parcel, approximately 300 yards offshore the Balboa Peninsula, Newport Beach, Orange County (Exhibit 1).

PROJECT DESCRIPTION: An after-the-fact permit request for an existing, artificial marine habitat experiment. The development includes the placement of a variety of materials on the sea floor, including but not limited to: (1) scrap automobile tires; (2) PVC pipe; (3) plastic mesh; (4) netting; (5) plastic jugs; (6) nylon rope; (7) polyurethane foam; (8) iron rod; and (9) concrete blocks. (See Section 2.1.3)

SUBSTANTIVE FILE DOCUMENTS: See Appendix A

Staff Note: Although the development occurred prior to the submission of a CDP application, the analysis contained in this report is based solely upon the project's consistency with the Chapter 3 policies of the Coastal Act. Commission action on an after-the-fact permit application does not constitute a waiver of any possible legal action with regard to the alleged violation nor does it constitute an admission as to the legality of any development undertaken without a coastal development permit.

SYNOPSIS

Staff recommends denial of this project on the basis that it is inconsistent with the Chapter 3 policies of the Coastal Act.

The Marine Forests Society (MFS) project consists of the placement of a variety of structures on the sea floor as a basis to examine the technical feasibility of large-scale marine habitat enhancement utilizing plastic structures, tires, and other materials. The development was conducted between 1988 and 1993, and is described by the applicant in the following manner:

1. approximately 2000 "kelp bio-structures," installed in 1988-1989, each consisting of an air-filled, one-gallon, plastic jug which is wrapped with plastic mesh, floating approximately 12 feet above the sea floor, and moored with 1/4-inch-diameter, nylon rope and a plastic anchor;
2. approximately 100 "mussel columns," installed in 1988-1989, each consisting of a 20-foot-long, 6-inch-diameter, polyvinylchloride (PVC) pipe, filled with air and capped in order to be suspended vertically in the water column, and moored 15 feet below the water surface with 5/8-inch-diameter, nylon rope and a plastic anchor;
3. approximately 15 "tire ribbons," installed in 1993, each consisting of approximately 100 scrap, automobile tires, tied together with nylon rope, and moored with 3/8-inch-diameter, nylon rope and plastic anchors, totaling approximately 1500 tires;
4. four "plastic tube and net habitats," installed in 1989, consisting of 20-foot-long, PVC pipes, nylon ropes, and nylon nets;
5. two "pyramid habitats," made of iron rods with nylon mooring line, three feet high;
6. one "bundle habitat," made of iron rods with nylon mooring line, three feet high;
7. four "plastic boulder habitats," described as 4 feet high, made of polyethylene mesh;
8. three "concrete block habitats," each consisting of eight, hollow, concrete blocks;
9. five "tire columns," installed in 1991, made of an unspecified number of automobile tires filled with polyurethane foam; and
10. two "unrelated experimental habitats," described as consisting of plastic substrates, floats and anchors.

The staff recommends that the Commission deny the MFS permit application because the design, siting, and operation of the project fail to implement appropriate measures to reduce impacts to coastal resources, in conflict with the resource protection policies of the Coastal Act and the requirements of the California Environmental Quality Act (CEQA).

Table 1 summarizes the basis for the staff recommendation for coastal development permit denial. Reference citations and in-depth analysis's of each issue area are included in Section 2 of this report.

Table 1. Issue Summary: Potential Project-Related Impacts

Issue	Analysis
Sewage Outfall	The proposed project is located within a shellfish harvesting exclusion zone due to its proximity to an Orange County Sanitation District sewage outfall. Artificial reefs are designed to attract and/or produce fish and invertebrates and to enhance sport fishing opportunities. The siting of an artificial reef in an area of degraded water quality increases the risk that marine life attracted to the area will be adversely affected by exposure to contaminants. Recreational anglers may catch and consume fish contaminated with <i>E. coli</i> and other pathogens associated with the sewage outfall. In addition, the Marine Forests Society (MFS) CDP application states that recreational divers may harvest shellfish from the project site. Siting the MFS project at this location is not consistent with the marine resource protection policies of Coastal Act sections 30230 and 30231.
Toxic Leachates from Tires	Tires contain compounds that are harmful to some organisms and acutely toxic to other organisms. Studies conducted by the Ontario Ministry of the Environment and for the Maryland Department of Natural Resources indicate that tires submersed in water release toxic chemicals. Additionally, used automobile tires are contaminated with road debris, dirt, oil, and other substances. These contaminant materials pose a risk to marine life and compromise water quality. Analysis regarding bio-accumulation of chemical compounds and the resultant impacts have not been completed. The impacts associated with the concentration of these noxious substances resulting from the placement of tires into the marine environment is potentially significant. The staff of the Santa Ana Region Regional Water Quality Control Board does not recommend approval of the MFS project due to their concerns regarding the release of toxic compounds from the tires and the bio-accumulation of these substances. California Department of Fish and Game biologists believe that surface toxicity may interfere with the ability of marine species to attach to tire surfaces. The use of automobile tires for the MFS project poses an unacceptably high risk of release of toxic substances into the marine environment in conflict with the requirements of Coastal Act sections 30230 and 30231 to protect the biological productivity and quality of coastal waters.
Marine Debris	The materials used for the MFS project, including used automobile tires, plastic jugs, PVC pipe, plastic mesh, netting, nylon rope, Styrofoam, and a variety of other, man-made materials, are not sufficiently dense to remain in place on the sea floor under heavy storm and wave conditions. The project structures are anchored to the sandy bottom by means of small plastic anchors and 1/4-inch-diameter, nylon rope. The MFS states that it does not intend to maintain the project site and has in fact already abandoned in-place several past experiments. For example, in 1988 the MFS installed 2000 "kelp bio-structures," each consisting of 12-foot-long, 1/4-inch-diameter anchoring lines, protruding above sand level, topped by a one-gallon plastic jug wrapped in plastic mesh. When it canceled the kelp experiment, the MFS abandoned the plastic jugs, ropes, and mesh netting in-place. During site inspections in September 1993, and October 1995, only a few of the original 2000 deflated plastic jugs were observed. Past experience demonstrates that project structures will eventually break loose from their moorings and become marine debris. At sea, discarded plastics create problems for both marine life and human activities. Drifting plastics can foul props and jam cooling intakes of small vessels. Beaches become cluttered with discarded materials. Sea life dies from eating plastics or from entanglement. PVC piping is shattered and moved about by rough ocean waters. Discarded netting and rope assemblies can trap fish and marine mammals long after they are abandoned. Abandoning project components in-place constitutes ocean dumping. The use of the such materials for artificial reef construction is inconsistent with public access and marine resource protection policies contained in Coastal Act sections 30210, 30211, 30230 and 30231.

Beach Erosion	The MFS project is located within nearshore waters, at depths of -30 to -40 feet, in an area known as the littoral zone. Sediment deposition within the littoral zone affects the rate and force with which ocean waves contact the shoreline. When sand is trapped by structures placed within the littoral zone and not allowed to complete its natural migratory cycle, shoreline sand deposition and beach erosion both up-coast and down-coast can be altered. Consequently, the dynamics of beach erosion and accretion can be altered by structures within the littoral zone. As sand is lost from the littoral zone in one area, the ocean waves will break closer to shore and increase shoreline erosion. The Balboa Peninsula is losing sand at a retreat rate of about 5 feet per year. The MFS project is designed to trap and hold sand and probably has affected local sediment transport. Because the MFS project may create or contribute to beach erosion, it is inconsistent with Coastal Act section 30253.
Public Access—Recreation	The use of fragile and low density materials for the MFS project, the limited life expectancy of the anchoring system, the lack of monitoring and maintenance of the project, and the planned in-place abandonment of project components, all increase the potential that materials from the project will litter nearby beaches, resulting in aesthetic degradation and user hazards in conflict with Coastal Act sections 30210 and 30211.
Project Alternatives	Using materials more suitable for the marine environment (i.e., materials of sufficient density, and persistence to assure long-term stability, and materials that do not contain toxic substances), using a more reliable anchoring system, locating the project outside of the littoral zone and in an area of higher water quality are all feasible alternatives that would substantially lessen the adverse effects of the MFS project to coastal resources. Because it does not incorporate the least environmentally damaging feasible alternatives, the proposed project is inconsistent with Coastal Act section 30233(a) and the CEQA.
Mitigation	Feasible mitigation measures that would lessen the project's impacts to coastal resources include: (1) a mechanism for long-term financial security for proper cleanup and/or removal of project materials; (2) a monitoring, mitigation and reporting plan which examines impacts to water quality, marine organisms and shoreline erosion; and (3) a long-term monitoring and maintenance program for the physical condition of the anchoring system and the structural integrity of the various project components. The MFS project should also include a well thought experimental methodology and a quantifiable measure of success. Because it does not incorporate such measures, the MFS project is inconsistent with Coastal Act section 30233(a) and the CEQA.

1.0 STAFF RECOMMENDATION

Denial

The staff recommends that the Commission adopt the following resolution:

The Coastal Commission hereby denies a permit request for the Marine Forests Society project on the grounds that feasible alternatives and mitigation measures are available which would substantially reduce significant adverse impacts on coastal resources within the meaning of section 30233(a) of the California Coastal Act of 1976 and the California Environmental Quality Act, and that the development is otherwise inconsistent with the provisions of Chapter 3 of the Coastal Act.

2.0 FINDINGS AND DECLARATIONS

2.1 Project Location and Background

2.1.1 Location

The project is located on a 10-acre, sub-tidal parcel in the Pacific Ocean, approximately 300 yards offshore of the Balboa Peninsula, Newport Beach, Orange County. The parcel is located on tidelands granted to the City of Newport Beach, and has an approximate latitude of 33° 35' 37" north and longitude of 117° 53' 00" west (see Exhibit 1).

2.1.2 Background and History

The Marine Forests Society (MFS) corporation is a non-profit organization, mainly staffed by volunteers, whose stated purpose is to demonstrate new possibilities in marine sciences, techniques, and economics to develop life in the sea. The MFS project is intended to demonstrate how scrap tires and other readily available discarded materials can be formed into productive artificial marine habitats and how successfully using tires as an artificial reef substrate can help alleviate solid waste disposal problems. The MFS project is additionally intended to determine the biological, technical and economic feasibility of using scrap tires and other discarded, man-made materials as artificial reef substrate.

In April 1987, the MFS applied for and received a conditionally approved aquaculture lease from the California Fish and Game Commission (CF&GC). Appendix B, CF&GC Lease History, summarizes the aquaculture lease agreement chronology. Consistent with the California Department of Fish and Game's (CDFG) aquaculture program to promote aquacultural development in the State, the lease specified that the MFS must either enter into a production agreement with the CF&GC and meet minimum planting and production requirements after five

years of operation in order to renew the lease or abandon the lease site and remove the development. Condition G of the lease agreement explicitly requires the lessee to obtain Coastal Commission regulatory approval prior to proceeding with the project. In conflict with this requirement, the MFS undertook the project without notifying the Coastal Commission or obtaining a coastal development permit or regulatory approval from other interested agencies. Thus, an environmental analysis to identify project-related impacts, as required by the Coastal Act and the California Environmental Quality Act was avoided. According to Rodolphe Streichenberger, President of the MFS, the MFS knowingly chose not to pursue regulatory approval from the Coastal Commission.¹

Also, the lessee (MFS) did not fulfill the minimum aquaculture production requirements. In fact, the MFS had no production (sales of products) from the lease. The project therefore failed to qualify as an aquaculture operation. More importantly, the project is located in an area where mariculture (marine aquaculture) of shellfish is prohibited due to potential contamination from the nearby Orange County Sanitation District wastewater out-fall and local marinas (see Section 2.2.5, California Department of Health Services). In October 1994, the CF&GC declared Lease No. M-738-02 abandoned by mutual agreement between Rodolphe Streichenberger and the CDFG.²

Condition "F" of Aquaculture Lease M-738-02 required that all project-related improvements be salvaged and removed within 90-days of the termination of the lease. The MFS has not removed any project-related materials. The CDFG has taken no action to enforce the removal requirement of the aquaculture lease during the MFS's pending pursuit of an after-the-fact CDP for the project. All project related materials remain on the site today or have been carried away by ocean currents.

2.1.3 Related Projects

The coastal permit application states that the MFS's aim is to establish financially profitable methods for creating artificial marine habitats. As discussed in greater detail in this report, the MFS proposes that if the project is a technical and economic success, large portions of California's sandy ocean bottoms can be used to create reefs composed of waste tires. The CDP application presents the MFS project as one that will lay the groundwork, and set precedent for similar future projects. According to the Marine Forests Society's 1993 Business Plan,

"after the expected success of the MFS project, the MFS will transfer the acquired knowledge to entrepreneurs willing to participate in the fifty tire reef/marine forest program that the MFS has promised to California ... the habitats will be built and exploited for profit by private entrepreneurs."

¹ Personal communications between Rodolphe Streichenberger, MFS, and Darryl Rance, Coastal Analyst, California Coastal Commission, June 14, 1995, and October 23, 1995.

² Letter from Robert Treanor, Executive Director, California Department of Fish and Game to Rodolphe Streichenberger, MFS, October 19, 1994.

2.1.3.1 MFS Tire Reef Demonstration Project

In March 1995, the City of Newport Beach granted a Harbor Permit to the MFS for a separate, different project consisting of the construction of an artificial reef using 30,000 scrap tires adjacent to the location of the project discussed in this report. At the same time, the City also issued a Negative Declaration for the proposed "tire reef demonstration project" (TRDP). In June 1994, the MFS submitted an incomplete CDP application for the TRDP.

2.1.3.2 Nautilus Farms Tire Reef

On March 16, 1994, Nautilus Farms Inc., secured a conditional aquaculture lease for a aquaculture/artificial reef project offshore of Huntington Beach from the Fish and Game Commission. The Nautilus Farms Tire Reef project proposal consists of the construction of a scrap tire reef consisting of three million tires. The issuance of the CDFG aquaculture lease agreement is contingent upon: (1) obtaining a lease agreement for the sub-tidal lands upon which the project is proposed; (2) obtaining a CDP from Coastal Commission (Nautilus Farms Inc. has not submitted a CDP application for this project); (3) agreement to an aquaculture planting and production plan; (4) and the preparation of an Environmental Impact Report to assess and mitigate impacts associated with the placement of tires into the marine environment. The Nautilus Farms project is proposed to closely follow the design and operational techniques established by the MFS. The EIR required for the Nautilus Farms project has not been completed.

2.1.4 Project Description

2.1.4.1 Purpose

The MFS describes the purpose of its project as an attempt to demonstrate the technical feasibility and financial profitability of creating large-scale, artificial, marine habitats with used tires and other, man-made materials, stating:

"[t]ires are a major component of solid waste generated throughout the world with some 28,500,000 used tires produced annually in California. Tire disposal is a major solid waste problem. The MFS project is intended to show how miscellaneous discarded materials and scrap tires can be formed into a productive reef. If the project is an economic success and technical success, the MFS has proposed that large portions of California's sandy ocean bottoms may be used to create habitats composed of waste tires."

The MFS specifies that while it is conducting aquacultural research, the project does not include the harvest of any aquacultural product for human consumption. However, the MFS permit application states that recreational divers may collect shellfish from the project site.

