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SCRIPPS INSTITUTION OF OCEANOGRAPHY

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June 24, 2004



Mr. Dominic Gregorio  
Division of Water Quality  
State Water Resources Control Board  
1001 I Street, 15th Floor  
Sacramento, CA 95814

Re: University of California San Diego, Scripps Institution of Oceanography  
Request for an Exception from the California Ocean Plan Prohibition on Discharges Into  
Areas of Special Biological Significance

Dear Mr. Gregorio

The University of California San Diego ("UCSD"), Scripps Institution of Oceanography ("Scripps") respectfully submits the following comments in support of its request to the State Water Resources Control Board ("State Board") to approve an exception to the California Ocean Plan for Scripps' discharge into the San Diego Marine Life Refuge ("Refuge"), an area of special biological significance ("ASBS").<sup>1</sup>

Scripps greatly appreciates the opportunity to provide these comments as a supplement to its June 7, 2004 submittal concerning the environmental review documents. The current letter addresses the Ocean Plan provisions which permit the State Board to grant exceptions from the ASBS discharge prohibition. The State Board must determine that granting the exception will not compromise protection of the ocean waters for beneficial uses and that the public interest will be served.<sup>2</sup> Scripps agrees with the staff recommendation that the exception be granted subject to the terms and conditions found in Appendix E of the State Board's Initial Study for UCSD/SIO Ocean Plan Exception.

<sup>1</sup> Pursuant to the 2000 amendments to the State Marine Managed Area Improvement Act as contained in Public Resources Code ("PRC") section 36700, Scripps understands that ASBSs are now called State Water Quality Protection Areas ("SWQPAs"). For purposes of this letter, all references to the Refuge ASBS include SWQPA issues.

<sup>2</sup> State Board "Water Quality Control Plan – Ocean Waters of California" (2001) ("Ocean Plan") at III.I.1.

Scripps believes that the approval of the exception will preserve and enhance the water quality in the ASBS; better protect the beneficial uses in the ASBS; provide enhanced monitoring techniques; allow Scripps to continue to conduct critically important medical, marine biology and earth science research and education; and that it offers Scripps the opportunity to partner with the State Board and San Diego Regional Water Quality Control Board (“Regional Board”) in the development of a monitoring program related to this discharge. All of these consequences of granting the exception provide significant public benefits.

### Background

Scripps has been discharging seawater at its current location since approximately 1910. In 1969, prior to the adoption of the Ocean Plan by the State Board, the Regional Board first issued a waste discharge requirements (“WDRs”) permit to Scripps. In 1972, the Ocean Plan was adopted by the State Board and it required that “waste shall be discharged a sufficient distance from” ASBSs to assure maintenance of natural water quality conditions in those areas. In early 1974, the State Board designated 31 ASBSs, including the San Diego Marine Life Refuge. Later in 1974, the Regional Board issued Scripps its first combined National Pollutant Discharge Elimination System (“NPDES”)/WDRs permit in Order No. 74-47. Because the Refuge was then designated as an ASBS, the Regional Board made a finding that the Scripps discharge would “not alter the natural water quality conditions” of the Refuge. (Regional Board 1974).<sup>3</sup> Since 1974, the Regional Board has reissued the NPDES/WDRs permit four times, the most recent being 1999. In each instance the Regional Board made a finding that the discharge was not harming the ASBS. Until now, Scripps has continued to operate its permitted discharge without an exception from the Ocean Plan.

In 2002, Scripps was first asked to submit an application for an exception to the Ocean Plan prohibition on discharges to the ASBS. Scripps was also asked to produce habitat and species survey work, toxicity tests and other information in order to complete its application for this exception. Scripps complied with all of these requests and the application was deemed complete in late 2003. Scripps believes that the data which it provided support a conclusion that its discharge will not compromise protection of the ASBS waters for beneficial uses.

### The State Board Should Grant the Exception

The State Board designated ASBSs as areas requiring protection of species and biological communities to the extent that alternation of natural water quality is undesirable.<sup>4</sup> The Ocean Plan provides for the preservation and enhancement of ASBSs by prohibiting discharge of waste into these areas. At the same time, the Ocean Plan provides that the State Board may grant exceptions to that prohibition where they will not compromise protection of the ocean waters for the beneficial uses.<sup>5</sup> As more fully set out below, the Scripps discharge has not and will not compromise protection of the ocean waters for beneficial uses and the granting of the exception will serve the public interest.<sup>6</sup>

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<sup>3</sup> At that time, the Regional Board incorrectly identified the ASBS as The La Jolla-San Diego Ecological Reserve (“Reserve”), when in fact the discharge flowed into the San Diego Marine Life Refuge.

