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Naga Expedition: station index and data

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# NAGA REPORT

## Volume 1

Scientific Results  
of Marine Investigations of the South China Sea  
and the Gulf of Thailand  
1959-1961



*Sponsored by*

South Viet Nam, Thailand  
and the  
United States of America

The University of California  
Scripps Institution of Oceanography  
La Jolla, California  
1974

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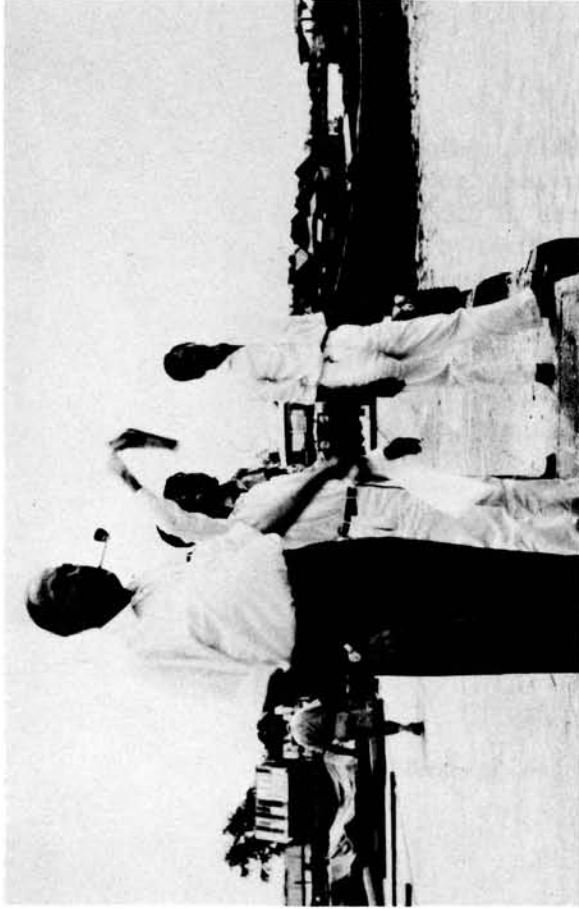
# NAGA EXPEDITION: STATION INDEX AND DATA

*by*

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The late Anton Fr. Bruun with students in Bangkok.



The RV *Stranger* on the Chao Phya River, Thailand.



The author and participating scientists aboard the RV *Stranger*.



The author aboard the RV *Stranger* off the coast of South Viet Nam.

# NAGA EXPEDITION: STATION INDEX AND DATA

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## INTRODUCTION

The Naga Expedition of 1959-1961 was one of a series of efforts on the part of the Government of the United States of America to cooperate in the development of the resources of Southeast Asia. Under a general economic accord with the Governments of Thailand and South Viet Nam a supplementary tripartite agreement was reached early in 1958 to conduct an exploratory survey of the marine resources potentially available for development in the Gulf of Thailand and in that portion of the South China Sea adjacent to South Viet Nam\* and to train marine scientists and technicians of the two Southeast Asian countries.

To implement its part of the agreement the United States Government invited the Scripps Institution of Oceanography (S.I.O.), University of California, to submit a proposal for such an investigation, including technical direction, research staff and a suitable oceanographic research vessel. Professor Roger R. Revelle, Director of S.I.O. at the time, submitted a proposal through the Regents of the University of California to the International Cooperation Administration (ICA). This proposal resulted in a Letter-of-Agreement which became effective on May 7, 1959. On August 26, 1960, a contract embodying and implementing the terms of the original agreement was negotiated.

Financial support for the project from the United States was supplied through this contract. A portion was subcontracted by the Regents of the University of California to the George Vanderbilt Foundation (GVF) of Stanford University. Thai and South Viet Namese participation and facilities were funded by the respective governments and participating universities. Subsequent support has been supplied from the University of California general funds and grants from the Office of Naval Research (O.N.R.), the U.S. Public Health Service (U.S.P.H.S.), the George Vanderbilt Foundation and, more recently, the National Science Foundation (N.S.F.).

Two independent advisory bodies were established to assist in the planning, coordination and execution of the project. The first, established by the terms of the agreement between the three cooperating countries, consisted of representatives of Thailand, South Viet Nam and respective branches of the United States Operations Mission (U.S.O.M.) and was called the "Coordinating Committee". The second body, known as the "Southeast Asia Panel", was an S.I.O. campus committee established by Director Revelle. It consisted of members of the staff and campus-associated agencies including the Inter-American Tropical Tuna Commission, U.S. Bureau of Commercial Fisheries and California Marine Life Research Program. The Project Officer of the expedition worked closely with these two groups and directed programs in the field.

The principal objectives of the project were as follows:

1. "To demonstrate the importance of oceanography and marine biology in relation to fisheries."
2. "To train oceanographic and fisheries scientists and technicians, to develop scientific understanding and appreciation and to accelerate the progress of science in the Gulf of Thailand and adjacent portions of the South China Sea."
3. "To lay scientific and administrative groundwork for early and continued development of marine resources in the Gulf of Thailand and adjacent portions of the South China Sea."

The agreement further stated:

"Major effort will be placed on carrying out the kind of basic studies which will be of value to the Southeast Asians over the next several decades. These studies will lead to an understanding of the

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\* A survey of the state of knowledge of hydrography then available to the participants in these efforts may be reviewed in Wyrski's (1961) paper, the first to be published in this Naga Report series. Much information is available in the Proceedings of the 9th Pacific Science Congress (Thailand, 1957) particularly in Volume 10-Fisheries and Volume 16-Oceanography. A brief but thorough discussion and bibliography of the Thai fishing industry may be found in Tiew's (1962). Various aspects of South Viet Nam, including the Bay of Nhatrang waters and coasts are treated in the Contributions of the Institut Oceanographique de Nhatrang. Relevant specific and general materials also appear in the Occasional Papers, Regional Studies and Special Publications of the Indo-Pacific Fisheries Council.

oceanography of the region, including the circulation, methods of enrichment, primary productivity and to the nature, distribution and abundance of the important marine resources.

A lesser, but equally important, effort will be placed on recognizing and acting on a specific problem, or problems, in the solution of which it is possible to demonstrate the practical applications of scientific findings.

To the extent possible, shipboard facilities will be provided for local scientific personnel to work as an integral part of the research group. Also, to the extent possible, resident staff members and visiting specialists will cooperate with local institutions such as the Chulalongkorn University and the University of Saigon in giving a series of lectures or short-term courses in their specialties. Scientific results arising from this project will be published in local and other suitable journals when feasible. In any case, summaries will be published locally."

The George Vanderbilt Foundation at Stanford University was asked to establish a program directed toward a marine faunal survey of the Gulf of Thailand and adjacent regions. This would include especially the preparation of a well documented collection of fishes. The collection would be deposited eventually in the United States and the Southeast Asian repositories where it would be available to biologists for study and loan.

It was planned that the Gulf of Thailand and adjacent portions of the South China Sea would be surveyed in a descriptive manner during the first year. The extent of the area would be determined by scientifically significant, rather than geographical, boundaries. In the second year monitoring cruises would be made as required to determine how typical were the conditions of the first year. Additional cruises, designed to attack specific problems raised by the descriptive studies and to train personnel, would be made.

The general plan of operation called for the expedition vessel to work alternately in the Gulf of Thailand and in the South China Sea on a seasonal basis predicated by the major climatic phenomena, the northeast and the southwest monsoons. These climatic regimens largely control environmental factors such as the ocean currents, temperature, precipitation and runoff. While these phenomena follow a roughly uniform pattern from year to year, there are significant variations in their onset, intensity and duration. There is even greater variation in the periods of transition between reversals of the system. Because of this and other factors, the final details of cruise schedules were not established in advance of the vessel's arrival in the area.

The RV *Stranger*, a 325-ton research vessel of the Scripps Institution of Oceanography, was to conduct the principal field investigations. Other ships and small craft were supplied through the courtesy of the Department of Fisheries of Thailand, the Royal Thai Navy and the Institut Oceanographique de Nhatrang, South Viet Nam. In addition to sea-going operations, collections were made at fish markets and fish landings in both Thailand and South Viet Nam.

Field work of the project began with the departure of the *Stranger* from San Diego, California, on June 15, 1959, and terminated with its return there on June 24, 1961. The regular survey cruises of the Gulf of Thailand and the South China Sea were begun following a short orientation course for participating nationals, including a nine-day cruise in the Gulf of Thailand in September, 1959; eleven survey cruises were completed before the vessel began its return to the United States in 1961.

Laboratory analyses, begun in 1959 on the collections of animals, including fish and planktonic forms and on the samples of bottom sediments, have continued. References are included in the Literature Cited and are indicated with an asterisk. Analysis and interpretation of physical, chemical, topographic and meteorological data have been made. Many of the studies have been or will be published by the Naga Report series of the University of California, Scripps Institution of Oceanography, La Jolla, California (of which this is Volume 1); several have been published elsewhere.

It is the purpose of this volume to provide a chronological list of all research activities carried out on the *Stranger* during the expedition: the voyage to Southeast Asia and the eleven survey cruises and the return voyage East. It is intended to give as much data, collected, processed and analyzed, as is feasible, or to

indicate, where not given, how the information (or collections) may be retrieved by interested researchers. That which does not appear here, but is none-the-less important, is the effect of the education of students, trainees, technicians and scientists from the three participating countries in the fields of Oceanography, Marine Biology and Marine Geology.

The total number of these participants was sixty-nine of whom fifty-eight were from Thailand and South Viet Nam. Of the latter group 57% made two or more cruises; 28% made four or more cruises. Nearly all who participated in four or more survey cruises were selected for four additional months of experience. For three months of this time the participants filled staff billets on board the *Stranger* during her return voyage to the United States. Following this, they spent two to four weeks at the Scripps Institution of Oceanography before returning home. Thus sixteen persons, 28% of the total number from the two participating countries, were gaining experience in the marine sciences for periods of twelve to twenty-four months.

## ACKNOWLEDGMENTS

Administrative headquarters for the expedition were provided by the Department of Fisheries, Ministry of Agriculture, Bangkok, who also provided freezer storage space at the Bangkok Fish Market, laboratory space and technical help at the Department of Fisheries' Technical Laboratory, ship personnel (diesel engineer) as well as field trainees and technicians. Instructors from the College of Fisheries at Kasetsart University (Bangkok) participated in the field work on the RV *Stranger*, in the laboratory work at Chulalongkorn University (Bangkok), and at the George Vanderbilt Foundation laboratories in Bangkok.

The Royal Thai Navy assigned hydrographic technicians, officers and petty officers to act as crew as well as scientific assistants and trainees on the *Stranger*. The Hydrographic Department provided both laboratory space and personnel at Bangkok to perform all the routine chemical salinity determinations. These numbered several thousand from the Gulf of Thailand and the South China Sea. It also provided medical and hospital facilities, berthing and repair facilities at Bangkok and at Sattahip. Additional berthing facilities for the vessel at Bangkok were arranged by the Royal Thai Navy through the courtesy of the Marine Division, Department of Police.

The Chulalongkorn University Faculty of Science staff and students participated in the biological collection, preservation, sorting and identifications and made available laboratory, office and storage facilities in their Department of Biology. Seminars, training courses and special field cruises were also held or initiated there.

The George Vanderbilt Foundation established field headquarters, including laboratory space and staff housing facilities at Bangkok. The laboratory was equipped with photographic facilities and a staff of two photographers. Besides processing their own fish market and shore collections, this laboratory accepted for identification, classification and preservation the pelagic and demersal fishes collected by the *Stranger*.

The Institut Oceanographique de Nhatrang made available facilities and living accommodations on numerous occasions and provided the motor boat *Mao Tien* for ferry service and collection aid in the Bay of Nhatrang.

The University of Saigon hosted ship and personnel on all Saigon stops and provided trainees and personnel throughout the expedition.

As part of the invaluable contributions to the expedition by these institutions, one hundred eight staff or students took part in the expedition on the *Stranger*, eighty-three of whom participated in one or more of the regular survey cruises. The entire expedition was characterized by exceptional cooperation of all participants. The project leader wishes to make special mention of those who bore extra administrative and decision-making burdens in the field and whose ingenuity and patience finally made this pilot project survey a success:

Dr. Anton Fr. Bruun, University of Copenhagen and University of California Captain Amporn Penyapol, Hydrographic Office, Royal Thai Navy, Bangkok

Mr. Boon Indrabarya, Department of Fisheries, Bangkok Professor Supachai Wanich Watana,  
Chulalongkorn University, Bangkok Rector Nguyen Quang Trinh, University of Saigon Dr. Le Van  
Thoi, University of Saigon

Participants in the Naga Expedition on the RV *Stranger* were:

Ba, Nguyen Van	King, M.	Scholander, Dr. Per F.
Banasopit, Thien	Knudsen, Dr. Jorgen	Sdubbundhit, Lt., j.g. Cha-Erb
Banner, Christopher	Llarco, M	Serene, Dr. Raoul
Blei, Raymond M.	Loi, Tran Ngoc	Shipek, Carl J.
Bolin, Dr. Rolf	Luom, Nguyen Van	Smith, Charles H.
Boonlapo, Bhaisal	Matsui, Tetsui	Smelser, Clifford E.
Boonma, Bunya	Mero, Dr. John	Songnark, Jumnong
Boonyuen, Vicharn	Miller, Capt. Frank	Sripajumpiya, Bhaisal
Brinton, Dr. Edward	Mingmitra, Chamnarn	Srivirojna, Lt., j.g. Amnuay
Bruun, Dr. Anton Fr.	Moodharasint, Kosol	Subagio
Buphavesa, Chaiyos	Muus, D.	Suboon, Lt., j.g. Anan
Calvert, Stephen	Nam, Sompong Mim	Sunpanich, Thumnoon
Chaitiamwong, Supachai	Nam, Tran Dinh	Suwanarit, Prachuab
Chalernpol, Lt. Cmndr. Sawang	Na-Nagara, Yong Yudh	Tanthikul, Soontorn
Chamsuksai, Bundith	Nhon, Tran Dai	Thien Tu Trinh
Chomsukprakit, Bhinyo	Nugulrak, Likit	Thompson, Robert W.
Clampitt, Clanton W.	Onnom, Songsukdi	Trac, Cao Xuan
Curray, Dr. Joseph R.	Pankasem, Narong	Tu, Tran Van
Debananda, Lt. Sg. Chuta	Penyapol, Capt. Amporn	Ucharatana, Chavalit
Faughn, Capt. James L.	Phoonsavad, Sompong	Vajrasthira, Chai
Gallardo, Ariel	Pinyoying, Sujet	van Andel, Dr. Tj. H.
Gonyea, Louis J.	Pirmoi, Sathuen	Van Landingham, John W.
Greenbaum, Richard H.	Piyakarnchana, Twesukdi	Varothai, Siri
Hai, Nguyen	Potibutra, Wong	Veevers, J.J.
Haxo, Dr. Francis T.	Prakitsri, Rangsarit	Villarta, R.
Hongkolohandha, Ens. Suchat	Quang, Tran Viet	Wooster, Dr. Warren S.
Hoodharasint, Kosol	Sach, Nguyen Van	Worawoothi, Pasok
Indrabarya, Kanok	Saichua, Pairat	Yamsri, Chala
Jacobs, William S.	Sainampuurg, Boonsong	Yuenyong, Satcha
Kasijan	Saisithi, Prasert	ZoBell, Dr. Claude E.
Khang, Nguyen Duc	Saomain, Asani	ZoBell, Mrs. Jean S.

In addition to cruise participants were those specialists who came to Southeast Asia to give instruction in their respective fields or to give special laboratory or cruise-planning assistance: Dr. Theodore Chamberlain, Professor Eugene La Fond, Mrs. Margaret K. Robinson, Dr. Douglas L. Inman, Dr. Robert Parker, jr., Mrs. Marcia Rottman, Dr. Garth Murphy.

Members of the George Vanderbilt Foundation in Bangkok were: Dr. Adair Fehlmann, Mr. Herbert Frey and Dr. R. R. Rofen.

Also cooperating with the project through the auspices of the National Institutes of Health were Dr. Francis T. Haxo and Dr. Beatrice M. Sweeney.

## METHODS OF COLLECTION AND OBSERVATION

References to various sources in which descriptions of the procedures, methods and data-processing followed by the Naga Expedition are given below. Citations for specific literature (accompanied by an asterisk), whose content includes material from the Naga Expedition collections or data, are also provided.

### I. Physical and Chemical

#### A. Collections and Observations

Serial hydrographic casts carrying three to thirteen Nansen bottles were lowered at each hydrographic station. Samples were then analyzed for oxygen, salinity and phosphate. Paired, protected reversing thermometers accompanied each Nansen bottle. In addition unprotected reversing thermometers were used with the protected ones at all depths greater than 100 m. Hydrographic casts were routinely made to within a few meters of the bottom in the Gulf of Thailand and in shelf waters off South Viet Nam. In the basin of the South China Sea, casts were to 1000 m and, at selected deep station, to 4000 m.

Bathythermograph (BT) records were obtained at each hydrographic station, at two equally spaced locations between consecutive hydrographic stations, at each special biological station and at observed current discontinuities.

Weather observations were made simultaneously with each BT observation and at special six-hour intervals on request by local weather offices. The observations included wind direction and speed, cloud types and coverage, humidity determination (wet and dry bulbs), barometric pressure and air temperature.

Surface water temperature was recorded with each BT observation using a "bucket" thermometer; surface water temperature as a continuous function of distance was recorded by thermograph.

Station positions were determined whenever possible by star sights, sun lines or by observations of terrestrial features. Dead reckoning, substantiated by soundings, was continually subject to adjustment as more precise fixes became available.

Bottom topography was recorded continuously on a Raytheon recording fathometer (Model de 705, Explorer).

Special observations include anchor stations occupied for hydrography over a lunar tidal day (Robinson, 1974a\*), current and drift observations (Robinson, 1974a\*, and Cruise S9 in this volume), extra BT observations, water sampling and net hauls in areas of known or suspected discontinuity, upwelling or notable phytoplankton concentration, surveys of topographical features and photography of observed surface phenomena.

#### B. Analyses and processing of Physical Data and Water Samples

The procedures for collecting, recording, analyzing and processing of data and of water samples were as described in U.S. Naval Oceanographic Office Publication No. 607 (1968). The observed data for temperature, salinity, and oxygen and the computed data for  $\tau$  and  $t$ , are tabulated in the Appendix of this volume according to location, depth, wind, weather and sea state and wire angle for each hydrographic station. Specific information applicable to the data processing of the Naga Expedition cruises appears at the beginning of the Appendix.

The BT slides were photographed at Scripps Institution of Oceanography. Copies were distributed to the Royal Thai Navy Hydrographic Office, Bangkok, Thailand, the Institut Oceanographique de Nhatrang, South Viet Nam, and the United States National Oceanographic Data Center, Washington, D.C., and, although the individual BT traces will not be published, copies may be obtained upon request from S.I.O. or from N.O.D.C.

Dissolved oxygen concentration was determined for each water sample as it came on board ship. Salinity titrations were completed by the Royal Thai Navy personnel at their Hydrographic Department laboratory.

Water samples, obtained from Nansen bottles, were frozen on shipboard for subsequent dissolved phosphorous ( $\text{PO}_4\text{-P}$ ) analysis at shore laboratories. In spite of care taken in preserving the samples, replicate



samples show a significant scatter and thus are considered to be unreliable. The apparent cause of the difficulties is as follows: Intermittent thawing of the samples may have occurred prior to analysis, leading to unanticipated bacterial activity. In addition, interaction between the samples and their plastic containers may have taken place so as to alter the initial PO<sub>4</sub>-P concentrations. For these reasons the values obtained are not considered sufficiently reliable to justify their publication. They are available upon request at the Scripps Institution of Oceanography.

Wyrski (1961) has already been cited for background material applicable to the general physical characteristics of the area. Robinson's (1974a\* and 1974b\*) physical studies are specifically of the Naga Expedition data. Parke, Emery, Szymankiewicz and Reynolds (1971) incorporate Naga Expedition data in a broad study of the continental margin structure.

## II. Geological

Bottom sediments were collected with a small (N.E.L.) snap sampler and with a small Phleger corer (Niino and Emery, 1961\* and Emery and Niino, 1963\*). A 150-pound gravity corer was used on the Expedition in the open Pacific in conjunction with underwater camera photography (Mero, 1965\*). Shell and chain dredges were used in the Timor Sea on cruise S11A (van Andel and Veevers, 1967\*).

The geological collections made on each cruise are indicated in the Station Index of each cruise under the column "Bio. Activity" (i.e., Phl. core, NEL, camera, grav. core, etc.); the sediment bottle number appears in the last column on the right. Both may be correlated with the Hydrographic Station number in the first column on the left.

Descriptions of sediments obtained in the Gulf of Thailand and the South China Sea may be found following the Station Index for S1, S2 and S9A respectively (see also under III. Biological, Benthic Sampling). Equipment descriptions and handling techniques for the snap sampler and corer may be found in the U.S. Naval Oceanographic Publication No. 607 (1968).

## III. Biological

Sampling was by various plankton net tows, various benthic grabs, trawls and dredges, and shore collections by rotenone poison. Collections were also made by hand methods such as hook-and-line, trolling, dip netting, bird or flying-fish on deck (FoD) or surface bottle sampling of phytoplankton blooms.

The Station Index for each cruise includes one column, "Bio. Activity" (occasionally "Geo. Activity"), indicating the type of collection made at each station, and each biological activity is indicated by a "Bio. Sta. \_\_\_" (second column). The Biological Station Number (which in some cases appears on specimen labels) may be correlated with the Hydrographic Station Number (first column, "Hydro. Sta. \_\_\_"). The last column on the right lists the S.I.O. fish collection number ("Fish No."; occasionally "NEL bottle No.").

Zooplankton samples are curated in the Scripps Zooplankton Collections at S.I.O. (Snyder and Fleminger, 1972) and at Chulalongkorn University, Bangkok. Biological material sorted from grabs, trawls and dredges is curated at the Institut Oceanographique de Nhatrang and in the Scripps Invertebrate Collections. Fish collections are to be found in the Scripps Vertebrate Collections and at the California Academy of Sciences, San Francisco, California. In cases where biological material has already been studied, the author of the published work should be contacted (Naga Expedition collections or data in the Literature are indicated by an asterisk).

Studies including material from the Naga Expedition biological collections are: Alvarino (1967), Banner and Banner (1962 and 1966), Brinton (1961 and in press), Cherbonnier [1960 (1961)], Fauchald (1967), Gallardo (1967), Imbach (1967), Matsui (1970), Piyakarnchana (1962), Piyakarnchana and Vajropala (1961), Rofen (1963), Rottman (in press), Serene and Lohavanijaya (1973), Shiino (1963), Southeast Asia Research Program (1963), Stephenson (1967), Sudara (1971), Sweeney and Haxo (1961) and ZoBell (1961).

### A. Plankton Sampling

The 1 m net tow was routinely used for the collection of zooplankton. The mouth is circular, 1 m in width and 0.79 m<sup>2</sup> in area. The netting forms a cylinder for a distance of 1 m behind the mouth which is followed by a

cone about 4 m long. The cone terminates in a removable cod end bag. The mesh width of the net is 0.65 mm and of the cod end, 0.3 mm.

Standard procedure for towing is along an oblique transect of the water column with the vessel moving at 1.5-2 knots. The course is usually with the wind on the starboard bow, the wire and net leading out from a davit on the starboard or windward side. A weight of 100 pounds, the same used for the hydrographic casts, is attached to the end of the towing wire. The net's towing line is clamped to the wire at a distance of 5-10 m above the weight. Timing of the tow begins when the net enters the water. The wire is paid out at 50 m/min. until the desired length of wire is out, usually 200 m when the water depth permits. The net is then retrieved at a constant speed of 20 m/min. The ship's speed is regulated in the course of the tow so that the wire maintains an angle of approximately 45° with the vertical. This assures that the net moves at a constant speed through the water.

A list of the 1 m net tows made on the Naga Expedition follows the Station Index for each cruise. (The Hydrographic Station Number in the first column may be used to locate the station data in the Appendix.) The depth of haul (m) was calculated from the amount of towing wire paid out and the angle of the wire with the vertical (usually approximately 45°):

$$\text{Maximum depth of Net} = (\text{wire paid out})(\text{cosine of wire angle})$$

While towing, the wire approximated a straight line (Smith and Ahlstrom, 1948).

For estimation of the volume of water (m<sup>3</sup>) strained by the net a TSK flow meter was mounted in the center of the mouth of the net. The volume of water filtered by the net for each tow was calculated, not read directly from the flow meter. The meter was initially calibrated by being raised vertically for a known distance through the water while clamped to the hydrographic wire while the vessel was stopped. The meter was raised at the approximate speed to be used in towing—about 2 knots. The number of revolutions made by the meter's impeller per unit distance raised was the calibration factor used in estimating the horizontal distance traversed by the net in the course of the standard oblique plankton tows:

$$\text{Calibration Factor for Flow Meter} = \frac{\text{Propeller Revolutions}}{\text{Distance (m) Flow Meter is Raised Vertically at 2 knots (60 m/min)}}$$

$$\text{Horizontal Distance of Net Tow (m)} = \frac{\text{Revolutions Recorded During Tow}}{\text{Calibration Factor for Flow Meter}}$$

$$\text{Volume of Water (m}^3\text{) Strained by Net During Oblique Net Tow} = \left( \text{Horizontal Distance of Net Tow (m)} \right) \left( \text{Area of Mouth of Net } 0.79 \text{ m}^2 \right)$$

The net usually strained about 300-400 m<sup>3</sup> of water during a standard haul with 200 meters of wire out (MWO). Tows were of shorter duration in the Gulf of Thailand and over the Sunda Shelf.

Data presented for the net tows made on cruises S11A and S11B include depth of haul as "meters of wire out" (MWO). An approximation of the actual depth of the tow may be calculated by multiplying MWO by the cosine of 45°. Similarly, an estimation of the volume of water strained by the net is not included for S11A and S11B. An approximation of this value may be obtained by assuming 20 m<sup>3</sup> of water to be strained for each minute of towing time.