2.1.4.2 Structures

The permit application proposes after-the-fact CDP authorization of a variety of structures installed during 1988, 1991 and 1993, described as:

1. approximately 2000 "kelp bio-structures," installed in 1988-1989, each consisting of an air-filled, one-gallon, plastic jug which is wrapped with plastic mesh, floating approximately 12 feet above the sea floor, and moored with 1/4-inch-diameter, nylon rope and a plastic anchor;
2. approximately 100 "mussel columns," installed in 1988-1989, each consisting of a 20-foot-long, 6-inch-diameter, polyvinylchloride (PVC) pipe, filled with air and capped in order to be suspended vertically in the water column, and moored 15 feet below the water surface with 5/8-inch-diameter, nylon rope and a plastic anchor;
3. approximately 15 "tire ribbons," installed in 1993, each consisting of approximately 100 scrap, automobile tires, tied together with nylon rope, and moored with 3/8-inch-diameter, nylon rope and plastic anchors, totaling 1500 tires;
4. four, "plastic tube and net habitats," installed in 1989, consisting of 20-foot-long, PVC pipes, nylon ropes, and nylon nets;
5. two "pyramid habitat," made of iron rods with nylon mooring line, three feet high;
6. one "bundle habitat," made of iron rods with nylon mooring line, three feet high;
7. four "plastic boulder habitats," described as 4 feet high, made of polyethylene mesh;
8. three "concrete block habitats," each consisting of eight, hollow, concrete blocks;
9. five "tire columns," installed in 1991, made of an unspecified number of automobile tires filled with polyurethane foam; and
10. two "unrelated experimental habitats," described as consisting of plastic substrates, floats and anchors.

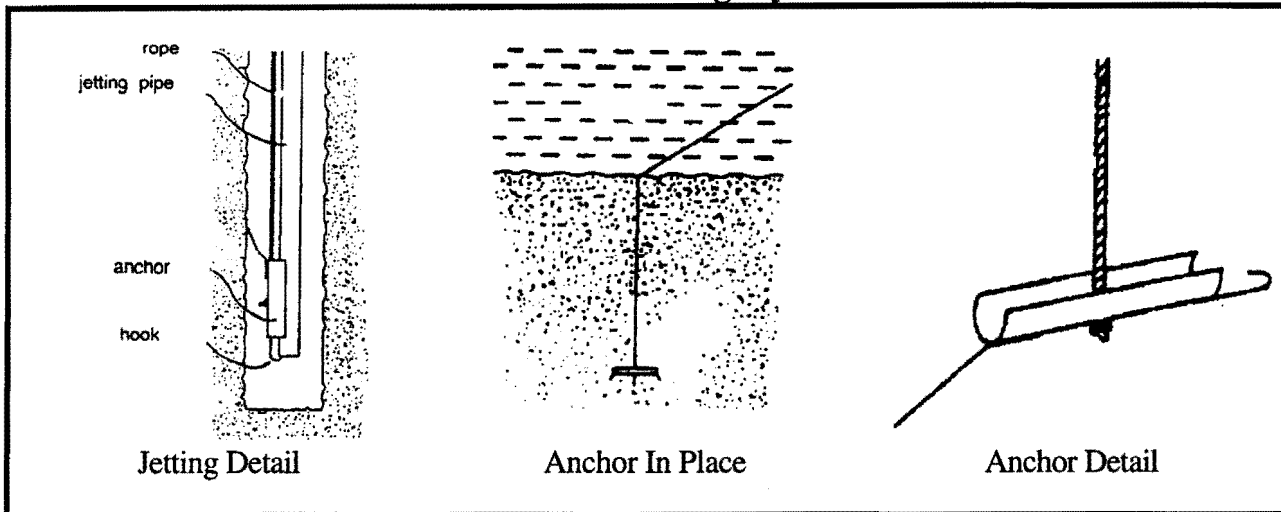
See Exhibit 2 for schematic diagrams of the project structures. The MFS identifies items 4-10 above as "miscellaneous units of canceled past experiments," and has not specified the exact materials, designs, locations and installation dates of these structures. The MFS administration encouraged volunteer participants to experiment with a full range of materials without administrative oversight or coordination. In response to the Commission staff's request to provide specific information concerning this development, the MFS responded:

"As a sacred rule and to develop creativity, the largest initiative was permitted and even recommended to the volunteers. The intellectual properties of inventions that occurred were ruled to remain the intellectual property of the individual inventors and not the MFS."

2.1.4.3 Anchoring System

The MFS employs a "water jet mooring system" to anchor the various project components to the sea floor. The anchoring system consists of nylon rope secured to a short piece of PVC pipe which is split lengthwise and buried in the sandy bottom with a water jet (see Figure 1 below).

Figure 1.
MFS Jet Mooring System



The MFS has provided the following specifications for the anchors:

"Kelp substrate anchors were made of split pvc pipe, Diam. 1.4", Length 4.5" with a quarter inch mooring line.

Mussel column anchors were made ... of 2 superimposed split pvc pipes, I.D. 2", Length 7".

Tire ribbon anchors, placed every 100 tires i.e. 100 feet, were made of 2 superimposed split pvc pipes, Diam. 2.5", Length 7".

All anchors were water jetted 9 ft deep below sand surface."

The MFS has not provided technical information concerning the mooring capacity or longevity of this anchoring system, stating in response to staff's requests for such information that:

"The mooring capacities of the anchoring systems have been calculated in 1987 according to the indications of Dr. Jacques Savel, Professor of Material Resistance at the School of Architecture of the University of Nantes, France. Unfortunately, these indications cannot be located anymore in the files of the Marine Forests Society."

2.1.4.4 Maintenance

The project description includes several canceled, past experiments which have been abandoned in-place in accordance with the MFS's "lay-it-flat" technique. The "lay-it-flat" technique consists of deflating or not maintaining the air that keeps the project components buoyant and allowing them to fall to the ocean floor and be covered and/or moved about by the migrating sandy substrate. The MFS provides the following information concerning these abandoned structures.

Kelp bio-structures (approximately 2000 installed):

"The kelp experiment was abandoned because of fragility of kelp growth due to unfavorable natural conditions."

Plastic tube and net habitat (four installed):

"This type of bottom habitat was abandoned because better results were obtained with tire-made bottom habitats."

"At experiment's end (inconclusive) the net-made volumes were detached from the structures by divers and dropped on the bottom where they stay now incorporated in a mussel layer."

Pyramid and Bundle Habitats (3 structures installed):

"At experiment's end (inconclusive) the pyramids [and bundles] disassembled and got buried into the sand."

Plastic boulder habitat (four installed):

"At experiment's end (inconclusive) the boulders disassembled and got buried into the sand."

Tire columns (five installed):

"Their floatation assured by plastic foam degraded after 6 months. Their stability when lying on the sea bottom and filled with sand led to the invention of the self anchored tire-ribbons."

Cement block and plastic mesh habitats (three installed):

"At experiment's end (inconclusive) the blocks subsided into the sand."

"Miscellaneous experiments with cement blocks and aquaculture mesh were soon abandoned because of poor stability."

2.2 Other Local, State and Federal Agencies

2.2.1 City of Newport Beach

The MFS development is located on submerged lands granted to the City of Newport Beach. As such, the City has authority concerning the MFS development as: (1) the local government within whose regulatory jurisdiction the project is located; (2) the owner of the property upon which the development is located; and (3) the "Lead Agency" for the project under the California Environmental Quality Act (CEQA).

2.2.1.1 Local Approval

On March 27, 1995, the Newport Beach City Council granted a Harbor Permit to the MFS for a proposal to place 30,000 used tires 500-1000 feet offshore Newport Beach in water 60 to 110

feet deep (hereinafter "TRDP"). The Harbor Permit states that one of the parcels on which the proposed TRDP would be located, "contains a variety of experimental reef projects consisting of pipes, tires, and floats." However, the findings for the approval of the permit address only the placement of the proposed TRDP in water 60 to 110 feet deep. The Harbor Permit does not analyze the effects of placing the MFS development in shallower water (30-40 feet) or the use of any materials except for tires as artificial reef substrate. Despite the obvious differences between the existing MFS development and the proposed TRDP, the City's intention is that the Harbor Permit, as conditioned, function as local regulatory approval for both projects.³

2.2.1.2 Property Ownership

The MFS development is located on submerged lands granted by the State Legislature to the City of Newport Beach pursuant to Chapter 74, Statutes 1978. The statute provides that the lands shall be used for the following purposes: (1) public harbors and related improvements for the promotion or accommodation of commerce and navigation; (2) public beaches, marinas, aquatic parks and other public recreational facilities; and (3) preservation, maintenance, and enhancement of the lands in their natural state and to serve as ecological units for scientific study and as environments which provide food and habitat for birds and marine life. The City is authorized to grant franchises for wharves and other public uses and may issue leases for purposes consistent with the trust upon which such lands are held.

The City indicates that pursuant to the aforementioned Harbor Permit it has authorized the MFS to use lands subject to the above described tide and submerged lands grant.⁴

2.2.1.3 California Environmental Quality Act

On March 27, 1995, at the same time that it granted the Harbor Permit, the Newport Beach City Council also adopted a Negative Declaration for the proposed TRDP. The project description for the negative declaration states:

"The proposal is a demonstration project funded in part by the California Integrated Waste Management Board to determine the feasibility of using scrap tire to create artificial reefs. Approximately 30,000 tires in "ribbons" would be anchored in two 10-acre parcels to create enhanced habitat for marine resources."

The only mention of the existing MFS development contained in the negative declaration is the statement on page 13 of the document that one of the parcels on which the TRDP would be

³ Letter from Tony Melum, Deputy Chief, Marine Division, City of Newport Beach, to Darryl Rance, Coastal Analyst, California Coastal Commission, July 9, 1996. Letter from Chris Kern, Coastal Analyst, California Coastal Commission, to Robin Clauson, Assistant City Attorney, City of Newport Beach, October 18, 1996. Personal communication between Melum, Clauson and Kern September 30, 1996. Personal communication between Clauson, and Kern, October 21, 1996.

⁴ See Footnote No. 3, supra.

located, "contains a variety of experimental reef projects consisting of pipes, tires, and floats." The existing MFS development is not part of the project defined for the purpose of the Negative Declaration, and the document does not therefore consider the environmental effects of the existing MFS development. The City received a number of comment letters from Responsible Agencies concerning the proposed TRDP in response to the Draft Negative Declaration. However, none of the comments addressed the existing MFS development.⁵ The City acknowledges that the environmental document includes no analysis of the existing MFS development, but states that the document is intended to satisfy the environmental analysis requirements under CEQA for the existing development as well as for the proposed TRDP.⁶

2.2.2 County of Orange

The Orange County Environmental Management Agency expressed several areas of concern with the proposed TRDP which are paraphrased below and include: (1) biological effects to the local marine community; (2) increased beach and shoreline erosion; (3) inadequate experimental methodology; and (4) the eventual failure of the MFS anchoring system and resulting marine debris.⁷ Although these concerns are expressed in the context of the proposed TRDP, and not the existing MFS development described in this permit application, the issues raised are relevant to the Commission's consideration of this after-the-fact CDP request. Furthermore, because the aforementioned Negative Declaration for the TRDP does not properly identify the existing MFS development, none of the comments on the document pertain directly to the project currently before the Commission.

1. The release of toxic chemicals from tires may cause long-term, adverse impacts to the food chain due to bio-accumulation of these substances. The MFS should test the organisms living in and on the reef to determine if the project has introduced toxins into the food chain, and clean road debris and other hazardous materials (e.g. oil, gas, metals etc.) from the tires prior to placement in the marine environment.
2. The Preliminary Coast of California Storm and Tidal Wave Study has shown that the Balboa Peninsula is losing sand at a retreat rate of about 5 feet per year. The Beach profile analysis in the vicinity of Balboa Pier shows that the depth at which any sand passes will not return to the littoral zone is in the range of -30 to -40 feet MLLW. Coastal structures within the littoral zone affect long-shore and offshore sediment

⁵ Although the comment letters concerning the Draft Negative Declaration for the TRDP do not directly address the existing MFS development described in this permit application, they do discuss issues concerning the use of automobile tires for constructing artificial reefs, and the expected durability of the MFS "jet mooring system." Because these issues are relevant to the Commission's consideration of this permit application, the comments are discussed in this report.

⁶ See Footnote No. 3, *supra*.

⁷ Letter from Kari Rigoni, Acting Manager, Orange County Environmental Planning Agency to John Douglas, the City of Newport Beach, April 3, 1995.

transport. The MFS project has most likely exacerbated the on-going erosion of the shoreline in the project area.

3. The MFS project does not include a scientific measure of "success" and is seriously lacking in experimental methodology, (e.g., there is no control group designated for qualitative or statistical comparison). The project description discusses visual inspection to determine success but provides no quantitative means for assessing it. There are no provisions for a regulatory agency to inspect the project to verify the claim of success or failure.
4. The County believes that the MFS anchoring system will eventually fail. The project includes no provision to assure that loose tires and other project components will be collected and properly disposed of.

2.2.3 California Regional Water Quality Control Board—Santa Ana Region (RWQCB)

The RWQCB denied clearance for the TRDP project due to: (1) lack of evidence showing that the project would not affect water quality; (2) the absence of a monitoring program to assess water quality and biological communities; and (3) the absence of any meaningful monitoring done on previous experiments.⁸ The RWQCB staff does not recommend approval of the existing MFS development because of concerns regarding the release of toxic substances from tires into the marine environment and the bio-accumulation of such compounds.⁹

2.2.5 California Department of Health Services (CDHS)

Health and Safety Code section 112170 authorizes the California Department of Health Services (CDHS) to conduct surveys of any proposed shellfish growing areas to determine if it meets bacteriological, chemical, and toxicological standards prescribed by regulation. If the water in the growing area is found to be in compliance with the required standards, a certificate attesting to said compliance will be issued.¹⁰

The CDHS has determined that the MFS project site lies within two safety zones drawn around the large un-disinfected ocean outfall of the Orange County Sanitation District and the marinas in Newport Bay, an area in which mariculture of shellfish is prohibited due to high concentrations of *E. coli* bacteria and other contaminants. Harvesting shellfish for human consumption is prohibited in this area under the National Shellfish Sanitation Program.¹¹ Consequently, the CDHS could not issue a Shellfish Growing Area Certificate for the project site under any

⁸ Letter from Joanne E. Schneider, Environmental Program Manager, Regional Water Quality Control Board, to Rodolphe Streichenberger, MFS, May 19, 1995.

⁹ Letter from Joanne E. Schneider, Environmental Program Manager, Regional Water Quality Control Board, to Susan Hansch, California Coastal Commission, August 31, 1995.

¹⁰ California Code of Regulations, Title 17, § 7760.

¹¹ The National Shellfish Sanitation Program is a voluntary program administered by the U.S. Food and Drug Administration involving State shellfish control agencies, the shellfish industry, and other Federal agencies.

conditions, and the sale of, or the offer, or hold for sale for human consumption of any shellfish from the MFS project is prohibited. The CDHS staff have offered the MFS assistance to find a more suitable location for their project.¹²

2.2.6 California Department of Parks and Recreation (CDPR)

The Orange Coast District of the CDPR identified several concerns in response to the Draft Negative Declaration for the TRDP.¹³ These concerns are paraphrased below and include: (1) shoreline erosion; (2) scrap tire suitability for brown algae growth; and (3) the questionable strength and longevity of the nylon rope and plastic pipe anchoring system. Although these concerns are expressed in the context of the proposed TRDP, and not the existing MFS development described in this permit application, the issues raised are relevant to the Commission's consideration of this after-the-fact CDP request. Furthermore, because the aforementioned Negative Declaration for the TRDP does not properly identify the existing MFS development, none of the comments on the document pertain directly to the project currently before the Commission.

