STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 80-95

APPROVAL OF COMPLETED STUDIES AND PROPOSED HEAT TREATMENT OPERATING CRITERIA AT SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3.

WHEREAS:

1. On May 18, 1972, the State Water Resources Control Board (State Board) adopted the "Water Quality Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California", hereinafter called the Thermal Plan. Specific Water Quality Objective 3B(3) provides:

   "The maximum temperature of thermal waste discharge shall not exceed the natural temperature of receiving waters by more than 20°F."

2. On July 31, 1972, the California Regional Water Quality Control Board, San Diego Region (Regional Board) adopted Order No. 72-26. The order granted Southern California Edison Company (SCE) and San Diego Gas and Electric Company (SDG&E) an exception from Objective 3B(3) of the Thermal Plan for heat treatment to control fouling organisms. The Regional Board proposed the following language as a substitute for Objective 3B(3).

   "The companies may raise the temperature of the cooling water discharge from planned Units 2 and 3 of the San Onofre Nuclear Generating Station to not more than 125° for periods of not more than two hours once each five week period for each unit, for purposes of control of marine organism growth in the cooling water system; and

   "Thermal treatment shall be done in such manner and under such conditions that loss of fish and other marine life is eliminated or minimized, and effects upon ocean water quality is minimized."

3. The Regional Board, in Order No. 72-26, requested State Board concurrence with the exception to the Thermal Plan.

4. On February 15, 1973, the State Board adopted Order No. 73-5, which concurred conditionally with Regional Board Order No. 72-26. Under the conditions contained in Order No. 73-5, SCE and SDG&E were required to complete certain studies (see Attachment 1).

5. On March 6, 1973, the conditions contained in Order No. 73-5 were incorporated into Regional Order No. 72-26 by Addendum 1 to Regional Board Order No. 72-26.

6. On January 31, 1979, SCE* submitted final reports for the studies required in Order No. 73-5 and Regional Board Order No. 72-26 to the State and Regional Boards. SCE requested that these reports be approved as fulfilling the conditions established in State Board Order No. 73-5 and Regional Board Order No. 72-76. SCE also sumbitted proposed heat treatment operating conditions (see Attachment 2).

7. After reviewing the reports submitted by SCE and other pertinent data, the State Water Resources Control Board concludes that the reports fulfill the conditions set forth in Order No. 73-5 and Regional Board Order No. 72-26.

8. The State Water Resources Control Board further finds that the heat treatment operating conditions proposed by SCE (Attachment 2) will assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife within the meaning of Section 316(a) of the Clean Water Act.

THEREFORE BE IT RESOLVED:

That the State Water Resources Control Board finds the conditions set forth in Order No. 73-5 and Regional Board Order No. 72-26 have been fulfilled and removes these conditions provided that:

1. Paragraph 1C of the Proposed Heat Treatment Operating Conditions, submitted by SCE in its final reports, be amended to provide that the target temperature shall not be exceeded by more than $10^{\circ}F$ or more than fifteen (15) minutes.

2. The Proposed Heat Treatment Operating Conditions be amended to add that SCE shall notify the San Diego Regional Water Quality Control Board and the Long Beach office of the California Department of Fish and Game at least 48 hours in advance of any heat treatment at Units 2 and 3.

* Reports were submitted by SCE as it is the operator and majority owner of Units 2 and 3

3. The Proposed Heat Treatment Operating Conditions, as modified above, be incorporated into the operating procedures for Units 2 and 3 of the San Onofre Nuclear Generating Station.

4. The proposed Heat Treatment Operating Conditions, as modified above, be incorporated into the San Diego Regional Board's waste discharge requirements for Units 2 and 3.

CERTIFICATION

The undersigned, Executive Director of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on December 18, 1980.

Clint Whitney
Executive Director

THEREFORE, IT IS HEREBY ORDERED that:

1. An exception to the Thermal Plan for intermittent heat treatment to control marine fouling organisms in the intake and discharge conduits of San Onofre Nuclear Generating Stations, Units 2 and 3 operated by Southern California Edison Company and San Diego Gas and Electric Company is approved.