Plankton volume was measured for each sample taken on cruises S1 through S10 and was standardized to 1000 m<sup>3</sup> of water strained. Volumes were obtained by the wet displacement method. The preserving fluid was

drained off through a piece of bolting cloth having the same mesh width as the cod end of the net. The moist plankton was then added to a known volume of pure fluid, the resulting volume being then equal to wet plankton plus fluid.

Sky conditions are considered relevant to zooplankton data particularly in view of the vertical migrations preferred by a number of species and the ability of others to avoid capture in daylight. The amount of sky covering is tabulated in tenths of a scale of 1 to 10. Cloud types are listed using the abbreviations noted in U.S. Naval Oceanographic Publication No. 607 (1968).

The ½ m net refers to the Marotoku plankton net the use of which on the Naga Expedition was discussed in Brinton, et. al. (\*1961). The net is actually of 45 cm mouth diameter and the mesh aperture width is 0.32 mm. The net was hauled vertically from a depth near the sea floor or from 200 m when sea-depth permitted. This net proved suitable for the collection of an array of organisms of a somewhat smaller size than those retained by the 1 m net which has twice the mesh aperture width.

The 20 cm, or phytoplankton, net has a mouth diameter of 20 cm and a mesh aperture width of 0.14 mm. Sampling by vertical haul, this net was used for the collection of the smaller zooplankton and the larger phytoplankton cells.

The 2 m stramin net is a large ring net with a mouth diameter of 212 cm and a mesh width of approximately 1 mm. The side length of the net bag is about 720 cm. It was towed nightly at the surface behind the ship with 100-200 m of wire out at a speed of 2-3 knots. Deeper oblique hauls to about 400 m were routinely made at six to eight stations per cruise in the oceanic South China Sea area.

The micro-nekton samples collected with the 2 m net were sorted in the biological laboratory at Chulalongkorn University. Major categories were sorted; e.g., fishes, pteropod molluscs, squid, euphausiid crustaceans, decapods, amphipods, pelagic tunicates. Smaller organisms such as chaetognaths and copepods were retained in the unsorted residue.

The 2 m net tows are listed in the Station Index for each cruise where they occur in chronological order of station activities (see column headed "Bio. Activity"). They are designated serially by cruise for cruises S3, S4, S6, S7, S8, S9, S9A, S10, S11 (all); i.e., S3-201, S3-202..., S4-201, S4-202..., etc. Those taken en route to Southeast Asia and on cruises S1, S2 and S5 bear only their hydrographic and/or biological station number (see also Snyder and Fleminger, 1972).

#### B. Benthic Sampling

In addition to the descriptions of bottom sediments which follow the Station Indexes for S1, S2 and S9A, Bay of Nhatrang bottom sediments descriptions may be found in Gallardo (\*1967).

Quantitative benthic samples were taken with van Veen (U.S. Naval Oceanographic Office Publication No. 607, 1968) and Petersen (Sverdrup, Johnson and Fleming, 1946) 0.1 m<sup>2</sup> grab samplers. Qualitative benthic samples were taken with a 2-foot biological dredge and with a 2.5-foot wire dredge. Nekton collections were made with a 6-foot, a 10-foot and, in one instance, a 7-foot beam trawl and with a 40-foot and a 16-foot otter trawl.

The sedimentary material sampled by the Peterson and van Veen grabs was washed through metal screens on shipboard, usually through mesh of .333 mm width, in order to remove the silt and fine sand. The residual sand, shells and living organisms were separated immediately, where practicable, and preserved separately. In the laboratory, these were sorted to molluscs, crustaceans, annelids, etc. When the residue was large, a preliminary sort was performed to separate out the delicate animals such as polychaetous annelids and tanaeid crustaceans. The remaining material was preserved in toto. These "shell and sand" samples, mainly deriving from cruise S9A, are retained in the geological collections at S.I.O.

## THE CRUISES

The westward voyage from San Diego to Bangkok is not to be considered an essential part of the routine survey. Geological investigations were made on one leg between San Diego and Honolulu, June 18-28, 1959, which correlated various bottom and core samples with deep sea photography, particularly of manganese nodules (Mero, 1964\*). The several net tows, the hydrographic, bathythermographic and weather data collections may be considered of an equipment-testing nature and for the purpose of establishing a coordinated working routine.

The return voyage eastward in 1961, Cruise S11, included five legs. The first, S11A, consisted of two parts of which the earlier (March 15-April 2) continued routine surveying (1 m and 2 m net tows, BT and weather observations) at closely spaced regular intervals through the Gulf of Thailand, South China Sea and adjacent waters to Darwin, Australia. The latter half of this leg (April 6-20) was primarily a geological survey of the Timor Sea (van Andel and Veevers, 1967\*, and Robinson, 1974b\*) on which BT and weather data and collections were made coordinate with and in addition to cores and dredges, but no net tows were made. Biological activities included only dipnetting and flying fish records.

The second leg, S11B, continued a regular survey routine including BT, weather observations and 1 m and 2 m net tows from Darwin to Manila through the Banda, Molucca, Celebes and Sulu Seas. On the remaining three legs of the return voyage, to Guam, Honolulu and San Diego (S11C, S11D, S11E), 1 m net tows were discontinued, but 2 m net tows, BT and weather observations were continued.

The plans of the routine Southeast Asian cruises included serial alternation of the two survey areas; i.e., odd-numbered cruises (S1, S3, S5, S7, S9 and S9A) refer to Gulf of Thailand surveys. Even-numbered cruises (S2, S4, S6, S8 and S10) refer to South China Sea cruises. In all latter cases, the ship departed from Bangkok (stations made en route to pattern area are designated Underway or U) making for Nhatrang. South China Sea cruises included stops both at Nhatrang and at Saigon which procedure facilitated rendezvous schedules for staff, student trainees and guests.

The cruise track and station pattern planned for each of the two areas was adhered to for each following cruise, respectively in the same area, except where weather or sea conditions interfered.

The cruise pattern for the Gulf of Thailand consisted of five transverse lines, oriented roughly perpendicular to the coastlines, crossing the Gulf in a northeast-southwest direction. The southernmost line ran from the Thai-Malaysian border near Kota Bharu toward Poulo Obi at the southern tip of the Indo-Chinese peninsula. The remaining four lines were parallel at selected intervals (not equidistant) to the north. Hydrographic stations (numbered consecutively by cruise: i.e., S1-1, S1-2...: S3-1, S3-2... etc.) were spaced at 30 to 40 mile intervals along each line. Two additional bathythermograph-weather stations (designated A and B) were located equidistantly between succeeding stations. Cruising distance was approximately 2,000 miles requiring 14 to 17 days.

The cruise pattern for the South China Sea consisted of stations aligned along six lines, perpendicular or nearly so, to the eastern coast of South Viet Nam, extending from near shore to approximately 250 miles offshore. The northernmost line ran due east-west at latitude 15°40'N, falling at the southern edge of the Gulf of Tonkin, passing just south and clear of Triton Island in the southern Paracels. The remaining lines were spaced at approximately 100-mile intervals, the southernmost approaching the southern tip of South Viet Nam (at Poulo Obi) from the south. Hydrographic stations (numbered consecutively by cruise: i.e., S2-1, S2-2...: S4-1, S4-2... etc.) were spaced at 40-mile intervals along the track lines. Two additional bathythermograph-weather observation stations (designated A and B) were located equidistantly between succeeding stations. Cruising distance was approximately 3,800 miles requiring 30 to 40 days.

Biological sampling activities on all cruises were carried out in conjunction with hydrographic or bathythermograph-weather observation stations, as well as in between such stations, and were numbered chronologically consecutively by year; i.e., 59-1 through 59-131, 60-101 through 60-1106, 61-1 through 61-343

(the latter includes all legs of the return voyage, cruise S11, as well as the regular survey, cruise S10). The correlation of the several kinds of activities at stations, including geological, is indicated in the Station Index for each cruise where the hydrographic (or BT-weather station) number, or ditto mark, indicates that the position of the biological, or geological, station is identical with it but that the time is later, usually included also.

The time given in the Station Index for all regular cruises is local time (zone = -7). Those for cruise S11 are local time; zone changes when occurring are indicated in the Index.

All cruises were conducted at 10 knots except cruise S5 which was at 9 knots due to engine trouble.

Charts showing track and station pattern and indicating each kind of activity on each cruise are given following the Station Indexes.

## NAGA Cruise Index

Cruise	Date	Hydrographic Station Numbers	Biological Station Numbers	Principal Survey Area	Page
Initial Voyage	June 15-August 28, 1959	NH1—NH47 (BT's = 1-21)	59-1—59-32	Pacific Ocean	18
				South China Sea	
				Gulf of Thailand	
S1	Oct. 19-31, 1959	S1-1—S1-35	59-1—59-76	Gulf of Thailand	22
S2	Nov. 16-Dec. 16, 1959	S2-1U—S2-82U; S2-1—S2-32; S2-33U—S2-50U	59-77—59-131	South China Sea	27
S3	Jan. 19-31, 1960	S3-U1—S3-U29; S3-1—S3-32	60-101—60-178A	Gulf of Thailand	33
S4	Feb. 15-Mar. 21, 1960	S4-U1—S4-U39; S4-1—S4-42	60-200—60-306	South China Sea	38
S5	Apr. 21-May 3, 1960	S5-U1—S5-U13; S5-1—S5-34C	60-307—60-416	Gulf of Thailand	44
S6	May 23-June 28, 1960	S6-U1—S6-U31; S6-1—S6-42	60-417—60-562	South China Sea	49
S7	Aug. 2-15, 1960	S7-1—S7-42E	60-563—60-699	Gulf of Thailand	55
S8	Sept. 6-Oct. 8, 1960	S8-U1—S8-U4; S8-1—S8-43; (incl. S8-S11—S8-S25)	60-700—60-843	South China Sea	60
S9	Nov. 9-25, 1960	S9-U1—S9-U4; S9-1—S9-41	60-844—60-1008	Gulf of Thailand	67
S9A	Dec. 8-14, 1960	S9A-1—S9A-20	60-1009—60-1106	Gulf of Thailand	75
S10	Jan. 10-Feb. 13, 1961	S10-U1—S10-U31; S10-1—S10-21; S10-S1—S10-S7B; S10-U32—S10-U77	61-1—61-156	South China Sea (and Gulf of Thailand)	79
S11A	Mar. 15-Apr. 21, 1961	S11A-1—S11A-192; S11A-V165—S11A-V377	61-156—61-256	Bangkok to Darwin	86
S11B	Apr. 23-May 3, 1961	S11B-1—S11B-92	61-257—61-297	Darwin to Manila	86
S11C	May 6-20, 1961	S11C-1—S11C-126	61-298—61-332	Manila to Guam	86
S11D	May 23-June 10, 1961	S11D-1—S11D-119	61-333—61-338	Guam to Honolulu	86
S11E	June 13-24, 1961	S11E-1—S11E-107	61-339—61-343	Honolulu to San Diego	86

NH = used only for stations on initial voyage

S = Stranger

U = Underway (en route or return to South China Sea regular stations)

S11A-S11E = return voyage legs

### Initial (San Diego to Bangkok) Voyage. Pacific Ocean, South China Sea, Gulf of Thailand

The initial voyage of the *Stranger* on the Naga Expedition was directly from San Diego, California to Bangkok, Thailand by way of Hawaii, Guam, Manila, and Nhatrang, South Viet Nam. Except for geological material gathered on the first leg, the voyage was primarily utilized as an early opportunity to test equipment and to coordinate a working ship's routine to encompass desired data and material collecting as far as possible.

The geological investigations made June 18-28 between San Diego and Honolulu were to correlate various bottom collections (gravity cores and dredges) with deep-sea underwater camera photographs (Mero, 1965\*).

Biological stations (59-1 through 59-32) and BT stations (1-21) are coordinated with station numbers (NH1 through NH47) in the Station Index. Data for 2 m net tow collections may be found listed in Snyder and Fleminger (1972).

Itinerary: depart San Diego, June 15, 1959—arrive Honolulu, June 29,

depart Honolulu, July 3—arrive Guam, July 21,

depart Guam, July 24—arrive Manila, August 8,

depart Manila, August 13—arrive Nhatrang, August 17,

depart Nhatrang, August 19—arrive Sattahip, August 24,

depart Sattahip, August 28—arrive Bangkok, August 28.

(Student training cruise in northern Gulf of Thailand, September 8-17.)

Sta. No. NH-	BT No.	Bio. Sta. No.	Date 1959	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. W	Bio.(or Geo.) Activity	Fish No. (SIO-61- )
depart San Diego, June 15, 1959										
zone = +9										
1	none	59-1	VI-17	-	2020	-	28 59 00	125 31 00	DIP	-
2	none	59-2	18	-	0850	-	27 56 00	127 31 30	bird (banded)	-
"	1	none	"	0905	-	2000+	27 56.5	127 31	none	-
2A	-	(geol.)	"	1003	-	2440	" "	" "	grav. core	-
2C	-	(geol.)	"	1340	-	2449	" "	" "	dredge	-
3	-	59-3	19	-	0858	2000+	27 16 15	128 45 00	1 m	SIO 61-640
"	2	none	"	0910	-	2000	27 16	128 45.5	none	-
3B	-	(geol.)	"	0930	-	2453	" "	" "	camera #1	-
3C	-	(geol.)	"	1235	-	2456	" "	" "	grav. core	-
4	3	none	20	1305	-	2000+	25 29 00	132 12 00	none	-
4B	-	(geol.)	"	1336	-	2266	" " "	" " "	grav. core	-
4C	-	(geol.)	"	1445	-	2280	" " "	" " "	camera #2	-
5	none	none	20	1925	-	-	25 15 00	132 32 15	none	-
zone = +10										
6	-	none	21	1100	-	-	24 29 15	135 15 45	none	-
"	4	none	"	1110	-	2000+	24 28.2	135 16	none	-
6B	-	(geol.)	"	1136	-	2435?	" "	" "	grav. core	-
6C	-	(geol.)	"	1415	-	2350	24 27	135 16.5	camera #3	-
7	none	none	21	1934	-	-	24 12 00	135 52 00	none	-
8	none	none	22	0920	-	-	23 20 30	135 15 30	none	-
"	5	none	"	0930	-	2000+	23 17	138 15	none	-
8C	-	(geol.)	"	-	-	2670	" "	" "	dredge	-
9	none	59-4	22	-	1947	-	23 20 30	139 03 00	DIP	-
10	-	59-5	23	-	0752	2920	23 20 00	141 13 00	dredge	-
"	6	(geol.)	"	0800	-	2910	23 17	141 13	dredge	-
10B	-	(geol.)	"	0802	-	2970	" "	" "	grav. core	-
10C	-	(geol.)	"	1158	-	2945	" "	" "	camera #4	-
11	none	none	23	1952	-	-	23 15 50	141 29 15	none	-
12	-	none	24	1058	-	-	24 21 30	143 58 30	none	-
"	7	none	"	1110	-	2000+	24 20.5	143 59	none	-
12B	-	(geol.)	"	1200	-	2780	" "	" "	grav. core	-
13	none	59-6	24	-	1730	-	23 49 00	144 45 30	?	SIO 61-632
13A	-	(geol.)	"	1830	-	2885	23 49.5	" "	dredge	-
14	-	none	25	1002	-	-	23 37 00	147 09 00	none	-
"	8	none	"	1005	-	2000+	" " "	" " "	none	-
14B	-	(geol.)	"	1137	-	2760	" " "	" " "	grav. core	-
"	none	(geol.)	25	1723	-	2850	23 54	148 00	dredge	-
15	none	59-7	"	1922	1922	-	23 54 00	148 01 00	?	SIO 61-7??
zone = +11										
16	-	none	26	1326	-	-	22 00 00	150 00 00	none	-
16A	-	(geol.)	"	1327	-	2860	" " "	" " "	camera #5(last)	-



Sta. N MI-	BT No.	Bio. Sta. No.	Date 1959	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. W	Bio.(or Geo.) Activity	Fish No. (SIO-61- )
"	9A	none	"	1630	-	2000+	" " "	" " "	none	-
"	9B	none	"	1855	-	"	" " "	" " "	none	-
17	none	none	27	0802	-	-	22 00 00	150 53 30	none	-
"	"	(geol.)	"	0839	-	3090	" " "	150 52	grav. core	-
18	none	none	27	2000	-	-	21 56 00	152 43 30	none	-
19	none	none	28	0802	-	-	21 38 00	154 42 00	none	-
	10	(geol.)	"	0810	-	2665	" " "	154 42.5	grav. core	-
20	none	none	28	1920	-	-	21 34 30	156 32 45	none	-
"	11	none	"	1925	-	2000+	21 25.1	156 32	none	-
Honolulu, June 29-July 3										
21	-	none	VII-4	1845	-	-	21 17 15	163 01 45	none	-
"	12A	none	"	1450	-	2000+	" " "	" " "	none	-
				zone = +12						
22	none	none	5	1938	-	-	21 26 15	167 21 00	none	-
23	none	none	6	2000	-	-	21 12 00	171 38 00	none	-
24	-	none	7	1800	-	-	21 11 00	175 00 00	none	-
"	13A	none	"	1810	-	2000+	21 11.5	" " "	none	-
25	none	none	8	1935	-	-	21 04 45	178 57 00	none	-
26	none	none	9	2005	-	-	21 33 30	177 13 30	none	-
				zone = -12				Long E		
27	none	59-8	11	-	0848	-	21 07 00	175 07 15	2 m	SIO 61-593
"	14	none	"	1030	-	2000+	20 06	175 01	none	-
28	15A	none	12	1354	-	2000+	19 42 00	172 25 15	none	-
29	none	none	13	1907	-	-	19 27 45	169 36 00	none	-
				zone = -11						
none	16	none	15	0845	-	2000+	18 05	164 21.5	none	-
30	17	59-9	15	1840	1830	-	17 41 00	162 34 15	2 m	SIO 61-594
31	18	59-10	16	1200	1146	2000+	17 03 00	160 01 00	DIP	SIO 61-595
"	-	59-11	"	"	"	"	" " "	" " "	2 m	SIO 61-641
32	none	59-13	17	-	1800	-	16 27 00	157 12 00	2 m	SIO 61-642
-	-	59-14	-	-	-	-	-	-	TROLL(akipjack)	-
33	none	59-15	18	-	1830	-	15 37 30	153 25 00	DIP	SIO 61-596
"	"	59-16	"	-	"	-	" " "	" " "	2 m	-
34	19	59-17	19	1050	1043	2000+	15 14 45	151 00 30	2 m	-
35	none	59-17A	19	-	1845	-	15 12 00	150 31 00	2 m	-
				zone = -10						
36	none	59-18	20	-	1930	-	14 31 00	147 01 00	1 m	-
"	"	59-19	"	-	-	-	" " "	" " "	2 m	SIO 61-643
37	none	59-20	22	-	2200	-	13 27 00	144 37 00	DIP	-
Queen, July 21-24										
38	none	59-22	25	-	1920	-	13 06 45	145 41 00	1 m	-
"	"	59-23	"	-	"	-	" " "	" " "	2 m	SIO 61-598
none	none	59-24	27	-	1930	-	?	?	TROLL	-
39	20	none	28	1745	1740	2000+	10 52 00	140 06 00	none	-
	none	59-26	29	-	1707	-	10 12	137 40	DIP	-
40	none	59-27	"	-	1845	-	10 07 30	137 27 30	DIP	SIO 61-599

Sta. No.	ET No.	Bio. Sta. No.	Date 1959	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Bio.(or Geo.) Activity	Fish No. (SIO-61- )
"	"	59-28	"	-	2000	-	" " "	" " "	2 m	SIO 61-617
-	none	59-29	30	-	0958	-	09 24.7	135 20.8	DIP	-
41	none	none	"	1059	-	-	09 24 40	135 21 00	none	-
42	none	59-30	31	-	0818	-	08 13 00	131 36 00	DIP	SIO 61-600
"	21	none	"	0920	-	2000+	08 10	131 36.5	none	-
43	none	none	VIII-7	2023	-	-	13 35 00	120 53 15	none	-
44	none	no #	13	1910	1910	-	14 02 30	119 12 00	2 m	-
45	none	no #	14	1730	1730	-	13 11 00	115 57 00	2 m	-
46	none	none	15	1730	-	-	13 00 00	113 47 30	none	-
"	"	no #	"	-	-	-	" " "	112 48	2 m	-
47	none	none	17	0400	-	-	12 43 30	110 45 00	none	-
none	none	59-31	22	-	-	-	09 00 00	103 00 00	FoD	-
none	none	59-32	23	-	-	-	11 30 00	103 30 00	FoD	-

Settship, August 24-28

Bangkok, August 28-September 8

Student Training Cruise, September 8-17

						Depth (m)				
1	-	none	IX-8	1301	-	18.3	13 04.5	100 09.5	none	-
2	-	none	8	1540	-	27.4	13 00.2	100 45	none	-
3	-	none	8	1840	-	46.6	12 39.8	100 44.7	none	-
X1	-	none	9	0900	-	25.6	12 03.4	100 01.6	none	-
X2	-	none	9	1030	-	34.5	12 03.9	100 01.7	none	-
X3	-	none	9	1430	-	31	12 27	100 37.1	none	-
X4	-	none	10	1316	-	26	12 37.5	100 28.5	none	-
X5	-	none	10	1516	-	-	12 35	100 20.1	none	-
X6	-	none	11	1105	-	-	12 38	100 19.5	none	-
X7	-	none	11	1300	-	37	12 39	100 38.7	none	-
X8	-	none	12	1115	-	21	12 50	100 30	none	-
X9	-	none	16	1430	-	-	12 57.5	100 28	none	-

## Cruise S1. Gulf of Thailand

The first survey of the Gulf of Thailand was timed to coincide with the transitional period between the ending of the seasonal southwest monsoon and the beginning of the northeast monsoon (Wyrski, 1961, pg. 18).

### Itinerary:

depart Bangkok, October 19, 1959,  
(stops at Ko Mak and Ko Samet)  
return to Bangkok, October 31.

### 35 Hydrographic Stations:

#### Physical:

- serial hydrographic cast at each station,
- BT observations at each station, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

#### Chemical:

- dissolved oxygen, salinity and phosphate concentrations later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

#### Biological:

- 33 1 m oblique net tows,
- 3 ½ m (45 cm) vertical net tows,
- 1 2 m (night) stramin net tow,
- 3 40' Otter trawls.

#### Geological:

- 33 Phleger cores,
- 34 Nel snap
- continuous fathometer recording.

Hydro. Sta. S1-	Bio. Sta. 59-	Date 1959	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Bio.(or Geo.) Activity	NEL Bottle No.
<u>Gulf of Thailand</u>									
1	none	X-19	2135	-	34.5	12 03 30	100 44 00	none	
"	(geol.)	"	-	-	32.6	" " "	" " "	Phl. core & NEL	#1466
2	33	20	0740	0925	56.4	10 43 00	100 29 00	1 m	
"	(geol.)	"	-	-	54.5	" " "	" " "	Phl. core & NEL	#846
2A	33A	20	-	1541	53	09 44.7	100 22 00	40' Otter T.	
3	34	20	2123	2235	35.0	09 03 00	100 48 30	1 m	
"	34A	"	-	2200	"	" " "	" " "	DIP	
"	(geol.)	"	-	-	"	" " "	" " "	NEL	#1348
4	35	21	0315	0806	45.7	07 50 00	101 19 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1529
5	36	21	1958	2123	25.0	06 22 00	102 11 20	1 m	
"	37	"	-	-	"	" " "	" " "	DIP	
"	38	"	-	2140	"	" " "	" " "	2 m	
"	(geol.)	"	-	-	"	" " "	102 11 20	NEL (see S -35; 06 21 00 N, 107 12 15 E)	#953
5A	none	22	0015	-	31.0	06 32 00	102 24 00	none	
5B	none	22	0207	-	43.0	06 41 00	102 33 00	none	
6	39	22	0403	0420	46.0	06 49 00	102 42 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1103
6A	none	22	0725	-	46.0	06 59 00	102 51 30	none	
6B	none	22	0722	-	35.0	07 09 00	103 05 30	none	
7	40	22	1115	1204	53.3	07 18 00	103 11 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#508
7A	none	22	1411	-	53.7	07 27 30	103 21 00	none	
7B	none	22	1606	-	45.7	07 37 00	103 31 00	none	
8	41	22	1758	1900	38.0	07 46 00	103 40 00	1/2 m	
"	42	"	-	1905	"	" " "	" " "	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. & NEL	#435
8A	none	22	2106	-	34.7	07 50 00	103 50 00	none	
8B	none	22	2300	-	23.0	08 05 00	104 00 00	none	
9	43	23	0055	0147	24.4	08 15 30	104 10 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#232
9A	none	23	0420	-	24.4	08 19 00	104 23 00	none	
9C	none	23	0839	-	20.0	08 46 15	104 20 40	none	
10	44	23	1130	1115	24.0	09 10 00	104 12 30	1 m	
"	45	"	-	1145	"	" " "	" " "	40' Otter T.	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1745
10A	none	23	1542	-	24.0	09 30 15	104 00 30	none	
11	46	23	1757	1837	29.0	09 50 00	103 52 15	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#201
11A	none	23	2007	-	26.6	09 42 00	103 43 15	none	
11B	none	23	2109	-	39.6	09 33 45	103 33 40	none	
12	47	23	2219	2300	43.0	09 28 00	103 23 00	1 m	
"	48	"	2320	2320	"	" " "	" " "	1/2 m	
"	49	"	-	2315	"	" " "	" " "	DIP	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#544
12A	none	24	0056	-	53.0	09 29 30	103 13 45	none	
12B	none	24	0230	-	52.0	09 11 30	103 02 30	none	
13	50	24	0401	0504	62.5	09 03 30	102 53 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#138
13A	none	24	0649	-	65.3	08 55 00	102 42 00	none	
14	51	24	0833	0945	73.0	08 40 50	102 18 30	1 m	
"	52	"	-	1045	70	08 40 00	102 18 30	40' Otter T.	
"	(geol.)	"	-	-	73	" " "	" " "	Phl. core & NEL	#1049
14A	none	24	1336	-	70.0	08 30 00	102 10 30	none	
15	53	24	1654	1734	65.6	08 15 00	101 55 00	1 m	
"	(geol.)	"	-	-	80	" " "	101 51 00	Phl. core & NEL	#813