1. Location of the MFS development in water 30 to 40 feet deep could affect wave refraction and concentrate wave energy on local beaches exacerbating localized erosion.
2. Past reports show that tires are not suitable for most brown algae that provide a basis for kelp forests and provides for true increases in species diversity.
3. The nylon ropes used to secure and anchor the bio-structures will be exposed to ocean wave and current forces, resulting in stress, chafing and ultimately leading to failure. The rope attachments are of questionable strength and design. At some point, the attachments will break and allow tires to migrate under wave and current action. Additionally, an artificial reef will attract fisherman to the site. Fishing boat activity in the area will increase the potential of snagging the MFS development with anchors. These impacts will add to failure rates of the nylon ropes from both individual and cumulative anchor snagging occurrences. During the stormy winter of 1983 at Huntington Beach, thousands of tires washed up onto the shore from a CDFG tire reef experiment. The inevitable large storm episode will move the MFS tires. Tires do become buried in inshore sand creating visitor use hazards. Sand temporarily filling 40-60% of the tire cavities will not guarantee their attachment to the sea floor. Oceanographic literature is rife with examples of even the largest and best designed man-made structures failing in storm episodes.

¹² Letter from Kenneth Hansgen, California Department of Health Services, to Rodolphe Streichenberger, MFS, June 22, 1993.

¹³ Letter from Jack Roggenbuck, California Department of Parks and Recreation (CDPR) to Nadell Gayou, The Resources Agency, March 3, 1995 and letter from David Pryor CDPR Resource Ecologist, to Gayou, March 3, 1995.

2.2.7 California Department of Boating and Waterways (CDBW)

The CDBW has identified the following concerns regarding the proposed TRDP:¹⁴

1. Development should be placed no shallower than -60 feet (MLLW) so as not to obstruct the on-off movement of sand and to avoid adverse effect on beach equilibrium profile. Careful consideration should be given to locating the tires into deeper water. Relocating the tires will most likely increase the life of the structures due to decreased effects of wave and swell energy.
2. Tires placed partially above the ocean bottom could entangle or snag boat anchors. If the vessel is powerful enough, it could break tires loose from their respective anchor and rope toggles. Therefore, the CDBW also suggest that the development should be noted on nautical charts and included in a "Notice to Local Mariners" to help avoid any hazards relating to anchoring in, or near these areas.

Although these concerns are expressed in the context of the proposed TRDP, and not the existing MFS development described in this permit application, the issues raised are relevant to the Commission's consideration of this after-the-fact CDP request. Furthermore, because the aforementioned Negative Declaration for the TRDP does not properly identify the existing MFS development, none of the comments on the document pertain directly to the project currently before the Commission.

2.2.8 California Department of Fish and Game (CDFG)

The California Legislature formalized the CDFG's status as the principal agency in the State's artificial reef building process by passage of Assembly Bill 706 (Fish and Game Code, Article 2, §§ 6420-6425). This legislation authorized the CDFG to investigate efforts to enhance marine species through the placement of artificial reefs and implement a program of artificial reef research and development, including reef design, placement, and monitoring.

As the principal agency for the construction of artificial reefs offshore California, CDFG biologists have been involved in the planning, construction and monitoring of over 30 artificial reefs. Through this working experience, the CDFG has established the following guidelines for artificial reef materials:¹⁵

1. The material must be persistent. It must be hard, but may not be so brittle that collisions with other materials, or boat anchors would tend to shatter it. It must remain essentially unchanged after years of submersion in salt water;

¹⁴ Letter from John R. Banuelos, Director of the Department of Boating and Waterways, to Nadell Gayou The Resources Agency, March 7, 1995.

¹⁵ California Department of Fish and Game, Marine Resources Division, Material Specifications and Notification Procedures -- Surplus Materials for Augmentation To Artificial Reefs, November 15, 1991. See Appendix C.

2. The material must have a specific gravity at least twice that of sea water. The material must be dense enough to remain in position during strong storm events, even in water depths as shallow as 30 feet;
3. The material must not contain potentially toxic substances. The CDFG preferred artificial reef materials include quarried rock and high density concrete; other materials are considered on a case by case basis.

The materials utilized in the MFS project do not meet the material specifications of the CDFG's Artificial Reef Program and are not suitable for long-term use in the marine environment. In that regard, the CDFG staff have stated that they are not convinced that the benefits that can be reasonably be expected to result from tire reef construction and PVC structures will outweigh the environmental hazards to California's marine resources.¹⁶

On October 12, 1995, the CDFG staff inspected the MFS project site, reporting: (1) the PVC columns, with their high-vertical relief and dense mussel growth typical of pier pilings, are providing some habitat value to fishes; (2) the fish-related habitat value of the tire-ribbons, in absence of the PVC columns, is questionable; (3) several of the PVC columns have sunk to the bottom and assorted other webbing/netting structures are scattered about the area in various states of disrepair.¹⁷

The CDFG has identified three main areas of concern regarding the existing MFS development, which are paraphrased below.¹⁸

1. The MFS has not presented any documentary evidence to support its claims that tire ribbons are highly productive. Based on past artificial reef experiments with tires, the CDFG regards tires as an inferior material for the attachment and development of a complex reef community. The tire reef will continue to lack many large invertebrates like rock scallops, giant keyhole limpets and sea urchins due to insufficient algae and a lack of a suitable substrate/habitat. Further, there is no evidence that mussels have or will become established on the tire substrates. Low relief, susceptibility to sand scour and predation appear to be working against mussel colonization of tires. In contrast, the PVC columns are supporting dense mussel colonies.
2. The MFS project site has attracted a number of fish, but is unlikely to provide the resources to increase local fish production. Any structure in nearshore waters will attract fish, but the CDFG believes it is important for an artificial reef to increase productivity of fish populations by providing permanent habitat and not merely to concentrate them. Lack of adequate cover and high numbers of predators will make it difficult for the young-of-the-year fish to recruit and survive on the tire reef. The sparsely attached community

¹⁶ Letter from Rolf E. Mall, Chief, Marine Resources Division, California Department of Fish and Game, to Darryl Rance, California Coastal Commission, June 29, 1995.

¹⁷ Letter from David O. Parker, Senior Biologist, California Department of Fish and Game, to Darryl Rance, California Coastal Commission, November 27, 1995.

¹⁸ See Footnote No. 17, *supra*.

growing on the tires will provide little additional food for fish, thus limiting any potential increase in resident fish stocks.

3. During a recent inspection of the project site, some tire ribbons were completely buried while others were almost completely exposed. The majority of the tires were half buried in the sand. Although most of the tires have remained in place, they may not survive strong storms like those that damaged or destroyed breakwaters and piers in the Los Angeles and Orange counties during the 1980's. Some of the lines holding the tire ribbons showed wear. Without continued maintenance, these lines will eventually wear away. Storm wave activity could dislodge the tires and scatter or wash them ashore. The PVC columns and their mooring lines will also require continued maintenance. PVC columns that break free may become hazards to boaters and/or may wash ashore. Mussels will not survive if the PVC columns sink to the bottom where predators and sand scour are present. The various materials abandoned from previous unpermitted MFS experiments currently serve no purpose. These materials are being covered with sand or moved about by ocean currents. This is not an acceptable way to deal with waste materials. The exact amount of this material is not known since some of the materials may have been scattered or buried.

2.2.9 U.S. Army Corps of Engineers (ACOE)

The MFS project requires review and approval by the ACOE. Pursuant to the Federal Coastal Zone Management Act (CZMA), any activity authorized by a permit issued by a federal agency that affects the coastal zone of a state, must be consistent with a federally approved coastal zone management program. Under the CZMA, the ACOE cannot issue a permit until the Coastal Commission concurs with a federal consistency certification or issues a Coastal Development Permit for the project. The ACOE has opened a violation file for the existing MFS development.

2.3 Coastal Act Issues

2.3.1 Filling of Coastal Waters

Coastal Act section 30108.2 defines "fill" as:

"Fill" means earth or any other substance or material, including pilings placed for purposes of erecting structures thereon, placed in a submerged area.

The MFS project includes the placement of various "experimental" materials, including scrap automobile tires, PVC pipe, plastic mesh, plastic jugs, various ropes and anchoring devices, and other miscellaneous materials on existing sand substrate. As such, the MFS project constitutes "fill" within the meaning of Coastal Act section 30108.2.

Coastal Act section 30233(a) provides in applicable part:

- (a) The diking, filling, or dredging of open coastal waters,.. shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

...(8) *Nature study, aquaculture, or similar resource dependent activities.*

Coastal Act section 30100.2 adopts for purposes of the Coastal Act the definition of aquaculture contained in section 17 of the Fish and Game Code. In relevant part, section 17 defines "aquaculture," in the following manner:

"Aquaculture" means that form of agriculture devoted to the propagation, cultivation, maintenance, and harvesting of aquatic plants and animals in marine, brackish, and fresh water. (Emphasis added.)

The MFS project involves the placement of structures in the ocean, some of which have increased the local production of and/or attracted naturally occurring aquatic plants and animals, and might therefore be associated with the propagation of such species. It does not however include cultivation, maintenance or harvesting of these organisms. The MFS project does not therefore qualify as aquaculture under section 17 of the Fish and Game Code and thus under the Coastal Act. Nevertheless, the project can be characterized as a resource-dependent activity similar to aquaculture or nature study. Accordingly, the purpose of the MFS project qualifies as an allowable fill under Coastal Act section 30233(a)(8).

Therefore, the Commission must review the MFS project in accordance with the remaining criteria specified in Coastal Act section 30233(a). The MFS project is allowable only if there are no feasible less environmentally damaging alternatives and if feasible mitigation measures have been provided to minimize adverse environmental effects. As discussed in Sections 2.3.2, 2.3.3, and 2.3.4 below, the Commission finds that the MFS project is not the least environmentally damaging feasible alternative and does not provide feasible mitigation measures to minimize the adverse effects of the project to coastal resources in conflict with Coastal Act section 30233(a).

2.3.2 Marine Water Quality and Marine Resources

Coastal Act section 30230 states:

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in such a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organism adequate for long-term commercial, recreational, scientific, and educational purposes.

Section 30231 states in part:

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible restored through, among other means, minimizing adverse effects of waste water discharges...

2.3.2.1 Sewage Outfall

The MFS development is located within a prohibited harvesting zone for bivalve shellfish for human consumption established under the National Shellfish Sanitation Plan. This zone was established around the outfall of the Orange County Sanitation District Ocean Discharge and the local marinas to provide a buffer zone from the bacterial and environmental contaminants associated with these facilities. The CDHS has stated that it could not issue a Shellfish Growing Certificate for the project site under any conditions.¹⁹

Artificial reefs are designed to attract and/or produce fish and enhance sport fishing opportunities. The siting of an artificial reef in an area of degraded water quality raises concerns regarding the marine life attracted to the area, and human consumption of contaminated fish and shellfish. By attracting and congregating fish in this area, the MFS development increases the risk that recreational anglers may catch and consume fish contaminated with *E. coli* and other pathogens associated with the sewage outfall. The MFS CDP application states that recreational divers may harvest shellfish from the project site.

In its action on the Federal Consistency Certification for the Point Loma Artificial Reef (PLAR), the Commission considered the potential impacts on the reef of sewage discharges from the outfall from the proposed International Wastewater Treatment Plant in San Diego.²⁰ The planned sewage outfall would discharge treated wastewater into the area proposed for the placement of the PLAR. The Commission examined the proposed location of the PLAR to determine if the reef site would be adversely affected by future discharges from the sewage outfall. A site originally selected for the PLAR was found to be located too near the sewage outfall, thus increasing the potential that discharges from the outfall would accumulate near the reef.²¹ Consequently, the USEPA recommended locating the reef farther from the sewage outfall.²² The Commission ultimately approved a new location for the reef away from the sewage outfall.

Conclusion: Sewage Outfall

The location selected for the MFS project is inappropriate given its proximity to the Orange County Sanitation District sewage outfall, local marinas and the corresponding exclusion zone established under the National Shellfish Sanitation Plan which prohibits harvesting shellfish for

¹⁹ See Footnote No. 12, *supra*.

²⁰ Coastal Commission Consistency Certification CC-38-91.

²¹ Engineering Science Tiajauna Oceanographic Engineering Study, 1988, (CC-38-91).

²² Letter from Keith Taka, USEPA, to Colonel Charles S. Thomas, ACOE, June 7, 1991, (CC-38-91).

human consumption. A Shellfish Growing Certificate could not be issued for the project site under any conditions. The project will result in adverse impacts from degraded water quality to marine organisms attracted to, or cultured at the site. Siting the project in this area increases the risk of human exposure to *E. coli* bacteria and other contaminants. The MFS has presented no evidence that the project could not feasibly be located in an area with higher water quality, thereby avoiding these adverse impacts. The MFS has neither provided mitigation measures to reduce the adverse environmental effects of locating the development in this area nor demonstrated that such measures cannot feasibly be provided.

The Commission therefore finds that MFS project has been carried out in a manner that does not: (1) sustain the biological productivity of coastal waters and maintain healthy populations of all species of marine organism adequate for long-term commercial, recreational, scientific, and educational purposes in conflict with Coastal Act section 30230; and (2) maintain the biological productivity of coastal waters to maintain optimum populations of marine organisms and for human health in conflict with Coastal Act section 30231. The Commission also finds that the MFS project is inconsistent with Coastal Act section 30233(a) because as sited the project is not the least environmentally damaging feasible alternative and because the project does not provide feasible mitigation measures to minimize the adverse environmental effects associated with siting the project in an area of poor water quality.

2.3.2.2 Toxic Leachates

Tires contain compounds that are harmful to some organisms and acutely toxic to other organisms. When placed in water, tires release these toxic hydrocarbon by-products into the local environment.²³ In addition to the substances that leach from the tire compound itself, used automobile tires are contaminated with road debris, dirt, oil, and other substances. These contaminant materials pose a risk to marine life and compromise water quality. Studies conducted by the Ontario Ministry of the Environment, the U.S. Bureau of Reclamation, and for the Maryland Department of Natural Resources indicate that tires submersed in water release toxic chemicals, including the following compounds: Quinoline, Naphtalene, I-methylnaphthalene, Dibenzothiophene, and Pyrene.²⁴ These compounds are primarily hydrocarbon by-products that are generally associated with petroleum based products. In the laboratory, leaching declines over time. The conclusion drawn is that the substances leach only from the exposed surface of the tires and is therefore temporary. However, the MFS project tire ribbons are located on a sandy sea floor in shallow water, and are subjected to constant scour from moving sand. In this erosive environment, new tire surface is constantly exposed to marine waters. Thus the rate that toxins leach from the MFS project tire ribbons should not be expected to decrease over time to the extent shown in the laboratory.

²³ Kellough, 1991.

²⁴ Hartwell, 1994.

The extent of toxicity is extremely variable depending on the animal or plant species being tested. For example, in the Maryland study, rainbow trout are killed but flathead minnows and Daphnia appear unaffected,²⁵ whereas the Bureau of Reclamation study showed tire leachates to be acutely toxic to Daphnia.²⁶ Similar analysis regarding bio-accumulation of chemical compounds and the resultant impacts have not been investigated. The impacts associated with the concentration of these noxious substances resulting from the placement of large numbers of tires into the marine environment is unknown but is potentially significant.