<sup>4</sup> Ocean Plan at Appendix 1.

<sup>5</sup> Ocean Plan at III.I.1.a.

<sup>6</sup> Ocean Plan III.I.1.b.

## The Exception Will Not Compromise Protection of Beneficial Uses

Even though Scripps has been discharging seawater used in its scientific and education processes for almost 100 years, there is no evidence that these discharges have negatively impacted marine species and habitats in the ASBS. Scripps recognizes that the data developed to date is limited and that it should be more fully developed as provided for in the terms and conditions associated with the granting of the exception. At the same time, there are existing facts which support the granting of the exception, which include the following:

For the past 30 years the Regional Board has consistently found that the discharges from Scripps have not altered the natural water quality conditions in the ASBS;

In making the recommendation to grant the exception, the State Board staff compared information contained in a 1980 biological survey to a 2003 biological survey and noted that for both sandy beach inhabitants and for marine algae and invertebrates in the Refuge and the Reserve, the “changes in community composition over time are not unusual” and may not be related to and “do not indicate any gross impact from the laboratory/aquarium discharges”<sup>7</sup>;

In the 2003 AMEC Earth and Environmental, Inc. marine biological survey a slight increase in fish species near the Scripps discharge was noted and staff concluded that “it does not appear that there is any obvious impact associated with the SIO laboratory discharges on the fish community”<sup>8</sup>; and

In September 2003, Scripps performed a chronic toxicity analysis using the sand dollar, giant kelp, and pacific topsmelt to determine if the treatment chemicals used at the Birch Aquarium at Scripps would be toxic to any of these organisms during their sensitive life stages. The No Observed Effect Level (“NOEL”) was 100%, thus satisfying the Ocean Plan water quality objective for chronic toxicity of 1 TUc for the daily maximum concentration listed in Table B.

Even though there is no evidence that discharge has or will compromise protection of the ocean waters, if the exception is granted Scripps will be required to undertake extensive monitoring of its discharge to determine its potential effects on the marine environment, including the biological community and the sediment. With such data in hand, Scripps will be able to immediately address any excursion that might impact the beneficial uses. The proposed terms and conditions for the exception could also result in significant advancements to the monitoring and research efforts associated with industrial and storm water discharges into coastal waters. This monitoring program could both provide improved tools or systems to measure and assess the immediate and long-term effects of the Scripps discharge in this Refuge, and in the process provide a model for other ASBSs throughout the state.<sup>9</sup> In that regard, granting the exception will both “preserve and enhance” beneficial uses of this ASBS, and protect the natural or background water quality conditions exposed to the Scripps industrial and storm water discharges.

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<sup>7</sup> Initial Study, pp. 16-17.

<sup>8</sup> *Id.* At 17.

<sup>9</sup> It should be understood that Scripps is not required as a condition of the exception or its permit (industrial or stormwater) process to develop a model monitoring program. Further, Scripps is only required to monitor for the effects of the Scripps discharges.

## Determining Natural or Background Conditions

Some of the earlier comments submitted in response to the staff's Initial Study argue that any discharge by Scripps that is allowed under the exception must ensure the "maintenance of natural water quality conditions." These commenters argue that in order to achieve that goal, the State Board must use the background seawater concentrations in Table C of the Ocean Plan as the water quality objectives. Further, they assert that Table C provides the water quality objectives for both industrial and storm water discharges. Scripps does not agree with these broadened applications of Table C for several reasons.

- Table C is intended to be used as part of a formula to calculate effluent limitations for water quality objectives listed in Table B. Table C is not intended to be used as the limit itself. Given the Ocean Plan equation for establishing allowable concentrations for each constituent in an effluent, a lower background concentration (e.g. zero) will result in an effluent limit higher than the water quality objective in Table B. But, if Table C is used in that equation as the water quality objective, the effluent limit will equal the water quality objective. That would mean, that except for the five metals (arsenic, copper, mercury, silver and zinc), the effluent limit on all other constituents listed in Table B, but not in Table C, would be zero. In 1978, when Table C was adopted, the sensitivity of measurement technology was far less sophisticated than it is today. Today, it is known that many of the Table B constituents not listed in Table C are "naturally" present in ocean waters. Indeed, it would be technically impossible to verify a "zero" concentration of anything in seawater. Thus, the use of Table C in the fashion proposed would distort the logic employed in developing the equation to derive effluent limits. Further, such an approach would undermine efforts to establish a scientifically sound and valid multi-pronged program to determine what is the natural or background water quality in the ASBS. Scripps proposes that Table C's role should be limited to its given effluent calculation role as identified in Section III C.3.a. of the Ocean Plan.

