Appendix A

MANAGEMENT AND FACILITIES

The management structure of the Southern California Coastal Water Research Project has worked well for a dozen years. Control of the Project is in the hands of a Commission of distinguished members of the public headed, in the past two years, by Presidents Janet Garber and James Sharp. The Commission meets four times a year to hear the reports of the Project's Director and Administrative Officer, approve the Research Plan, and review financial and personnel matters.

Twice a year the staff meets with the Consulting Board, under the chairmanship of Professor Perry McCarty, to report on the progress of the scientific studies and to obtain advice and guidance on current and future investigations.

Day-to-day decisions relating to the conduct of the scientific work are made by the Director and senior staff members who meet frequently to discuss Project activities. Most of our research projects are the combined efforts of chemists, biologists, and marine technicians, who are striving to be leaders in marine environmental studies; the spirit of friendly cooperation among these scientists is one of our strong points.

An official accounting of our funds is kept by the County Sanitation Districts of Los Angeles County. In addition, the Project Administrative Officer maintains data that can be used to determine our financial status and to control the costs of individual research tasks. This accounting system permits financial planning and cost allocation based on the Research Plan. A summary of our revenues and expenditures for 1983 and 1984 is shown in Table 1.

As a means of keeping the local sponsors of this program informed about our research, meetings with a group of their technical representatives are held on the first Thursday of every even-numbered month. The Director usually meets with the Sponsors' senior management two or three times a year.

Table 1. Summary of Project revenues and expenditures for 1983 and 1984.

	July 82-June 83		July 83-June 84	
REVENUES				
Interest	$ 24,100		$ 32,800	
Joint Powers Agreement	500,000		600,000	
Encina Wastewater Pollution Control Facility			8,800	
South East Regional Reclamation Authority			8,800	
National Oceanic & Atmospheric Administration	158,600		166,000	
Environmental Protection Agency	25,000		95,000	
Orange County Sanitation Districts	189,500		7,800	
City of Los Angeles			9,100	
City of Escondido	10,000			
Miscellaneous	15,000		16,000	
		$922,200		$944,300
EXPENDITURES				
Salaries and benefits				
Salaries and wages				
Scientists and technicians	455,800		479,700	
Management and administration	127,300		133,900	
Pension and insurance	64,900		86,200	
		648,000		699,800
Fixed assets				
Equipment		4,800		27,400
Service and supplies				
Contract and grants	10,700			
Materials and supplies	35,900		54,300	
Shiptime	11,800		12,000	
Independent contractors	12,800		27,200	
Consulting Board	7,400		4,800	
Computer services			2,000	
Publications	32,000		13,700	
Transportation and travel	11,100		9,300	
Office rental	38,400		40,700	
Office expense	9,900		11,200	
Maintenance	11,700		13,300	
Telephone	8,800		13,200	
Utilities	16,800		17,100	
Equipment rental	3,000		1,600	
Legal and accounting services	14,300		13,800	
Insurance	10,100		10,500	
Miscellaneous	100		2,400	
		234,800		247,100
		$887,600		$974,300

THE RESEARCH PROGRAM

Our cycle begins with the preparation of a Research Plan. This is a collection of proposals for research to be done in the following two years. Each proposal is developed by one or more of the scientists who plan to carry out the work. First, it describes some environmental problem which is of general interest. Then it give the specific objective of the research to be done that will answer part of that problem; this is followed by an estimate of the probable answer or outcome. Next comes the description of what will be done, where, how often, and by whom. All the above can usually be covered in two pages, providing enough information so that priorities can be set when the collection of 30 or so proposals is considered as a group.

After considerable discussion and consultation with the Consulting Board and the sponsors' Program Review Committee, the most suitable proposals are chosen. This selection necessarily takes into account work in progress, contractual obligations with federal agencies, the special competence of staff members, availability of laboratory facilities, and other such matters. Even after the Research Plan is adopted, we try to retain some flexibility so that it is possible to take advantage of better ideas and/or unexpected findings that arise in midcycle. If after the work starts it becomes evident that the results will be unsatisfactory, we simply scratch that project and transfer the effort to a new one or one that is going well.

As the research proceeds, we constantly exchange ideas with other scientists doing similar work by means of meetings, scientific papers, and personal contacts. The result is a continual exchange of ideas that helps all involved keep up with technological creep.

Finally, we put together the best of the results of two years' research in reports such as this one. These reports are widely distributed to laboratories throughout the U.S. and the world. We are always pleased to have comments and criticisms on the papers contained herein, especially because many of them will later be published elsewhere in specialized professional journals.

LABORATORY FACILITIES

Our scientific work requires several laboratories in which we can do the necessary experiments and make precise measurements. Our headquarters building in Long Beach contains the following equipment and capabilities.

Two microcomputers, an IBM PC and IBM PC/XT, manipulate scientific and administrative data. The PC is dedicated to scientific support, with a range of capabilities from word processing to BASIC programming. It has been used primarily to communicate with the University of Southern California computer (IBM 370) for a full range of data management and statistical support. The PC/XT is dedicated to administration and word processing of reports such as this one.