The CDP application contains two letters from S. Ian Hartwell of the Toxic Aquatic Contaminants Program, Maryland Department of Natural Resources which state that the identity of chemicals causing toxicity in various tests were not known, chemicals causing toxicity in fish were shown to be persistent for at least 60 days in fresh water, and that the use of scrap tires for artificial reefs was not a formally endorsed policy of the Maryland Department of Natural Resources due to concerns with toxicity. Mr. Hartwell's personal opinion is that the use of scrap tires in the marine environment will not result in acute toxic effects. However, his statement is very clear that the Maryland Department of Resources has not established an official policy regarding the safety of using scrap tires in marine applications. In fact, the Fisheries Division of the Maryland Department of Natural Resources will not consider using scrap tires in Chesapeake Bay until more information on potential secondary effects to fisheries is available. Mr. Hartwell also states that the identification of the toxic chemicals in the leachates is not fully understood. No assessment has been made regarding the persistence, fate, and transport and possible bio-accumulative effects of the toxic leachates on marine species.²⁷

As discussed in Section 2.2.3 of this report, the RWQCB staff does not recommend approval of the existing MFS development due to their concerns regarding the release of toxic compounds from the tires and the bio-accumulation of these substances.

The CDFG's experience with tire reefs constructed in the 1970's indicated that the use of tires for reef material did not produce a high quality reef structure and consequently, such use was abandoned. Tire reef efforts by the CDFG indicate lower levels of development over a longer period of time than could be expected using quarry rock or high-density concrete rubble. It is the position of CDFG biologists that this reduced invertebrate and algae community attachment may be attributed to surface toxicity. Surface toxicity may interfere with the colonization of tire surfaces by sessile attached invertebrates and algae.²⁸ This position is supported by a study of the colonization of artificial reef materials by corals and other sessile organisms in Hawaii, which finds that of the materials tested, recruitment of sessile organisms was lowest for tires.²⁹ The

²⁵ Letter from S. Ian Hartwell, Maryland Department of Natural Resources, to Rodolphe Streichenberger, MFS, March 23, 1995.

²⁶ Nelson, 1993.

²⁷ Letter from S. Ian Hartwell, Maryland Department of Natural Resources, to CCC, December 9, 1996; see Footnote No. 25, *supra*.

²⁸ Letter from John Turner, Chief of the Environmental Services Division, CDFG, to John Douglas, City of Newport Beach Planning Department, March 9, 1995.

²⁹ Fitzhardinge, 1989.

study suggests that toxic components of the tires prevented corals from settling directly on the tires, or that corals had settled directly on the tires but had died.

As discussed in Section 2.2.8 of this report, the CDFG specifies that materials used for the construction of artificial reefs should not contain potentially toxic substances. Substituting the tires used for the MFS project with a material or materials that meet the CDFG criteria concerning toxicity would eliminate the risk to the marine environment posed by the release of toxic compounds from the tires. The Commission has granted numerous approvals for artificial reef projects using materials that do not contain toxic substances.³⁰ The MFS has not demonstrated that using such materials would not be feasible for its project. As constructed, the MFS project is not the least environmentally damaging feasible alternative.

As discussed above, the significance of the effects of toxic leachates from the MFS tire ribbons and tire columns is not fully understood, because several important subjects have not been investigated (e.g., persistence, fate, and transport and possible bio-accumulative effects of the toxic leachates on marine species, the effect of surface toxicity on the colonization of the tires by sessile attached organisms, and the influence of sand scour on leaching). The risk of harm to the marine environment associated with the use of tires in the MFS project could be reduced if the project included a scientifically valid monitoring program to study these effects and provided for removal of the tires if an adverse impact were detected. The MFS project does not include a monitoring program. In fact, the MFS has failed to comply with the monitoring and reporting requirements imposed by the City of Newport Beach through the aforementioned Harbor Permit/Negative Declaration, stating in its CDP application:

"This monitoring and evaluation of biological productivity is not considered of first interest. It is known that structures always do benefit life in the sea. [Monitoring to know how specific structures or reefs are biologically active is too often a pretext to keep scientists busy. Otherwise they would be short of projects on which to spend public money]."

Conclusion: Toxic Leachates

The use of automobile tires for the MFS project poses an unacceptably high risk of harming marine organisms and of reducing the biological productivity of coastal waters due to the release of toxic substances into the marine environment. The persistence, fate, transport and possible bio-accumulative effects of these toxic leachates on marine species has not been adequately studied. The use of tires for the MFS project does not represent the least environmentally damaging feasible alternative, and the MFS project does not include feasible mitigation measures to minimize the adverse impacts caused by the release of toxic substances to the marine environment. The Commission therefore finds that MFS project has been carried out in a manner that does not: (1) sustain the biological productivity of coastal waters and maintain healthy populations of all species of marine organism adequate for long-term commercial, recreational, scientific, and educational purposes in conflict with Coastal Act section 30230; and (2) maintain

³⁰ See Appendix A.

the biological productivity of coastal waters to maintain optimum populations of marine organisms and for human health in conflict with Coastal Act section 30231. Additionally, the Commission finds that the MFS has not demonstrated that there is no feasible less environmentally damaging alternative and that feasible mitigation measures have been provided to minimize adverse environmental effects in conflict with Coastal Act section 30233(a).

2.3.2.3 *Marine Debris*

The MFS project is intended to demonstrate: (1) how used tires and other readily available, man-made materials can be formed into productive artificial marine habitats; and (2) how successfully using tires as an artificial reef substrate can help alleviate solid waste disposal problems. In addition to used automobile tires, the MFS project uses PVC pipe, plastic mesh, netting, plastic jugs, Styrofoam, concrete blocks, various ropes and anchoring devices, and other miscellaneous materials. The MFS administration has placed no guidelines on the type of materials utilized in the project and have ardently encouraged volunteer participants to experiment with a full range of materials. The MFS does not know exactly what materials have been placed on the project site. These proposed materials were selected because they were available to the MFS at little or no cost. According to the applicant, scrap tires could provide the MFS with a \$0.25 to \$2.00 ea. disposal fee, whereas the acquisition and transportation materials such as quarry rock would increase project cost.

The CDFG has experimented with a variety of materials, including scrap automobile tires, to determine their suitability for artificial reef construction. The experimental tire reefs broke apart and were either moved about or washed onto the shore during storm events in 1977 and 1983 which resulted in major beach cleanup efforts. Based on these experiences and the potential that toxic substances may leach into the marine environment from tires, the CDFG determined that tires are unsuitable for the construction of artificial reefs. As discussed in Section 2.2.8 of this report above, the CDFG has developed criteria for evaluating the suitability materials used to construct artificial reefs. These criteria consider a material's density relative to seawater, persistence in the marine environment, and potential toxicity. Toxicity is discussed in Section 2.3.2.2 above. Below is an evaluation of the persistence and density of the materials used for the MFS project.

Persistence

Some of the materials used in the MFS project, including tires, may meet this criteria. However, other materials used (e.g., PVC pipe which is too brittle and nylon rope which abrades and deteriorates) are not persistent in the marine environment.

Johnson's Oyster Farm, an aquaculture operation in Tomales Bay, Marin County, utilizes sections of PVC pipe as a substrate for the culture of oysters. Although Johnson's aquaculture facility is located within the semi-sheltered environment of Tomales Bay, tidal currents have broken up and carried many sections of the PVC pipe out to sea. Eventually, some of the PVC

pipe washed up on beaches along the Point Reyes National Seashore and beyond. According to a personal conversation with John Del Osso, Ranger, at the Point Reyes National Seashore, PVC pipe is easily moved about by ocean forces. Once in the surf zone, the PVC can be broken up by the forces of the crashing waves. PVC pipe has been the source of on-going clean-up within the Point Reyes National Seashore.

Density

To assure that artificial reefs remain intact and in place during periods of heavy seas, the CDFG specifies that materials used for reef construction are at least twice the density of sea water. With the exception of the concrete block used to construct the "cement block habitat," none of the materials used in the MFS project are dense enough to remain in position during strong winter storms.

The instability of reefs constructed from scrap tires is well documented. In its August 14, 1996, Draft Guidelines for Marine Artificial Reef Materials, the U. S. Minerals Management Service (MMS) finds that tires are basically unstable in salt water and that attempts to address this problem in artificial reef projects by bundling tires together have failed because the materials used to bale the tires together eventually corrode, resulting in loose, unballasted tires on the sea bottom.³¹ The MMS report includes accounts of tires from failed reefs washing up onto beaches in Florida and North Carolina, stating:

"hundreds of tires were bundled together using nylon strapping and sunk off Ft. Lauderdale, Florida several years ago. Those tire bundles separated, scattering tires over a large area. Local residents consider the tires an eyesore and want them removed. Foster and Fowler (1992) reported that North Carolina has experienced large numbers of tires washing up onto beaches in the southern part of the state after deployment of tens of thousands of tires, unballasted, and strung together by cables. North Carolina no longer permits the use of tires as artificial reefs."

The Associated Press reported that in late January and early February 1996, seven shrimp trawlers were employed by the State of North Carolina to collect old tires released when cables holding an artificial reef together failed.³² The article states that in 1993-94, the State of North Carolina spent \$118,000 to collect and dispose of tires from the failed reef, and that the latest effort cost \$200,000. A fisherman quoted for the story states that "tires are a lot harder on the gear than catching shrimp," and another said that the tires "cost us all enough in shrimp nets over the years."

The New Jersey Marine Fisheries Administration undertook a study to determine the stability of various tire reef designs, stating:³³

³¹ Minerals Management Service, 1996.

³² Assoc. Press, February 2, 1996.

³³ Myatt, 1989.

"...anecdotal reports of tires washing ashore in other states provide ample justification for approaching a tire reef project with caution."

The study concludes that in order to remain stable in water at least 60 feet deep, tire reefs must be ballasted with concrete to substantially increase the density of the reef units. The recommended design criteria include: minimum submerged density of 275 kg/m³; minimum ballast-to-rubber ratio of 10 kg of concrete /kg of rubber; and minimum ballast-to-tire ratio of 11 kg of concrete per tire. The study advises additional testing if reefs are proposed to be constructed in water shallower than 60 feet. These recommendations echo the conclusions drawn from a study of artificial reef designs undertaken in Chesapeake Bay and nearby coastal waters which concludes that:

"(1) Unballasted tires should not be used for reef structure because they move offsite during storm activity...Tires have only 15% of their in-air weight when submerged in sea water...and require substantial quantities of concrete to keep them in place."

The tire ribbons and columns included in the MFS project are unballasted and, do not therefore meet any of these recommended criteria, designed to assure stability of tire reefs in water 60 feet deep. Moreover, the MFS project is sited in water 30 to 40 feet deep, and is therefore subjected to significantly stronger storm and wave forces than these criteria address.

Another study of artificial reef designs from Southeast Asia states that:

"Debris, tires, and scrap materials have ended up along beaches due to inadequate fastening and anchoring methods. They have often damaged fishing nets and result in litter along beach resorts."³⁴

California too has experience with the adverse consequences of unstable tire reefs. The Huntington Beach Tire Reef (HBTR) project was funded by the Los Angeles Rod and Reel Foundation, a non-profit organization, at no initial cost to the State. However, during the 1977 storms, large numbers of tires from the reef washed onto shore, resulting in a major clean-up effort.³⁵ According to a personal communication with Dennis Bedford of the California Department of Fish and Game's (CDFG) Artificial Reefs Program, the Los Angeles Rod and Reel Foundation failed to assume responsibility for the clean-up, and, instead, CDFG removed the tires at public expense. Similarly, the MFS is an organization whose continued operation and financial accountability is not guaranteed. Project site and beach clean-up consideration must be approached with caution to avoid making beach clean-up and/or project site remediation a financial burden to the public.

The MFS states that the materials are permanently anchored to the sea floor, and that material density is therefore not an issue. The MFS anchoring system consists of small plastic anchors and 1/4-inch nylon rope to secure project components to the ocean floor. The MFS expects the nylon, mooring line to last approximately 20 years in the marine environment and that the

³⁴ White, 1990.

³⁵ Lewis, 1989.

anchoring system is sufficient to assure that the project components remain in place during severe winter storms, stating:

*"No storm ever in nine years pulled any MFS structure out of the sea bottom. If in the past such a thing occurred it was because of unpermitted boat anchoring or vandalism."*³⁶

The CDP application states that "the lifetime of the anchoring system is expected to be a minimum of 20 years." The staff has requested the documentation necessary to analyze the long-term compatibility of the anchoring system in the marine environment. In response to this request the CDP application states:

"...the mooring capacities of the project anchoring systems were calculated in 1987... however, these calculations are not available for review."

The long-term capacity of the anchoring system cannot be verified. It is reasonable to expect that the nylon rope used for project moorings will chafe and wear in the turbulent nearshore environment and eventually fail.

If the MFS project included regular maintenance and replacement of the anchoring system components, it is possible that the materials would remain in place. However, the MFS states that it does not intend to maintain the project site, and the project description includes several failed, past experiments which have been abandoned in-place. When an experiment fails to meet the applicant's objective, it is abandoned in-place in accordance with the MFS's "lay-it-flat" technique. The MFS's "lay-it-flat" technique consists of deflating or not maintaining the air that keeps the project components buoyant and allowing them to fall to the ocean floor and be covered and/or moved about by the migrating sandy substrate. For example, in 1988, the MFS installed 2000 "kelp bio-structures," each consisting of 12-foot-long, 1/4-inch-diameter anchoring lines, protruding above sand level, topped by a one-gallon plastic jug wrapped in plastic mesh. When the kelp experiment failed, the plastic jugs, ropes, and mesh netting were abandoned in-place. During site inspection in September 1993 and October 1995, only a few of the original 2000 deflated plastic jugs were observed, and they were providing little or no habitat value. Without maintenance, it is likely that the low-density materials used for the MFS project will eventually become marine debris.

At sea, discarded plastics create problems for both marine life and human activities. The small vessel operator experiences fouled props and jammed cooling intakes from drifting plastics. Beaches become cluttered with discarded materials. Sea life dies from eating plastics or from entanglement. PVC piping is shattered and moved about by violent ocean waters. Discarded netting and rope assemblies can trap fish and marine mammals long after they are abandoned. Consequently, some of the MFS project materials (e.g., plastic bottles, nets, tires, PVC pipe,

³⁶ This statement is contained in a supplement to the MFS project description dated July 31, 1995. At that time, the oldest project components had been in place for approximately seven years, according to the project description, and the tire ribbons had been in place for two years. In accordance with the installation dates provided by the MFS, none of the project components had been in place for nine years at the time that the MFS made this claim regarding the longevity of the mooring system.

various rope assemblies etc.) continue to create potential hazards for marine life and are not compatible for long-term use in the marine environment. Abandoning project components in-place constitutes ocean dumping.

The use of these materials in the marine environment creates a significant risk of harm to marine resources and to the quality and biological productivity of coastal waters. Feasible, less environmentally damaging alternative materials such as high-density concrete rubble and quarry rock are available. By using materials that meet the CDFG's recommended guidelines for artificial reef construction, the MFS project would be less environmentally damaging.

Feasible mitigation measures which could minimize the potential that project materials may become marine debris and the associated adverse effects to coastal resources include: (1) a mechanism for long-term financial security for proper cleanup and/or removal of project materials; and (2) a long-term monitoring and maintenance program for the physical condition of the anchoring system and the structural integrity of the various project components. The MFS has not complied with the conditions of the City Harbor Permit which require both a financial security bond or letter of credit and a monitoring and reporting program for the structural condition of the project. The MFS project does not provide mitigation measures to minimize the adverse effects from the use of low density and fragile materials in the construction of artificial reef components.

Conclusion: Marine Debris

The materials used for the MFS project are not dense enough to remain in place during heavy seas, and many of the materials used are not persistent in the marine environment. Calculations and quantifiable documentation to support the mooring capacity and the life expectancy of the anchoring system have not been provided. The applicant proposes to abandon project components in-place, and does not intend to provide long-term maintenance of the project site. The Commission therefore finds that the MFS project is not consistent with Coastal Act sections 30230 and 30231 because the materials used for the project pose a significant risk of harm to marine resources and to the quality and biological productivity of coastal waters.