The effluent concentration formula contained in the Ocean Plan takes the dilution factor into account and Table C does not. From a scientific perspective, a dilution factor should be recognized for near shore discharges. Further, the proposed use of Table C to establish what natural water quality conditions are, fails to take into account the variability associated with both the receiving water and the discharge water. Table B on the other hand, establishes daily maximum, instantaneous maximum, and six month median limits that take such variables into account.

It is scientifically indefensible to suggest that naturally occurring earth elements do not occur in seawater – particularly for the inorganic chemicals listed in Table B (e.g., metal ions like nickel, cadmium, etc.) Even ammonia, listed in Table B, is an ubiquitous decomposition byproduct of biological processes. If you had "zero" ammonia in the ocean, you would equate this to an absence of biological processes – i.e., a "dead" ocean.

Based on Scripps' acute and chronic toxicity analysis, Table B of the Ocean Plan is protective of ocean waters and should be used to determine the maximum effluent limits. Scripps' most recent chronic toxicity analysis demonstrated 100% survival rate at concentrations higher than those in Table C or B.

Applying Table C as the water quality objectives is particularly concerning with regard to wet weather flows. During storm events, effluent limits and water quality objectives will likely be exceeded even if Scripps made every effort to develop and implement state-of-the-art storm water programs. Such an approach would, notwithstanding best management practices, result in exceedance of such numeric limits.<sup>10</sup> Scripps believes that a better approach to determine the natural conditions of the Refuge is to employ a more comprehensive assessment program that monitors the discharge to determine its bioavailability and impacts on species and habitat, and as appropriate to use the best professional judgment of the permit writer, rather than using a single numeric limit as the tool to determine if beneficial uses are being compromised.

Because the numeric water quality objectives set out in Table B were intended to apply to all discharges within the jurisdiction of the Ocean Plan and were created “for protection of marine aquatic life,” it seems appropriate that the State Board in making the decision whether to grant an exception would consider the water quality and effluent methodologies described in Section II A.1. “to ensure the reasonable protection of the beneficial uses,” and not just apply Table C.

#### Granting the Exception Would Be in the Public Interest

Scripps is a world famous marine science institution that provides critically important research and educational opportunities. Its distinguished faculty and research scientists conduct state-of-the-art oceanographic and medical related research funded by both governmental and private sector entities. Some of these activities include the following:

#### Research Values

Scripps has been providing valuable scientific knowledge about California’s environment for more than a century. Scripps scientists contribute important information to the benefit of state managers, regulators, and the general population. It should be recognized that the seawater system at Scripps is a fundamental component of its research capabilities.

a. Over the past five years more than 100 peer-reviewed published scientific studies were conducted at Scripps, and each of these was dependent on the flow through seawater in the Scripps Seawater Experimental Aquarium. Currently, more than 50 Scripps researchers and visiting scholars annually use this facility, and therefore access to this facility, with its circulating seawater, is required if this important research and discovery is to continue.

b. Dr. Margo Haygood is conducting marine animal studies that may hold the key to the development of drugs to fight cancer. The brown-colored *Bugula neritina*, an animal with stringy tufts that look like algae, is the source of bryostatin, an anticancer drug currently in phase II and phase III clinical trials for a number of different cancers. By looking into the physical properties and genetics of bryostatin, scientists in Dr. Haygood’s laboratory are devising new methods for large-scale production of the drug bryostatin-1, one of the most promising anti-cancer drug candidates yet to come

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<sup>10</sup> Scripps is concerned that imposition of the Migden mandatory minimum penalties, especially for storm water effluent limit exceedances, will be unavoidable.

from a marine source. Bryostatin is used in conjunction with other agents for the treatment of several cancers including ovarian, melanoma, leukemia, breast, and non-Hodgkins lymphoma.

The success of Dr. Haygood's laboratory relies heavily on the flowing seawater system at Scripps. While many populations of *Bugula neritina* do not contain bryostatin-1, the La Jolla variety in fact does and the Scripps open seawater system is critical for maintaining a supply of healthy organisms for this important laboratory work.

c. Research conducted in the laboratory of Dr. Victor Vacquier is addressing several important biological problems with implications for human contraception and a lethal kidney disease.