2. In order to permit the Regional Board to set precise limits on the frequency, degree and duration of heat treatment, the companies shall complete the following studies according to the accompanying time schedules:

   a. Determine the optimum operational procedure for achieving maximum protection of marine life and ocean water quality during thermal shock treatment.

   b. Determine under actual or simulated operating conditions the lethal temperature/time of exposure relationship for the control of fouling organisms in the intake system, and the necessity for raising the temperature for thermal shock as opposed to maintaining an elevated temperature for a longer period of time. This relationship must take into account all of the various operating conditions encountered during a typical 12-month period;

   c. Determine the frequency required for heat treatment of the intake system during the various seasons of the year, and determine the necessity for heat treatment during winter months;

   d. Determine whether both the intake and discharge conduits require heat treatment. If the discharge conduit is found to require heat treatment, studies (b) and (c) must be repeated for the discharge conduit;

   e. Determine the need for heat treatment vs. mechanical cleaning of the various parts of the shore structure; if the shore structure requires heat treatment, repeat studies (b) and (c) for such parts of the shore structure;

f. Document the number and biomass of marine fauna killed in that part of the heat treatment cycle when the discharge conduits are used as an intake and compare this to the number and biomass of marine fauna killed in the entire cycle; and

g. Conduct investigations of means to further limit entrainment of marine life during normal operations and heat treatment.

3. The companies shall comply with the following time schedule:

a. The work plan must be submitted within three months and must be ratified by the State and Regional Boards. If possible, studies should be performed first on a laboratory scale and confirmed by prototype observations using San Onofre Unit No. 1.

b. The studies must commence within six months.

c. Progress reports must be submitted every four months commencing four months after commencement of the studies. The progress reports are to contain the following:

(1) Data gathered in previous four-month period.

(2) Preliminary data analyses and summaries.

(3) Evaluation of progress.

(4) Problems encountered and proposed solutions to problems.

(5) Tentative conclusions, if possible.

d. The final results and conclusions are to be submitted within three years after commencement of the studies but not later than one year before commencement of operation of the plant.

4. The Regional Board shall, after reviewing the aforementioned studies, set precise limits on the frequency, degree and duration of heat treatment and such other terms and conditions as are deemed necessary, such that beneficial uses shall be protected to the maximum extent practicable. These numerical limits shall be concurred in by the State Board and by the Environmental Protection Agency before they become effective.

5. If, in the judgment of the Regional Board, the companies fail to satisfy the requirements set forth in Nos. 2 and 3 above, the exception to the Thermal Plan herein recited shall have no force and effect.

Adopted as the order of the State Water Resources Control Board at a meeting duly called and held at Sacramento, California.

Dated: February 15, 1973

ABSENT
W. W. Adams, Chairman

ABSENT
Ronald B. Robie, Vice Chairman

E. F. Dibble, Member

Roy E. Dodson, Member

Mrs. Carl H. (Jean) Auer, Member

Proposed Heat Treatment Operating Conditions
Submitted by
Southern California Edison Company

I. General Conditions

A. The frequency of heat treatment will be determined, in part, by a growth model for the Bay Mussel, Mytilus edulis, as described in Figure 1. Measurements and observations of biological material from the conduit, and observation of cooling water system parameters will also be used.

System operational constraints may require that a heat treatment be conducted prior to the time scheduled using the parameters above, typically during the prior weekend.

B. Heat treatment temperature and duration will be based on the Time-Temperature Mortality Curve for the Bay Mussel, Mytilus edulis (Figure 2), which includes an additional amount of time added to account for temperature measurement inaccuracy, non-homogeneity of temperature in the cooling water system, and other unknown factors. The highest temperature consistent with plant operating requirements will be selected to keep the heat treatment time to a minimum. Target times will be rounded up to the nearest five minutes.

C. The target temperature and time is subject to the precision which can be practicably attained by station operators. Consequently, during the temperature rise period, before initiating heat treatment, and as the influent temperature varies, temperatures may be inadvertently increased above the target temperature due to equipment limitations; however, the target temperature is not expected to be exceeded by more than 5°F or more than ten minutes. If temperature sensor readings differ slightly, the target temperature will be reached using the sensor with the lowest reading.

D. One or more heat treatments of the intake and discharge conduits will be conducted early in the initial operation of each of the units, as part of the startup testing of all plant equipment and systems. Heat treatment operations will be flexible with respect to temperature, duration and frequency for this period and for at least the first year of commercial operation, in order to adjust to the specific operational and biofouling conditions of Units 2&3.

II. Specific Conditions

A. Intake Conduit and Screenwell

1. Heat treatment of the intake conduit, fish return system and screenwell will be performed at 100°F (as measured in the screenwell) for 2.1 hours. 100°F represents the presently expected, maximum temperature capability of each unit. The heat treatment temperature will be adjusted upward or downward to the highest temperature compatible with station operation during initial operation of the units. A corresponding change will be made to the heat treatment duration in accordance with the Bay Mussel Time-Temperature Mortality Curve (Figure 2). (Heat treatment duration represents the period of time at the target temperature, and not the time required to reach 100°F and the time to return to normal operation).