Section 30233(a) of the Coastal Act requires that filling of open coastal waters shall be permitted where there is no feasible, less environmentally damaging alternatives and where feasible mitigation measures have been provided to minimize adverse environmental effects. As discussed above, there are feasible less environmentally damaging alternatives to the materials used for the MFS project, and the project does not include feasible mitigation measures to minimize its adverse environmental effects. The Commission therefore finds that the MFS project is not consistent with Coastal Act section 30233(a).

2.3.3 Sediment Transport and Beach Erosion

Coastal Act section 30253 states in part:

New development shall...neither create nor contribute significantly to erosion...

The project site is located at the edge of the littoral zone, at depths of -30 to -40 feet MLLW. Within the littoral zone, sediments are moved by waves and currents, with parallel (long shore transport) and perpendicular (on-offshore transport) to the shore. Structures placed within the littoral zone affect the movement and deposition of sediment. When sand is trapped by structures placed within the littoral zone and not allowed to complete its transport, shoreline sand deposition and beach erosion both up-coast and down-coast can be altered.

By letter to MFS President Rodolphe Streichenberger dated May 5, 1995, Coastal Engineer David Skelly states that: "At a depth of 40 feet the tires [of the existing MFS development] are essentially outside the littoral zone." Skelly's letter concludes: "There is absolutely no basis for expecting the MFS tire experiment to have any impact on the sand deposition at the shoreline." (See Exhibit 5.)

The Coast of California Storm and Tide Wave Study, South Coast Region, Orange County "Existing State of Orange County Coast" (Final Report April 1993, Report 93-1), has shown that the Balboa Peninsula beaches have been artificially widened by nourishment and much of the littoral cell has been modified by shoreline structures, nourishment and other human activities. At present, the beaches at the Balboa Peninsula are eroding several feet a year, but this has not been considered a serious problem due to the tremendous width of the nourished areas.

Field studies reported in the above cited wave study indicate that sand is moving along the Balboa Peninsula to the south and south-west as a broad migrating lobe into water depths of -44 to -50 feet. Further north, at Huntington Beach, surveys of the mooring site used by the American Trader, in -45 feet of water, show about 5 feet of shoaling in recent years. Transport through and shoaling in water depths greater than -30 to -40 feet indicate active transport of material at the project site.

At its present location, the MFS development can alter on-shore/off-shore sediment transport. Site inspections conducted in September of 1994 and October of 1995 revealed that many of the tires are either partially buried or completely buried in sediment. The burial status of the tires affirms that they are located within the littoral zone. While the effects to sediment transport would be expected to be greater if the structures were located at the -10-foot to -15-foot depth, the MFS development has likely caused some modification to sediment transport.

The City of Newport Beach granted a permit for a proposed MFS tire reef located in water -60 to -110 deep (as discussed in Section 2.2.1 of this report). Evidently, the MFS believes that it is feasible to construct a tire reef at such depths. Siting the project in deeper water, outside of the littoral zone is a less environmentally damaging feasible alternative to the MFS project.

Conclusion: Sediment Transport and Beach Erosion

The Commission finds that the MFS project may create or contribute to beach erosion in conflict with Coastal Act section 30253(2), and that the MFS has not demonstrated that there is no

feasible less environmentally damaging alternative to locating the project in the littoral zone in conflict with Coastal Act section 30233(a).

2.3.4 Recreation--Public Access

Coastal Act section 30210 states:

In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

Coastal Act section 30211 states:

Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

The MFS project has the potential to adversely impact recreational opportunities. Consistent with experience using such materials in the marine environment, it is likely that materials used for the MFS project, including scrap tires and PVC pipe will eventually wash up onto nearby beaches. As discussed in Section 2.3.2.3 above, PVC pipe from the Johnson's Oyster Farm is a source of on-going beach debris within the Point Reyes National Seashore. Section 2.3.2.3 also discusses in detail several instances where the failure of tire reefs has resulted in tires washing up on beaches, requiring publicly funded clean-up. The California Department of Parks and Recreation states that tires buried in nearshore sand are hazardous to beach users.³⁷ Many of the MFS project materials are not commonly used in artificial reefs and are not therefore addressed in the literature concerning reef design and stability. However, other low density materials used for the MFS project (e.g., PVC pipe and other plastic materials) cannot be expected to remain permanently in place, and do not therefore meet the CDFG artificial reef material specifications.

The Commission has granted a number of permits for artificial reef projects constructed with materials sufficiently dense and persistent to assure long-term stability, and that are located further offshore in deeper water than the MFS project.³⁸ All of these alternatives would reduce or avoid the adverse effects to public access and recreation resulting from the MFS project. The MFS has not demonstrated that there are no less environmentally damaging feasible alternatives that would lessen or avoid the impacts of the project to public access and recreation.

Feasible mitigation measures that could minimize the impacts of the project to public access and recreation include: (1) a mechanism for long-term financial security for proper cleanup and/or

³⁷ Letter from Jack Roggenbuck, California Department of Parks and Recreation (CDPR) to Nadell Gayou, The Resources Agency, March 3, 1995 and letter from David Pryor CDPR Resource Ecologist, to Gayou, March 3, 1995.

³⁸ See Appendix A

removal of project materials; and (2) a long-term monitoring and maintenance program for the physical condition of the anchoring system and the structural integrity of the various project components. The MFS has failed to comply with the conditions of the City Harbor Permit which require both a financial security bond or letter of credit and a monitoring and reporting program for the structural condition of the project. The MFS project does not provide mitigation measures to minimize the adverse effects from the use of low density and fragile materials in the construction of artificial reef components.

Conclusion: Recreation--Public Access

The use of fragile and low density materials for the MFS project, the limited life expectancy of the anchoring system, the lack of monitoring and maintenance of the project, and the planned in-place abandonment of project components, all increase the potential that materials from the project will litter nearby beaches, resulting in aesthetic degradation and user hazards. The MFS has not demonstrated that there are no feasible alternatives that would avoid these impacts and has not provided feasible mitigation measures to minimize these adverse effects. The Commission therefore finds that the MFS project is not consistent with Coastal Act sections 30210, 30211, and 30233(a) .

2.4 Violation

The MFS began constructing this project in 1988, without an approved coastal development permit. The MFS project thus appears to be in violation of the Coastal Act. As demonstrated in the preceding sections, the Commission finds that the MFS project is inconsistent with Coastal Act sections 30210, 30211, 30230, 30231, 30233, and 30253. The project has already been constructed and is causing ongoing adverse impacts to coastal resources.

2.5 California Environmental Quality Act

Section 21080.5 (d)(2)(i) of the California Environmental Quality Act (CEQA) states:

The rules and regulations adopted by the administering agency shall require that an activity will not be approved or adopted as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse impact which the activity may have on the environment.

The MFS project, as discussed herein, would have significant adverse environmental impacts to coastal resources. Project alternatives and mitigation measures are available which would substantially lessen these adverse environmental impacts, as discussed in Section 2.3 of this report. The Commission therefore finds that the MFS project is not consistent with section 21080.5 (d)(2)(i) of the CEQA.

Appendix A Substantive File Documents

Coastal Development Permit Application File No. E-95-05

Donald Y. Aska, ed., State University System of Florida and Florida Sea Grant College, "Artificial Reefs in Florida" (Proceedings of a conference held June 10 and 11, 1977 at the University of South Florida, St. Petersburg; Report No. 24), May 1978.

Feigenbaum, D., M. Bushing, J. Woodward and A. Friedlander. 1989. Artificial Reefs in Chesapeake Bay and Nearby Coastal Waters. *Bull. Mar. Sci.* 44(2): 734-742.

Fitzhardinge, R.C. and J.H. Bailey-Brock. 1989. Colonization of Artificial Reef Materials by Corals and Other Sessile Organisms. *Bull. Mar. Sci.* 44(2): 567-579.

Hartwell, S.I. Et al. 1994. Toxicity of Scrap Tire Leachates in Estuarine Salinities. Special Report for the Maryland Department of Natural Resources.

Integrated Waste Management Board, "California Tire Grant Program, 1992-93 Information and Application Instructions," January 1993.

Kellough, R.M. 1991. The Effects of Scrap Automobile Tires In Water. Ontario Ministry of the Environment. December, 1991.

Lewis, R.D. and K.K. McKee. 1989. A Guide To Artificial Reefs of Southern California. California Department of Fish and Game.

MFS, "Mussel Reefs, Ecosystems of the Future" brochure [no date given].

Myatt, D.O., E.N. Myatt and W.K. Figley. 1989. New Jersey Tire Reef Stability Study. *Bull. Mar. Sci.* 44(2): 807-817.

Nelson, Mueller, and Hemphill, 1993. Identification of Tire Leachate Toxicants and a Risk Assessment of Water Quality Effects Using Tire Reefs in Canals. U.S. Bureau of Reclamation.

White, A.T., L.M. Chou, M.W.R.N. De Silva and F.Y. Guarin. 1990. Artificial Reefs for Marine Habitat Enhancement in Southeast Asia. ICLARM Education Series 11, 45 p. International Center for Living Aquatic Resources Management, Philippines.

Notice of Preparation of a Draft Environmental Impact Report, CDFG (Robson Collins, contact), January 31, 1994.

U.S. Environmental Protection Agency and Pacific Environmental Services, Noyes Data Corporation (Park Ridge, NJ), *Scrap Tire Technology and Markets* [no date provided].

U. S. Minerals Management Service. 1996. Draft Guidelines for Marine Artificial Reef Materials. August 1996.

"Fishermen Find Sideline Picking Up Old Tires," *The Associated Press*, February 2, 1996.

"State Ok's OC sea farms to grow kelp and mussels," *The Orange County Register*, February 5, 1993.

"State grant will allow Newport Beach group to build up mussels while sinking used tires," *The Orange County Register*, June 2, 1993.

"Grant Will Build Mussel in Used Tires," *Los Angeles Times*, June 26, 1993.

"Plan for man-made kelp forest sunk for now despite its champion's zeal," *The Orange County Register*, May 9, 1994.

"Plan to make kelp bed with tires is way off schedule," *The Orange County Register*, May 9, 1994.

The Marine Forester, Exploring the Oasis of Life in the Sea, Vol. 1, No. 1, March 1993 and Vol. 1, No. 2, August 1993.

State/Local Government Actions

Fish and Game Commission, agenda for meeting of August 5, 1993.

California Coastal Commission. 1996. Adopted Findings on CDP E-96-07 (Big Sycamore Canyon Ecological Reserve Artificial Reefs), including substantive file documents.

_____. 1995. Adopted Findings on Consistency Certification No. CC-81-95 (Bolsa Chica Artificial Reef), including substantive file documents.

_____. 1992. Adopted Findings on Consistency Certification No. CC-9-92 (Bolsa Chica Artificial Reef), including substantive file documents.

_____. 1991. Adopted Findings on Consistency Certification No. CC-67-91 (Pt. Loma Artificial Reef), including substantive file documents.

_____. 1989. Adopted Findings on CDP E-89-7 (Palos Verdes Artificial Reef), including substantive file documents.

_____. 1987. Adopted Findings on CDP E-87-3 (Santa Monica Bay Artificial Reef), including substantive file documents.

_____. 1987. Adopted Findings on CDP E-87-5 (Topanga Artificial Reef), including substantive file documents.

_____. 1986. Adopted Findings on Consistency Certification No. CC-6-86 (Bolsa Chica Artificial Reef), including substantive file documents.

_____. 1986. Adopted Findings on CDP E-86-3 (Pacific Beach Artificial Reef), including substantive file documents.

_____. 1986. Adopted Findings on CDP E-86-4 (Mission Bay Park Artificial Reef), including substantive file documents.

_____. 1986. Adopted Findings on CDP E-86-5 (Oceanside Artificial Reef No. 2),
including substantive file documents.

_____. 1986. Adopted Findings on CDP E-86-6 (Oceanside Artificial Reef No. 1),
including substantive file documents.

Appendix B

CF&GC Lease History

Date	Action
April 1987	<p>The California Fish & Game Commission (CF&GC) conditionally approved an aquaculture lease (No. M-738-01) on approximately 10 acres of sub-tidal lands. The purpose of the aquaculture lease was specifically to experiment with "bio-structures" (9-foot lengths of rope anchored in the sea floor with plastic anchors) and support buoys as artificial substrates for the attachment of kelp and shellfish (scallops and mussels).</p> <p>The lease was issued subject to several terms, conditions, and covenants. Condition G of the lease specifically required the lessee to comply with the rules and regulations of, and obtain permits from the Coastal Commission (<i>Lease No. M-738-01, Section G</i>). The MFS did not notify the Coastal Commission of the proposed development and did not obtain a CDP or regulatory approval from other agencies. According to a personal communication with Rodolphe Streichenberger, President of the MFS, the MFS did not to pursue regulatory approval from the Coastal Commission because "it was a relatively small project and the permitting process would be bureaucratic and cumbersome (pers. comm. with Rodolphe Streichenberger, MFS, October 23, 1995).</p>
April 1988	<p>The original conditionally approved lease was superseded by another lease (No. M-738-02) which authorized movement of the site to a different 10-acre parcel located 1,100 yards further northeast, with abandonment of the original lease site once the move was approved and completed. No new modes of operation or culture methods were authorized. As in the original lease, the lessee was to observe and comply with all rules and regulations promulgated by any governmental agency having authority by law, including the Coastal Commission, and obtain any other permits or licenses required by such agencies. (<i>Lease No. M-738-01, Section G</i>).</p>
October 1988	<p>The CF&GC amended the lease to allow placement of 50 mussel bio-structures (as defined in the original lease, 9-foot lengths of rope anchored in the sea floor with plastic anchors and support buoys), and again in February 1993 to allot ten additional acres of State water bottoms for aquaculture purposes. The additional allocation was consolidated under the existing lease to comprise a single lease of two parcels. The boundaries of the aquaculture lease sites were subsequently amended several times to experiment with different near-shore environments.</p>
August 1993	<p>The CF&GC amended the conditionally approved lease to authorize use of "tire mussel ribbon" (TMR) structures in cultivating mussels. The use of tires was contingent upon (1) the MFS securing a bond for the clean-up requirement, and (2) the preparation of an environmental document for the proposed TMR project that the CF&GC could certify. This was the first time the CF&GC considered the use of tires as an artificial reef substrate; however, the MFS had already placed 1,500 tires on the lease site in 1993 without CF&GC or Coastal Commission approval.</p>
October 1994	<p>The CF&GC declared Lease No. M-738-02 abandoned by mutual agreement between Rodolphe Streichenberger and the CDFG, as aquaculture operations at the lease site did not materialized.</p>

Appendix C

MATERIAL SPECIFICATIONS AND NOTIFICATION PROCEDURE SURPLUS MATERIALS FOR AUGMENTATION TO ARTIFICIAL REEFS

The California Department of Fish and Game (CDFG) is designated as the "lead agency" in the construction of artificial reefs off the coast of California. Department biologists have been involved in the planning and construction of over 30 artificial reefs off our coastline. Some of these reefs, in Orange and San Diego Counties are permitted for future expansion, through the use of surplus materials of opportunity. Cities, Counties, public agencies and private organizations or businesses are invited to submit proposals to CDFG for the disposal of certain categories of surplus material, for use in the construction of artificial reefs. ONLY THOSE PROPOSALS WHICH WILL INCUR NO COST TO THE STATE FOR TRANSPORTATION OF MATERIALS TO THE REEF SITE WILL BE

CONSIDERED.