Hydro. Sta. S1-	Bio. Sta. 59-	Date 1959	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Bio.(or Geo.) Activity	NEL Bottle No.
15A	none	24	1915	-	50.3	08 07 00	101 40 30	none	
15B	none	24	2047	-	48.8	07 57 00	101 29 30	none	
16	54	24	2218	2255	47.0	07 50 00	101 18 30	1 m	
"	55	"	-	2245	"	" " "	" " "	DIP	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1556
16A	none	25	0035	-	40.0	07 41 30	101 09 00	none	
16B	none	25	0148	-	29.0	07 34 00	100 58 30	none	
17	56	25	0310	0344	23.5	07 25 00	100 47 30	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#509
17A	none	25	1431	-	15.0	08 02 00	100 30 00	none	
18	57	25	1840	0917	19.0	08 38 45	100 15 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1378
18A	none	25	2049	-	27.4	08 47 30	100 26 00	none	
18B	none	25	2221	-	31.0	08 55 00	100 36 30	none	
19	58	25(26)	2351	0020	34.7	09 02 30	100 47 30	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#629
19A	none	26	0206	-	52.7	09 12 00	100 58 00	none	
19B	none	26	0341	-	62.9	09 21 00	101 10 30	none	
20	59	26	0507	0620	66.0	09 27 30	101 21 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#922
20A	none	26	0750	-	68.0	09 43 00	101 32 30	none	
20B	none	26	0921	-	71.3	09 53 00	101 32 30	none	
21	60	26	1051	1133	69.5	10 03 00	101 55 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#703
21A	none	26	1322	-	68.6	10 09 00	102 06 30	none	
21B	none	26	1450	-	64.7	10 15 00	102 13 30	none	
22	61	26	1617	1700	63.0	10 21 30	102 29 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1443
22A	62	26	1844	1900	53.4	10 28 15	102 39 45	DIP	
22B	none	26	2112	-	39.0	10 32 00	102 51 20	none	
23	63	26	2238	2311	35.0	10 40 45	103 01 30	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1281
24	64	27	0400	0435	41.0	11 17 30	102 55 30	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#704
25	65	28	1041	1110	36.6	11 52 30	102 11 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1000
25A	none	28	1242	-	47.1	11 44 00	102 00 30	none	
25B	none	28	1408	-	51.4	11 36 30	101 47 00	none	
26	66	28	1528	1607	61.6	11 29 00	101 38 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core (see 57-14; 11 32 00 N, 101 38 15 E)	
26A	none	28	1750	-	56.0	11 21 00	101 27 00	none	
26B	none	28	1920	-	53.3	11 13 00	101 12 00	none	
27	67	28	2046	2119	54.9	11 06 00	101 01 00	1 m	
"	68	"	-	-	"	" " "	" " "	1/2 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#911
27A	none	28	2313	-	56.7	10 58 30	100 50 00	none	
27B	none	29	0040	-	55.6	10 51 00	100 39 00	none	
28	69	29	0206	0238	55.8	10 44 00	100 29 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#767
28A	none	29	0409	-	55.8	10 37 00	100 18 00	none	
28B	none	29	0536	-	57	10 29 30	100 07 00	none	
29	70	29	0717	1747	50.3	10 22 00	99 56 30	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1463
29A	none	29	0920	-	46.4	10 15 00	99 47 00	none	
29B	none	29	1047	-	39.3	10 08 00	99 37 00	none	
30	71	29	1223	1246	27.0	10 00 30	99 27 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1963

Hydro. Sta. S1-	Bio. Sta. 59-	Date 1959	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Bio.(or Geo.) Activity	NEL Bottle No.
31	72	29	1617	1714	44.8	10 37 00	99 37 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1465
32	73	29	2315	2340	22.9	11 17 00	99 39 00	1 m	
"	(geol.)	"	"	-	-	" " "	" " "	Phl. core & NEL	#766
32A	none	30	0109	-	37.0	11 24 30	99 50 00	none	
32B	none	30	0234	-	39.3	11 32 00	100 01 00	none	
33	74	30	0359	1435	39.3	11 39 00	100 12 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1507
33A	none	30	0606	-	35.7	11 46 30	100 23 30	none	
33B	none	30	0733	-	33.8	11 54 30	100 34 15	none	
34	75	30	0859	0925	32.0	12 02 00	100 46 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1967
34A	none	30	1105	-	30.0	12 09 30	100 56 30	none	
34B	none	30	1230	-	27.7	12 16 30	101 07 30	none	
35	76	30	1911	1940	30.5	12 24 00	101 19 00	1 m	
"	(geol.)	"	-	-	"	" " "	" " "	Phl. core & NEL	#1626

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. No. S1-	Bio. Sta. No. 59-	Depth haul m	Cubic m Water Filtered	Vol Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions		Hydro. Sta. No. S1-	Bio. Sta. No. 59-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions	
					Amt. 10ths	Cloud Type						Amt. 10ths	Cloud Type
2	33	-	582	88	2	SC C	19	58	24	393	107	-	night
3	34	28	274	146	-	night	20	59	35	390	109	-	night
4	35	35	488	133	10	SC C	21	60	49	642	41	10	AC SC
5	36	21	470	126	-	night	22	61	42	450	38*	8	AC AS SC
6	39	32	149	140	-	night	23	63	25	326	338	-	night
7	40	35	486	56	10	SC C AS	24	64	28	296	287*	-	night
8	42	25	283	242	10	C SC	25	65	25	361	39	5	AS AC SC
9	43	14	411	96	-	night	26	66	42	340	62	6	Cu AS Ci
10	44	14	148	672	7	AS SC AC	27	67	39	480	572	-	night
11	46	18	196	628	10	SC NS Cu	28	69	42	317	359	-	night
12	47	35	381	361	-	night	29	70	35	349	86	5	Cu CN SC
13	50	42	498	86	-	night	30	71	14	171	*	4	Cu
14	51	64	564	46	9	CB SC Cu	31	72	32	506	167	10	Cu SC NS
15	53	42	445	107	10	NC Cu	32	73	14	154	292*	-	night
16	54	35	432	138	-	night	33	74	28	280	268	-	night
17	56	14	442	68	-	night	34	75	21	197	193*	4	Cu C SC
18	57	11	147	313*	-	night	35	76	21	230	148	-	night

\* Sample partially rotted

## Cruise 51 Bottom Sediments

Hydro. Sta. Sl-	Date Oct. 1959	Depth (m)	Lat. N	Long. E	Phleger core	N.E.L. Bottle #	Field Description
1	19	32.6	12°03'30"	100°44'00"	1	1466	coarse sand with mud and broken shells: odor; clayey, plasticity; low, sorting; poor
2	20	54.5	10 43 00	100 29 00	1	846	-
3	20	35	09 03 00	100 48 30	0	1348	-
4	21	45.7	07 50 00	101 19 00	1	1529	-
5	21	25.0	06 22 00	102 11 20	0 *	953	coarse sand with mud and broken shells
6	22	46	06 49 00	102 42 00	1	1103	mud and little broken shells
7	22	53.3	07 18 00	103 11 00	1	508	mud
8	22	38	07 46 00	103 40 00	1	435	mud
9	23	24.4	08 15 30	104 10 00	1	232	coarse mud
10	23	24	09 10 00	104 12 30	1	1745	coarse sand, clay
11	23	29.0	09 50 00	103 52 15	1	201	-
12	23	43.0	09 28 00	103 23 00	1	544	mud, coarse sand
13	24	62.5	09 03 30	102 53 00	1	138	mud
14	24	73	08 40 00	102 18 30	1	1049	shell, coarse sand and mud
15	24	80	08 15 00	101 51 00	1	813	fine sand and clay
16	24	47	07 50 00	101 18 30	1	1556	mud
17	25	23.5	07 25 00	100 47 30	1	509	coarse sand
18	25	19.0	08 38 45	100 15 00	1	1378	window shell and mud
19	25 26	34.7	09 02 30	100 47 30	1	629	coarse sand and mud
20	26	66	09 27 30	101 21 00	1	922	coarse sand and mud
21	26	69.5	10 03 00	101 55 00	1	703	muddy sand
22	26	63	10 21 30	102 29 00	1	1443	muddy sand
23	26	35	10 40 45	103 01 30	1	1281	muddy sand and shell
24	27	41	11 17 30	102 35 30	1	704	muddy sand
25	28	36.6	11 52 30	102 11 00	1	1000	muddy sand
26	28	61.6	11 29 00	101 38 00	1	0**	-
27	28	54.9	11 06 00	101 01 00	1	911	mud
28	29	55.8	10 44 00	100 29 00	1	767	muddy sand
29	29	50	10 22 00	99 56 30	1	1463	mud
30	29	27	10 00 30	99 27 00	1	1963	mud and shell
31	29	45	10 37 00	99 37 00	1	1465	mud
32	29	22.9	11 17 00	99 39 00	1	766	mud and shell
33	30	39.3	11 39 00	100 12 00	1	1507	clay and sand
34	30	32	12 02 00	100 46 00	1	1967	coarse sand and shell
35	30	30.5	12 24 00	101 19 00	1	1626	clay and sand

\* for Phleger core see S7-35, 06°21'00" N; 102°12'15" E

\*\* for N.E.L. sample see S7-14, 11°32'00" N; 101°38'15" E

## Cruise S2. South China Sea

Cruise S2 continued and extended into the South China Sea the working routine of collections established on cruise S1, including the systematic bottom sampling with the Phleger corer and the NEL snap sampler at stations where the depth is less than 150 m.

### Itinerary:

depart Bangkok, November 16, 1959—arrive Nhatrang, November 21,  
depart Nhatrang, November 25—return Nhatrang, November 29,  
depart Nhatrang, November 30—arrive Saigon, December 6,  
depart Saigon, December 9—return Bangkok, December 16.

### 32 Hydrographic Stations:

#### Physical:

- serial hydrographic cast at each station,
- BT observations at each station, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

#### Chemical:

- dissolved oxygen, salinity and phosphate concentrations later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

#### Biological:

- 26 1 m oblique net tows,
- 16 ½ m (45 cm) vertical net tows,
- 3 2 m (night) stramin net tows,
- 1 40' Otter trawl,
- 2 biological dredges (I.O.N.).

#### Geological:

- 5 Phleger cores,
- 14 NEL snap samples,
- continuous fathometer recording.



Hydro. Sta. S2-	Bio. Sta. S9-	Date 1959	Sta. Time	Bio. Sta. Time	Depth feet	Lat. N	Long. E	Bio.(or Geo.) Activity	Remarks	Fish or NEL No.
<u>Gulf of Thailand</u>										
1U	none	XI-16	1720	-	165	12 42 15	100 45 30	none		
2U	"	16	1850	-	105	12 31 45	100 52 20	"		
3U	"	16	1950	-	90	12 25 05	100 55 30	"		
4U	"	16	2050	-	75	12 19 45	101 04 15	"		
5U	"	16	2150	-	95	12 15 00	101 12 00	"		
6U	"	16	2250	-	125	12 11 00	101 20 30	"		
7U	"	16	2350	-	135	12 06 00	101 28 45	"		
8U	"	17	0050	-	144	12 01 30	101 36 15	"		
9U	"	17	0150	-	153	11 57 00	101 44 30	"		
10U	"	17	0250	-	156	11 52 00	101 52 45	"		
11U	"	17	0350	-	159	11 48 00	102 01 00	"		
12U	"	17	0450	-	159	11 43 00	102 09 00	"		
13U	"	17	0550	-	141	11 39 00	102 17 00	"		
14U	"	17	0650	-	129	11 36 00	102 23 15	"		
15U	"	17	0750	-	135	11 28 30	102 29 00	"		
16U	"	17	0850	-	130	11 23 00	102 33 10	"		
17U	"	17	0950	-	125	11 15 15	102 39 00	"		
18U	"	17	1050	-	125	11 07 30	102 45 00	"		
19U	"	17	1150	-	116	11 00 20	102 50 00	"		
20U	"	17	1250	-	111	10 52 45	102 56 00	"		
21U	"	17	1350	-	93	10 45 15	103 01 25	"		
22U	"	17	1450	-	87	10 37 15	103 07 45	"		
23U	"	17	1550	-	81	10 29 15	103 14 15	"		
24U	"	17	1650	-	84	10 21 15	103 20 50	"		
25U	"	17	1750	-	99	10 12 30	103 26 00	"		
26U	"	17	1850	-	87	10 03 45	103 31 10	"		
27U	77	17	1950	2005	105	09 55 00	103 36 15	2 m		
28U	none	17	2150	-	100	09 47 15	103 40 40	none		
29U	"	17	2250	-	115	09 38 30	103 45 35	"		
30U	"	17	2350	-	108	09 29 45	103 50 45	"		
31U	"	18	0050	-	90	09 23 00	103 59 30	"		
32U	"	18	0150	-	83	09 14 00	104 04 30	"		
33U	"	18	0250	-	86	09 06 45	104 08 30	"		
34U	"	18	0350	-	99	08 59 15	104 12 45	"		
35U	"	18	0450	-	72	08 52 00	104 17 30	"		
36U	"	18	0550	-	69	08 46 30	104 20 45	"		
37U	"	18	0650	-	66	08 40 30	104 24 15	"		
38U	"	18	0350	-	70	08 33.9	104 28.25	"		
39U	"	18	0850	-	95	08 26.3	104 32.6	"		
40U	"	18	0950	-	100	08 22.15	104 39.8	"		
<u>South China Sea</u>										
41U	"	18	1050	-	90	08 21.1	104 48.4	"		
42U	"	18	1150	-	85	08 21.8	104 58.25	"		
43U	"	18	1250	-	100	08 23.2	105 08.6	"		
44U	"	18	1350	-	90	08 24.1	105 27.25	"		
45U	"	18	1450	-	94	08 25.3	105 28.2	"		
46U	"	18	1550	-	91	08 26.5	105 37.2	"		
47U	"	18	1650	-	81	08 27.7	105 46.8	"		
48U	"	18	1750	-	87	08 28.7	105 54.75	"		
49U	"	18	1850	-	90	08 29.75	106 03.75	"		
"	78	18	-	1925	15 fm	08 31 10	106 07 35	FoD		
50U	79	18	1950	1950	95	08 33.2	106 11.8	2 m		
51U	none	18	2150	-	85	08 43.8	106 19.3	none		
52U	"	18	2250	-	84	08 51.3	106 24.3	"		
53U	"	18	2350	-	87	08 58.75	106 29.2	"		
54U	"	19	0050	-	88	09 06.9	106 34.0	"		

Hydro. Sta. S2-	Bio. Sta. S9-	Date 1959	Sta. Time	Bio. Sta. Time	Depth feet	Lat. N	Long. E	Bio.(or Geo.) Activity	Remarks	Fish or NEL No.
55U	"	19	0150	-	85	09 12.9	106 38.75	"		
56U	"	19	0250	-	89	09 20.0	106 43.4	"		
57U	"	19	0350	-	75	09 27.3	106 47.5	"		
58U	"	19	1450	-	75	09 35.1	106 51.3	"		
59U	"	19	0550	-	75	09 42.7	106 55.0	"		
60U	"	19	0650	-	75	09 50.3	106 58.75	"		
61U	"	19	0750	-	70	09 58.4	107 02.6	"		
62U	"	19	0850	-	70	10 01.9	107 04.4	"		
63U	"	19	1050	-	85	10 11.9	107 16.4	"		
64U	"	19	1250	-	60	10 19 05	107 28 15	"		
65U	"	19	1450	-	84	10 22 15	107 40 40	"		
66U	"	19	1650	-	90	10 26 45	107 53 19	"		
67U	"	19	1850	-	93	10 33 15	108 04 15	"		
68U	"	19	2050	-	90	10 37 45	108 12 15	"		
69U	"	19	2250	-	105	10 41 30	108 19 20	"		
70U	"	20	0050	-	110	10 46 00	108 26 40	"		
71U	"	20	0250	-	105	10 50 15	108 33 45	"		
72U	"	20	0450	-	87	10 56 15	108 46 45	"		
73U	"	20	0650	-	133	11 00 00	108 53 45	"		
74U	"	20	0850	-	204	11 07 30	108 57 30	"		
75U	"	20	1050	-	213	11 15 00	109 01 15	"		
76U	"	20	1250	-	222	11 22 00	109 05 15	"		
77U	"	20	1450	-	231	11 28 00	109 09 00	"		
78U	"	20	1650	-	230	11 34 00	109 11 45	"		
79U	"	20	1850	-	255	11 39 45	109 15 30	"		
80U	"	20	2050	-	285	11 46 45	109 19 15	"		
81U	"	20	2250	-	270	11 54 00	109 19 45	"		
82U	"	21	0050	-	107	12 06 00	109 17 15	"		
none	81	23	-	1350	7 fm	12 20 25	109 15 25	dredge	Nhatrang Bay	SIO 61-646
none	82	23	-	night	5 fm	12 12.0	109 13.0	DIP	"	" (anchorage)
					DEPTH (Fathoms)					
1(1)	none	26	0614	-	85	12 53 45	109 31 50	none	E. of Cape Varella	
2(1A)	none	26	0941	-	81	12 50 15	109 38 30	none	" " " "	
3(1B)	none	26	1109	-	133	12 49 15	109 45 45	none	" " " "	
4(2)	none	26	1512	-	835	12 46 30	109 51 30	none	" " " "	
5(2A)	none	26	1745	-	967	12 45 00	110 02 30	none	" " " "	
6(2B)	none	26	1920	-	1112	12 46 00	110 06 15	none	" " " "	
7(2C)	none	26	2055	-	1220	12 47 30	110 11 15	none	" " " "	
8(3)	none	27	0025	-	1223	12 51 00	110 23 30	none	" " " "	
9(3A)	none	27	0635	-	1220	12 58 00	110 40 30	none	" " " "	
10(3B)	none	27	1328	-	1477	13 06 30	111 00 00	none	" " " "	
11(4)	none	27	1531	-	1455	13 06 30	111 02 00	none	" " " "	
12(4A)	none	27	2000	-	1214	13 04 30	111 19 30	none	" " " "	
13(4B)	none	27	2200	-	1214	13 04 30	111 30 45	none	" " " "	
14(5)	none	28	0005	-	1490	13 04 30	111 43 00	none	" " " "	
15(5A)	none	28	0856	-	1409	12 41 00	110 44 30	none	-	
6	83	30	1337	1430	52	12 09 15	109 24 30	1/2 m	-	
"	84	30	-	1450	"	" " "	" " "	1 m	-	
6A	none	30	1638	-	80	12 04 00	109 34 50	none	-	
6B	none	30	1751	-	112	11 58 30	109 44 30	none	-	
6C	none	30	1911	-	895	11 55 30	109 57 00	none	-	
7	85	30(XII-1)	2038	0032	1130	11 52 00	110 08 00	1/2 m	-	
7A	none	XII-1	0223	-	1220	11 47 30	110 17 30	none	-	
7B	none	1	0401	-	1351	11 45 30	110 27 30	none	-	
7C	none	1	0545	-	1415	11 44 00	110 36 30	none	-	
8	86	1	0340	1138	1382	11 37 30	110 45 00	1/2 m	-	
"	87	"	-	1145	"	" " "	" " "	1 m	-	
8A	none	1	1355	-	1365	11 30 15	110 57 30	none	-	
8B	none	1	1555	-	1452	11 23 00	111 13 00	none	-	

Hydro. Sta. S2-	Bio. Sta. 59-	Date 1959	Sta. Time	Bio. Sta. Time	Depth feet	Lat. N	Long. E	Bio.(or Geo.) Activity	Remarks	Fish or NEL No.
9	88	1	1807	2024	1740m	11 17 00	111 23 00	1 m	-	
9A	none	1	2248	-	2115	11 10 00	111 35 00	none	-	
9B	none	2	0052	-	2139	11 03 30	111 48 30	none	-	
10	89	2	0307	0736	2132	10 57 00	112 02 00	1 m	-	
"	90	"	-	0330	"	" " "	" " "	FoD	-	
10A	none	2	1000	-	2180	10 48 30	112 14 15	none	-	
10B	none	2	1205	-	2135	10 41 30	112 27 30	none	-	
10C	none	2	1425	-	1440	10 34 15	112 41 30	none	-	
11	91	2	1600	1812	1395	10 27 00	112 54 30	1/2 m	-	
"	92	"	-	1823	"	" " "	" " "	1 m	-	
"	93	"	-	2020	"	" " "	" " "	FoD	-	
11A	none	2	2058	-	1380	10 13 00	112 44 30	none	-	
11B	none	2	2316	-	1000	09 58 00	112 37 15	none	-	
12	94	3	0134	0438	1160	09 37 00	112 26 30	1 m	-	
12A	none	3	0311	-	920	09 30 15	112 11 00	none	-	
12B	none	3	0936	-	780	09 15 00	112 06 00	none	-	
12C	none	3	1215	-	735	08 57 30	111 58 00	none	-	
13	95	3	1355	1528	748	08 45 15	111 50 00	1 m	-	
"	96	"	-	1515	"	" " "	" " "	1/2 m	-	
13A	none	3	2154	-	900	08 54 00	111 37 30	none	-	
13B	none	4	0016	-	1065	09 04 00	111 25 30	none	-	
14	97	4	0242	0557	1325	09 13 00	111 14 00	1 m	-	
14A	none	4	0830	-	1600	09 21 15	111 02 00	none	-	
14B	none	4	1030	-	1650	09 30 30	110 49 30	none	-	
15	98	4	1230	1438	1540	09 40 00	110 37 30	1 m	-	
15A	none	4	1649	-	1410	09 48 30	110 25 30	none	-	
15B	none	4	1859	-	215	09 57 45	110 13 30	none	-	
16	99	4	2111	2307	740	10 07 00	110 01 30	1 m	-	
"	100	"	-	2253	"	" " "	" " "	1/2 m	-	
16A	none	5	0124	-	535	10 16 00	109 49 30	none	-	
16B	none	5	0342	-	155	10 25 00	109 37 30	none	-	
17	101	5	0542	0627	140	10 34 00	109 25 15	1 m	-	
"	102	5	-	0624	"	" " "	" " "	1/2 m	-	
17A	none	5	0859	-	66	10 43 00	109 13 30	none	-	
17B	none	5	1110	-	57	10 52 00	109 01 30	none	-	
18	103	5	1355	1430	24	11 00 00	108 50 00	1 m	-	
<u>Salmon, December 6-9, 1959</u>										
19	104	9	1840	1929	12	09 45 30	107 03 00	1/2 m	-	
"	104A	"	-	1941	23	" " "	" " "	1 m	-	
"	(geol.)	"	-	2000	23m	" " "	" " "	NEL	-	#1683
19A	none	9	2130	-	16	09 31 30	107 08 30	none	-	
19B	none	9	2315	-	19	09 19 30	107 13 45	none	-	
20	106	10	0100	0144	18	09 06 00	107 18 30	1/2 m	-	
"	107	"	-	0156	"	" " "	" " "	1 m	-	
"	(geol.)	"	-	0200	32 m	" " "	" " "	NEL	-	#437
20A	none	10	0357	-	20	08 51 00	107 26 00	none	-	
20B	none	10	0550	-	25	08 36 30	107 33 30	none	-	
21	108	10	0746	0835	30	08 28 00	107 44 00	1/2 m	-	
"	109	"	-	0835	"	" " "	" " "	1 m	-	
"	(geol.)	"	-	0830	55 m	" " "	" " "	NEL	-	#870
21A	none	10	1042	-	32	08 16 00	107 50 30	none	-	
21B	none	10	1233	-	38	08 00 30	107 58 30	none	-	
22	110	10	1421	1515	45	07 47 00	108 05 00	1 m	-	
"	(geol.)	"	-	1530	82 m	07 43 00	" " "	NEL	-	#502
22A	none	10	1714	-	45	07 30 30	108 12 00	none	-	
22B	none	10	1902	-	46	07 16 00	108 18 00	none	-	
23	111	10	2150	2306	51	07 07 00	108 24 00	1 m	-	
"	(geol.)	"	-	2200	101 m	" " "	" " "	NEL	-	#999