2. Heat treatment of the intake conduit, fish return system and screenwell will be conducted at intervals predicted by a growth model, which is based on ambient water temperature. Heat treatments will be scheduled using the San Onofre Units 2&3 heat treatment Decision Flow Chart (Figure 1). Heat treatments will also be conducted prior to or following a station outage, if the outage period is anticipated to extend beyond the time of the next (growth model) predicted heat treatment.

B. Discharge Conduit

1. As long as normal operating discharge temperatures exceed 80°F for a minimum of 1000 hours, 85°F for 150 hours or 90°F for 31 hours, the discharge conduit will not require heat treatment. Unless these conditions are met, it must be assumed that settling and growth of biofouling organisms has occurred. When these conditions are not met, growth calculations, based on ambient intake water temperatures, will be used to schedule a discharge conduit heat treatment.

2. When required, the discharge conduit for Unit 2 will be heat treated at a discharge temperature of 105°F for 1.1 hour and Unit 3 at 105°F for 0.9 hour.

   These times are the onshore heat treatment times required to treat the furthest point offshore for 0.58 hours, the time indicated by the Time-Temperature Mortality Curve for the Bay Mussel (Figure 2). The differences compensate for conduit lengths which become significant because of different discharge velocities between heat treatment and normal operation.

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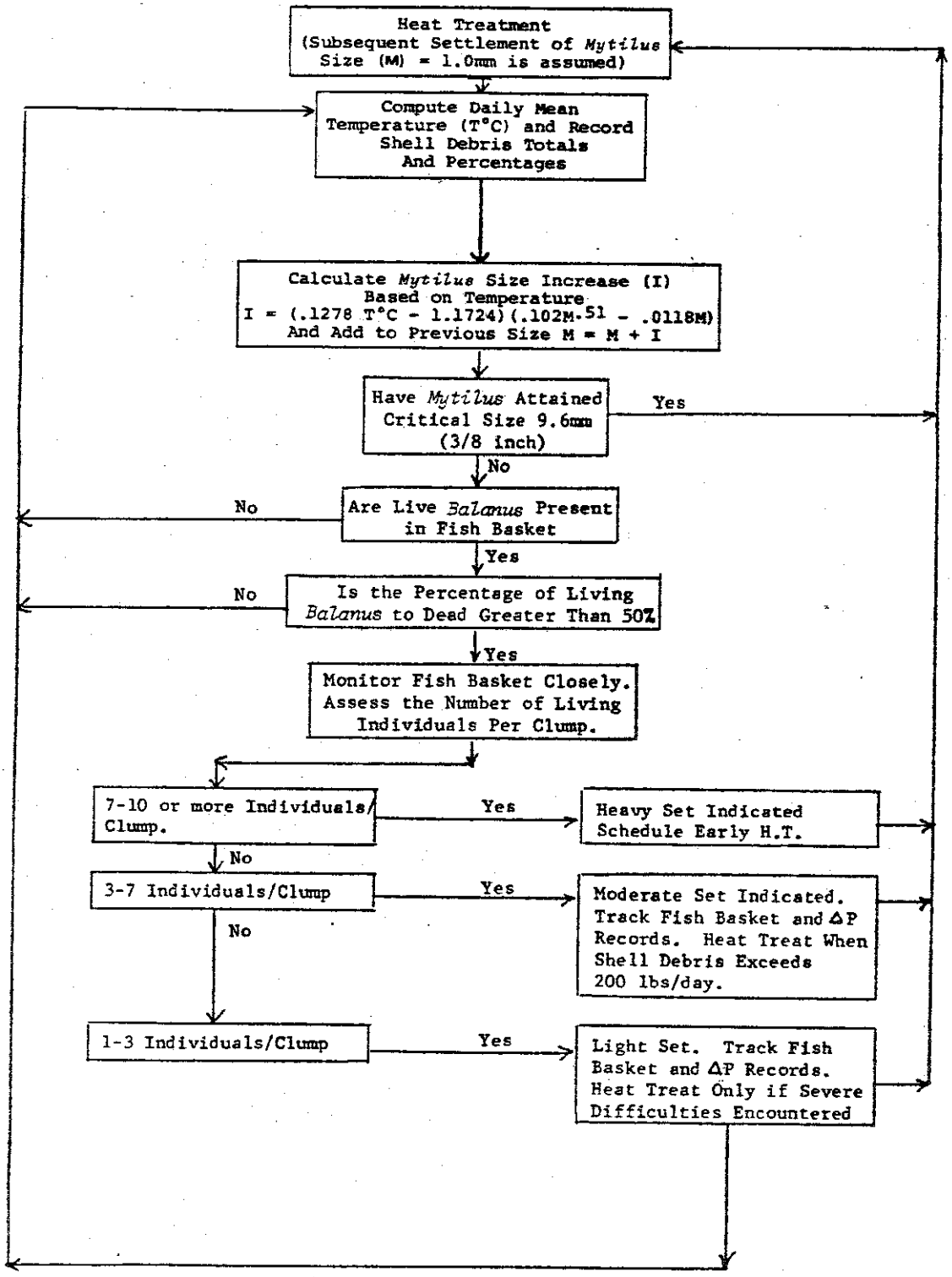