Acceptable Materials

Materials suitable for construction of artificial reefs must meet the following general criteria:

- (1) The material must be persistent. It must be hard, but may not be so brittle that collisions with other similar materials, or boat anchors would tend to shatter it. It must remain essentially unchanged after years of submersion in salt water.
- (2) The material must have a specific gravity at least twice that of seawater. The material must be dense enough to remain in position during strong winter storms, even in water depths as shallow as 30 feet.
- (3) The material must not contain potentially toxic substances.

Acceptable materials include, but may not be limited to QUARRIED ROCK and HIGH DENSITY CONCRETE. Other materials may be considered on a case to case basis.

Preparation of Surplus Concrete Materials

SIZE: Concrete slabs must be broken into chunks; 2 ft. minimum diameter; 4-6 ft. optimum size.

Concrete pilings must be broken into lengths, ranging from 2-10 ft.

REBAR: Reinforced concrete is allowable, but no rebar may protrude more than 3 inches.

PROCEDURE

Placement of material at any reef site requires prior written approval from the California Department of Fish and Game, Specific off-loading sites and actual configuration of material placement will be determined by CDFG, in writing and will be strictly adhered to.

Responsibilities of Principal Party to Agreement
(City, Port District, etc.)

NOTIFICATION: The principal party to the agreement must notify CDGF one full month prior to moving any material to the specified reef site.

REEF AUGMENTATION REPORT:

As part of the record keeping on all reef construction off the California coast, the principal party to this agreement must submit a Report of Augmentation to CDFG no later than 10 working days after completion of off-loading of materials. This report will include:

- (1) Verification of inspection by the principal party that each barge load of materials is in compliance with the above specifications.
- (2) Estimated quantity of material actually placed on the site.
- (3) A sketch of the completed augmentation, accompanied by LORAN coordinates for each load of material placed.

Responsibilities of Barge Contractor

NOTIFICATION: The barge contractor must notify the U.S. Coast Guard two weeks prior to moving any material to the reef site. The Coast Guard must be given a minimum of two week lead time to include this job in their Aids to Navigation and Notice to Mariners. Los Angeles area: (310) 499-5410; San Diego area: (619) 557-5877.

This notification must include:

- (1) Location of work site.
- (2) Size and type of equipment that will be performing the work,
- (3) Name and radio call sign for working vessels, if applicable.
- (4) Telephone numbers for on site contact with project engineers.
- (5) Schedule for completing the project.

PLACEMENT OF MATERIALS:

The contractor must arrange for inspection of loaded barge materials, immediately prior to movement of any barge to the reef site.

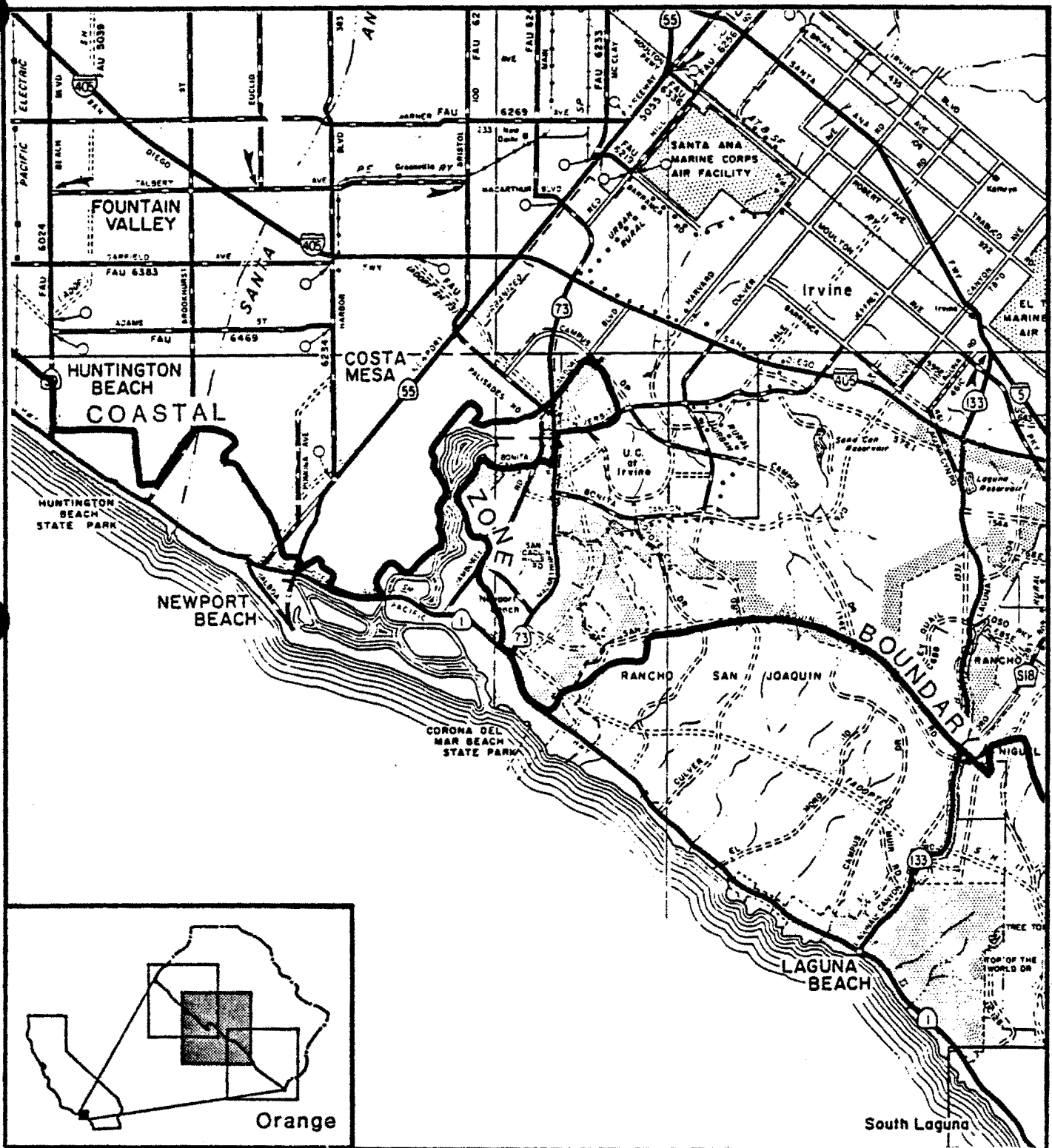
The barge contractor shall place temporary buoys at the off loading site. These buoys must remain in place for one month after completion of off loading operations.

The barge loads of material must not be allowed to drift off site during material augmentation.

Prepared by:

Dennis W. Bedford
Marine Resources Division - Long Beach

November 15, 1991



California Coastal Commission

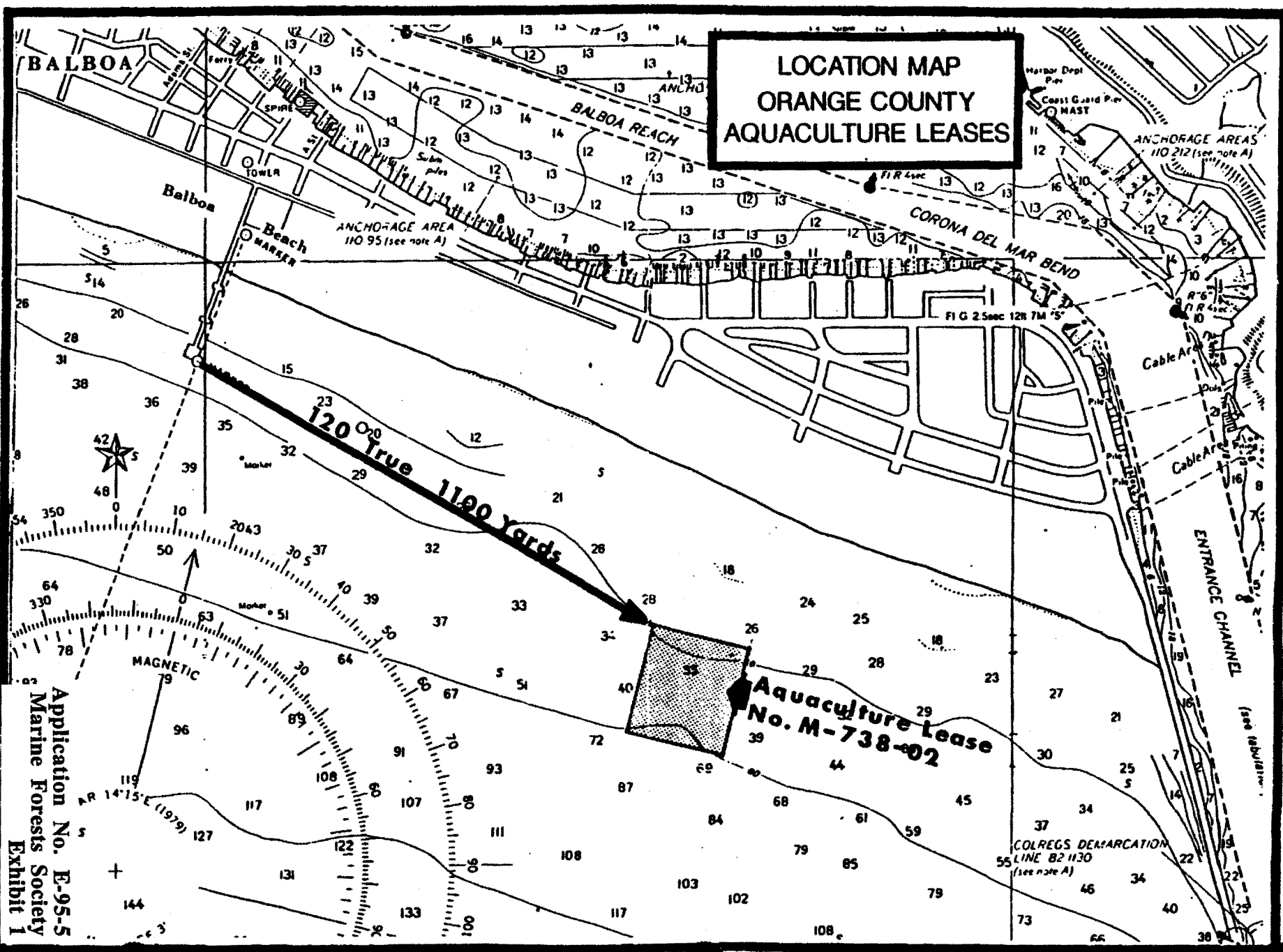
LOCATION MAP

1 0 1 2
miles



County of Orange

Application No. E-95-5
Marine Forests Society
Exhibit 1

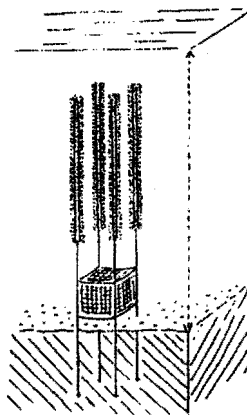


LOCATION MAP
ORANGE COUNTY
AQUACULTURE LEASES

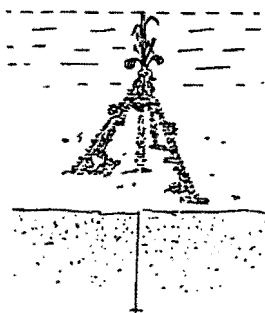
Application No. E-95-5
Marine Forests Society
Exhibit 1

Aquaculture Lease
No. M-738-02

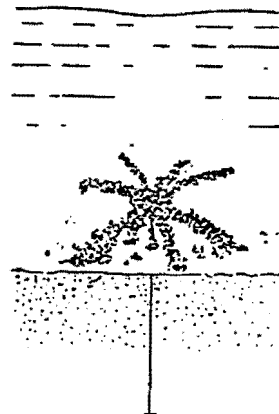
COLLEGS DEMARCATION
LINE 82 1130
(see note A)