A **taxonomy laboratory** identifies and preserves reference specimens of the marine animals of southern California. In addition to a reference collection of bottled animals, this laboratory has a reference collection of taxonomic literature and microscopes (Aus Jena and Nikon stereoscopes, 4x to 100x) for examining animals. Our staff is active in the Southern California Association of Marine Invertebrate Taxonomists (SCAMIT).

In the **trace metals laboratory,** two atomic absorption spectrophotometers (Varian Tectron AA-6 and AA-175), equipped with flame, carbon rod, and simultaneous background correction are used to measure metals in seawater, sediments, animal tissues, and effluents. With these instruments, and very careful preparation techniques, repeatable results are obtained for silver, cadmium, copper, chromium, nickel, lead, and zinc at the parts-per-billion-level. A cold-vapor atomic absorption spectrometer (Laboratory Data Control Hg monitor) is used to measure organic and inorganic mercury in environmental samples. For arsenic, selenium, and antimony measurement we call upon the personnel and facilities of the University of California at Irvine which uses a 250-kw Triga reactor for nuclear activation analysis. For more general analysis we can use the inductive coupled argon plasma emission spectrophotometer at the University of California at Los Angeles.

The **trace organics laboratory** makes precise measurements of chlorinated pesticides, benzenes, and polychlorinated biphenyls (to parts per trillion in seawater). Concentrations of these compounds have been measured extensively in the body parts of fish and invertebrates and in bottom sediments, river runoff, sewage effluent, aerial fallout, and harbor water. This laboratory also routinely measures the oxygenated metabolites of DDT and PCB in fish tissues.

Three principal instruments are employed in the trace organics laboratory: 1) a gas chromatograph (Tracor MT 220) utilizing dual packed columns and Ni electron-capture detectors; 2) a Varian Vista 44 gas chromatograph equipped with a glass capillary column, a Ni electron-capture detector, a flame-ionization detector, and a computerized data handling system, which allows us to automatically quantitate a large number of trace organics including base-neutral and acid extractable compounds; 3) a Varian 5000 liquid chromatograph (HPLC) with a variable-wavelength detector that makes it possible to measure the metabolites of trace organic contaminants in the tissues of sea animals.

Other laboratory equipment includes a rotary evaporator, cell-disrupting homogenizer, analytical balance, freeze-dryer, Coulson detector, and a kiln for cleaning glassware.

We also have access to a Dupont DP-1 gas chromatograph/mass spectrometer equipped with a Hewlett Packard MX-series data system containing the National Bureau of Standards mass spectra library of 30,000 compounds. This instrument, located at the California State University at Long Beach chemistry department, allows us to determine the identity of unknown organic compounds.

The **toxicity laboratory** is an insulated aquarium room in which ocean water is used for many kinds of experiments. Four 340-liter (90-gallon) glass tanks and four 150-liter (40-gallon) tanks are kept at 12°C by the flow of surrounding cold water. Each aquarium has its own individual pump and filter so that the natural seawater in the tank is recirculated through the filter several times a day. One flow-through system of five 76-liter (20-gallon) tanks is used for toxicity tests; seventy jars, fourteen 19-liter (5-gallon) tanks, and 150 1-liter beakers are used for experiments with invertebrates.

The **biochemistry laboratory** is responsible for the dissection of specimens, preparation of tissues (e.g., homogenization and centrifugation), and allocation of processed samples to the other laboratories. In addition, gel filtration of samples through a refrigerated Sephadex G75 column is also performed. Biochemical determinations are made of such parameters as enzyme activities; protein, glutathione, and hemoglobin concentratons; and energy reserves. These parameters are determined with the aid of a Bausch and Lomb UV/VIS spectrophotometer.

The **wet laboratory** conducts measurements of the pH, salinity, and dissolved oxygen and ammonia content of seawater in order to monitor the water quality of aquaria in the toxicity laboratory.

The **histopathology laboratory** is equipped with a complete Tissue Tek II system for making slides. This system includes an automatic tissue processor, embedding center, microtome, drying ovens, and staining supplies. Slides are examined using a Leitz Model SM-LUX microscope equipped with a camera for photographing slides.

OTHER FACILITIES

Project personnel spend a great deal of time at sea (848 man-days in the last 2 years) taking samples of water and bottom sediments, trawling and fishing, towing television cameras, and placing current meters and collection devices. Our marine coordinator has been very

successful at obtaining the services of various small ships at modest cost. We wish to thank the City of Los Angeles for the use of the Marine Surveyor, the Los Angeles County Sanitation Districts for the use of the Sea-S-Dee, the Orange County Sanitation Districts for the use of the Enchanter, and the City of San Diego for the use of the Monitor. Appendix D summarizes the past two years of ship usage.

The Project has its own equipment for making measurements at sea, including current meters, drogues, corers, and Van Veen grabs. Special instrumentation includes underwater color television (120-m depth), a 35-mm still camera (1000-m depth), peristaltic and deep-well pumps for seawater sampling, and a Turner fluorometer.