Dr. Vacquier's research concerns fertilization at the molecular level in sea urchins and abalone. These marine animals serve as the model organisms to study sperm-egg interaction during fertilization, one of the least understood fundamental biological processes. The same molecular mechanisms underlie sperm-egg interaction in both humans and sea urchins. Dr. Vacquier hopes that these investigations will someday be applied to the development of novel methods of non-hormonal contraception in humans and other mammals.

Additionally, Dr. Vacquier and other researchers in his laboratory have discovered four "receptor" proteins embedded in the membranes of sea urchin sperm cells that are involved in sperm activation with regard to egg fertilization. These receptors are closely related to the human polycystic kidney disease proteins (PKD proteins). Human PKD is the most frequent human genetic disease (and the most common lethal human genetic disease) with an incidence greater than 1 per 1,000 in the population. PKD leads to nonfunctional kidneys, the disease responsible for nearly 12 percent of all dialysis and 12 percent of all kidney transplantation. In addition to human suffering and shortened lifespan, the annual cost of PKD in the United States is in billions of dollars. Dr. Vacquier's research on the activation of sea urchin spermatozoa has been proven important in determining the normal function of PKD proteins in humans, reinforcing the fact that marine animals are directly relevant to the health sciences. Only local species of sea urchins are used in this research and these animals require a constantly flowing supply of fresh, fast-running seawater, made possible by the Scripps seawater system.

d. Coastal environmental research at Scripps is also dependent on the seawater system. Dr. Dimitri Deheyn conducts investigations examining the impacts of marine pollution and environmental toxicity in areas such as San Diego Bay, one of the region's most visited attractions and economically important areas.

Dr. Deheyn's research work is dependent on the accessibility and use of the Scripps Experimental Aquarium. The seawater system allows him to breed local invertebrates to be used in toxicity testing of samples collected in the field. Dr. Deheyn uses these animals as indicators to gauge the effects of discharges and determining the location and severity of pollution. He also uses the animals under experimental conditions of contamination to simulate what could happen in the natural environment, and therefore to build up prevention strategies for environmental management.

e. Marine mammals may hold clues to a variety of important medical and other applications. Scientists at Scripps are examining these animals to better understand their biology, develop techniques to study diving behavior at sea, and investigate physiological adaptations with potential medical relevance.



Physiological research by Dr. Paul Ponganis at the Scripps Ring Tank Facility, which is also dependent upon the Scripps seawater system, has focused on the ability of marine mammals to withstand changes in pressure (i.e., avoid the bends) and to tolerate low levels of oxygen during dives. Such research is key to both protecting these animals in the wild and for biomedical applications. Tissue adaptations in seals, for example, may be relevant to preventing cellular injury in humans during heart attacks and strokes.

In one example, Dr. Ponganis, an anesthesiologist as well as a marine researcher, studies seals and the way their lungs routinely collapse during dives and re-expand on return to the surface. Such re-expansion is partially dependent on the biochemical lining on the inner surface of their lungs, the structure of which may be relevant to human medical conditions, including various respiratory distress syndromes, in which such function is abnormal.

f. Other Scripps researchers use the Scripps seawater system to investigate natural processes involved in marine reserves, the areas considered vital for protecting ocean wildlife for future generations. For example, Bonnie Becker studies mussels in a marine reserve in San Diego by looking into their chemical “fingerprints.” She examines how these animals move from one location to another to better understand connections between marine populations inside and out of the marine reserve. Becker’s research is dependent upon raising and spawning mussels at Scripps using the filtered water system at the Scripps Experimental Aquarium.

The knowledge generated from these studies may better inform resource and fisheries managers about marine reserves, artificial seeding of marine organisms, fisheries management, and other important applications. These issues recently came into the public spotlight through two landmark reports on the oceans (the Pew Oceans Commission and the U.S. Commission on Ocean Policy) that highlighted the benefits of such knowledge as essential for protecting and managing the quality of ocean ecosystems. All of this research requires a constant flow of fresh seawater, and without it this and other valuable research work at Scripps could not continue.

## 2. Education Values

The Birch Aquarium at Scripps depends heavily on the open seawater system. The Birch Aquarium at Scripps plays an important role as an education and public outreach facility. With visitors and outreach programs reaching 400,000 people per year, including 80,000 schoolchildren, the Birch Aquarium at Scripps addresses a critical need for public ocean education recently highlighted in a landmark report issued by the U.S. Commission on Ocean Policy. The Birch Aquarium at Scripps uses plants and animals in their natural habitats as a powerful educational tool. Examples that depend on the Scripps seawater system include a 70,000-gallon kelp tank and tide pools designed to exhibit the richness and diversity of marine life and the importance of conservation. By showcasing California ecosystems in such a manner, the Birch Aquarium at Scripps reaches out to the next generation of scientists and ocean advocates.