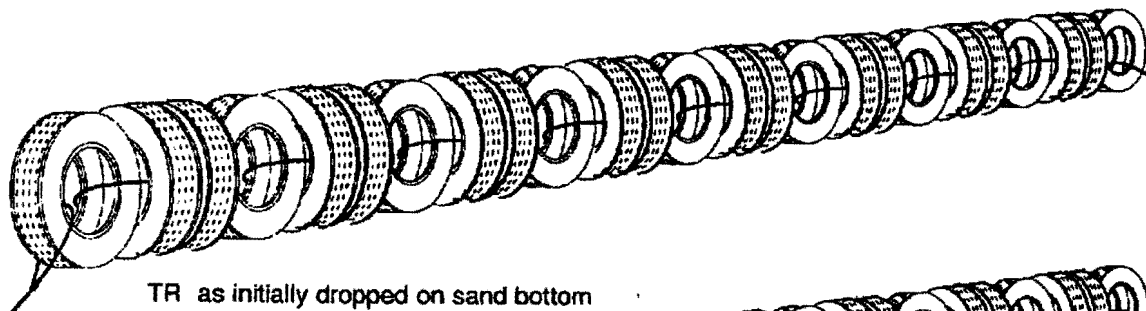
Net and Tube Habitat



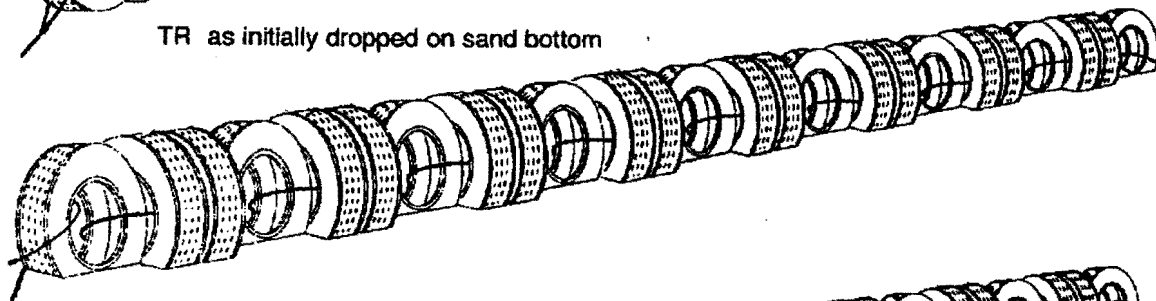
Pyramid Habitat



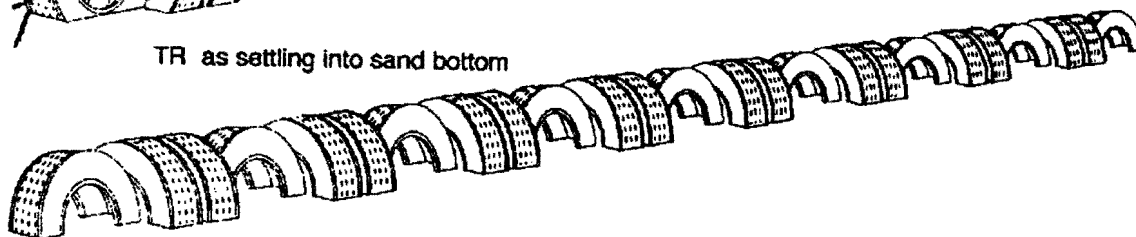
Bundle Habitat



TR as initially dropped on sand bottom

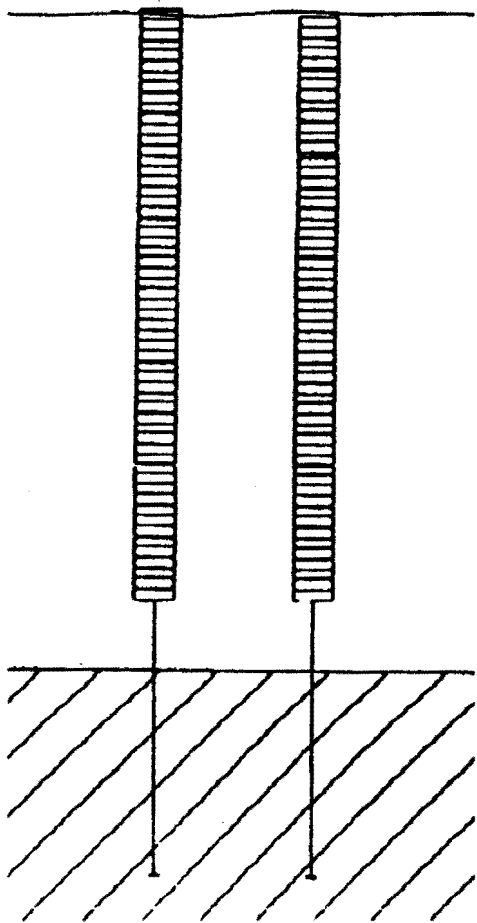


TR as settling into sand bottom

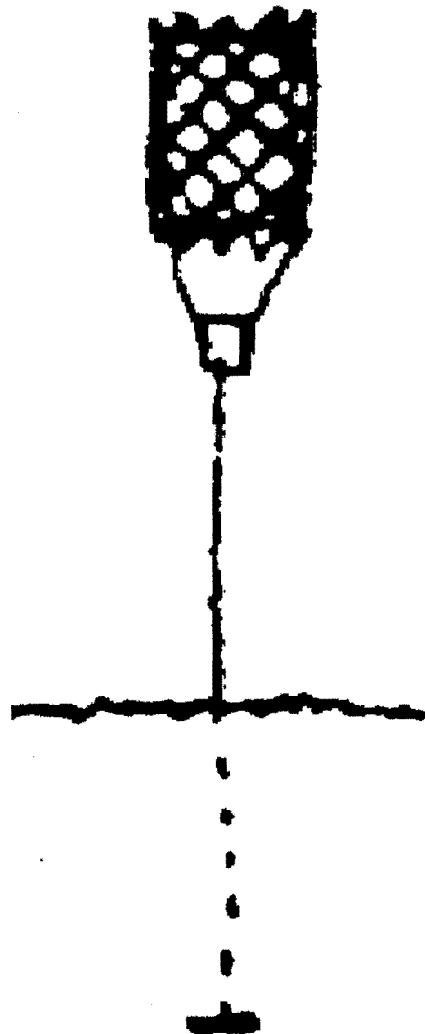


TR as stabilized in sand bottom

Tire Mussel Ribbons



Tire Columns



Kelp Bio-structure

WHEELER J. NORTH

March 18 1995

Rodolphe Streichenberger, President
Marine Forests Society
P.O. Box 5843
Balboa Island
California 92662

Dear Rodolphe,

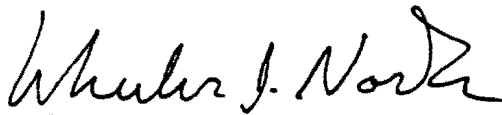
This responds to your request for a letter of endorsement for the experimental tire reef project being proposed by Marine Forests to the City of Newport Beach. It is my understanding that the proposed reef will consist of 30,000 tires deployed over ten acres of sandy bottom, to provide an overall coverage of about 20 percent. The tires will be assembled by the methods already proven successful by means of your small tire reef experiment.

The small tire reef experiment has demonstrated several important facts:

1. The system design is stable and has survived winter storms here.
2. The tires resemble natural hard bottom sufficiently well so that they become encrusted by various sessile animals including mussels.
3. The artificial reef structure attracted motile animals such as fishes that commonly associate with rocky bottom and kelp beds.
4. Your project shows that your group has the capability of designing, constructing, installing and monitoring tire reefs.

It seems to me that Marine Forests on a small scale has developed a system with good potential for turning a liability (scrap tires) into an asset (enhancing marine life). The logical next step is to repeat the effort on a significantly larger scale to determine whether unanticipated differences might occur as the size of the activity is expanded. To me, the project appears to have value and I hope that you will be successful in obtaining regulatory approval to conduct the follow-on study.

Sincerely,



Wheeler J. North
Prof. of Environmental Science Emeritus

CALIFORNIA INSTITUTE OF TECHNOLOGY

September 22 1989

KERCKHOFF MARINE LABORATORY
101 DAHLIA STREET
CORONA DEL MAR, CALIFORNIA 92625

TELEPHONE (714) 673-8884

TO WHOM IT MAY CONCERN

This letter describes and endorses the accomplishments and activities of Rodolphe Streichenberger. Mr. Streichenberger and I have been exchanging scientific ideas and information since 1984 and he spent a year at my laboratory in 1986. Our collaborative studies during this period resulted in an invention that permitted easy and inexpensive implantation of solid objects such as kelp and shellfish substrates on a sedimentary bottom. The new technique opened up a significant potential for commercial cultivation of living marine resources in coastal sedimentary areas which are usually desertlike in that attached plants and animals are scarce or absent. Mr. Streichenberger's concept of thus enriching marine habitats is called Sea Biostructuring.

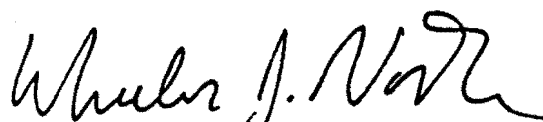
Observations of development of fish populations in waters that had been artificially structured with inert or living materials led Mr Streichenberger to conclude that:

- 1) Available nutrients are sufficiently plentiful in coastal waters and can be stored and recycled provided the habitat is sufficiently structured.
- 2) Underwater structures for fixation of sessile organisms are the first element required for the process of enhancing development by sea life.
- 3) Function of the structure is greater than a simple thymotactic effect. The most important function is provision of a foundation for growth.

Mr. Streichenberger has continued his research and development activities here in southern California from 1987 onward. In 1988 he installed the first "marine forest" on a sandy plain lying just west of the entrance to Newport Harbor. He and his associates are continuing to augment this unique facility by transplanting additional kelp and shellfish-culturing substrates. This is a first-of-its-kind advance in marine utilization.

Mr. Streichenberger must be credited for pioneering work in a difficult but promising research and development program in marine science.

Sincerely,



Wheeler J. North
Professor of Environmental Science

Application No. E-95-5
Marine Forests Society
Exhibit 4

SE SKELLY ENGINEERING

DAVID W. SKELLY COASTAL ENGINEER

May 5, 1995

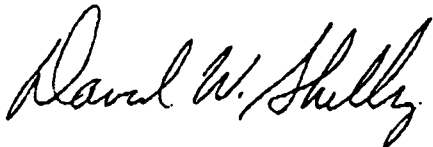
Mr. Rodolphe Streichenberger
Marine Forests Society
P.O. Box 5843
Balboa Island, CA 92662

COMMENTS ON POTENTIAL FOR SHORELINE EROSION FROM MFS PARCEL 1

1. The majority of sand movement along the shoreline is within the surfzone. The surfzone very seldom extends out to water depths greater than 20 feet. At a depth of 40 feet the tires are essentially outside the littoral zone.
2. The average depth of closure for the seasonal profile change in this area is less than 40 feet. Closure in the Oceanside Littoral Cell is at depths of about 30 feet.
3. The parcel has been in place for several years and there is absolutely no evidence of any impact on the shoreline. The depth contours in the lee (shoreward) of the installation show no changes. If the tires were having any effect on the distribution of sand it would be measurable in the vicinity of the tires.
4. The tires are very close to the bottom (1 to 2 feet) and do not effect incoming waves, at all. The tires should not be compared to nearshore and shoreline structures, such as jetties, piers, groins etc. These structure are in the active littoral zone and take up the entire water column.

There is absolutely no basis for expecting the MFS tire experiment to have any impact on the sand deposition at the shoreline.

Respectfully,



David W. Skelly MS, PE
RCE #47857

619 S. VULCAN AVE, #214B ENCINITAS, CA 92024 PHONE/FAX 619 942-8379

Application No. E-95-5
Marine Forests Society
Exhibit 5

D.I.V.E.R.S.

**Divers
Involved
Voluntarily in
Environmental
Rehabilitation and
Safety**

April 19, 1995

To whom it may concern,

The Marine Forest Society's Tire Reef Demonstration Project should not be permitted anywhere along our coasts because of the impact it will have on the environment. An Environmental Impact Report was advised for this project by the California Department of Fish and Game and the California Coastal Commission yet, the Marine Forest Society has bypassed their recommendation by submitting a negative declaration to the City of Newport Beach. This negative declaration did not include any scientific results that prove the impact would be insignificant to the underwater parcels. It also did not prove with any scientific documentation that the project is feasible. The declaration also did not state any impact the project will have on the Pismo Clams' environment, which will obviously be affected. Divers have noticed a repopulation of the clams since their disappearance ten years ago. The tires' toxicity, their inability to act as a good substrate, and the sand area they will occupy will all have a detrimental effect on the Pismo Clams' recovery. The California Department of Fish and Game no longer consider tires to be a suitable material for creating artificial reefs because of their risk of breaking free and coming ashore, which they have experienced in the past. For these obvious reasons we, the undersigned, support any and all opposition to the Balboa Marine Forest Artificial Reef Project. We are too busy cleaning up other underwater debris and do not wish to retrieve more trash that could be avoided.

Sincerely,

Divers Involved Voluntarily in Environmental Rehabilitation and Safety

**Application No. E-95-5
Marine Forests Society
Exhibit 6**

The Marine Forest Society's Tire Reef Demonstration Project should not be permitted anywhere along our coasts because of the impact it will have on the environment. An Environmental Impact Report was advised for this project by the California Department of Fish and Game and the California Coastal Commission yet, the Marine Forest Society has bypassed their recommendation by submitting a negative declaration to the City of Newport Beach. This negative declaration did not include any scientific results that prove the impact would be insignificant to the underwater parcels. It also did not prove with any scientific documentation that the project is feasible. The declaration also did not state any impact the project will have on the Pismo Clams' environment, which will obviously be affected. Divers have noticed a repopulation of the clams since their disappearance ten years ago. The tires' toxicity, their inability to act as a good substrate, and the sand area they will occupy will all have a detrimental effect on the Pismo Clams' recovery. For these obvious reasons we, the undersigned, support any and all opposition to the Balboa Marine Forest Artificial Reef Project.

NAME	ADDRESS	PHONE #	SIGNATURE
Kelly Bracher	17150-H San Mateo	714-964-3726	Kelly M. Bracher
LAWRENCE MABASIO	1046 E. OLIVAS RD. #101 (SUN) 265-3921		
DANA WOODS	2181 STATE AVE. C.M.	714-722-1930	Dana Woods
MELINDA KIRK	126 LORALYN DR., ARCADIA, CA 91006	(714) 859-8617	Melinda Kirk
Charles Dickson	12831 Aspenwood Garden Grove 7505112		Charles Dickson
Amy Spilard	1024 Cordellwood, Brea, California (714) 524-1355		Amy Spilard
Joey Cornell	3339 Clinda Lane Anaheim, CA 714 822 1804		Joey Cornell
TONY NAVARRO	9140 LARKSPUR DR WESTMINSTER (714) 898-5194		Tony Navarro
RICHARD CAROL	1848 TEDMAR ANAHEIM (714) 535-0756		Richard Carol
JEFF J JEWELL	12841 CHARLONA TUSTIN 714 835 1447		Jeff J Jewell
Karen Withey-Smith	1685 Hay Dr Chino Hills Ca 714 534 6306		Karen Withey-Smith
DAWN MARCOVA	16 VIA LANTANA RSM CA 914 858 1364		Dawn Marcova
TONY MARCOVA	16 VIA LANTANA RSM CA (714) 858 1364		Tony Marcova
U. J. Williams	1930 STEVELY AVE (310) 430 9916		Eugene W. Williams
FRANK CASTELLER	12516 Emile Court B 310 356 1071		Frank Caster
FRANK KINHART	2038 Golden Top Long Beach		Frank Kinhart
FRANK KINHART	2038 GOLDEN TOP LONG BEACH CALIF.		Frank Kinhart
ATEICIA D. RAY	4918 JERRED Ave, Apt. A. Long Beach, CA 90805		Ateicia D. Ray
MIKE TONSE	17991 TAYLOR CIR #3 Huntington Beach 92647		Mike Tonse
VANITY HALL	1915 S. Denton San Gabriel 91796		Vanity Hall
Eugene Anderson	11300 Woodhurst Garden Grove 92643		Eugene Anderson
Dan Dale	2100 1/2 Olympic Dr. MBD CA 90690		Dan Dale
Anthony Jetter	267 W Fairview Glendale CA 91202		Anthony Jetter
Phil Rock	26964 Bolan Ln. Rolling Hills CA 90741		Phil Rock

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NAME	ADDRESS	PHONE #	SIGNATURE
Elizabeth Francisco	1055 Camino Mariposa T.J. Ca 91300	(818) 498-2532	[Signature]
TESS FITZPATRICK	5907 TIPAM WAY (215) 251-1666	San Antonio	[Signature]
John Edwards	501 Herndon St. 33 Hermosa Beach 310-318-1820	310-318-1820	[Signature]
Howard Elson	541 Buell Ave Venice CA 90291	407-76	[Signature]
HELEN ATCHEE	1714 SANGER CA 90055	308-6608	[Signature]
Cheryl Ann Brown	248 Hollywood Blvd Burbank CA 91505	(818) 338-8888	[Signature]
BRIAN HILL	POB 729 Petaluma CA 94953	(707) 771-1111	[Signature]
Michael C.	4264	837-8012	[Signature]
Bruce Olson	1274 CHESHIRE ROAD 421-0308	Bruce Olson	[Signature]
Andrea Lurie	1896 4th Allen St. Tazewell Ca. 91356		[Signature]
Jammiel Briley	941 W. 35th 713-740-8877		[Signature]
Jennifer Bolton	7200 Fashion Ave (310) 492-6489		[Signature]
Georgina Burrey	8202 Brooklyn Ave 213-433-9975		[Signature]
FRANCIS	54736 3236 San Ave LOS ANGELES CA 90034	(310) 201-0512	[Signature]
Jay Shapiro	14003 Candlerwood Dr. S. Inglewood CA 91342		[Signature]
DAN TAYLOR	834 CALE PLUMASAN (CLEMENTE) 92673		[Signature]
ANGEL RODRIGUEZ	32010 ALEXANDRIA # L.A. CA 90004		[Signature]
Bob	757 OCOON AVE S.M. CA 90407		[Signature]
STAWN MILER	8522 Evelyn Dr. Santa Ana Ca. 92715		[Signature]
Deborah Compton	8511 1/2 Horner Los Angeles, CA 90035		[Signature]
Angela Sanchez	Kitt San Marcos Dr #104 Ventura Ca 93005		[Signature]
Maria Brown	21272 Lecommas Walnut Cal 91797		[Signature]
Bill Stroup	PO Box 991 Redneck Beach Ca 90277		[Signature]
Werner Schue	349 NORLIMBERG Dr MONROVIA Ca 91016		[Signature]