Figure 1. Daily heat treatment decision flow chart for San Onofre Units 2 and 3

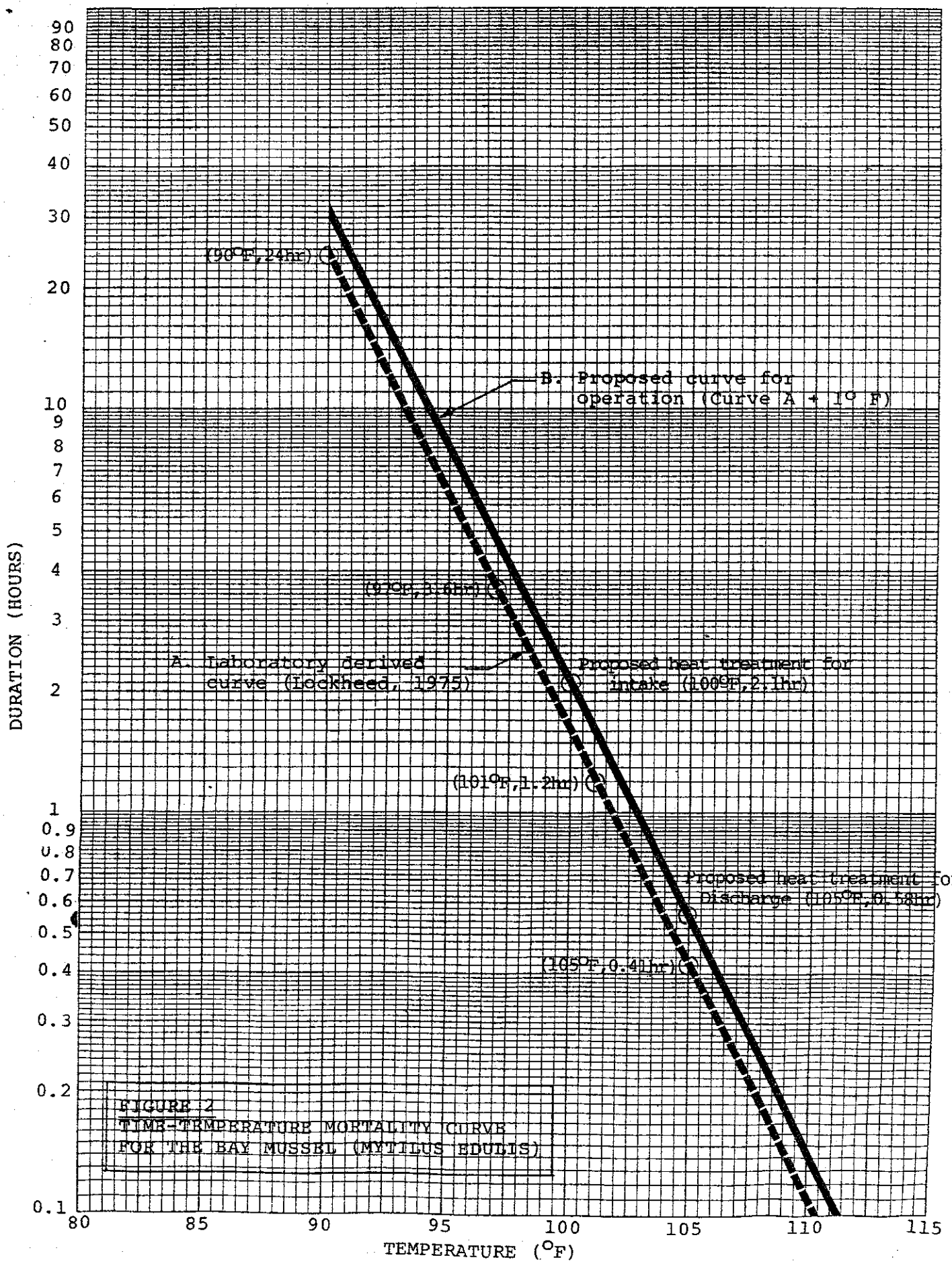

FIGURE 2
TIME-TEMPERATURE MORTALITY CURVE
FOR THE BAY MUSSEL (MYTILUS EDULIS)