Hydro. Sta. S2-	Bio. Sta. 59-	Date 1959	Sta. Time	Bio. Sta. Time	Depth feet	Lat. N	Long. E	Bio.(or Geo.) Activity	Remarks	Fish or NEL No.
23A	none	11	0105	-	53	06 43 00	108 31 00	none	-	
23B	none	11	0254	-	57	06 26 00	108 38 00	none	-	
24	112	11	0444	0533	60	06 08 00	108 44 00	1 m	-	
"	(geol.)	"	-	0500	110 m	" " "	" " "	NEL	-	#523
"	113	"	-	0520	110 m	" " "	108 26 30	1/2 m	-	
24A	none	11	0758	-	49	05 52 00	108 26 30	none	-	
24B	none	11	1005	-	39	05 38 00	108 07 15	none	-	
25	114	11	1155	1234	37	05 27 30	107 49 15	1 m	-	
"	(geol.)	"	-	1200	68 m	" " "	" " "	NEL	-	#1877
25A	none	11	1439	-	37	05 17 00	107 30 00	none	-	
25B	none	11	1635	-	34	05 07 00	107 10 30	none	-	
26	115	11	1832	1915	34	04 56 30	106 50 30	1 m	-	
"	116	"	-	1937	"	" " "	" " "	2 m	-	
"	117	"	-	1907	"	" " "	" " "	1/2 m	-	
"	(geol.)	"	-	1900	62 m	" " "	" " "	Phl. core & NEL	-	#1250
26A	118	11	2145	-	41	04 48 00	106 34 00	FoD	-	
26B	none	11	2315	-	48	04 39 30	106 17 30	none	-	
27	119	12	0055	0137	46	04 32 20	106 03 00	1/2 m	-	
"	120	"	-	0153	"	" " "	" " "	1 m	-	
"	(geol.)	"	-	0100	86 m	" " "	" " "	NEL	-	#630
27A	none	12	0348	-	46	04 47 15	105 58 30	none	-	
27B	none	12	0532	-	45	05 02 00	105 54 30	none	-	
28	121	12	0915	0753	40	05 16 30	105 51 00	1 m	-	
"	(geol.)	"	-	0300-0800	80 m	" " "	" " "	Phl. core & NEL	-	#1415
28A	none	12	0950	-	38	05 31 00	105 46 15	none	-	
28B	none	12	1221	-	31	05 50 00	105 41 00	none	-	
29	122	12	1405	1447	28	06 06 00	105 33 00	1 m	-	
"	(geol.)	"	-	-	56 m	" " "	" " "	Phl. core & NEL	-	#1467
29A	none	12	1644	-	27	06 20 30	105 31 30	none	-	
29B	none	12	1812	-	29	06 35 00	105 27 00	none	-	
30	123	12	2042	2126	27	06 49 30	105 19 15	1/2 m	-	
"	124	"	-	2141	"	" " "	" " "	1 m	-	
"	(geol.)	"	-	2100	49.2 m	" " "	" " "	Phl. core & NEL	-	#994
30A	none	12	2353	-	26	07 04 15	105 12 15	none	-	
30B	none	12	0153	-	23	07 18 00	105 05 30	none	-	
31	125	13	0353	0420	21	07 32 15	104 58 30	1/2 m	-	
"	126	"	-	0429	"	" " "	" " "	1 m	-	
"	(geol.)	"	-	0400	42 m	" " "	104 59 30	NEL	-	#127
31A	none	13	0634	-	19	07 47 00	104 51 15	none	-	
31B	none	13	0831	-	17	08 03 00	104 52 30	none	-	
32	127	13	1042	1119	16	08 20 30	104 51 00	1/2 m	-	
"	128	"	-	1130	"	" " "	" " "	1 m	-	
"	(geol.)	"	-	1100	32 m	" " "	" " "	Phl. core & NEL	-	#675
<u>Gulf of Thailand</u>										
33U	none	13	1800	-	15	08 59 30	104 15 45	none	-	
34U	"	13	2007	-	13	09 13 00	104 10 00	"	-	
35U	"	13	2201	-	17	09 26 00	104 04 00	"	-	
36U	"	14	0000	-	15	09 39 00	103 58 15	"	-	
37U	"	14	0200	-	16	09 55 30	103 53 30	"	-	
38U	129	14	0400	0930	12	10 11 45	103 50 30	TROLL	-	
39U	none	14	1000	-	13	10 24 15	103 29 15	none	-	
40U	"	14	1203	-	14	10 31 00	103 18 30	"	-	
41U	"	14	1400	-	19	10 45 15	102 57 45	"	-	
42U	"	14	1600	-	23	10 56 30	102 44 15	"	-	
43U	"	14	1800	-	25	11 13 30	102 23 00	"	-	
44U	"	14	2000	-	29	11 23 50	102 09 45	"	-	
45U	"	14	2200	-	29	11 34 45	101 57 05	"	-	
46U	"	14	0000	-	28	11 48 00	101 41 30	"	-	

Hydro. Sta. S2-	Bio. Sta. 59-	Date 1959	Sta. Time	Bio. Sta. Time	Depth feet	Lat. N	Long. E	Bio.(or Geo.) Activity	Remarks	Fish or NEL No.
47U	"	15	0200	-	22	12 00 30	101 26 00	"	-	
48U	"	15	0400	-	15	12 13 15	101 10 30	"	-	
49U	"	15	0600	-	17	12 25 45	100 55 00	"	-	
50U	"	15	0805	-	23	12 43 30	100 45 15	"	-	
none	130	15	-	0935	-	12 55 00	100 48.3	dredge	-	
none	131	15	-	1108	11	13 01 45	100 50 30	40' Otter T.	between Ko Lau & Ko Sienon	

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. S2-	Bio. Sta. 59-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup>	Sky Conditions		Hydro. Sta. S2-	Bio. Sta. 59-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup>	Sky Conditions	
					Ant. 10ths	Cloud Type						Ant. 10ths	Cloud Type
6	84	35.4	475	21.1	-	Cu SC	20	107	12.7	775	36.1	-	night
8	87	128	570	48.5	-	-	21	109	28.7	465	21.5	-	cloudy
9	89	141	637	40.8	-	night	22	110	19.3	512	50.7	7	CN Cu
10	89	141	588	39.1	-	overcast	23	111	38.0	460	45.6	-	night
11	92	153	692	41.8	-	SC CN	24	112	50.0	713	47.6	-	night
12	94	136	454	30.8	-	night	25	114	20.5	375	53.4	-	cloudy
13	95	153	520	34.6	-	CB Cu SC	26	115	20.5	441	76.8	-	night
14	97	115	550	16.4	-	cloudy	27	119	27.4	399	32.6	-	night
15	98	100	688	23.2	-	SC	28	121	29.6	628	41.3	-	Cl SC CC
16	99	141	563	41.0	-	night	29	122	21.1	376	34.6	-	cloudy
17	101	153	591	23.6	4 & 2	Cu AC	30	124	28.7	414	62.9	-	night
18	103	14.8	284	31.7	-	haze	31	126	21.1	345	66.7	-	night
19	(104A)	13.4	213	112	-	night	32	128	21.1	264	79.8	-	-

Cruise S2 Bottom Sediments

Hydro. Sta. S2-	Date 1959	Depth (m)	Lat. N	Long. E	Phlegger core	N.E.L. Bottle #	Field Description
6	XI-30	17.8	12°09'15"	109°24'20"	0	(none)	-
18	XII--5	366	11 00 00	108 50 00	0	(none)	-
19	9	23	09 45 30	107 03 00	0	1683	Pl: low; Od: none; Sd: medium; SC: few
20	10	32	09 06 00	107 18 30	0	437	Pl: low; Od: none; Sd: medium; SC: abundant
21	10	55	08 28 00	107 44 00	0	870	SD: medium; SC: few
22	10	82	07 43 00	108 05 00	0	502	Cr: gray; Pl: low; Od: none; Sd: fine; SC: few
23	10	101	07 01 00	108 24 00	0	999	Sd: fine; SC: trace
24	11	110	06 08 00	108 44 00	0	523	Cr: light black; Pl: low; Od: none; Sd: fine; SC: abundant
25	11	68	05 27 30	107 49 15	0	1877	SC: few
26	11	62	04 56 30	106 50 30	1	1250	Ty: silt; Ln: 2 layers; Cr: gray; Pl: medium; Od: none; Sd: very fine; St: present; SC: none; Sg: good
27	12	86	04 32 30	106 03 00	0	650	Ty: silt, clay; Ln: 2 layers; Cr: gray; Pl: medium; Od: none; Sd: very fine; St: present; SC: none; Sg: good
28	12	80	05 16 30	105 51 00	1	1415	Ty: silt; St: no; Ln: nl; Pl: medium; Cr: gray; Od: none; St: present; Cl: present; SC: none
29	12	56	06 06 00	105 33 00	1	1467	Ty: silt; Cr: gray; Pl: medium; Od: none; St: present; SC: trace
30	12	49.2	06 09 30	105 19 15	1	996	Ty: muddy; Cr: gray; Pl: medium; Od: none; St: present; SC: none
31	13	42	07 32 15	104 59 30	0	127	Pl: medium; Od: clayey; Sd: medium; Sg: good
32	13	32	08 20 30	104 51 00	1	675	Cr: gray; Pl: low; Od: none; Sd: fine; St: present; SC: abundant; Sg: good

Ty: Type  
 St: Stratification  
 Ln: Lamination  
 Pl: Plasticity  
 Od: Odor  
 Sd: Sand  
 St: Silt  
 Cl: Clay  
 SC: Shell content  
 Sg: Sorting  
 Cr: Color

### Cruise S3. Gulf of Thailand

This second survey of the Gulf of Thailand included stops at Songkhla, Ko Kra (for three fish poison stations), Ko Chang and Ko Samit (for one fish poison station). Weather and sea conditions were good throughout the cruise. Bottom sampling was for biological purposes using a 6' Beam trawl, a 30' Otter trawl and a 2' biological dredge.

#### Itinerary:

depart Bangkok, January 19, 1960,

return Bangkok, January 31.

#### 32 Hydrographic Stations:

##### Physical:

- serial hydrographic cast at each station,
- BT observations at each station, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

##### Chemical:

- dissolved oxygen, salinity and phosphate concentrations later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

##### Biological:

- 33 1 m oblique net tows,
- 32 ½ m (45 cm) vertical net tows,
- 9 2 m (night) stramin net tows,
- 9 6' Beam trawls,
- 1 30' Otter trawls,
- 1 2' biological dredge,
- 4 fish poison stations.

##### Geological:

- (biological trawls and dredge)
- continuous fathometer recording.

Hydro. Sta. S3-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<u>Gulf of Thailand</u>											
U1	101	I-19	1900	1923	15	12 33 00	100 44 00	-	2 m(S3-201)	-	-
"	102	"	-	2009	"	" " "	" " "	-	6' Beam T.	Ko Khram Yai	-
U2	none	19	2216	-	14	12 18 00	100 46 45	-	none	-	-
U3	none	19	2323	-	22	12 08 45	100 46 00	-	none	-	-
U4	none	20	0029	-	15	11 59 00	100 44 00	-	none	-	-
U5	none	20	0135	-	19	11 49 30	100 42 30	-	none	-	-
U6	none	20	0242	-	23	11 39 00	100 40 45	-	none	-	-
U7	none	20	0348	-	23	11 29 15	100 37 45	-	none	-	-
U8	none	20	0453	-	27	11 19 45	100 36 45	-	none	-	-
U9	none	20	0601	-	28	11 09 30	100 35 00	-	none	-	-
U10	none	20	0708	-	30	11 00 00	100 33 00	-	none	-	-
U11	103	20	0822	0830	30	10 49 00	100 31 00	-	DIP	-	-
U12	none	20	0928	-	31	10 39 30	100 28 30	-	none	-	-
U13	103A	20	1034	1045	30	10 29 15	100 26 30	-	1 m	-	-
U14	none	20	1203	-	31	10 19 30	100 24 30	-	none	-	-
U15	none	20	1315	-	28	10 09 45	100 22 30	-	none	-	-
U16	none	20	1427	-	27	09 58 30	100 21 00	-	none	-	-
U17	none	20	1534	-	19	09 47 15	100 17 30	-	none	-	-
U18	none	20	1712	-	18	09 38 30	100 19 30	-	none	-	-
"	104	20	-	1755	14-17	09 37 00	100 21 00	-	6' Beam T.	Phangan	-
"	105	20	-	1905	14-17	09 38 00	100 20 00	-	2 m(S3-202)	-	SIO 61-612
U19	none	20	2121	-	17.5	09 29 30	100 22 00	-	none	-	-
U20	none	20	2225	-	18	09 20 00	100 27 00	-	none	-	-
U21	none	20	2330	-	17	09 12 00	100 32 30	-	none	-	-
U22	none	21	0035	-	15	09 03 00	100 37 00	-	none	-	-
U23	none	21	0140	-	15.5	08 54 00	100 42 00	-	none	-	-
U24	none	21	0245	-	15	08 45 45	100 47 00	-	none	-	-
U25	none	21	0353	-	18	08 37 00	100 52 00	-	none	-	-
U26	none	21	0601	-	19	08 29 00	100 57 00	-	none	-	-
U27	none	21	0609	-	21	08 21 00	101 02 00	-	none	-	-
U28	none	21	0713	-	25	08 12 00	101 07 00	-	none	-	-
U29	none	21	0831	-	23	08 07 45	101 10 00	-	none	-	-
"	106	21	-	1135	21	08 05 00	101 10 30	52	TROLL	-	-
"	107	21	-	1445	25	07 16.3	100 38 00	-	Hook & Line	Songkhla	-
"	108	21	-	1930	25	" "	" " "	-	DIP	"	-
1	109	22	0835	0906	15	06 22 15	102 14 00	-	1/2 m	-	-
"	109A	"	-	0921	"	" " "	" " "	-	1 m	-	-
"	110	"	-	1005	"	" " "	" " "	-	6' Beam T.	-	-
1A	none	22	1246	-	21	06 32 00	102 25 00	-	none	-	-
1B	none	22	1411	-	23	06 43 00	102 34 30	-	none	-	-
2	111	22	1505	1538	20	06 49 00	102 41 30	-	1/2 m	-	-
"	111A	"	-	1545	"	" " "	" " "	-	1 m	-	-
2A	none	22	1715	-	23	06 54 00	102 50 00	-	none	-	-
2B	none	22	1831	-	23	07 05 00	102 56 00	-	none	-	-
3	112	22	1952	2000	28	07 12 30	103 07 00	-	DIP	-	-
"	112A	"	-	2015	"	" " "	" " "	-	1/2 m	-	-
"	112B	"	-	2031	"	" " "	" " "	-	1 m	-	-
"	113	"	-	2100	53 m	07 12 30	103 08.6	-	6' Beam T.	(net lost)	-
"	114	"	-	2218	"	07 14.8	103 10.6	-	2 m(S3-203)	-	SIO 61-613
3A	none	22	2335	-	29	07 20 00	103 15 30	-	none	-	-
3B	none	23	0056	-	31	07 27 20	103 24 00	-	none	-	-
4	115	23	0217	0248	28	07 34 30	103 32 00	-	1/2 m	-	-
"	115A	"	-	0303	"	" " "	" " "	-	1 m	-	-
4A	none	23	0435	-	22	07 42 00	103 41 00	-	none	-	-

Hydro. Sta. S3-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth Fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
4B	none	23	0555	-	19	07 49 00	103 48 30	-	none	-	-
5	116	23	0716	0741	17	07 57 00	103 57 00	-	1/2 n	-	-
"	116A	"	-	0750	"	" " "	" " "	-	1 n	-	-
5A	none	23	0917	-	12	08 06 00	104 05 30	-	none	-	-
5B	none	23	1102	-	12	08 14 15	104 14 00	-	none	-	-
6	117	23	1300	1327	11	08 20 00	104 24 20	-	1/2 n	-	-
"	117A	"	-	1336	"	" " "	" " "	-	1 n	-	-
6A	none	23	1545	-	15	08 23 30	104 36 00	-	none	-	-
6B	none	23	1729	-	9	08 38 00	104 29 00	-	none	-	-
6C	118	23	1909	1915	12	08 52 00	104 22 00	-	FeD	-	-
7	119	23	2052	2106	12	09 06 00	104 14 00	-	1/2 n	-	-
"	119A	"	-	2115	"	" " "	" " "	-	1 n	-	-
"	120	"	-	2125	"	" " "	" " "	-	2' Bio Dredge	-	-
"	121	"	-	2200	"	" " "	" " "	-	2n(S3-204)	-	-
7A	none	23	2330	-	14	09 21 45	104 08 00	-	none	-	-
7B	none	24	0110	-	10.5	09 35 00	103 59 45	-	none	-	-
8	122	24	0253	0323	12	09 52 00	103 50 30	-	1/2 n	-	-
"	122A	"	-	0332	"	" " "	" " "	-	1 n	-	-
"	123	"	-	0330	"	" " "	" " "	-	DIP	-	-
8A	none	24	0533	-	20	09 43 00	103 40 30	-	none	-	-
8B	none	24	0700	-	20	09 34 30	103 28 30	-	none	-	-
9	124	24	0805	0825	24	09 25 00	103 21 45	-	1 n	-	-
"	124A	"	-	0840	"	" " "	" " "	-	1/2 n	-	-
9A	none	24	1021	-	28	09 17 45	103 11 15	-	none	-	-
9B	none	24	1147	-	28	09 09 30	103 01 15	-	none	-	-
10	125	24	1305	1341	31	09 01 50	102 51 00	-	1/2 n	-	-
"	125A	"	-	1351	"	" " "	" " "	-	1 n	-	-
10A	none	24	1521	-	32	08 53 30	102 41 00	-	none	-	-
10B	none	24	1646	-	39	08 45 00	102 30 30	-	none	-	-
11	126	24	1811	1825	40	08 37 00	102 21 30	-	1 n	-	-
"	126A	"	-	1848	"	" " "	" " "	-	1/2 n	-	-
"	127	"	-	1914	"	" " "	" " "	-	40' Otter T.	-	-
"	128	"	-	2110	"	" " "	" " "	-	2 n(S3-205)	-	-
"	129	"	-	2030	"	" " "	" " "	-	DIP	-	-
11A	none	24	2245	-	40	08 30 30	102 09 00	-	none	-	-
11B	none	25	0008	-	36	08 23 00	101 58 00	-	none	-	-
12	130	25	0131	0240	32	08 16 00	101 46 00	-	1/2 n	-	-
"	130A	"	-	0200	"	" " "	" " "	-	1 n	-	-
"	131	"	-	"	"	" " "	" " "	-	DIP	-	-
12A	none	25	0425	-	27	08 09 00	101 34 30	-	none	-	-
12B	none	25	0605	-	25	08 02 00	101 22 30	-	none	-	-
13	132	25	0729	0811	24	07 54 00	101 11 30	-	1 n	-	-
"	132A	"	-	0810	"	" " "	" " "	-	1/2 n	-	-
13A	none	25	0928	-	18	07 47 30	100 59 15	-	none	-	-
14	133	25	1046	1107	13	07 40 00	100 43 30	-	1 n	-	-
"	133A	"	-	1118	"	" " "	" " "	-	1/2 n	-	-
none	134	25	-	1734	3-5'	08 26 06	100 45 06	0	DIP & POISON	Ko Kra	-
none	134(?)	"	-	1830	-	" " "	" " "	0	BEACH	" " (Is., turtles) -	-
none	134A	"	-	1830	3-10'	" " "	" " "	0	hand pick	" "	-
none	134B	"	-	1830	0-4'	" " "	" " "	0	DIP & POISON	" "	-
none	135	"	-	2000	-	08 25 30	100 45 40	-	DIP	off Ko Kra	-
none	136	26	-	0800	0-7'	" " "	" " "	0-50'	DIP & POISON	" " "	-
none	136A	"	-	0800	0-10'	" " "	" " "	0	hand pick	" " "	-
none	137	"	-	0945	27 m	08 25 30	100 44 40	1-2	6' Beam T.	" " "	-
15	138	26	1528	1504	11	08 38 00	100 17 00	-	1 n	-	-
"	138A	"	-	1513	"	" " "	" " "	-	1/2 n	-	-
15A	none	26	1653	-	14	08 48 00	100 26 00	-	none	-	-



Hydro. Sta. S3-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
15B	none	26	1822	-	17	08 57 00	100 37 00	-	none	-	-
16	139	26	1952	2019	18	09 07 00	100 47 45	-	1 m	-	-
"	139A	"	-	2025	"	" " "	" " "	-	1/2 m	-	-
"	140	"	-	2055	"	" " "	" " "	-	6' Beam T.	-	-
"	141	"	-	2145	"	" " "	" " "	-	2m (S3-206)	-	-
16A	none	26	2311	-	26	09 16 00	100 58 00	-	none	-	-
16B	none	27	0040	-	31	09 25 30	101 09 00	-	none	-	-
17	142	27	0214	0306	36	09 35 00	101 20 00	-	1/2 m	-	-
"	142A	"	-	0318	"	" " "	" " "	-	1 m	-	-
17A	none	27	0511	-	37	09 44 00	101 31 00	-	none	-	-
17B	none	27	0648	-	37	09 54 00	101 41 00	-	none	-	-
18	143	27	0824	0853	38	10 03 00	101 51 30	-	1 m	-	-
"	143A	"	-	-	"	" " "	" " "	-	1/2 m	-	-
"	144	"	-	0930	"	" " "	" " "	-	6' Beam T.	-	-
"	145	"	-	0900	"	" " "	" " "	-	Hook & Line	-	-
18A	none	27	1118	-	37	10 08 45	102 05 00	-	none	-	-
18B	none	27	1242	-	35	10 15 30	102 17 30	-	none	-	-
19	146	27	1409	-	32	10 23 00	102 30 00	-	1 m	-	-
"	146A	"	-	-	"	" " "	" " "	-	1/2 m	-	-
"	147	"	-	1408	"	" " "	" " "	-	DIP	-	-
"	148	"	-	1500	"	" " "	" " "	-	Hook & Line	-	-
"	149	"	-	1600	-	10 28 30	102 40 00	-	DIP(Driftwood)	-	-
19A	none	27	1625	-	27	10 29 00	102 40 15	-	none	-	-
19B	none	27	1744	-	18	10 35 00	102 48 30	-	none	-	-
20	150	27	1856	1916	14	10 41 15	103 03 00	-	1 m	-	-
"	150A	"	-	1927	"	" " "	" " "	-	1/2 m	-	-
"	151	"	-	1943	"	" " "	" " "	-	6' Beam T.	-	-
"	152	"	-	2030	"	" " "	" " "	-	2 m (S3-207)	-	SID 61-712
21	none	28	0115	-	17.5	11 16 00	102 36 00	-	none	-	-
"	153	"	-	?	31 m	11 16 00	102 35 52	-	1 m	-	-
"	153A	"	-	?	"	" " "	" " "	-	1/2 m	-	-
"	154	"	-	?	"	" " "	" " "	-	Hook & Line	-	-
none	155	28	-	0700	0-10'	11 58.8	102 17.8	0-25	hand pick	Ko Chang Is.	-
22	156	28	1220	1235	18.5	11 52 30	102 11 00	-	1 m	-	-
"	156A	"	-	1250	"	" " "	" " "	-	1/2 m	-	-
22A	none	28	1410	-	5.5	11 45 30	102 00 00	-	none	-	-
22B	none	28	1529	-	29.5	11 38 20	101 49 00	-	none	-	-
23	157	28	1648	1721	30	11 31 00	101 38 00	-	1 m	-	-
"	157A	"	-	1740	"	" " "	" " "	-	1/2 m	-	-
"	158	"	-	-	"	" " "	" " "	-	Hook & Line	-	-
23A	none	28	1918	-	30	11 26 00	101 25 45	-	none	-	-
23B	none	28	2039	-	29	11 18 45	101 15 00	-	none	-	-
24	159	28	2200	2224	29	11 11 20	101 03 30	-	1 m	-	-
"	159A	"	-	2234	"	" " "	" " "	-	1/2 m	-	-
"	160	"	-	2248	"	" " "	" " "	-	2 m (S3-208)	-	SID 61-614
24A	none	29	0028	-	31	11 04 00	100 53 06	-	none	-	-
24B	none	29	0145	-	30	10 57 00	100 42 00	-	none	-	-
25	161	29	0307	0338	25	10 50 00	100 30 45	-	1 m	-	-
"	161A	"	-	0356	"	" " "	" " "	-	1/2 m	-	-
"	162	"	-	0350	"	" " "	" " "	-	DIP	-	-
25A	none	29	0522	-	29	10 42 30	100 19 30	-	none	-	-
25B	none	29	0643	-	29	10 35 20	100 08 00	-	none	-	-
26	163	29	0800	0823	49 m	10 27 45	99 56 30	-	1 m	-	-
"	163A	"	-	0837	"	" " "	" " "	-	1/2 m	-	-
26A	none	29	0956	-	24	10 20 00	99 45 00	-	none	-	-
26B	none	29	1111	-	21	10 13 00	99 34 30	-	none	-	-
27	164	29	1231	1254	13	10 05 45	99 23 15	-	1 m	-	-
"	164A	"	-	1300	"	" " "	" " "	-	1/2 m	-	-

Hydro. Sta. S3-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
"	165	"	-	-	"	" " "	" " "	-	Hook & Line	-	-
"	166	"	-	1200-1300	"	" " "	" " "	-	DIP	-	-
28	167	29	1644	1700	19.5	10 40 00	99 35 30	-	1 m	-	-
"	167A	"	-	1712	"	" " "	" " "	-	1/2 m	-	-
"	169	"	-	-	"	" " "	" " "	-	Hook & Line	-	-
"	169	"	-	1700	"	" " "	" " "	-	DIP	-	-
29	170	29	2127	2147	12	11 17 00	99 39 00	-	1 m	-	-
"	170A	"	-	2156	"	" " "	" " "	-	1/2 m	-	-
"	171	"	-	2216	"	" " "	" " "	-	DIP	-	SIO 61-615
"	172	"	-	2216	"	" " "	" " "	-	2 m (S3-209)	-	-
29A	none	30	0006	-	19	11 26 00	99 49 45	-	none	-	-
29B	none	30	0132	-	20	11 34 00	100 01 00	-	none	-	-
30	173	30	0315	0347	19.5	11 42 00	100 12 00	-	1 m	-	-
"	173A	"	-	0401	"	" " "	" " "	-	1/2 m	-	-
30A	none	30	0531	-	17	11 51 00	100 24 00	-	none	-	-
30B	none	30	0647	-	18	11 59 00	100 34 40	-	none	-	-
31	174	30	0824	0850	15	12 04 30	100 46 00	-	1 m	-	-
"	174A	"	-	0902	"	" " "	" " "	-	1/2 m	-	-
"	175	"	-	0911	"	" " "	" " "	-	6' Beam T.	-	-
"	176	"	-	0900	"	" " "	" " "	-	DIP	-	-
31A	none	30	1118	-	15	12 12 00	100 57 00	-	none	-	-
31B	none	30	1240	-	17	12 17 30	101 09 00	-	none	-	-
none	177	30	-	1530	0-3'	12 34 00	101 27.1	15-50m	DIP & POISON	Ke Samet	-
32	178	30	1925	1941	15	12 24 00	101 19 15	-	1 m	-	-
"	178A	"	-	1951	"	" " "	" " "	-	1/2 m	-	-

1'm Net Tows (see also Snyder and Fleming, 1972)

Hydro. Sta. No. S3-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions		Hydro. Sta. No. S3-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions	
					Amt. 10ths	Cloud Type						Amt. 10ths	Cloud Type
U13	103A	33.4	435	352	-	pt. cldy	17	142A	25.4	550	225	-	night
1	109A	14.3	348	144	10	S AS	18	143	27.5	562	84	-	-
2	111A	21.2	385	219	8	CS	19	146	30.0	512	236	9	Cu
3	112B	22.0	330	275	-	cloudy	20	150	12.5	222	418	-	night
4	115A	25.0	507	75	-	night	21	153	10.0	240	200	-	night
5	116A	12.5	365	36	8	-	22	156	10.3	297	289	3	-
6	117A	14.1	254	51	4	CI Cu CI Cu	23	157	34.4	503	148	5	CI Cu AC
7	119A	7.50	160	1107	-	night	24	159	25.0	579	117	-	night
8	122A	14.9	221	343	-	night	25	161	27.5	546	151	-	night
9	124	13.7	185	1070	1	AS	26	163	22.5	383	109	2	AS SC
10	125A	25.0	427	150	5	CS CI	27	164	12.5	367	118	1	CS Cu
11	126	32.5	351	230	8	AS AC	28	167	15.0	254	173	-	pt. cldy
12	130A	25.4	459	168	-	night	29	170	7.50	249	272	-	night
13	132	16.9	306	140	5	SC AS	30	173	12.7	272	301	-	night
14	133	8.45	338	148	2	CI SC	31	174	14.1	319	350	2	CS
15	138	11.5	346	193	6	C FC	32	178	12.5	260	346	-	night
16	139	12.7	316	203	-	night							

## Cruise S4. South China Sea

Rough weather, occurring on the underway segment, Bangkok-Nhatrang, caused a delay wherein near-shore work off Nhatrang preceded the regular cruise pattern in open sea; a bottom fauna survey was conducted which included grabs (van Veen and Petersen grab sampling data collected February 23-24 are here omitted but may be referred to in Gallardo, 1967\*, who includes bottom descriptions), trawls and two fish-poison stations during the period of February 20-26. Completion of the first half of the routine survey in good weather permitted further special collections near Poulo Cecir de Mer, including two 6' Beam trawls, a biological dredge and one fish-poison station en route Saigon. Observations made on this cruise indicated the desirability of a future survey of two seamounts and the environs of Triton and Spratley Islands (see cruise S6).