In addition to the Scripps scientific research work, the public is able to obtain valuable education on marine and conservation issues through the Birch Aquarium and other Scripps facilities, such as the Experimental Aquarium and the Ring Tank. This raises the sensitivity of the public at large to the importance of marine ecosystems and the stresses being imposed on them as a result of human activity, thus motivating broader public support for increased protective measures. The continued operation of

these facilities is dependent on the existing seawater pumping and delivery system that results in the return seawater discharge.

3. **Scripps Scientists Can Help to Develop an Improved Monitoring Program.** In addition to the scientific research and public education benefits listed above, Scripps believes that another public benefit derived from the granting of this exception is development of improved monitoring programs that look at biological, water quality, sediment quality, and a variety of ocean dynamics that influence the Refuge. Scripps scientists have developed and retained historical data that will be helpful in establishing information concerning natural conditions in the Refuge. Scripps may be able to design and add tools for long-term compliance based assessment programs related to its discharge that will prove transferable to other ASBS discharges. For example, these tools could include the following:

**Monitoring of infaunal and epifaunal communities within the ASBS**

**Comparing present data with detailed previous data;**

**Analysis of spatial patterns of species abundance, distribution, and biodiversity with regard to discharges;**

**Sediment monitoring using a triad approach; and**

**Monitoring nearshore fish assemblages using traditional methodologies and emerging acoustic technologies that are under development at Scripps.**

Designing and implementing a long-term ecological monitoring program for the Scripps discharge will provide information on the overall health and diversity of the Refuge. Scripps can bring near shore marine systems knowledge and expertise as well as an understanding of the dynamics of the ocean systems to the process, and thus provide the opportunity for developing a model monitoring program to assess the potential effects of its discharge.

### **Conclusion**

Scripps believes that the granting of the exception by the State Board will satisfy the requirements established in the Ocean Plan. The beneficial uses of the San Diego Marine Life Refuge will not be compromised and in fact the preservation and enhancement of this ASBS will be furthered by the granting of this exception. Scripps believes that it is inappropriate to apply Table C as numeric water quality objectives and effluent limits for the industrial or storm water discharges, as that is not consistent with the original purpose of this table and such an approach would necessarily set up unreasonable standards for effluent limits, leading to the possibility of unnecessary violations and penalties. Scripps believes that the public interest will be substantially enhanced by the granting of the exception in that significant medical and environmental research, public education and training will be allowed to continue while preserving and enhancing the ASBS. Finally, Scripps believes that its substantial body of knowledge regarding the coastal marine system and this ASBS will allow it to add significant value to the development of a monitoring program for this exception that may prove transferable to other ASBS discharges.

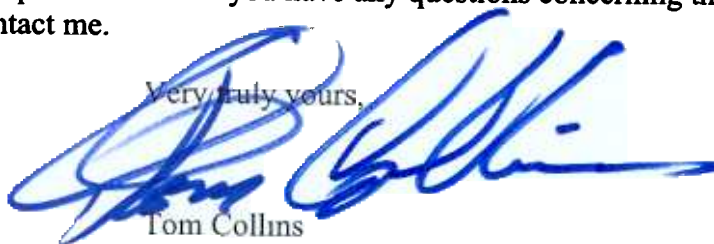
Scripps is committed to working with the State and the Regional Board to implement the 19 terms and conditions associated with the exception. Scripps understands these conditions will become



part of its NPDES/WDPs permit renewal process. Scripps has already established internal committees to address the industrial discharge, the storm water discharge and development of the monitoring program. We look forward to developing plans of action which will result in preservation and enhancement of the ASBS, which are legally and scientifically appropriate, which allow the important scientific research work that is part of the Scripps mission to continue, and which will serve the public interest. As a University of California system member, Scripps does have significant financial constraints and would appreciate any financial assistance or guidance which the State Board and Regional Board can provide regarding grants or other funding sources.

Scripps will appear at the State Board Workshop on July 7 to make a presentation. We request that the Chair of the State Board reserve 30 minutes for the Scripps presentation; we will defer that time if it is not necessary to make a full presentation. If you have any questions concerning this letter or other items, please feel free to contact me.

Very truly yours,



Tom Collins

Deputy Director, Administrative Affairs  
Scripps Institution of Oceanography