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NAME	ADDRESS	PHONE #	SIGNATURE
Annette Matsuda	1111 W. Sepulveda Bl. Torrance CA.		Annette Matsuda
Linda Mengistu	P.O. Box 922092 Sylmar, Ca 91392		Linda Mengistu
Patricia Saylor	545 Howell Mtn Rd N Arcadia 707 905 0137		Patricia Saylor
Ken Odom	1444 S. Galt Ave #307, LARCH 90025		Ken Odom
Carolina Galvez	1109 E. Mendocino St. Altadena CA 91001	(818) 318-4305	Carolina Galvez
Eric Bradley	same 1109 E. Mendocino St Altadena CA 91001	(818) 318-4305	Eric Bradley
Vanessa Adams	636 Beverly Dr. Arcadia CA 91006	(818) 574-5957	Vanessa Adams
Elma Allen	688 R St San Monica		Elma Allen
Mark Black	2407 20th Santa Monica 90405		Mark Black
Jim Crawford	103 Welcome Ln Seal Beach 90740		Jim Crawford
Tony Chavez	35401 N. Sky, VICTA ACTON CAL 91310		Tony Chavez
Jennifer Saldivar	" " " "		Jennifer Saldivar
Dijandra Stringer	4100 Arch Dr. #12A Studio City CA 91606		Dijandra Stringer
Leticia Zamba	4100 Arch Dr. #12 Studio City CA 91606		Leticia Zamba
Rebecca Gilbert	447 Heronda St, Hermosa (310) 370-0722		Rebecca Gilbert
Michael (Gibson)	447 Heronda St #103 Hermosa 310-376 0722		Michael (Gibson)
Sarah Mayers	1475 N Mills Ave. CLAREMONT CA 91711		Sarah Mayers
CHRIS RAMSEY	215 E. ORANGE AVE #207 FULLERTON CA 92632		CHRIS RAMSEY
Claudia Maniz	220 Maple Place Montebello CA 90640		Claudia Maniz
David Campbell	2208 Pinckard Newport Beach CA 90778		David Campbell
ADAM SHYU	437 Macalester dr. Walnut. 91789 709-465-5535		ADAM SHYU
REBECCA A. MANN	903 Gota Park Dr. # F SARASOTA, FL 34234 813 358-1079		REBECCA A. MANN
Bonnie Sun	Orillon 3525 maplenwood LA CA 90011		Bonnie Sun
Deborah Salceda	110 Sunridge Playa del Rey Ca 90295		Deborah Salceda

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NAME	ADDRESS	PHONE #	SIGNATURE
JIM ENBER	1605 SHIRINGTON PI	4Y-LIN 714-602-6993 N.B. 92663	Joseph Enber
PAUL HIRSCH	2100 S Lewis	928-7418	Paul Hirsch
Will Lucifor	22968 Victory Bl, Woodland Hills	CA 91367	Will Lucifor
GIGI DEREZANIN	3118 HONOLULU AVE, LA CRESCENTA	818-457-0500 CA 91214	Gigi Derezanin
Brian Barand	3472 North F Street San Bernardino	CA 92405	Brian Barand
Karen George	1505 Northpark Blvd. Apt 133 San Bernardino	CA 92407	Karen George
KAREN AYDUB	17 DUDLEY AVE #4 VENTURE	90291 (310) 396-6277	Karen Aydub
Valerie Shatynski	13726 Penn St Whittier	CA 90602 (310) 696-6577	Valerie Shatynski
Ronnie Espolt	4518 Long Beach Blvd LB	(310) 428-5045	Ronnie Espolt
Scott Carrey	11684 Ventura Blvd. Ste 495 Studio City	CA 91604 818-956-1032	Scott Carrey
T.A. KOLB	235 E. COLORADO BLVD #257 PASADENA	CA 91101	T.A. Kolb
G.A. KOLB	" " " " " " CA 91101		G.A. Kolb
William T. Park	3540 SAN-DIAGO PL. OCEANSIDE	CA 92056	William T. Park
Frederick M. Park	3540 SAN-DIAGO PL. OCEANSIDE	CA 92056 (619) 631-5236	Frederick M. Park
STEVEN TAYLOR	4038 REDWOOD AVE L.A.	CA 90066	Steven Taylor
YOSHIKO MAKI	6000 ETIWANDA AVE #209 TARRANA	CA 91356	Yoshiko Maki
BRUCE CAMPBELL	614 GRETA GREGORY WAY L.A.	CA 90049	Bruce Campbell
Georgiann P. Baras	3531 Venture Dr Huntington Bch	CA 92649	Georgiann P. Baras
GLENN SHANKER	4215 L. Fayette F77 L.A.	213-387-4671	Glenn Shanker
Anthony P. Parnas	810 E. Main St. Upland	919 956-5192	Anthony P. Parnas
Marjorie Hark	950 E. Mountain St. Upland	919 956-5192	Marjorie Hark
Budget Valverde	1830 E 194th St SA	CA 92701	Budget Valverde
Amoroso	3250 Borham Blvd LA	90068	Amoroso
Van Mitchem	7 Monmouth Ave #306 Emeryville	94608	Van Mitchem

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NAME	ADDRESS	PHONE #	SIGNATURE
BOB RUHL	3686 S. Main St.	(213) 233-3506	Bob Ruhl
STUE SPANGLER	15005 Holladay Ln	800 217 1301	Stue Spangler
TOM WASSERBERGER	1555 Grandville Ave LA, CA 90049		Tom Wasserberger
JOHN J. Flier	14852 Jupiter St. Whittier CA 90611		John J. Flier
GURUSINGH KHOLSA	2337 N 9th St Phoenix AZ 85006		Gurusingh Kholsa
Israel Rojo	55 Roswell #4 Long Beach CA 90803	(310) 439-6552	Israel Rojo
Julie Johnson	62 Granada #4 L.B. CA 90803		Julie Johnson
CHARLIE MCARDI	7939 Vulcan Drive	(213) 876-605-90	Charlie McCardi
MIKE MICHE	653 Boycroft Ave	(310) 987-1095	Mike Miche
Denise Knight	12955-B Littleton, Cyn LT CA 91342	(818) 875-3372	Denise Knight
Jeanne Hirschbeck	4117 Michael Ave. L.A.	900 666 827-2500	Jeanne Hirschbeck
ANITA ACOSTA	1622 S. Mayflower Ave #B Marina del Rey 90266		Anita Acosta
MICHELLE CAJERO	1622 S. Mayflower Ave #B Marina del Rey 90266		Michelle Cajero
KEITH BUTLER-BATES	601 E. FAS TEND ROMANIA CA 90767		Keith Butler-Bates
JANAM ARFA	5727 Canyon Ave #257. Woodland Hills 91367	(818) 213 67	Janam Arfa
Rachel Bopp	19557 Eagle Ridge Ln. Northridge CA 91340		Rachel Bopp
Yvonne Wicks	15515 Sunset #201, Pacific Palisades CA 90272		Yvonne Wicks
M. FRIEDMAN	21041 PINEHILL ST #114 CANADA PARK CA 91301	(818) 773-5318	M. Friedman
P. C. SMOKER	771 Wallace St. Birmingham, ME 00415	9665	P. C. Smoker
Dan Zehfuss	7726 Le Berthier St. Tujunga CA 91163	818 353-8992	Dan Zehfuss
BANDY FRIEDMAN	6650 Hayvenhurst - 108 VN CA 91342	818 228 9087	Bandy Friedman
Lana Harsh	30473 Mulholland Hwy #61 Agoura, CA 91301	(818) 839-7603	Lana Harsh
Erin E. Johnson	2104 Canterbury Blvd #304 Hollywood CA 90028		Erin E. Johnson
Rikki Smoot	10921 Morrison #4 No. Hollywood CA 91601		Rikki Smoot

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NAME	ADDRESS	PHONE #	SIGNATURE
420 Puchala	4105 W. Univ Dr. #105 Pomona		[Signature]
DIANA DWANIG	1510 HOLLY OAK DR. W. COVINA, CA 91791		
Chloe Etienne	3350 Truxtun Rd San Diego	92135-1212	[Signature]
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Steve Baratta	3409 Venetian Dr. L.A. CA	92626 (714) 549-2547	[Signature]
Greg Drescher	11355 Dona Lda Dr. (213)	656-3037	[Signature]
JACOB LEWIS	4775 LEON AVE. (818)	504-0096	[Signature]
Suzanne Roussseau	Box 503, San. Placerville, CA	92674 492-8170	[Signature]
Tamara Kuttel	12763 Mitchell A. #41 H, Cul	90750	[Signature]
Nana Mattena	6633 Carnegie Ave, Canyon Park CA	91303	[Signature]
Ali Alizadeh	4355 RICHMOND AVE	CA 91732	[Signature]
Richard Killian	5606 LAS VIRAGNES RD #66 CALABASAS, CA	91302	[Signature]
Andrew Pett	5907 Cahill Ave Tarzana	91356	[Signature]
Chris Murat	23118 Kentwood Ave Harbor City CA	90710	[Signature]
Bill Nilson	1300 N. Brand Blvd Glendale CA	91202	[Signature]
Ed Williams	1166 N Edgmont #6 L.A. CA	90029	[Signature]
Kathy Hess	10452 Scoville Ave San Gabriel, CA	91040	[Signature]
Wes Chamian	8407 Fullbright av C.P. Ca	91306	[Signature]
Therese Ketchum	12607 BICLA AVE L.A. CA	90063	[Signature]
Janice Boop	117-28 Wilshire Blvd Bk11 J.A. CA	90025	[Signature]
Brandy Marks	11728 Wilshire Blvd Bk11 L.A. CA	90025	[Signature]
Harmon Williams	4945 118th Pl Inglewood CA	90304	[Signature]
Marcus Henkle	925 Westlake Blvd. Westlake CA	91361	[Signature]

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NAME	ADDRESS	PHONE #	SIGNATURE
L12 HERRERA	1544 CONCORSE AVE (213)	726-3510	F. HERRERA
FRANK GREEN	232 E. 21ST ST #5 (310)	755-5904	Frank Green

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STATE CAPITOL
P.O. BOX 942849
SACRAMENTO, CA 94249-0001
(916) 445-7448

District Office
305 NORTH HARBOR BLVD.
SUITE 303
FULLERTON, CA 92632
(714) 525-0175

Assembly
California Legislature



DICK ACKERMAN
ASSEMBLYMAN, SEVENTY-SECOND DISTRICT
Serving the cities of
Anaheim Hills, Brea, Fullerton, La Habra, Placentia, Yorba Linda

VICE CHAIRMAN:
NATURAL RESOURCES

MEMBER:
APPROPRIATIONS
EDUCATION
ELECTIONS, REAPPORTIONMENT
CONSTITUTIONAL AMENDMENTS
ENVIRONMENTAL SAFETY &
TOXIC MATERIALS
LOCAL GOVERNMENT
PUBLIC EMPLOYEES, RETIREMENT &
SOCIAL SECURITY

March 13, 1997

RECEIVED
MAR 20 1997

California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, California 94105

CALIFORNIA
COASTAL COMMISSION

Attention: Rusty Areias, Chairman

Dear Mr. Areias,

I am writing in support of the Marine Forests Society in their application process to obtain a permit to continue building sustainable marine habitats along California's coastline to encourage marine wildlife in areas that have experienced a decrease in the number of fish, marine mammals and marine flora.

It is my understanding that Marine Forests Society is sustained through voluntary contributions, grants from foundations and other organizations. The non-profit organization was founded in 1986 and hundreds of volunteers have given many hours over the past eleven years to carry out the organization's mission.

The Marine Forests Society is committed to helping preserve California's coastline through commitment of volunteers and the utilization of private resources.

Please help this organization to continue their good works on behalf of the citizens of California by granting them a permit.

Sincerely,

DICK ACKERMAN
Assemblyman, 72nd District

DA:wl

Application No. E-95-5
Marine Forests Society
Exhibit 7



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

Dec. 9, 1996

RECEIVED
DEC 19 1996

California Coastal Commission
45 Fremont St., Suite 2000
San Francisco, Calif. 94105-2219

CALIFORNIA
COASTAL COMMISSION

To whom it may concern:

I am writing in response to a request from the Marine Forests Society to address the potential for toxic impacts due to the construction of artificial reefs using scrap tires. My primary field of expertise is ecotoxicology. Therefore, I shall not address concerns relating to the success or suitability of scrap tires as a marine reef habitat substrate, nor their biological productivity. Our research was performed while I was with the Maryland Department of Natural Resources (DNR). Currently, I am on a temporary assignment from DNR to the National Marine Fisheries Service.

In Chesapeake Bay, considerable effort has been devoted to preserving and enhancing habitat for oysters. Over-exploitation and the widespread occurrence of oyster diseases have devastated the oyster populations throughout the Bay, with consequent ecological and commercial ramifications. Extensive programs to provide suitable oyster settling habitat in areas of historical oyster reefs and in refuges have been undertaken in both Maryland and Virginia. Scrap tires have been placed in a variety of locations in the Bay, which have proven to be a suitable substrate for oyster settlement, and reef community development. In response to a proposal to use scrap tires as artificial reef substrate over extensive areas, we performed a series of experiments to assess the potential for scrap tires to leach unacceptable materials into the environment. Our concern was that we didn't want to find out 10 years down the road that it was a bad idea, we had harmed the environment, and we would then have to locate, remove and dispose of them. Our approach was to look at a worst case scenario to determine if further studies were warranted prior to implementation of a large scale program.

Our experiments were designed to assess toxic contaminants which may leach from tires over an extended (multi-year) period. In an effort to 'age' the tires in a very short time, we used a modified TCLP extraction procedure. This is a very vigorous process, which provided material suitable for laboratory testing, however the results require extrapolation to real world situations. We also collaborated with scientists at Environment Canada who performed detailed chemical analyses on our samples. Briefly, our general findings include:

1. Toxicity was inversely related to salinity increases in all species tested.



Application No. E-95-5
Marine Forests Society
Exhibit 8

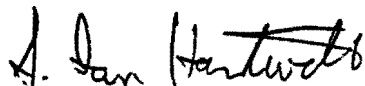
2. Toxic chemicals appear to leach off the surface of the tires, rather than from within the rubber matrix. Thus, once the tires have been in the water for an extended period of time, toxic leachates are no longer present. Observations consistent with this conclusion have been made by Canadian researchers in the field, in fresh water. We did not address exposure to burrowing organisms or surface feeders.
3. Extrapolation to real world mixing and dilution scenarios yields estimated concentrations of toxic materials far below the most sensitive NOEL.
4. The chemical nature of the leachable toxic substance(s) is unknown, and there is some evidence from Canadian studies that different fractions may be responsible for observed toxicity to different test species. The short-term rate of chemical release from tires was not addressed.

As with all research projects, we were left with answers to some questions, and a series of new questions. Our hesitation over the wide-spread use of scrap tires in Chesapeake Bay stems from the unknowns associated with the chemical nature of the toxicants and their apparent persistence in the weeks to months time-frame, not their acute toxicity risk. Our situation is somewhat different than yours, in that we are dealing with a shallow, semi-enclosed body of water, with several already severely contaminated areas. Further experiments, using whole tires in large tanks, confirmed our extrapolations of no acute toxic effects in a more realistic leaching environment. These latter experiments were never included in our draft report due to time limitations.

In my opinion, the potential harm to the environment from scrap tire reefs is very much smaller than the potential harm due to road runoff, especially in freshwater environments. Every rain storm has the potential to wash materials from millions of vehicle tires into rivers. Also, new, leachable tire surface is exposed constantly as those tires wear during normal use. The constant discharge of toxic chemicals to coastal waters from stormwater runoff in the watersheds is probably a far greater source of tire-derived contaminants than the low level, short term release from a tire reef, which may provide other environmental benefits.

If you would like further details, I will be pleased to send a copy of our final report.

Sincerely,



S. Ian Hartwell, Ph.D.

cc: R. Streichenberger
P. Massicot