### Itinerary:

depart Bangkok, February 15, 1960—arrive Nhatrang, February 17,  
(bottom sampling off Nhatrang, February 20-26)—return Nhatrang, March 3,  
arrive Saigon, March 11,  
depart Saigon, March 15—return Bangkok, March 21.

### 42 Hydrographic Stations:

#### Physical:

- serial hydrographic cast at each station,
- BT observations at each station, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

#### Chemical:

- dissolved oxygen, salinity and phosphate concentrations later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

#### Biological:

- 42 1 m oblique net tows,
- 29 ½ m (45 cm) vertical net tows,
- 21 2 m (all but one at night) stramin net tows,
- 9 10' Beam trawls,
- 2 6' Beam trawls,
- 1 2' biological dredge,
- 3 fish-poison stations.

#### Geological:

- (biological grabs, trawls and dredge)
- continuous fathometer recording.

Hydro. Sta. S4-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<u>Gulf of Thailand</u>											
U1	200	II-15	1850	2008	18.5	12 33 00	100 49 00	8	2 m (S4-201)	Ko Samae Sea	-
U2	201	15	1950	2020	14.0	12 25 10	100 55 25	6	DIP	-	-
U3	none	15	2130	-	14	12 18 45	101 03 55	-	none	-	-
U4	none	15	2230	-	15	12 14 30	101 11 30	-	none	-	-
U5	none	15	2330	-	21.5	12 09 55	101 19 40	-	none	-	-
U6	none	16	0030	-	22.5	12 05 30	101 27 15	-	none	-	-
U7	none	16	0130	-	23.5	12 01 00	101 35 07	-	none	-	-
U8	none	16	0237	-	24.5	11 56 15	101 43 52	-	none	-	-
U9	none	16	0343	-	27.5	11 51 15	101 52 45	-	none	-	-
U10	none	16	0448	-	26	11 46 10	102 01 20	-	none	-	-
U11	none	16	0559	-	25	11 41 30	102 10 25	-	none	-	-
U12	none	16	0505	-	22.5	11 36 45	102 19 45	-	none	-	-
U13	201A	16	0812	0815	19	11 31 50	102 28 40	5.5	DIP	Ko Kut	-
U14	none	16	0923	-	22	11 23 00	102 34 45	-	none	" "	-
"	202	16	-	0940	-	11 20 00	102 37 00	13.5	TROLL	" "	-
U15	none	16	1031	-	17	11 14 55	102 40 30	-	none	-	-
U16	none	16	1137	-	17.5	11 06 30	102 46 15	-	none	-	-
U18	none	16	1353	-	18	10 50 00	102 57 45	-	none	-	-
U19	none	16	1457	-	15.5	10 41 45	103 03 30	-	none	-	-
U20	none	16	1600	-	13	10 32 00	103 10 30	-	none	-	-
U21	none	16	1704	-	14	10 24 10	103 16 10	-	none	-	-
U22	none	16	1810	-	13	10 15 00	103 22 00	-	none	-	-
U23	none	16	1914	-	19	10 06 30	103 27 45	-	none	-	-
U24	203	16	2020	2030	15	09 58 00	103 33 45	25	DIP	-	-
"	203A	"	-	2032	"	09 58 00	103 27 45	26.5-24.7	2 m (S4-202)	-	-
U25	none	16	2152	-	16	09 49 45	103 39 00	-	none	-	-
U26	none	16	2259	-	25	09 41 00	103 44 00	-	none	-	-
U27	none	17	0006	-	17	09 32 00	103 50 00	-	none	-	-
U28	none	17	0122	-	14	09 24 00	103 55 07	-	none	-	-
U29	none	17	0238	-	13	09 15 45	104 00 30	-	none	-	-
U30	none	17	0355	-	13.5	09 07 15	104 06 00	-	none	-	-
U31	none	17	0527	-	15	09 01 00	104 10 30	-	none	-	-
U32	none	17	0605	-	13	08 54 30	104 15 30	-	none	-	-
U33	none	17	0845	-	11	08 47 30	104 20 15	-	none	-	-
U34	none	17	1030	-	10	08 39 40	104 26 10	-	none	-	-
<u>South China Sea</u>											
U35	none	17	1209	-	11.5	08 30 45	104 32 15	-	none	-	-
U36	none	17	1340	-	16	08 21 45	104 38 45	-	none	-	-
U37	none	17	1525	-	13	08 20 45	104 50 00	-	none	-	-
U38	none	17	1659	-	13.5	08 21 45	104 56 45	-	none	-	-
U39	none	17	-	-	-	-	-	-	-	-	-
none	204	20	-	2100	-	11 07 00	108 56 30	10	TROLL	E. Pulo Cecir de Terre Is.	-
none	205	23	-	0915	4-15'	12 12 06	109 17 30	50'	DIP & POISON	Bich Tow Bay, Hon Lon Is.	-
none	206	23	-	1645	8	12 09 30	109 17 30	-	10' Beam T.	Nhatrang BAY	-
none	207	24	-	0900	0-8'	12 21 40	109 15 38	0-100'	DIP & POISON	Binchang Bay	-
none	208	25	-	1430	85'	12 14.7	109 18.4	-	10' Beam T.	Nhatrang Bay (start)	-
						12 14.8	109 14.7			(finish)	-
none	209	26	-	2046	102 m	13 31 45	109 24 45	5.5	2 m (S4-203)	No. of Nhatrang	-
S4-1	none	27	1147	-	20	15 40 00	108 41 00	-	none	-	-
"	210	"	-	1220	37 m	15 41 00	108 41 00	-	1 m	-	-
"	"	"	-	"	"	" " "	" " "	-	1/2 m	-	-
"	211	"	-	1300	"	" " "	" " "	-	10' Beam T.	-	SIO 61-573

Hydro. Sta. S4-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
1A	none	27	1602	-	22.5	15 40 30	109 02 15	-	none	-	-
1B	none	27	1804	-	82.5	15 40 00	109 28 00	-	none	-	-
"	212	"	-	1836	60-108	15 40 00	109 22.9	-	10' Bean T.	-	-
"	213	"	-	1850	198 m	15 40 00	109 28.4	-	DIP	-	-
2	214	27	2109	2236	260	16 40 00	109 43 30	-	1 m	-	-
"	"	"	-	2256	"	" " "	" " "	-	$\frac{1}{2}$ m	-	-
"	215	"	-	2323	476 m	" " "	" " "	-	2 m (S4-204)	-	SIO 61-649
"	216	28	-	0100	479 m	" " "	" " "	-	10' Bean T.	-	SIO 61-575
2A	none	28	0350	-	275	15 40 00	110 04 00	-	none	-	-
2B	none	28	0602	-	222	15 40 00	110 25 00	-	none	-	-
3	217	28	0812	1013	400	15 40 00	110 46 00	131	1 m	-	-
"	"	"	-	1027	"	" " "	" " "	"	$\frac{1}{2}$ m	-	-
3A	none	28	1406	-	452	15 39 30	111 02 00	-	none	-	-
3B	none	28	1730	-	552	15 40 00	111 28 00	-	none	-	-
4	218	28	1938	2222	680	15 40 00	111 49 00	35.5	1 m	-	-
"	"	"	-	2243	"	15 37 00	111 56 30	"	$\frac{1}{2}$ m	-	-
"	219A	28	-	2313	1244 m	15 40 00	111 48 00	-	2 m (S4-205)	-	SIO 61-650
"	219	29	-	0200	1264 m	15 39 00	111 51 00	-	10' Bean T.	-	-
4A	none	29	0644	-	810	15 38 00	112 09 30	-	none	-	-
4B	none	29	0846	-	660	15 43 25	112 29 00	-	none	-	-
5	220	29	1055	1343	1290	15 44 20	112 50 00	58	1 m	Lincoln Is.	-
"	"	"	-	1408	"	" " "	" " "	"	$\frac{1}{2}$ m	" "	-
5A	none	29	1603	-	1380	15 28 00	112 52 15	-	none	-	-
5B	none	29	1744	-	1450	15 11 15	112 57 00	-	none	-	-
6	221A	29	1921	2330	1600	14 56 00	113 00 50	-	DIP	-	SIO 61-569
"	221	III-1	-	0105	"	" " "	" " "	-	1 m	-	-
"	"	"	-	0124	"	" " "	" " "	-	$\frac{1}{2}$ m	-	-
"	222	1	-	0155	-	14 48 00	113 04 00	-	2 m (S4-206)	-	SIO 61-576
6A	none	1	0415	-	1300	14 47 00	113 03 00	-	none	-	-
6B	none	1	0553	-	1550	14 33 15	113 08 00	-	none	-	-
7	223	1	0732	1020	1450	14 18 30	113 12 00	-	1 m	-	-
"	"	"	-	1043	"	" " "	" " "	-	$\frac{1}{2}$ m	-	-
7A	none	1	1309	-	1950	14 01 00	113 21 00	-	none	-	-
7B	none	1	1512	-	2350	13 47 15	113 28 00	-	none	-	-
8	224	1	1718	1939	2360	13 30 00	113 36 00	-	1 m	-	-
"	"	"	-	1958	"	" " "	" " "	-	$\frac{1}{2}$ m	-	-
"	226	"	-	2020	"	" " "	113 38.7	-	2 m (S4-207)	-	SIO 61-578
8A	none	1	2335	-	2365	13 28 50	113 17.35	-	none	-	-
8B	none	2	0124	-	1725	13 28 50	112 57 40	-	none	-	-
9	227	2	0314	0528	1150	13 28 00	112 27 50	-	1 m	-	-
"	"	"	-	0550	"	" " "	" " "	-	$\frac{1}{2}$ m	-	-
9A	none	2	0749	-	1500	13 28 15	112 20 30	-	none	-	-
9B	none	2	1235	-	980	13 27 50	111 58 20	-	none	-	-
10	228	2	1417	1551	1485	13 27 00	111 40 25	-	1 m	-	-
"	"	"	-	1600	"	" " "	" " "	-	$\frac{1}{2}$ m	-	-
10A	none	2	1803	-	1550	13 26 30	111 23 50	-	none	-	-
10B	229	2	1955	1957	1575	13 26 45	111 07 55	-	2 m (S4-208)	-	SIO 61-579
11	230	2	2250	2449	1550	13 27 15	110 48 50	-	1 m	-	SIO 61-570
"	"	3	-	0115	"	" " "	" " "	-	$\frac{1}{2}$ m	-	-
11A	none	3	0302	-	1520	13 27 40	110 34 00	-	none	-	-
11B	none	3	0434	-	1400	13 27 55	110 17 25	-	none	-	-
12	231	3	0606	0735	1200	13 28 15	110 05 30	-	1 m	-	-
"	"	"	-	0755	"	" " "	" " "	-	$\frac{1}{2}$ m	-	-
12A	none	3	0944	-	134	13 26 45	109 46 40	-	none	-	-
12B	none	3	1105	-	85	13 26 45	109 31 10	-	none	-	-
"	232	3	-	1135	141 m	13 26 15	" " "	-	10' Bean T.	-	-
12C	none	3	1230	-	77	13 25 15	109 31 00	-	none	-	-

Hydro. Sta. S4-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
13	233	3	1344	1354	24.5	13 27 10	109 23 00	-	1 n	-	-
"	234	3	-	2025	35 m	12 22 13	109 21 20	3/4	2 n(S4-209)	Hon Chula Is.	SIO 61-580
14	235	4	1829	1853	51	12 09 15	109 24 15	10	1 n	-	-
"	236	4	1918	1918	"	" " "	" " "	5-7.5	2 n(S4-210)	Hon Lon Is.	SIO 61-581
"	237	4	-	2020	"	12 09.7	109 24.7	"	10' Beam T.	" " "	-
14A	none	4	2248	-	72	12 03 00	109 39 00	-	none	-	-
14B	none	5	0027	-	892	11 57 00	109 53 00	-	none	-	-
15	238	5	0211	0427	1180	11 50 30	110 07 00	-	1 n	E. of Nhatrang	-
"	"	"	-	0447	"	" " "	" " "	-	1/2 n	" " "	-
"	239	"	-	0245	"	" " "	" " "	-	DIP	" " "	SIO 61-582
15A	none	5	0637	-	1450	11 45 00	110 21 00	-	none	-	-
15B	none	5	0823	-	1430	11 38 30	110 36 00	-	none	-	-
16	240	5	1009	1133	1400	11 32 30	110 49 06	-	1 n	-	-
"	"	"	-	1154	"	" " "	" " "	-	1/2 n	-	-
"	241	"	-	1217	"	" " "	" " "	-	2 n(S4-211)	-	SIO 61-583
16A	none	5	1450	-	1437	11 25 05	111 03 35	-	none	-	-
16B	none	5	1633	-	1450	11 17 55	111 18 05	-	none	-	-
17	242	5	1816	1943	1800	11 10 45	111 32 10	-	1 n	-	-
"	"	"	-	2002	"	" " "	" " "	-	1/2 n	-	-
"	244	"	-	2023	5292 m	11 11 05	111 33 50	-	2 n(S4-212)	-	SIO 61-584
17A	none	5	2250	-	2185	11 04 20	111 44 00	-	none	-	-
17B	none	6	0034	-	2205	10 57 00	111 58 10	-	none	-	-
18	245	6	0223	1040	2235	10 52 00	112 07 30	-	1 n	-	-
"	"	"	-	1101	"	" " "	" " "	-	1/2 n	-	-
"	245A	"	-	-	"	" " "	" " "	-	DIP	-	SIO 61-729
18A	none	"	1330	-	2240	10 42 30	112 17 00	-	none	-	-
18B	none	6	1539	-	1850	10 35 20	112 35 20	-	none	-	-
19	246	6	1751	2004	1700	10 32 30	112 53 20	-	1 n	-	-
"	"	"	-	2023	"	" " "	" " "	-	1/2 n	-	-
"	247	"	-	1820	"	" " "	" " "	-	DIP	-	SIO 61-585
"	248	"	-	2048	"	" " "	" " "	-	2 n(S4-213)	-	SIO 61-651
19A	none	6	2325	-	1400	10 22 30	112 47 20	-	none	-	-
19B	none	7	0104	-	1365	10 11 55	112 41 00	-	none	-	-
20	248	7	0244	0402	960	09 59 45	112 33 40	-	1 n	-	-
"	"	"	-	0423	"	" " "	" " "	-	1/2 n	-	-
"	249	"	-	-	"	" " "	" " "	-	DIP	-	SIO 61-586
20A	none	7	0610	-	1200	09 49 00	112 27 30	-	none	-	-
20B	none	7	0745	-	1120	09 38 20	112 21 30	-	none	-	-
21	250	7	0923	1059	980	09 23 30	112 12 30	-	1 n	-	-
"	"	"	-	1119	"	" " "	" " "	-	1/2 n	-	-
21A	none	7	1319	-	1330	09 09 45	112 04 05	-	none	-	-
21B	none	7	1448	-	825	08 55 40	111 56 20	-	none	-	-
22	251	7	1820	2111	300	08 35 50	111 47 20	-	1 n	-	-
"	"	"	"	2131	"	" " "	" " "	-	1/2 n	-	-
"	252	"	-	1800	"	" " "	" " "	-	DIP	-	SIO 61-587
"	253	"	-	2149	"	" " "	" " "	-	2 n(S4-214)	-	SIO 61-588
22A	none	8	0035	-	715	08 22 55	111 40 00	-	none	-	-
22B	none	8	0212	-	885	08 10 00	111 32 15	-	none	-	-
23	254	8	0351	0624	1060	07 58 00	111 24 25	-	1 n	-	-
"	"	"	"	0646	"	" " "	" " "	-	1/2 n	-	-
"	255	"	-	0400	"	" " "	" " "	-	DIP	-	SIO 61-589
23A	none	8	0835	-	1060	08 11 30	111 16 00	-	none	-	-
23B	none	8	1015	-	850	08 24 00	111 06 15	-	none	-	-
24	256	8	1204	1336	840	08 37 45	110 54 45	-	1 n	-	-
"	"	"	-	1358	"	" " "	" " "	-	1/2 n	-	-
"	257	"	-	"	"	" " "	" " "	-	DIP	-	-

Hydro. Sta. S4-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
24A	none	8	1620	-	320	08 44 00	110 49 00	-	none	-	-
24B	258	8	1829	1845	1330	08 58 05	110 36 05	-	2 m (S4-215)	-	SIO 61-590
25	259	8	2123	2335	1450	09 13 40	110 26 15	-	1 m	-	-
"	"	"	-	2354	"	" " "	" " "	-	1/2 m	-	-
"	260	"	-	2130	"	" " "	" " "	-	DIP	-	SIO 61-591
25A	none	9	0148	-	1400	09 30 25	110 13 25	-	none	-	-
25B	none	9	0332	-	960	09 39 35	110 02 05	-	none	-	-
25B(1)	none	9	0517	-	550	10 00 00	109 39 55	-	none	-	-
26 (2)	261	9	0743	0838	730	10 03 45	109 47 00	-	1 m	-	-
"	"	"	-	0859	"	" " "	" " "	-	1/2 m	-	-
"	262	"	-	0520	"	" " "	" " "	-	DIP	-	-
26A	none	9	1023	-	355	10 13 40	109 30 00	-	none	-	-
26B	none	9	1137	-	140	10 23 45	109 31 00	-	none	-	-
27	263	9	1254	1329	100	10 31 30	109 25 00	-	1 m	-	-
"	"	"	-	1350	"	" " "	" " "	-	1/2 m	-	-
"	264	"	-	1424	"	" " "	" " "	-	10' Beam T.	-	-
28	266	9	1933	1957	32	11 02 00	108 59 00	-	1 m	-	-
"	267	"	-	2022	"	" " "	" " "	-	2 m (S4-216)	-	SIO 61-592
"	268	"	-	2100	"	" " "	" " "	-	DIP	(blue-green algae surface)	-
none	269	10	-	0300	59 m	11 02	108 59 00	-	DIP	-	SIO 61-653
none	270	10	-	0912	49 m	10 23.8	108 53.2	-	2' dredge	Poylo, Cecir	-
none	271	10	-	1002	50 m	10 21.8	108 52 00	-	6' Beam T.	" "	-
none	272	10	-	0845	3-15 m	10 29 15	108 57 30	-	DIP & POISON	" "	-
none	273	10	-	1815	20 fm	10 16.3	108 01.4	-	TROLL	-	-
none	274	10	-	1848	18 fm	10 16.0	107 56.5	-	6' Beam T.	-	-
none	275	10	-	2034	85-95'	10 15.5	107 49.2	-	2 m (S4-217)	-	-
none	276	10	-	2200	18 fm	10 16.3	107 46.3	-	DIP	-	SIO 61-654
none	277	11	-	1030	15 fm	10 13.3	107 07.0	-	DIP	Cap St. Jacques (bl-gr algae)	-
<u>off Saison. (South and Southwest)</u>											
29	278	15	2300	2324	13	09 43 00	107 03 45	20	1 m	-	-
29A	none	16	0113	-	16.5	09 29 30	107 10 00	-	none	-	-
29B	none	16	0253	-	18.5	09 15 20	107 17 05	-	none	-	-
30	279	16	0434	0530	21	09 01 00	107 24 20	-	1 m	-	-
30A	none	16	0322	-	23	08 47 20	107 32 15	-	none	-	-
30B	none	16	0906	-	27	08 33 30	107 40 40	-	none	-	-
31	280	16	1051	1125	31	08 18 50	107 49 45	-	1 m	-	-
"	"	"	-	1146	"	" " "	" " "	-	1/2 m	-	-
31A	none	16	1339	-	37.5	08 05 15	107 56 20	-	none	-	-
31B	none	16	1545	-	44	07 50 40	108 03 25	-	none	-	-
32	281	16	1727	-	43	07 37 00	108 10 00	-	1 m	-	-
"	282	"	-	1730	"	" " "	" " "	-	DIP(Log)	-	-
"	283	"	-	1720	"	" " "	" " "	-	DIP	-	-
"	284	"	-	1857	-	07 36 45	108 10 00	-	2 m (S4-218)	-	SIO 61-621
32A	none	16	2111	-	46	07 22 15	108 17 05	-	none	-	-
32B	none	16	2255	-	50	07 09 05	108 24 15	-	none	-	-
33	285	17	0037	0123	57	06 55 00	108 31 10	-	1 m	-	-
33A	none	17	0317	-	61	06 41 00	108 38 15	-	none	-	-
33B	none	17	0502	-	61	06 27 40	108 44 55	-	none	-	-
34	286	17	0644	0736	61	06 14 10	108 51 50	-	1 m	-	-
"	"	"	-	0751	"	" " "	" " "	-	1/2 m	-	-
34A	none	17	1014	-	52	06 03 10	108 32 10	-	none	-	-
34B	287	17	1232	1240	46	05 57 05	108 12 40	-	DIP(Log)	-	-
35	288	17	1505	1539	39	05 41 00	107 53 00	-	1 m	-	-
35A	none	17	1808	-	34	05 29 00	107 31 40	-	none	-	-
35B	289	17	2024	2034	33	05 18 10	107 12 20	-	2 m (S4-219)	-	SIO 61-622
36	290	17	2321	2349	32	05 07 25	106 53 20	-	1 m	-	-

Hydro. Sta. S4-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
36A	none	18	0225	-	35	04 57 00	106 30 30	-	none	-	-
36B	none	18	0441	-	46	04 46 15	106 12 05	-	none	-	-
37	291	18	0630	0704	44	04 37 00	105 56 30	-	1 m	-	-
"	"	"	-	0725	"	" " "	" " "	-	1/2 m	-	-
37A	none	18	0910	-	44	04 43 05	105 51 30	-	none	-	-
37B	none	18	1052	-	42	05 09 15	105 46 40	-	none	-	-
38	292	18	1234	1307	40	05 25 10	105 41 20	-	1 m	-	-
38A	none	18	1502	-	36.5	05 40 55	105 35 35	-	none	-	-
38B	none	18	1636	-	28	05 56 25	105 30 25	-	none	-	-
39	293	18	1814	1845	29	06 12 25	105 24 55	-	1 m	-	-
"	294	"	-	1902	"	" " "	" " "	-	2 m (S4-220)	-	-
"	295	"	-	1900	"	" " "	" " "	-	DIP	-	-
39A	none	18	2100	-	30	06 29 00	105 20 00	-	none	-	-
39B	none	18	2236	-	27	06 44 10	105 15 20	-	none	-	-
40	296	19	0012	0040	26.5	06 59 15	105 11 10	-	1 m	-	-
"	"	"	-	-	"	" " "	" " "	-	1/2 m	-	-
40A	none	19	0227	-	24.5	07 14 30	105 06 45	-	none	-	-
40B	none	19	0403	-	22	07 29 10	105 02 30	-	none	-	-
41	297	19	0525	0615	20	07 41 45	104 58 40	-	1 m	-	-
41A	none	19	0753	-	17	07 47 05	104 54 35	-	none	-	-
41B	none	19	0910	-	15	08 08 35	104 51 45	-	none	-	-
42	298	19	1030	1054	14	08 21 00	104 49 50	-	1 m	-	-
"	299	"	-	1040	"	" " "	" " "	-	DIP (phytoplankton)	-	-
"	300	"	-	1232	15	08 24.6	104 36 00	-	DIP	-	-
none	301	19	-	1430	12	08 35.1	104 15 00	-	DIP	-	-
none	302	19	-	1538	15	08 42.6	104 06.1	-	DIP	-	-
<u>Gulf of Thailand</u>											
none	303	20	-	1630	23	11 55.8	101 28.0	-	DIP (phytoplankton)	-	-
none	304	20	-	1800	20	12 07.0	101 17.7	-	TRILL	-	-
none	305	20	-	1940	-	12 18.5	101 05.2	-	DIP	-	STO 61-656
none	306	20	-	1944	-	" "	" "	-	2 m (S4-221)	-	STO 61-655

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. No. S4-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions		Hydro. Sta. No. S4-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions	
					Amt. 10 <sup>ths</sup>	Cloud Type						Amt. 10 <sup>ths</sup>	Cloud Type
1	210	21.0	404	93.9	-	pt. cldy	22	251	131	508	102	-	night
2	214	115	531	165	-	night	23	254	128	561	40.9	3	Cu
3	217	84.5	563	53.4	9	SC AC	24	256	134	506	59.4	2	Cu
4	218	141	480	52.0	-	night	25	259	131	525	57.3	-	night
5	220	141	550	40.0	2	FC	26	261	141	540	59.2	1	Cu
6	221	141	532	69.5	-	night	27	263	126	586	20.4	1	CN Cu
7	223	84.5	525	49.6	3	Cu AC SC	28	266	33.4	355	149	-	night
8	224	128	530	32.1	-	night	29	278	12.3	139	251	-	night
9	227	106	515	44.6	-	night	30	279	36.8	440	227	-	night
10	228	115	584	29.1	4	AC FC Cu	31	280	33.5	477	115	2	Ci CS Cu
11	230	141	543	53.4	-	night	32	281	72.0	511	78.4	-	pt. cldy
12	231	139	515	36.8	8	Cu	33	285	83.6	445	85.5	-	night
13	233	14.1	401	72.2	6	AC Cu AS	34	286	72.2	495	97.0	8	Cu AC SC
14	235	48.1	456	138	-	night	35	288	51.6	559	247	-	pt. cldy
15	238	141	607	52.8	-	night	36	290	44.8	455	130	-	night
16	240	141	-	-	6	SC FC	37	291	68.1	518	106	2	Cu CS
17	242	139	467	40.7	-	night	38	292	50.0	474	21.1	-	pt. cldy
18	245	115	540	38.9	2	Cu	39	293	46.0	209	158	3	AC Cu AS
19	246	141	545	38.6	-	night	40	296	34.4	192	156	-	night
20	248(2)	141	523	80.2	-	night	41	297	32.1	336	89.1	-	pt. cldy
21	250	123	537	33.5	7	Ci Cu	42	298	17.4	99.1	.4	4	AC AS AS S



## Cruise S5. Gulf of Thailand

Because the period April-May invariably represents the changeover from the northeast to southwest winds and the introduction of the rainy season to Thailand (Wyrski, 1961, pg. 17), and since the preliminary plankton analyses of collections from cruises S1 and S2 indicated fish egg and larval abundance in two specific areas, cruise S5 included special intensive biological surveys (closely spaced stations of 1 m net tows) in addition to routine survey of the Gulf. The first area was on the east side of the Gulf between Ko Rong and the mainland along a line across the mouth of the Baie de Kompang Som. The second (western) area was the large bay south of Chumphon. In addition a series of thirteen 1 m net tows were taken along the entire western coast of the Gulf from Ban Hua Hin to Pattani.

Weather was generally of light variable winds with smooth to slight seas, although much small-scale cyclonic activity and many water spouts were observed at the southern tip of Indo-China. Due to engine problems the entire cruise was made at 9 knots instead of the usual 10 knots.

An interpretation of the bathythermograph temperature data from this cruise may be found in Robinson and Srivirojna (1961\*).

### Itinerary:

depart Bangkok, April 21, 1960,

(one stop at Ko Kra, April 29)

return Bangkok, May 3.

### 34 Hydrographic Stations:

#### Physical:

- serial hydrographic cast at each station,
- BT observations at each level, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

#### Chemical:

- dissolved oxygen, salinity and phosphate concentration later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

#### Biological:

- 67 1 m oblique net tows,
- 7 2 m (night) stramin net tows,
- 3 6' Beam trawls.

#### Geological:

- continuous fathometer recording.

Hydro. Sta. S5-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<u>Gulf of Thailand</u>											
U1	307	IV-21	2000	2009	6½	12 36 25	100 01 00	3.5	1 n	-	-
U2	308	22	0114	0130	14	12 03 35	100 09 30	11.2	1 n	-	-
"	309	"	-	"	"	" " "	" " "	"	DIP	-	-
U3	310	22	0605	0605	19½	11 26 00	99 53 15	15.4	1 n	-	-
U4	311	22	1100	1120	26	10 46 15	99 46 25	21.0	1 n	-	-
U5	312	22	1357	1345	26	10 26 45	99 53 30	38.0	1 n	Chumporn Bay	-
U6	313	22	1546	1600	26	10 07 45	99 58 37	8.5	1 n	Ke Tao	-
"	314	"	-	"	"	" " "	" " "	"	DIP	" "	-
U7	315	22	1815	1830	12	09 49 30	100 09 15	6.0	1 n	Ke Phangan	-
"	316	"	-	1930	12	09 46 15	100 10 30	5.6	6* Beam T.	" "	-
"	316A	"	-	"	"	" " "	" " "	"	DIP	" "	SID 61-657
"	317	"	-	"	"	" " "	" " "	"	2 n	net rip(no sample) -	-
U8	318	22	2203	2200	14½	09 35 40	100 16 30	2.0	1 n	Ke Samui	-
U9	319	23	0139	0150	14	09 05 30	100 16 45	23.0	1 n	-	-
U10	320	23	0606	0615	13½	08 30 30	100 38 00	9.0	1 n	Ke Kra	-
U11	321	23	1030	1045	20	07 57 00	101 01 30	41.5	1 n	-	-
U12	322	23	1442	1450	21½	07 27 30	101 23 30	50.0	1 n	-	-
U13	323	23	1823	1900	22	06 52 30	101 45 00	10.0	1 n	-	-
1	324	24	0003	0037	15	06 23 00	102 11 45	8.8	1 n	-	-
"	325	"	0110	0110	15	06 24 12	102 13 00	10.8	6* Beam T.	-	-
1A	none	24	0300	-	19	06 30 00	102 22 00	-	none	-	-
1B	none	24	0435	-	23	06 38 00	102 31 30	-	none	-	-
2	326	24	0604	0630	25	06 45 30	102 41 00	41.0	1 n	-	-
"	326A	"	-	0605	"	" " "	" " "	"	DIP	-	-
2A	327	24	0835	0815	27	06 54 00	102 51 00	53.0	floating log	-	-
2B	none	24	1004	-	27	07 02 00	103 01 00	-	none	-	-
3	328	24	1133	1201	28	07 10 00	103 10 30	45.0	1 n	-	-
3A	none	24	1337	-	29	07 17 30	103 21 30	-	none	-	-
3B	none	24	1502	-	32½	07 24 30	103 31 30	-	none	-	-
4	329	24	1629	1645	23	07 32 00	103 41 30	75.0	1 n	-	-
4A	330	24	1827	1855	21	07 39 00	103 51 45	77.5	2 n	Pt. Ca Mau	-
4B	none	24	2026	-	20	07 47 00	104 03 00	-	none	-	-
5	331	24	2153	2225	17	07 55 00	104 14 00	52.6	1 n	Poule Obi	-
"	332	"	-	"	"	" " "	" " "	"	DIP	" "	-
5A	none	24	2355	-	15	08 02 30	104 24 00	-	none	-	-
5B	none	25	0111	-	12½	08 09 00	104 33 15	-	none	-	-
"	333	"	-	0214	-	08 15 00	104 41 40	11.0	FoD	Poule Obi	-
6	334	25	0226	0235	13	08 16 00	104 43 30	11.0	1 n	" "	-
7	335	25	0905	0930	12	09 01 30	104 14 37	17.4	1 n	False Poule Obi	-
"	336	"	-	0958	23 n	09 05 30	104 15 48	18.0	DIP(sargassum)	-	-
"	337	"	-	1050	"	09 13 00	104 12 30	25.0	TROLL	-	-
"	338	"	-	1101	"	09 14 06	104 11 30	26.5	TROLL	-	-
"	339	"	-	1120	"	09 15 48	104 10 48	26.0	TROLL	-	-
"	340	"	-	1133	"	09 17 12	104 10 00	25.0	TROLL	-	-
8	341	25	1305	1305	14½	09 26 30	104 05 15	20.0	1 n	Poule Dame	-
"	342	"	-	1444	13	09 35 00	104 01 12	21.0	TROLL	" "	-
9	343	25	1651	1651	14½	09 50 00	103 53 40	10.0	1 n	Frere de l'Est	-
"	344	"	-	1710	"	" " "	" " "	"	DIP	" " "	-
9A	345	25	1851	1851	15	09 40 45	103 41 40	21.9	1 n	" " "	-
9B	346	25	2059	2102	20	09 31 36	103 30 00	12.0	1 n	Poule Fan Kant	-
"	347	"	-	2100	"	" " "	" " "	"	FoD	" " " "	-

Hydro. Sta. S5-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
10	348	25	2237	2247	22	09 24 30	103 21 15	25.0	1 n	-	-
10A	none	26	0036	-	26½	09 15 00	103 10 20	-	none	-	-
10B	none	26	0207	-	26½	09 06 00	102 59 10	-	none	-	-
11	349	26	0337	0359	32	08 57 00	102 48 45	44.0	1 n	Peulo Panjang	-
"	350	"	-	0400	"	" " "	" " "	"	DIP	" "	-
11A	none	26	0521	-	38	08 47 30	102 38 10	-	none	-	-
11B	none	26	0715	-	38½	08 38 00	102 27 30	-	none	-	-
12	351	26	0849	0849	38	08 29 20	102 17 40	85.0	1 n	Peulo Panjang	-
12A	none	26	1055	-	37	08 21 00	102 08 30	-	none	-	-
"	352	26	1124	1126	37½	08 18 00	102 05 10	95.0	TROLL	Pattani	-
12B	none	26	1218	-	36	08 13 00	102 00 00	-	none	-	-
13	353	26	1338	1416	36½	08 05 20	101 50 30	80.5	1 n	Ban Lam Pho	-
13A	none	26	1554	-	27½	07 57 30	101 40 00	-	none	-	-
13B	none	26	1724	-	23	07 50 40	101 29 40	-	none	-	-
14	354	26	1845	1904	25	07 44 10	101 19 10	58.0	1 n	Ban Lam Pho	-
"	355	"	-	1925	"	" " "	" " "	"	2 n	" " "	SIO 61-658
"	356	"	-	"	"	" " "	" " "	"	DIP	" " "	-
14A	none	26	2114	-	23	07 36 30	101 11 00	-	none	-	-
14B	357	26	2237	2242	13½	07 28 30	101 02 45	28.5	1 n	Sengkha	-
"	358	"	-	2240	"	" " "	" " "	"	FoD	"	-
15	359	27	0017	0035	10	07 20 30	100 54 30	10.0	1 n	"	-
"	360	"	-	0030	"	" " "	" " "	"	FoD	"	-
16	361	27	0530	0547	14½	08 03 20	100 42 20	24.0	1 n	-	-
17	362	27	1130	1206	9	08 39 45	100 14 45	12.0	1 n	Laem Talumphak	-
"	363	"	-	1235	"	" " "	" " "	"	6' Beam T.	" "	-
"	364	"	-	1245	"	" " "	" " "	"	DIP	" "	-
17A	none	27	1532	-	14	08 49 00	100 26 00	-	none	-	-
17B	none	27	1703	-	15	08 57 30	100 37 00	-	none	-	-
18	365	27	1851	1923	20	09 05 40	100 48 15	53.0	1 n	Sichen	-
"	366	"	-	1944	"	" " "	" " "	"	2 n	"	-
"	367	"	-	1945	"	" " "	" " "	"	DIP	"	-
18A	none	27	2127	-	23	09 13 06	100 58 00	-	none	-	-
18B	none	27	2301	-	30	09 21 45	101 09 36	-	none	-	-
19	368	28	0034	0059	35	09 30 06	101 20 30	90.0	1 n	-	-
"	369	"	-	0050	"	" " "	" " "	"	DIP	-	-
19A	none	28	0251	-	36	09 39 00	101 31 42	-	none	-	-
19B	none	28	0426	-	38	09 47 12	101 43 00	-	none	-	-
20	370	28	0559	0626	38	09 55 30	101 54 00	92.0	1 n	Kas Rong	-
"	371	"	-	0800	-	10 02 06	102 02 30	54.0	FoD	Peulo Wai	-
20A	none	28	0816	-	37	10 03 20	102 04 50	-	none	-	-
20B	none	28	0949	-	35	10 11 00	102 15 00	-	none	-	-
21	372	28	1126	1159	33½	10 19 00	102 25 30	53.0	1 n	-	-
21A	none	28	1345	-	29	10 27 00	102 36 12	-	none	-	-
21B	none	28	1517	-	23	10 34 50	102 48 00	-	none	-	-
22	373	28	1659	1704	17	10 43 06	102 59 00	12.2	1 n	-	-
22A	374	28	1754	1807	12	10 46 00	103 03 15	7.3	1 n	-	-
22B	375	28	1857	1904	11	10 49 00	103 08 12	2.2	1 n	-	-
22C	376	28	2001	2010	12	10 42 48	103 09 24	2.2	1 n	-	-
"	377	"	-	2030	"	" " "	" " "	"	DIP	-	-
"	378	"	-	2037	"	" " "	" " "	"	2 n	-	-
22D	379	28	2137	2147	13½	10 40 00	103 05 15	7.3	1 n	-	-
22E	380	28	2319	2327	17	10 49 12	102 58 00	7.5	1 n	Kas Semit	-
22F	381	29	0021	0030	13	10 52 24	103 02 30	2.0	1 n	" "	-
23	382	29	0520	0540	13	11 27 00	102 45 30	10.7	1 n	Ko Kut	-
"	383	"	-	0545	"	" " "	" " "	"	FoD	" "	-
"	384	"	-	1030	5	11 48 00	102 30 00	0.5	Line(fish)	Ko Mak (anch.)	-

Hydro. Sta. S5-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
23A	385	29	1657	1702	17	11 45 00	102 23 30	1.8	1 n	Ke Rang	-
"	386	"	-	1715	"	" " "	" " "	2.0	DIP	" "	-
23B	287	29	1814	1818	17	11 49 00	102 17 00	6.5	1 n	" "	-
24	388	29	1930	1948	20	11 53 00	102 10 00	10.0	1 n	Ke Chang	-
"	389	"	-	2000	"	" " "	" " "	"	DIP	" "	-
"	390	"	-	2050	"	" " "	" " "	"	2 n	" "	-
24A	none	29	2210	-	26	11 44 00	102 00 00	-	none	-	-
24B	none	29	2343	-	29	11 36 00	101 49 00	-	none	-	-
25	391	30	0115	0141	31	11 27 40	101 38 00	49.0	1 n	Ke Chang	-
25A	none	30	0320	-	31	11 19 40	101 27 15	-	none	-	-
25B	none	30	0452	-	30	11 11 30	101 16 20	-	none	-	-
"	391A	"	-	0535	-	11 08 00	101 12 00	84.0	FoD	-	-
26	392	30	0624	0703	29	11 03 20	101 05 40	84.0	1 n	Prachuab Kirikhan -	-
26A	none	30	0854	-	30	10 55 30	100 55 00	-	none	-	-
26B	none	30	1040	-	31½	10 47 40	100 44 40	-	none	-	-
27	393	30	1228	1246	30	10 38 55	100 33 00	64.5	1 n	Laem Yai	-
27A	none	30	1445	-	30	10 30 45	100 21 55	-	none	-	-
27B	none	30	1615	-	31½	10 23 00	100 10 20	-	none	-	-
28	394	30	1735	1809	26½	10 19 12	100 03 00	15.0	1 n	-	-
"	395	"	-	1800	"	" " "	" " "	"	DIP	-	-
28A	396	30	2000	2008	24	10 13 00	99 51 00	36.0	1 n	Kan Prachuab -	-
"	397	"	-	2030	"	" " "	" " "	"	2 n	" "	-
"	398	"	-	2045	"	" " "	" " "	"	DIP	" "	SID 61-659
28B	399	30	2232	2241	20	10 08 50	99 39 40	25.0	1 n	" "	-
29	400	V-1	0012	0032	15	10 03 12	99 27 00	16.0	1 n	Languan	-
29A	401	1	0146	0154	10½	09 54 18	99 30 00	13.0	1 n	Ke Wao Yai	-
29B	402	1	0403	0415	19	10 00 45	99 42 30	7.0	1 n	Ke Ten	-
29C	403	1	0636	0644	16½	10 12 00	99 26 30	10.0	1 n	Ke Lalar	-
29D	404	1	0821	0829	20	10 17 54	99 37 30	20.5	1 n	Chumporn	-
"	405	"	-	0835	"	" " "	" " "	"	DIP	" "	-
30	406	1	1050	1111	22	10 36 50	99 39 00	17.0	1 n	Laem Tron	-
30A	none	1	1334	-	16	10 56 45	99 40 00	-	none	-	-
31	407	1	1556	1610	11	11 17 45	99 39 30	5.5	1 n	Laem Mae-Rampong -	-
31A	none	1	1758	-	11	11 25 45	99 50 20	13.0	none	-	-
31B	none	1	1916	-	20	11 33 40	100 01 10	16.3	none	-	-
"	408	"	-	2020	-	11 39 06	100 08 42	21.0	FoD	-	-
32	409	1	2048	2117	18½	11 41 30	100 12 10	23.5	1 n	Prachuab Kirikhan -	-
"	410	"	-	2100	"	" " "	" " "	"	DIP	" "	-
32A	411	1	2259	2300	17½	11 51 06	100 24 54	31.0	FoD	-	-
32B	none	2	0032	-	17½	12 00 00	100 37 10	-	none	-	-
33	412	2	0205	0222	15	12 09 00	100 49 45	23.1	1 n	Ke Chuang	-
33A	none	2	0344	-	16	12 15 00	100 59 20	17.0	none	" "	-
33B	none	2	0513	-	14	12 19 00	101 09 15	16.0	none	" "	-
34	413	2	0626	0649	14	12 24 00	101 23 45	12.0	1 n	Laem Ya	-
34A	414	2	1420	1423	13½	12 57 55	100 44 36	3.0	1 n	Ke Lan	-
34B	415	2	1518	1534	13	13 02 00	100 48 00	1.8	1 n	Ke Nok	-
34C	416	2	1609	1620	13½	13 05 30	100 50 50	1.8	1 n	Ke Siahang	-

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. No.	Bio. Sta. No.	Depth haul m	Cubic m Water Filtered	Vol. Plankton/1000 m <sup>3</sup> cc	Sky Conditions		Hydro. Sta. No.	Bio. Sta. No.	Depth haul m	Cubic m Water Filtered	Vol. Plankton/1000 m <sup>3</sup> cc	Sky Conditions	
S5-	60-				Amt. 10 <sup>ths</sup>	Cloud Type	S5-	60-				Amt. 10 <sup>ths</sup>	Cloud Type
U1	307	7.50	285	158	-	night	19	368	60.0	389	236	-	night
U2	308	17.0	230	879	-	night	20	370	53.0	405	59.3	-	pt. cldy
U3	310	24.5	388	797	-	-	21	372	52.1	368	269	4	-
U4	311	34.1	314	178	4	Cu AS	22	373	21.2	282	532	-	pt. cldy
U5	312	25.0	295	67.8	8	AC AS	22A	374	16.1	260	614	-	pt. cldy
U6	313	35.3	250	936	4	Ci CiS AC	22B	375	11.8	253	896	-	night
U7	315	19.3	316	980	4	-	22C	376	13.9	296	646	-	night
U8	318	18.9	338	1660	-	night	22D	279	16.1	171	836	-	night
U9	319	17.4	375	255	-	night	22E	380	20.1	308	816	-	night
U10	320	17.6	332	87.4	7	-	22F	381	14.3	268	1930	-	night
U11	321	25.7	397	93.3	-	pt. cldy	23	382	16.7	259	174	-	pt. cldy
U12	322	37.2	294	190	3	CS AS SC Cu	23A	385	23.4	307	635	10	S SC AS
U13	323	30.1	454	128	-	night	23B	387	24.3	309	308	-	night
1	324	17.6	320	301	-	night	24	388	27.7	425	439	-	night
2	326	26.5	327	205	-	pt. cldy	25	391	42.4	324	204	-	night
3	328	45.9	334	111	7	Cu SC	26	392	40.9	304	247	-	-
4	329	30.1	305	32.8	-	pt. cldy	27	393	35.2	199	246	-	pt. cldy
5	331	12.7	303	330	-	night	28	394	40.0	304	247	3	AS AC
6	334	7.95	289	201	-	night	28A	396	32.8	315	241	-	night
7	335	15.4	264	368	2	Cu	28B	399	32.4	471	573	-	night
8	341	17.0	344	692	-	pt. cldy	29	400	17.7	270	278	-	night
9	343	17.6	126	8970	4	Cu	29A	401	18.0	218	170	-	night
9A	345	10.3	308	491	-	night	29B	402	22.6	227	428	-	night
9B	346	32.1	428	855	-	night	29C	403	24.7	326	190	7	AS AC Cu
10	348	22.4	442	203	-	night	29D	404	25.7	253	332	8	AS AC Cu
11	349	20.6	331	574	-	night	30	406	35.3	307	163	8	-
12	351	49.2	415	446	-	pt. cldy	31	407	14.1	319	473	-	pt. cldy
13	353	54.6	410	224	10	AC SC	32	409	22.5	277	697	-	night
14	354	31.5	254	150	-	pt. cldy	33	412	16.1	262	500	-	night
14B	357	19.8	305	154	-	night	34	413	16.8	288	215	4	Cu
15	359	12.8	261	306	-	night	34A	414	14.6	215	1060	5	Cu SC
16	361	14.0	263	152	-	pt. cldy	34B	415	14.3	260	1535	3	AS Cu
17	362	14.1	287	1330	3	-	34C	416	12.9	236	508	3	Cu AS
18	365	16.8	275	116	-	night							

## Cruise S6. South China Sea

Weather and sea conditions on cruise S6 reflected the arrival of the southwest monsoon season. Underway stations along the eastern Gulf included 1 m and 2 m net tows to be added to those from this area taken on S5.

The first leg of the regular cruise pattern in the South China Sea included an especially good fathometric record of the southern and southwestern periphery of the base of Triton Island.

The second stop at Nhatrang included a series of bottom sampling made between Hon Dung and Hon Lon (Gallardo, 1967\*, pg. 278; stations numbered there 341-349 are in fact from cruise S6 (S6-U32—S6-U40), the correct date being June 8, 1960). During the course of the following leg a seamount lying between Poulo Cecir de Mer and Spratley Island, first noticed on cruise S2, was sampled by NEL snap sampler, and serial 1 m net tows and a 2 m net tow were taken there.

The final and return leg to Bangkok (including the Chao Phya River) was utilized in a special (National Institute of Health) water sampling project (ZoBell, 1961\*).

Areas of discolored water (previously observed on cruise S4 to occur only south of Line 3 and in the Gulf of Thailand) were found at each Hydrographic Station along Line 1 as well as at a number of stations along Lines 2, 3 and 4. The causative agent was found to be a blue-green alga, *Trichodesmium* sp. At Station S6-40, directly south of Cape Ca Mau numerous patches of the blue-green alga Lyngbya were observed.

### Itinerary:

- depart Bangkok, May 23, 1960—arrive Nhatrang, May 27,
- depart Nhatrang, May 28—return Nhatrang, June 3,
- (bottom sampling between Hon Dung and Hon Lon, June 8)—(reconnaissance cruise, June 9-10)
- depart Nhatrang, June 10—arrive Saigon, June 16,
- depart Saigon, June 19—return Bangkok, June 28.

### 42 Hydrographic Stations:

#### Physical:

- serial hydrographic cast at each station,
- BT observations at each station, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

#### Chemical:

- dissolved oxygen, salinity and phosphate concentration later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

#### Biological:

- 63 1 m oblique net tows,
- 11 ½ m (45 cm) vertical net tows,
- 19 2 m (all at night except one series of 3, June 3) stramin net tows,
- 2 6' Beam trawls,
- 1 2' Biological dredge.

#### Geological:

- (biological trawls and dredge)
- 2 NEL snap samples
- continuous fathometer recording.

Hydro. Sta. S6-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
<u>Gulf of Thailand</u>											
U1	417	V-24	1046	1100	20	11 21 40	102 29 00	14	1 m	Ke Kut	-
"	418	"	1216	1220	20	11 13 15	102 37 45	20	TROLL	" "	-
U2	419	24	1530	1602	14 $\frac{1}{2}$	10 52 24	103 02 30	2	1 m	Kas Samit	-
U3	420	24	1645	1657	12	10 48 45	103 06 00	3	1 m	Ile du Milsew	-
U4	421	24	1745	1754	13	10 42 42	103 09 54	2	1 m	Kas Rong	-
U5	422	24	2206	2215	13	10 17 55	103 31 00	24	1 m	Ile de Phu Quoc	-
"	423	"	-	2233	"	" " "	" " "	"	2 m (S6-201)	" " " "	-
"	424	"	-	2240	"	" " "	" " "	"	DIP	" " " "	-
U6	425	25	0257	0313	16	09 30 30	103 54 45	17	1 m	Recher Table	-
"	426	"	-	0315	"	" " "	" " "	"	DIP	" "	-
U7	427	25	0730	0738	10	08 51 30	104 16 15	16	1 m	Fausse Paulo Obi	-
U8	428	25	1148	1200	14 $\frac{1}{2}$	08 20 50	104 42 00	9	1 m	Paulo Obi	-
U9	429	25	1604	1610	13	08 24 30	105 19 15	28	1 m	" "	-
<u>South China Sea</u>											
U10	430	25	2048	2057	13	08 31 05	106 03 20	8	1 m	Ilot Boise	-
"	431	"	-	2117	"	08 30 20	106 05 30	"	2 m (S6-202)	" "	-
"	432	"	-	2140	"	" " "	" " "	"	DIP	" "	-
"	433	26	-	0530	12	09 32 30	106 50 55	10	FoD	Ba Dong, VN	-
"	434	"	1348	1350	16	10 27 00	107 56 00	16	DIP	Pta. KaGa I.	-
"	435	"	1952	2051	19	10 58 00	108 48 45	13	2 m (S6-203)	Pte. Lagan	-
U11	none	28	1200	-	37	12 33 00	109 28 30	3	none	Mui Ganh	-
U12	none	28	1300	-	50 $\frac{1}{2}$	12 42 50	109 29 30	4	none	Mui Dei	-
U13	none	28	1400	-	57	12 52 30	109 29 15	2	none	Mui Mao	-
U14	none	28	1500	-	71	13 03 30	109 28 15	4	none	Hen Do	-
U15	none	28	1600	-	68	13 12 15	109 27 30	9	none	Lao Ma Nha	-
U16	none	28	1700	-	68	13 22 15	109 27 30	10	none	Mui Laoi Cay	-
U17	none	28	1800	-	68	13 31 30	109 26 30	7	none	Paulo Gambfr	-
U18	none	28	1900	-	60	13 40 30	109 25 00	5	none	" "	-
U19	436	28	2000	2004	55	13 49 45	109 23 20	6	2 m (S6-204)	Hoi Lee	-
U20	none	28	2200	-	60	14 03 10	109 21 30	7	none	Thanh Hi	-
U21	none	28	2300	-	61	14 12 30	109 20 00	9	none	Ile Nuoc	-
U22	none	28	2400	-	54	14 21 45	109 17 45	6	none	Ile Tortue	-
U23	none	29	0100	-	44	14 30 00	109 13 00	7	none	Pt. An Yo	-
U24	none	29	0200	-	44	14 40 00	109 12 00	7	none	Cap Sa Hoi	-
U25	none	29	0300	-	42	14 47 00	109 10 30	8	none	Saltane	-
U26	none	29	0400	-	35	14 55 45	109 10 45	12	none	Cap Mia	-
U27	none	29	0500	-	33	15 05 30	109 09 00	15	none	Cap Bataigon	-
U28	none	29	0600	-	27	15 15 30	109 07 15	7	none	Cu Lao Re	-
U29	none	29	0700	-	37	15 20 00	109 01 45	5	none	" " "	-
U30	none	29	0800	-	33	15 26 00	108 54 10	5	none	Cap Nam Tram	-
U31	none	29	0900	-	25	15 32 30	108 47 50	7	none	Cap An Hea	-
1	437	29	1003	1027	23	15 40 10	108 42 20	11	1 m	Ngoe My	-
"	438	"	-	1053	23	" " "	" " "	"	$\frac{1}{2}$ m	" "	-
"	439	"	-	1045	23	" " "	" " "	"	DIP	" "	-
1A	none	29	1237	-	47	15 40 00	108 58 10	18	none	Cu Lao Re	-
1A <sub>1</sub>	none	29	1253	-	48	" " "	109 00 20	17	none	" " "	-
1A <sub>2</sub>	none	29	1257	-	49	" " "	109 00 50	"	none	" " "	-
1A <sub>3</sub>	none	29	1312	-	50	" " "	109 02 20	"	none	" " "	-
1A <sub>4</sub>	none	29	1330	-	52	" " "	109 03 50	16	none	" " "	-
1B	none	29	1345	-	68	15 40 30	109 15 00	18	none	" " "	-
2	440	29	1626	1736	205	15 40 00	109 31 15	28	1 m	" " "	-
2A	441	29	1926	1933	285	15 41 30	109 47 15	43	2 m	" " "	SI061-660
"	442	"	-	2040	295	" " "	" " "	"	DIP	" " "	-
2B	none	29	2212	-	315	15 41 30	110 03 20	-	none	-	-

Hydro. Sta. S6-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NPL No.
* 3	443	29	2354	0118	255	15 42 00	110 20 00	95	1 n	Viet Nam (70 MMO)-	
* "	444	30	-	0133	"	" " "	" " "	"	1 n	" " (200 MMO)-	
* "	445	"	-	0151	"	" " "	" " "	"	1 n	" " (625 MMO)-	
"	446	"	-	2355	"	" " "	" " "	"	FeD	" " -	
"	447	"	-	0100	"	" " "	" " "	"	DIP	" " -	
3A	none	30	0358	-	390	15 43 00	110 36 00	-	none	-	-
3B	none	30	0541	-	428	15 43 30	110 52 00	-	none	-	-
4	448	30	0804	1015	510	15 41 30	111 12 30	6	1 n	Triton Is.	-
"	449	"	-	1034	"	" " "	" " "	"	1/2 n	" " -	-
4A	none	30	1210	-	600	15 40 00	111 25 00	-	none	-	-
"	450	"	-	1315	-	15 39 30	111 36 00	25	DIP	Triton Is. (water sample)	-
4B	none	30	1401	-	710	15 39 00	111 40 36	-	none	-	-
5	451	30	1546	1754	810	15 38 00	112 01 00	48	1 n	Triton Is.	-
5A	452	30	1947	1956	1080	15 38 00	112 18 00	65	2 n (86-206)	" "	SIO 61-638
5B	none	30	2239	-	585	15 41 00	112 34 00	-	none	-	-
6	none	31	0017	-	1390	15 44 45	112 50 00	-	none	-	-
"	453	"	-	0341	"	" " "	" " "	251	1 n	Viet Nam	-
"	454	"	-	0400	"	" " "	" " "	"	1/2 n	" " -	-
"	455	"	-	"	"	" " "	" " "	"	DIP	" " -	-
6A	none	31	0605	-	1400	15 32 00	112 54 00	-	none	-	-
6B	none	31	0818	-	1650	15 18 40	112 58 00	-	none	-	-
7	none	31	1019	-	2080	15 05 30	113 01 45	-	none	-	-
"	456	"	-	1203	2080	" " "	" " "	262	1 n	Viet Nam	-
7A	none	31	1441	-	1250	14 48 30	113 06 15	-	none	-	-
7B	none	31	1708	-	1150	14 30 00	113 12 00	-	none	-	-
8	457	31	1947	2107	1950	14 12 00	113 17 00	250	1 n	Viet Nam	-
8A	none	31	2358	-	2000	14 05 00	113 07 30	-	none	-	-
8B	none	VI-1	0239	-	1500	14 00 00	112 57 00	-	none	-	-
9	458	1	0519	0807	1900	13 55 00	112 46 30	220	1 n	Viet Nam	-
"	459	"	-	0829	"	" " "	" " "	"	1/2 n	" " -	-
9A	none	1	1307	-	1750	13 50 00	112 34 00	-	none	-	-
9B	none	1	1638	-	1150	13 46 45	112 19 00	-	none	-	-
10	460	1	1935	2101	1250	13 44 00	112 05 00	170	1 n	Viet Nam	-
"	461	"	-	2050	"	" " "	" " "	"	DIP	" " -	-
"	462	"	-	2123	1350	" " "	" " "	"	2 n (86-207)	" "	SIO 61-637
10A	none	2	0245	-	1325	13 40 00	111 51 00	-	none	-	-
10B	none	2	0529	-	1550	13 36 30	111 36 00	-	none	-	-
* 11	463	2	0812	1102	900	13 35 15	111 21 00	125	1 n	Viet Nam (70 MMO)-	
* 11X	464	"	-	1116	"	" " "	" " "	"	1 n	" " (200 MMO) -	
* 11Y	465	"	-	1136	"	" " "	" " "	"	1 n	" " (1100 MMO) -	
11A	none	2	1520	-	1600	13 34 45	111 06 30	-	none	-	-
11B	none	2	1710	-	1550	13 34 30	110 51 50	-	none	-	-
* 12	466	2	1906	2046	1515	13 34 10	110 37 10	82	1 n	Viet Nam (70 MMO)-	
* 12X	467	"	-	2056	"	" " "	" " "	"	1 n	" " (200 MMO) -	
* 12Y	468	"	-	2115	"	" " "	" " "	"	1 n	" " (1100 MMO) -	
12(1)	469	"	-	2000	"	" " "	" " "	"	DIP	" "	SIO 61-619
12A	none	3	0015	-	1900	13 33 30	110 22 40	-	none	-	-
12B	none	3	0154	-	1275	13 33 00	110 08 00	-	none	-	-
13	470	3	0334	0430	450	13 32 35	109 53 15	34	1 n	Viet Nam	-
* "	471	"	-	0455	640	13 33 00	109 54 00	35	2 n (86-208)	" (100 MMO) -	
* "	472	"	-	0613	975	13 35 00	109 59 00	40	2 n (86-209)	" (1500 MMO) -	
* "	473	"	-	0822	1000	13 39 00	110 00 00	41	2 n (86-209A)	" (800 MMO) -	
13A	none	3	1154	-	130	13 29 00	109 38 00	-	none	-	-

\* Vertical Series



Hydro. Sta. S6-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or MSL No.
14	474	3	1340	1408	55	13 26 10	109 25 00	6	1 m	Hon Chai	-
"	475	"	-	1429	"	" " "	" " "	"	1/2 m	" "	-
"	476	"	-	1822	-	12 43 30	109 31 40	7	FeD	Houfon Pen.	-
"	477	"	-	2142	-	12 15 00	109 20 45	1	FeD	Hon Lon	-
<b>Nhatrang</b>											
none	478	4	-	1115	6	-	-	-	Line	anchored	-
none	479	5	-	2300	6	-	-	-	DIP	"	-
none	480	7	-	1300	6	-	-	-	DIP	"	SID61-661
(Bottom sampling between Hon Dung and Hon Lon Islands)											
S1	481	8	0713	0725	11 1/2	12 15 45	109 16 06	-	v v snap	-	-
S1A(U32)	481A	"	0732	0734	12	12 15 45 12 15 35	109 16 06 109 15 25	-	2' Bio. Dr.	(start) (finish)	-
S2(U33)	482	"	0845	0928	27	12 15 30	109 21 32	-	P. grab	-	-
S3(U34)	483	"	0941	0958	24	12 15 27	109 20 33	-	P. grab	-	-
"	484	"	-	1010	"	" " "	" " "	-	DIP	-	-
S4(U35)	485	"	1026	1046	22	12 15 57	109 21 10	-	P. grab	-	-
"	486	"	-	1030	"	" " "	" " "	-	DIP	-	-
S5(U36)	487	"	1105	1112	25	12 14 34	109 20 56	-	P. grab	-	-
S6(U37)	488	"	1141	1156	23 1/2	12 14 37	109 19 55	-	P. grab	-	-
S7(U38)	489	"	1225	1242	20	12 13 48	109 19 12	-	P. grab	-	-
S8(U39)	490	"	1300	1305	25	12 13 37	109 20 15	15	P. grab	-	-
S9(U40)	491	"	1343	1400	21	12 13 28	109 19 40	-	P. grab	-	-
S10(U41)	492	"	1430	1440	11	12 15 40 12 15 43	109 17 04 109 15 10	-	6' Beam T.	(start) (finish)	-
Reconnaissance Cruise (Nhatrang Bay)											
-	493	9	-	1010	-	-	-	-	DIP	Hon Ngoai	-
-	494	"	-	1130	-	-	-	-	DIP	" "	-
-	495	"	-	1425	-	-	-	-	DIP	" "	-
-	496	"	-	2300	5 fm	-	-	-	DIP	anchored	-
-	497	10	-	1230	5 fm	-	-	-	DIP	"	-
(track pattern continued)											
15	498	10	1915	1954	52	12 09 00	109 24 45	5	1 m	Hon Lon	-
"	499	"	-	2016	"	" " "	" " "	"	1/2 m	" "	-
"	500	"	-	2037	"	" " "	" " "	"	2 m (S6-210)	" "	-
15A	none	10	2245	-	71	12 03 00	109 39 15	-	none	-	-
15B	none	11	0031	-	860	11 57 05	109 54 00	-	none	-	-
16	501	11	0222	0521	1170	11 51 40	110 08 05	51	1 m	Nhatrang	-
"	502	"	-	0545	"	" " "	" " "	"	FeD	"	-
16A	none	11	0718	-	1360	11 45 40	110 22 40	-	none	-	-
16B	none	11	0925	-	1460	11 39 50	110 39 36	-	none	-	-
17	503	11	1134	1334	1400	11 34 00	110 52 00	98	1 m	Nhatrang	-
"	504	"	-	1400	"	" " "	" " "	"	1/2 m	"	-
"	505	"	-	1405	"	" " "	" " "	"	DIP	"	-
17A	none	11	1618	-	1450	11 29 00	111 06 40	-	none	-	-
"	506	"	-	1700	"	" " "	" " "	113	DIP	Nhatrang	-
17B	none	11	1825	-	1200	11 24 00	111 20 05	-	none	-	-
18	507	11	2034	2203	1500	11 18 05	111 34 10	143	1 m	Nhatrang	-
"	508	"	-	2226	"	" " "	" " "	"	2 m (S6-211)	"	SID61-639
18A	none	12	0208	-	2220	11 11 00	111 47 00	-	none	-	-
18B	none	12	0435	-	2250	11 04 00	112 00 00	-	none	-	-
19	509	12	0655	0859	2250	10 56 30	112 13 00	132	1 m	Spratley Is.	-
19A	none	12	1121	-	2250	10 49 30	112 25 05	-	none	-	-
19B	none	12	1333	-	2140	10 42 30	112 37 40	-	none	-	-
20	510	12	1545	1746	1450	10 35 05	112 51 00	129	1 m	Spratley Is. (sample lost)	-
"	511	"	-	1805	"	" " "	" " "	"	1/2 m	Spratley Is.	-
"	512	"	-	1830	"	" " "	" " "	"	2 m (S6-212)	" "	SID61-636
"	513	"	-	2102	"	" " "	" " "	"	1 m	" "	-
20A	none	12	2321	-	1350	10 23 00	112 43 40	-	none	-	-

Hydro. Sta. S6-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
20B	none	13	0130	-	1020	10 10 30	112 36 40	-	none	-	-
21	514	13	0344	0606	1150	09 58 15	112 30 00	87	1 n	Spratley Is.	-
21A	none	13	0825	-	1150	09 46 00	112 22 30	-	none	-	-
21B	none	13	1033	-	940	09 33 30	112 15 40	59	none	Spratley Is.	-
22	515	13	1240	1353	1000	09 21 40	112 08 50	-	1 n	-	-
22A	none	13	1558	-	970	09 11 15	112 02 30	-	none	-	-
22B	none	13	1739	-	900	09 01 25	111 56 15	-	none	-	-
23	516	13	1920	1950	950	08 51 00	111 50 00	14	DIP	Spratley Is.	-
"	517	"	-	2027	"	" " "	" " "	"	1 n	" "	-
"	518	"	-	2050	"	" " "	" " "	"	2 n.(86-213)	" "	SIO61-662
23A	none	13	2359	-	825	09 00 00	111 38 00	-	none	-	-
23B	none	14	0148	-	1000	09 09 00	111 26 30	-	none	-	-
24	519	14	0338	0515	1300	09 18 15	111 14 00	58	1 n	Spratley Is.	-
"	520	"	-	0533	"	" " "	" " "	"	1/2 n	" "	-
24A	none	14	0728	-	1490	09 27 00	111 03 45	-	none	-	-
24B	none	14	0914	-	1700	09 35 15	110 53 00	-	none	-	-
25	521	14	1050	1217	1700	09 44 00	110 42 00	-	1 n	(not lost)	-
"	522	"	-	1255	"	" " "	" " "	98	1/2 n	(no sample) Spratley Is.	-
* 25A	523	14	1458	1512	1550	09 54 00	110 34 40	103	1 n	Paulo Cezir de Mar (70 MMO)	-
* 25AX	524	"	-	1523	"	" " "	" " "	"	1 n	" " "(200 MMO)	-
* 25AY	525	"	-	1547	"	" " "	" " "	"	1 n	" " "(1100 MMO)	-
"	526	"	-	1515	"	" " "	" " "	"	DIP	" " "	-
25B	527	14	1845	1855	1250	10 01 15	110 24 15	92	2 n(S6-214)	" " "	SIO61-713
"	528	"	-	1930	"	" " "	" " "	"	DIP	" " "	-
25C	(geol.)	14	2158	-	312	10 08 45	110 14 40	80	NEL	" " "	#1155
26	529	14	2322	0117	950	10 12 30	110 08 00	-	1 n	-	-
26A	none	15	0320	-	850	10 19 20	109 57 40	-	none	-	-
26B	none	15	0503	-	205	10 25 00	109 47 00	-	none	-	-
27	530	15	0645	0725	155	10 30 30	109 36 30	40	1 n	Paulo Cezir de Mar	-
27A	none	15	0948	-	81	10 38 00	109 23 15	-	none	-	-
27B	none	15	1155	-	70	10 45 40	109 09 00	-	none	-	-
28	531	15	1408	1446	25	10 55 30	108 55 30	20	1 n	Pt. Lagan	-
"	532	"	-	1458	"	" " "	" " "	"	1/2 n	" "	-
"	(geol.)	"	-	-	50 m	" " "	" " "	-	NEL	-	#1347
29	533	19	1830	1848	12	09 45 10	107 04 00	34	1 n	Cap St. Jacques	-
"	534	"	-	1904	"	" " "	" " "	"	2 n(S6-215)	" " "	SIO61-, 14
29A	none	19	2130	-	15 1/2	09 30 20	107 11 00	-	none	-	-
29B	none	19	2325	-	17 1/2	09 17 00	107 18 00	-	none	-	-
30	535	20	0120	0157	21	09 02 00	107 25 00	47	1 n	Paulo Condoree	-
30	536	20	-	0150	21	09 03 00	107 25 00	47	DIP	" "	-
30A	none	20	0405	-	25	08 48 00	107 32 20	-	none	-	-
30B	none	20	0603	-	26	08 33 30	107 40 00	-	none	-	-
31	537	20	0800	0825	32	08 18 30	107 47 50	70	1 n	Paulo Condoree	-
31A	none	20	1036	-	37 1/2	08 03 45	107 55 00	-	none	-	-
31B	none	20	1232	-	43	07 48 50	108 02 30	-	none	-	-
32	538	20	1428	1456	46	07 34 00	108 10 00	112	1 n	Paulo Condoree	-
32A	none	20	1701	-	50	07 20 30	108 16 40	-	none	-	-
32B	539	20	1925	1938	58	07 06 40	108 24 10	140	2 n(S6-216)	Paulo Condoree-	-
33	540	20	2210	2249	62	06 54 00	108 31 00	132	1 n	North Matana	-
33A	none	21	0250	-	60	06 39 30	108 25 00	-	none	-	-
33B	none	21	0547	-	52	06 27 30	108 15 40	-	none	-	-
34	541	21	0841	0904	45	16 16 00	108 06 40	90	1 n	North Matana	-
34A	none	21	1211	-	42	06 01 00	107 52 00	-	none	-	-
34B	none	21	1501	-	36	05 48 00	107 37 40	-	none	-	-
35	542	21	1726	1746	33	05 37 00	107 22 40	63	1 n	North Matana	-
35A	543	21	2026	2038	29	05 27 30	107 08 20	67	2 n(S6-217)	" "	-
35B	none	21	2357	-	34	05 16 40	106 54 40	-	none	-	-

Hydro. Sta. S6-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth Em	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEI No.
36	544	22	0232	0308	30	05 08 00	106 41 50	81	1 m	North Natuna	-
36A	none	22	0557	-	31	05 00 00	106 30 15	-	none	-	-
36B	none	22	0904	-	47	04 52 15	106 19 00	-	none	-	-
37	545	22	1209	1231	45	04 45 00	106 08 00	110	1 m	North Natuna	-
37	546	22	-	1306	45	04 45 00	106 08 00	110	6' Beam T. (400 MW)	-	-
37A	none	22	1552	-	45	04 55 00	106 00 30	-	none	-	-
37B	none	22	1727	-	42	05 07 40	105 52 00	-	none	-	-
38	547	22	1902	1928	39½	05 20 40	105 45 15	141	1 m	Tg. Dungan (Malaya)	-
"	548	"	-	1920	40	" " "	" " "	"	DIP	"	-
"	549	"	-	1946	"	" " "	" " "	"	2 m (S6-218)	"	-
"	549A	"	-	2030	"	" " "	" " "	"	FeD	"	-
38A	none	22	2152	-	35½	05 33 10	105 39 00	-	none	-	-
38B	none	22	2327	-	32	05 46 00	105 31 00	-	none	-	-
39	550	23	0104	0125	29	05 59 00	105 23 15	139	1 m	Tg. Dungan	-
"	551	"	-	0108	"	" " "	" " "	"	FeD	"	-
"	552	"	-	0110	"	" " "	" " "	"	DIP	Tg. Dungan	-
39A	none	23	0314	-	29	06 13 30	105 18 00	-	none	-	-
39B	none	23	0450	-	30	06 28 30	105 16 10	-	none	-	-
40	553	23	0626	0651	28	06 44 20	105 14 10	103	1 m	Feule Obi	-
"	554	"	-	0817	26	06 48 00	105 13 30	98	DIP	(40 mesh mesh) Feule Obi	-
40A	none	23	1100	-	23	07 00 00	105 12 30	-	none	-	-
40B	none	23	1300	-	22½	07 15 00	105 11 20	-	none	-	-
41	555	23	1606	1629	19½	07 32 00	105 09 40	64	1 m	Feule Obi	-
41A	556	23	1945	1958	18	07 48 30	105 08 00	41	2 m (S6-219)	"	SIO61-715
"	557	"	-	2000	"	" " "	" " "	"	DIP	"	-
41B	none	24	0227	-	12½	08 08 40	105 04 30	-	none	-	-
42	558	24	0705	0722	14	08 19 00	104 47 40	6	1 m	Feule Obi	-
<u>Gulf of Thailand</u>											
none	559	27	-	0010	-	10 35 00	102 10 00	60	FeD	Pt. Samit	-
none	560	27	-	0130	-	10 35 00	102 09 00	60	FeD	"	-
none	561	27	-	0545	-	11 00 00	101 54 00	52	FeD	Ko Kut	-
none	562	28	-	0900	-	-	-	-	FeD	"	-

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. No. S6-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Flankton/ 1000 m <sup>3</sup>	Sky Conditions		Hydro. Sta. No. S6-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Flankton/ 1000 m <sup>3</sup>	Sky Conditions	
					Amt. 10ths	Cloud Type						Amt. 10ths	Cloud Type
U1	417	27.8	341	190	7	AC AS SC	15	498	85.3	376	210	-	night
U2	419	20.9	296	371	9	AC SC AS	16	501	153	529	28.3	8	-
U3	420	12.8	298	347	8	CI AS Cu	17	503	141	474	33.8	6	FC AS
U4	421	17.2	287	541	9	AS AC CI	18	507	136	541	38.9	-	night
U5	422	16.1	261	1100	-	night	19	509	139	482	35.2	8	AC FC
U6	425	21.2	271	981	-	night	20	513	115	567	28.2	10	AC FC SC
U7	427	10.6	256	184	8	AC SC AS	21	514	146	521	44.1	10	AC SC Cu
U8	428	17.7	358	335	9	CN SC Cu	22	515	156	534	29.9	7	AS FC Cu
U9	429	17.7	277	32.5	3	AS CN SC	23	517	134	506	49.5	-	night
U10	430	14.7	312	112	-	night	24	519	144	563	8.85	4	-
1	437	30.7	449	55.8	7	AS AC Cu	* 25A	523	45.0(70)	218	110	4	-
2	440	123	530	17.0	7	Cu SC AC	* 25AX	524	134 (200)	602	76.3	4	-
* 3	443	49.5(70)	322	164	-	night	* 25AY	525	630(1100)	3380	19.2	4	-
* 3X	444	139 (200)	577	64.0	-	night	26	529	141	599	91.9	-	-
* 3Y	445	402 (625)	792	36.5	-	night	27	530	123	565	46.0	3	AS AC
4	448	136	522	67.2	8	AS SC Cu	28	531	35.3	310	184	2	CN AS Cu
5	451	129	491	51.0	8	AS SC	29	533	14.1	322	158	9	AS SC AC
6	453	139	548	54.6	-	night	30	535	31.2	450	48.8	-	night(rain)
7	456	141	493	40.6	6	AS FC	31	537	45.0	415	159	10	SC CB
8	457	129	529	35.9	-	night	32	538	46.5	471	29.7	10	CN SC
9	458	131	567	28.2	4	AS Cu	33	540	93.7	511	25.5	-	night
10	460	129	538	39.1	-	night	34	541	63.0	417	38.4	8	CS Cu AC
* 11	463	49.5(70)	252	31.8	5	AC AS	35	542	46.0	322	99.7	10	SC AS(rain)
* 11X	464	139 (200)	506	31.5	5	AC AS	36	544	46.8	369	149	-	night
* 11Y	465	736 (1100)	2580	16.6	5	AC AS	37	545	55.4	472	244	10	NS AC
* 12	466	49.5(70)	288	62.6	-	night	38	547	56.6	408	115	-	night
* 12X	467	118 (200)	582	60.2	-	night	39	550	32.2	263	296	-	night
* 12Y	468	707 (1100)	2796	193	-	night	40	553	46.0	304	181	10	-
13	470	139	519	73.4	-	night	41	555	22.5	350	128	10	CN NS SC
14	474	83.6	391	79.4	10	AC SC	42	558	17.2	293	277	10	NS S SC

\* Vertical series (4 sets)

## Cruise S7. Gulf of Thailand

Cruise S7 was worked from the northernmost line of the regular pattern: i.e., the reverse order of cruises S1, S2, and S3, but in the same direction, east to west. Weather was good to moderate, the season being the southwest monsoon and the runoff of July rainfall into the Gulf of Thailand having begun.

Biological net tows included routine use of 1 m, ½ m, 2 m nets and also a 30 cm phytoplankton net. In addition to the net tows, a 6' Beam trawl and a 2.5' dredge collections were made south of Ko Samui and a 6' Beam trawl collection was made south of Kas Rong. Two NEL snap sampler collections (S7-14, S7-35) were made at specific locations in order to fill two gaps from the geological sampling of the Gulf on cruise S1 (S1-5, S1-26). One stop was made at Songkhla on August 9-10.

### Itinerary:

depart Bangkok, August 2, 1960,  
(one stop at Songkhla, August 9-10)  
return Bangkok, August 15.

### 42 Hydrographic Stations:

#### Physical:

- Serial Hydrographic cast at each station,
- BT observations at each station, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

#### Chemical:

- dissolved oxygen, salinity and phosphate concentration later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

#### Biological:

- 61 1 m oblique net tows,
- 16 ½ m (45 cm) vertical net tows,
- 7 2 m (all at night) stramin net tows,
- 15 30 cm (phytoplankton) net tows,
- 2 6' Beam trawls,
- 1 2.5' wire dredge.

#### Geological:

- 2 NEL snap sampler collections (S7-14, S7-35),  
(biological trawls and dredges),
- continuous fathometer recording.

Hydro. Sta. S7-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
<u>Gulf of Thailand</u>											
1	563	VIII-2	1631	1630	13.5	12 59 30	100 35 15	6.0	TROLL	Ko Phai	-
"	564	"	-	1723	"	" " "	" " "	"	1 m	"	-
2	none	2	-	-	-	12 59 00	100 15 00	10.0	none	-	-
"	565	"	1942	2004	11	" " "	" " "	9.0	1 m	Laew Phak Bho	-
"	566	"	-	2000	-	" " "	" " "	11	DIP	" " "	-
3	567	2	2224	2247	11	12 40 00	100 15 00	17.0	1 m	shore line	-
"	568	"	-	2255	"	" " "	" " "	"	1/2 m	" " "	-
"	569	"	-	2302	"	" " "	" " "	"	30 cm	" " "	-
"	570	"	-	2245	"	" " "	" " "	"	DIP	" " "	-
4	571	3	0116	0200	12	12 40 00	100 35 30	10.8	1 m	Ko Kram Yai	-
"	572	"	-	0140	"	" " "	" " "	"	FeD	" " "	-
"	573	"	-	0140	"	" " "	" " "	"	DIP	" " "	-
5	574	3	0428	0502	15	12 20 00	100 35 15	25.0	1 m	Ko Chuang	-
6	575	3	0727	0748	14	12 20 00	100 15 00	15.0	1 m	beach line	-
7	576	3	1209	1233	13	11 48 30	99 57 30	7.5	1 m	Ko Raet	-
"	577	"	-	1252	"	" " "	" " "	"	1/2 m	" " "	-
"	578	"	-	1258	"	" " "	" " "	"	30 cm	" " "	-
"	579	"	-	1235	"	" " "	" " "	"	DIP	" " "	-
8	580	3	1654	1728	13	11 17 00	99 40 00	6.5	1 m	Laem Mae Rampung-	-
8A	none	3	1905	-	20	11 24 30	99 51 00	14.0	none	Koh Chan	-
8B	581	3	2034	2043	20 1/2	11 30 30	100 02 30	18.5	2 m (S7-201)	Kae Klongvan	-
"	582	"	-	2210	"	" " "	" " "	"	FeD	" " "	-
9	583	3	2230	2253	19 1/2	11 39 00	100 13 00	25	1	Kiri Khan	-
"	584	"	-	2307	"	" " "	" " "	"	1/2 m	" " "	-
"	585	"	-	2313	"	" " "	" " "	"	30 cm	" " "	-
9A	none	4	0044	-	17.0	11 45 00	100 24 00	34	none	" " "	-
9B	none	4	0212	-	17.5	11 53 30	100 35 00	45	none	" " "	-
10	none	4	0339	-	20.0	12 01 30	100 47 00	33	none	Ko Chuang	-
"	586	"	-	0404	"	" " "	" " "	"	1 m	" " "	-
10A	none	4	0530	-	14.5	12 11 00	101 01 30	20	none	" " "	-
10B	none	4	0645	-	14 1/2	12 16 20	101 11 00	19	none	" " "	-
11	587	4	0755	0815	15	12 22 00	101 25 00	9	1 m	Ko Samet	-
"	588	"	-	0829	"	" " "	" " "	"	1/2 m	" " "	-
"	589	"	-	0834	"	" " "	" " "	"	30 cm	" " "	-
12	590	4	1205	1230	17	12 07 15	101 47 45	26	1 m	Laem Singha	-
13	591	4	1511	1543	17	11 53 45	102 12 09	7.5	1 m	Ko Chang	-
"	592	"	-	1559	"	" " "	" " "	"	1/2 m	" " "	-
"	593	"	-	1605	"	" " "	" " "	"	30 cm	" " "	-
13A	none	4	1733	-	24 1/2	11 46 30	102 01 00	21	none	" " "	-
13B	none	4	1904	-	30	11 40 00	101 50 00	34	none	" " "	-
14	594	4	2033	2105	31	11 32 00	101 38 15	47	1 m	" " "	-
"	(geol.)	"	-	-	57 m	" " "	" " "	"	NEL	" " "	#956
"	595	"	-	2126	"	" " "	" " "	"	2 m (S7-202)	" " "	-
"	596	"	-	2035	"	" " "	" " "	"	FeD	" " "	-
14A	none	4	2324	-	31	11 25 00	101 28 00	61	none	" " "	-
14B	none	5	0111	-	30	11 18 00	101 18 00	-	none	-	-
15	none	5	0302	-	30	11 11 00	101 10 00	-	none	-	-
"	597	"	-	0333	"	" " "	" " "	-	1 m	-	-
"	598	"	-	0320	"	" " "	" " "	-	DIP	-	-
15A	none	5	0535	-	30	11 04 30	101 03 00	-	none	-	-
15B	none	5	0726	-	30	10 57 00	100 54 30	-	none	-	-
16	599	5	0930	0948	29 1/2	10 50 00	100 44 30	-	1 m	-	-
16A	none	5	1134	-	30	10 43 30	100 33 30	-	none	-	-
16B	none	5	1305	-	30	10 37 30	100 24 30	-	none	-	-
17	600	5	1436	1500	29	10 29 30	100 12 00	-	1 m	-	-

Hydro. Sta. 57-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
"	601	"	-	1512	"	" " "	" " "	-	1/2 m	-	-
"	602	"	-	1521	"	" " "	" " "	-	30 cm	-	-
17A	603	5	1603	1718	27	10 18 00	99 48 00	19	1 m	Ko Tao	-
17B	604	5	1851	1901	24 1/2	10 18 45	99 47 45	10	1 m	" "	-
"	605	"	-	1915	"	" " "	" " "	"	1/2 m	" "	-
"	606	"	-	1923	"	" " "	" " "	"	30 cm	" "	-
"	607	"	-	1936	"	" " "	" " "	"	2 m (S7-203)	" "	-
"	608	"	-	2025	24 1/2	" " "	" " "	10	FeD	" "	-
18	609	5	2140	2155	20 1/2	10 13 00	99 35 45	15	1 m	" "	-
"	610	"	-	2140	"	" " "	" " "	"	FeD	-	-
18A	611	5	2332	2344	14	10 05 35	99 24 35	13	1 m	Lansguan	-
"	612	"	-	0002	"	" " "	" " "	"	1/2 m	" "	-
"	613	"	-	0008	"	" " "	" " "	"	30 cm	" "	-
18B	614	5	0132	0141	12.5	09 52 00	99 30 00	11.5	1 m	Ko Wao Yai	-
18C	615	6	0900	0912	13.5	09 52 00	99 42 00	5	1 m	Ko Wao	-
"	616	"	-	0925	"	" " "	" " "	"	1/2 m	" "	-
"	617	"	-	0931	"	" " "	" " "	"	30 cm	" "	-
"	618	"	-	0945	"	" " "	" " "	"	FeD	" "	-
18D	619	6	0450	0457	16	09 52 00	99 53 45	6	1 m	Ko Phangan	-
18E	620	6	0621	0629	16 1/2	09 52 00	100 06 00	5.5	1 m	" "	-
"	621	"	-	0644	"	" " "	" " "	"	1/2 m	" "	-
"	622	"	-	0650	"	" " "	" " "	"	30 cm	" "	-
18F	623	6	0808	0818	28 1/2	09 52 00	100 19 10	16	1 m	" "	-
18G	624	6	1021	1026	14	09 33 30	100 17 50	12	1 m	Ko Samui	-
19	625	6	1249	1311	9.5	09 17 30	100 06 15	8	1 m	" "	-
"	626	"	-	1320	"	" " "	" " "	"	DIP	" "	-
"	627	"	-	1331	"	" " "	" " "	"	6' Beam T.	" "	-
"	628	"	-	1440	"	" " "	" " "	"	2.5' Dredge	" "	-
19A	none	6	1713	-	10	08 57 45	100 06 00	10	none	Laem Kho Kwang	-
"	629	"	-	1932	-	-	-	-	1 m	" "	SIO 61-663
20	630	6	1914	1920	9 1/2	08 39 00	100 15 00	10	DIP	Laem Talumphuk	-
20A	631	6	2111	2115	14 1/2	08 49 00	100 26 00	25	2 m (S7-204)	" "	-
20B	none	6	2325	-	16 1/2	08 58 00	100 36 30	39	none	" "	-
21	632	7	0055	0120	20	09 06 30	100 47 15	47	1 m	Ko Samui	-
21A	none	7	0900	-	28.5	09 12 00	100 58 30	55	none	" "	-
21B	none	7	0439	-	32	09 24 00	101 09 00	65	none	" "	-
22	633	7	0617	0645	37	09 28 00	101 21 15	77	1 m	" "	-
22A	none	7	0834	-	37	09 36 15	101 32 25	85	none	Ko Phangan	-
22B	none	7	1004	-	39	09 51 00	101 42 00	97	none	" "	-
23	634	7	1135	1202	38	09 59 00	101 52 45	91	1 m	Kas Rong	-
23A	none	7	1350	-	37.5	10 07 40	102 04 00	76	none	" "	-
23B	none	7	1524	-	36.0	10 14 20	102 15 20	64	none	" "	-
24	635	7	1650	1516	33.0	10 19 50	102 25 50	51	1 m	" "	-
"	636	"	-	1600	"	" " "	" " "	"	6' Beam T.	" "	-
"	637	"	-	1850	"	" " "	" " "	"	DIP	" "	-
"	638	"	-	1924	"	" " "	" " "	"	2 m (S7-205)	" "	-
24A	none	7	2040	-	27	10 29 30	102 32 00	33	none	" "	-
24B	none	7	2155	-	20 1/2	10 35 30	102 52 25	21	none	" "	-
25	639	7	2311	2326	15	10 41 30	103 02 25	9	1 m	" "	-
25A	none	8	0136	-	14	10 26 45	103 18 15	7	none	Kas Rong Sam Lam	-
26	640	8	0343	0412	12 1/2	10 12 00	103 32 30	18	1 m	Ream	-
26A	none	8	0609	-	15	09 57 40	103 45 45	-	none	" "	-
27	641	8	0730	0800	17	09 48 55	103 54 15	13	1 m	Ile d'A n Thoi	-
27A	none	8	0949	-	15	09 41 00	103 44 00	23	none	" "	-
27B	none	8	1132	-	18	09 30 00	103 33 00	12	none	Poulo Panjang	-
28	642	8	1258	1316	21	09 23 30	103 24 00	5	1 m	" "	-
"	643	"	-	1335	"	" " "	" " "	"	1/2 m	" "	-

Hydro. Sta. S7-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
"	644	"	-	1342	"	" " "	" " "	"	30 am	" "	-
28A	none	8	1521	-	24	09 15 30	103 15 00	14	none	" "	-
28B	none	8	1765	-	27½	09 06 45	103 03 00	26	none	" "	-
29	645	8	1846	1915	32½	09 00 00	102 53 00	40	1 m	" "	-
29A	none	8	2120	-	36	08 48 30	102 43 00	53	none	" "	-
29B	none	8	2303	-	38	08 40 00	102 33 00	66	none	" "	-
30	646	9	0047	0113	40	08 31 30	102 22 30	80	1 m	" "	SIO 61-664
"	647	"	-	0134	"	" " "	" " "	"	½ m	" "	-
"	648	"	-	0146	"	" " "	" " "	"	30 am	" "	-
"	649	"	-	0100	"	" " "	" " "	"	FeD	" "	-
30A	none	9	0352	-	40	08 23 00	102 12 30	120	none	Songkhla	-
30B	none	9	0541	-	40	08 14 00	102 02 30	107	none	"	-
31	650	9	0732	0805	37	08 06 00	101 52 00	93	1 m	"	-
31A	none	9	1011	-	28	07 56 00	101 42 00	80	none	"	-
31B	651	9	1144	1150	25	07 48 00	101 32 00	67	DIP	"	-
32	652	9	-	1320	-	07 40 00	101 22 00	54	1 m	"	-
32A	653	9	1447	1455	22.5	07 33 45	101 10 30	40	1 m	"	-
32B	654	9	1624	1629	14.0	07 28 00	100 57 00	27	1 m	"	-
33	655	9	0815	1825	10.0	07 22 00	100 43 30	10	1 m	Ke Maed	-
"	656	"	-	2120	"	" " "	" " "	"	DIP	" "	SIO 61-665
"	657	"	-	2150	"	" " "	" " "	"	LIME	" "	-
"	658	10	-	1200	-	-	-	10	(fish market)	" "	-
"	659	10	-	1600	-	" " "	" " "	-	threw net	beach	-
33A	660	10	2046	2103	10	07 14 50	100 49 05	12	1 m	Songkhla	-
33B	661	10	2301	2312	6	07 12 10	101 07 25	17.5	1 m	Laem Ta Chi	-
33C	662	11	-	0115	-	07 09 30	101 25 45	14	1 m	" " "	-
33D	663	11	-	0332	-	06 56 00	101 38 15	7.5	1 m	Panare	-
"	664	"	-	0353	-	" " "	" " "	"	½ m	"	-
"	665	"	-	0400	-	" " "	" " "	"	30 am	"	-
34	666	11	0555	0630	19½	06 44 00	101 50 45	11	1 m	Sai Buri	-
"	667	"	"	0600	"	" " "	" " "	"	FeD	" "	-
34A	none	11	0809	-	16½	06 32 35	102 04 15	12.5	none	Narathiwat	-
35	668	11	1005	1026	14½	06 21 00	102 12 15	7	1 m	Tumpet	-
"	669	"	-	1045	"	" " "	" " "	"	½ m	"	-
"	670	"	-	1049	"	" " "	" " "	"	30 am	"	-
"	671	"	-	1045	"	" " "	" " "	"	KFP	"	-
35A	672	11	1214	1220	12.5	06 30 00	102 21 00	19	1 m	Keta Bharu	-
"	673	"	-	1300	"	" " "	" " "	"	DIP	" "	-
35B	none	11	1252	-	25	06 38 30	102 30 00	30	none	" "	-
36	674	11	1511	1625	25	16 48 00	102 39 30	42	1 m	" "	-
36A	none	11	1748	-	25	06 56 00	102 48 15	54	none	" "	-
36B	675	11	1915	1920	27	07 05 30	102 57 15	67	2 m (87-206)	" "	-
"	676	"	-	2030	"	" " "	" " "	"	FeD	" "	-
37	677	11	2124	2154	28	07 15 00	103 06 00	78	1 m	" "	-
"	678	"	-	2222	"	" " "	" " "	"	½ m	" "	-
"	679	"	-	2237	"	" " "	" " "	"	30 am	" "	-
"	680	"	-	2130	"	" " "	" " "	"	FeD	" "	-
37A	none	12	0013	-	30	07 24 00	103 16 00	92	none	" "	-
37B	none	12	0151	-	31	07 33 00	103 26 30	100	none	Poule Obi	-
38	681	12	0341	0405	24.5	07 42 45	103 37 00	85	1 m	" "	-
38A	none	12	0602	-	18.5	07 52 30	103 47 30	71	none	" "	-
38B	none	12	0749	-	10.5	08 01 30	103 57 00	59	none	" "	-
39	682	12	0935	1004	11	08 11 00	104 07 00	45	1 m	" "	-
39A	none	12	1147	-	12	08 19 15	104 14 00	35	none	" "	-
39B	none	12	1315	-	11	08 21 00	104 27 00	23	none	" "	-
40	683	12	1433	1450	14	08 24 00	104 37 00	13.5	1 m	" "	-
"	684	"	-	1435	"	" " "	" " "	"	TROLL	" "	-

Hydro. Sta. S7-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NPL No.
40A	none	12	1718	-	8	08 37 30	104 29 00	23	none	" "	-
40B	none	12	1918	-	9	08 52 00	104 21 00	12	none	False Poole Obi	-
41	685	12	2118	2120	12	09 05 15	104 13 00	19	1 m	" "	-
41A	none	12	2349	-	13	09 19 00	104 05 00	20	none	Frere de l'Est	-
41B	none	13	0153	-	19	09 33 00	103 57 00	26	none	Iles de Paule Dana	-
"	686	"	-	0945	12	10 20 00	103 19 50	11	TROLL	Kao Tang	-
41C	687	13	1448	1454	15	10 52 15	103 02 30	2	1 m	Kao Smit	-
"	688	"	-	1512	-	" " "	" " "	1	1/2 m	" "	-
"	689	"	-	1500	-	" " "	" " "	-	DIP	-	-
41D	none	13	1715	-	16 1/2	10 58 45	102 52 25	13	none	Kao Smit	-
41E	none	13	1850	-	21 1/2	11 06 00	102 42 15	5.5	none	Ilet Kuarvie	-
42	690	13	2029	2050	23	11 13 00	102 32 25	21	1 m	Ke Kut	-
"	691	"	-	2125	"	" " "	" " "	"	FeD	" "	-
"	692	"	-	2035	"	" " "	" " "	"	DIP	" "	-
"	693	"	-	2106	"	" " "	" " "	"	2 m(S7-207)	" "	-
42A	none	13	2342	-	27	11 21 35	102 20 10	19	none	" "	-
42B	none	14	0141	-	30	11 30 20	102 07 45	22	none	Ke Rang	-
42C	694	15	1555	1601	12	12 58 05	100 45 10	4.5	1 m	Ke Nek	-
42D	695	15	1647	1649	12 1/2	13 01 55	100 48 10	1.5	1 m	" "	-
42E	696	15	1735	1738	12	13 05 55	100 50 40	2.0	1 m	" "	-
"	697	"	-	2000	7.0	13 12 00	100 51 00	2.0	DIP	Ke Siahang	-
"	698	"	-	"	"	" " "	" " "	"	DIP	" "	-
"	699	"	-	"	"	" " "	" " "	"	DIP	" "	-

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. No. S7-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions		Hydro. Sta. No. S7-	Bio. Sta. No. 60-	Depth m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions	
					Amt. 10ths	Cloud Type						Amt. 10ths	Cloud Type
1	564	12.5	299	720	10	AS SC	23	634	70	447	228	-	pt. cldy
2	565	14.4	224	974	-	night	24	635	55.7	378	369	8	AS Cu AC
3	567	9.38	224	300	-	night	25	639	20.4	263	236	-	night
4	571	18.0	260	262	-	night	26	640	15.0	229	358	-	night
6	574	23.6	375 (?)	211 (?)	-	night	27	641	21.2	265	359	10	NS SC(rain)
6	575	16.1	272	589	9	AS SC	28	642	33.4	421	333	10	SC AS
7	576	18.0	234	383	10	AS SC	29	645	44.1	391	241	8	AS SC
8	580	14.1	117	3680	9	AC SC	30	646	70.6	451	180	-	night
9	583	25.7	267	423	-	night	31	650	65.6	538	130	9	AS AC
10	586	26.8	381	537	-	night	32	652	43.1	340	217	7	AC SC
11	587	23.6	287	167	10	SC	32A	653	35.9	261	119	9	AS SC NS
12	590	20.1	282	589	9	AS SC	32B	654	23.4	304	217	8	Cu AS SC
13	591	25.2	319	301	10	AS SC S	33	655	14.6	294	102	7	AC SC
14	594	45.0	363	441	0	night	33A	660	14.1	308	211	-	night
15	597	46.0	329	243	-	night	33B	661	6.94	146	554	-	night
16	599	42.4	315	157	7	night	33C	662	30.7	413	118	-	night
17	600	45.1	344	725	6	Cu SC AS	33D	663	31.5	371	170	-	night
17A	603	38.6	314	348	7	AS SC	34	666	31.8	464	75.6	2	AC AS
17B	604	38.9	271	266	6	NS SC	35	668	21.6	331	233	9	AS SC
18	609	24.1	376	301	-	night	35A	672	18.0	305	32.8	9	AS SC
18A	611	20.0	271	192	-	night	36	674	33.5	275	120	10	NS SC
18B	614	10.6	220	241	-	night	37	677	45.1	374	136	-	night
18C	615	18.0	261	384	-	night	38	681	35.3	240	246	-	night
18D	619	22.3	275	570	-	night	39	682	15.8	266	226	10	AS SC
18E	620	24.3	316	298	9	AS SC AC	40	683	21.2	302	392	8	AS FC
18F	623	40.2	296	247	9	AS AC	41	685	18.0	288	280	-	night
18G	624	17.7	292	619	9	AS SC	41C	687	21.2	303	357	9	AS CS SC
19	625	10.2	263	194	8	cloudy	42	690	34.8	238	800	-	night
20	629	11.3	265	367	-	night	42C	694	14.7	257	370	10	AS SC
21	632	28.3	435	209	-	night	42D	695	14.7	210	1140	10	AS SC
22	633	59.0	397	237	8	AS CS FC	42E	696	15.4	218	670	10	AS SC



## Cruise S8. South China Sea

Cruise S8 continued the regular survey off the east coast of South Viet Nam with only some modifications (as indicated on map) necessitated by difficult weather. The pre-routine leg, en route Nhatrang, included a Petersen grab and an NEL snap sampler collection off Kas Rong Sam Lem in the eastern Gulf of Thailand as well as similar collections off Rach Duong Keo, Poulo Condore, Pt. Vinay and the Cua da Giang river mouth in the South China Sea. Routine 1 m and 2 m net tows were also made.

The first leg of the routine survey included a Petersen grab and an NEL snap sampler collection off Cap An Hoa and a 6' Beam trawl off Cu Lao Re. A special 1 m net tow to greater depths (4252 MWO in 2280 fathoms) was made in the off shore basin of the South China Sea.

The return stay at Nhatrang included bottom sampling of the Bay with 13 van Veen and one Petersen grab and a Phleger corer [this series bears also the designation Loi-11 through Loi-25 and is identical with those listed by Gallardo (1967\*, pg. 279) as Station Numbers 350 through 364].

Extra 1 m net tows were made in the area of S8-1 and S8-3. In addition to the routine shallow tows made at night during the cruise with the 2 m stramin net, seven tows of greater depths (800-3000 MWO) were made.

A special bottom sampling (S8-26A) was again made from the ridge southeast of Poulo Cecir de Mer including an NEL snap sampler, a 2.5' wire dredge and a deep (800 MWO) 2 m net tow (see cruise S6-25A through S6-25C).

At Stations S8-32 and S8-42A 156 drift bottles (with plastic card-type floats) were released under the direction of Mr. Hai of Nhatrang Institute (see Notation).

### Itinerary:

depart Bangkok, September 6, 1960—arrive Nhatrang, September 9,  
depart Nhatrang, September 11—return Nhatrang, September 17,  
(bottom sampling, Nhatrang Bay, September 19-20)  
depart Nhatrang, September 20—arrive Saigon, September 26,  
depart Saigon, September 30—return Bangkok, October 8.

### 42 Hydrographic Stations:

#### Physical:

- serial hydrographic cast at each station,
- BT observations at each station, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

#### Chemical:

- dissolved oxygen, salinity and phosphate concentration later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

#### Biological:

- 49 1 m oblique net tows,
- 7 ½ m (45 cm) net tows,
- 16 2 m (all but one at night) stramin net tows,
- 4 6' Beam trawls,
- 5 2.5' wire dredges,
- 13 Petersen grabs,
- 15 van Veen grabs.

#### Geological:

- 7 NEL snap samplers,
- 1 Phleger cores (Bay of Nhatrang S8-S23)  
(biological trawls, dredges and grabs)
- continuous fathometer recording.

Notation of Drift Bottle Launching on Cruise S8:

The two launchings were of 156 drift bottles of the Bougis model with cards written in three languages, English, French and Vietnamese.

1. immediately following Station S8-32 off Cap St. Jacques,

**Total:** 78 drift bottles  
**Position:** 07° 34' N; 107° 42' E  
**Date:** October 1, 1960  
**Local time:** 2000 h (appx.)  
**Wind direction:** 270 (appx.)  
**Sea Condition:** rough

2. immediately following Station S8-42A near Poulo Obi,

**Total:** 78 drift bottles  
**Position:** 07° 51' N; 104° 58' E  
**Date:** October 6, 1960  
**Local time:** 0600 h (appx.)  
**Wind direction:** 220 (appx.)  
**Sea conditions:** smooth

Remark: Each drift bottle has its special number. The list of these numbers is kept by Nhatrang Institute.

Nguyen Hai  
October 14, 1960

Hydro. Sta. SB-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
<u>Gulf of Thailand</u>											
none	700	IX-6	1915	1925	18	12 31 30	100 49 30	8.0	2 n(SB-201)	Ko Chuang	-
none	701	7	-	0700	-	11 30 15	102 24 00	10.0	FeD	Ko Kut	-
none	702	7	1410	1430	12	10 34 20	103 13 00	4.5	P. grab	Kas Hong Sam Lam	-
"	(geol.)	"	-	-	24 m	" " "	" " "	"	NEL	" " " "	#143
none	703	7	-	2030	15	09 44 00	103 48 00	15.0	2 n(SB-202)	Bocher Table	-
none	704	"	-	"	"	" " "	" " "	"	DIP	" "	-
<u>South China Sea</u>											
U1	705	8	0736	0747	15	08 20 15	104 52 15	2.7	1 n	Beaker Hall	-
U2	706	8	1045	1058	12½	08 24 30	105 22 00	18	P. grab	Rach Duang Keo	-
"	707	"	-	1106	"	" " "	" " "	"	1 n	" " "	-
"	(geol.)	"	-	-	25 m	" " "	" " "	"	NEL	" " "	#133
none	708	8	-	1530	12	08 39 00	106 05 30	3.5	DIP	Ilot Boise	-
none	709	8	-	1842	13	09 03 00	106 26 00	22.0	2 n(SB-203)	Poulo Condere	SIO 61-666
none	710	8	-	1900	"	" " "	" " "	"	DIP	" "	SIO 61-667
none	711	8	-	1922	"	" " "	" " "	"	2.5' dredge	" "	-
U3	712	9	1005	1030	15	10 47 20	108 25 20	11	P. grab	Pt. Vinay	-
"	(geol.)	"	-	-	30 m	" " "	" " "	"	NEL	" "	#189
none	713	9	-	1305	18	11 00 40	108 51 48	13.2	TROLL	Pt. Lagan	-
none	714	9	-	1640	34	11 32 00	109 11 00	4.0	FeD	Hem De	-
none	715	9	-	2130	5	12 12 00	109 13 00	0.5	DIP	Nhatrang	-
none	716	10	-	2000	"	" " "	" " "	"	DIP	" "	-
U4	717	11	1515	1530	20	13 07 45	109 22 30	3.9	P. grab	Cua da Giang (river mouth)	-
"	(geol.)	"	-	-	40 m	" " "	" " "	"	NEL	" "	8 ex. jar
none	718	11	1900	1906	57½	13 41 30	109 24 15	5	2 n(SB-204)	Poulo Gambir	-
1	719	12	0835	0859	23½	15 40 00	108 41 00	9.5	1 n & ½ n	Cap An Hoa	-
"	720(geol.)	"	-	0912	47 m	" " "	" " "	"	NEL	" " "	#1467
"	721	"	-	0915	-	" " "	" " "	"	P. grab	" " "	-
1 <sub>1</sub>	none	12	1019	-	36½	15 40 40	108 51 00	14	none	Pt. Hapoix (current interface)	-
1 <sub>2</sub>	none	12	1029	-	37	15 41 00	108 51 00	14	none	" "	-
1A	722	12	1116	1132	50	15 40 35	108 59 00	18	1 n	C. Bantan	-
"	723	"	-	1208	"	" " "	" " "	"	1 n	" "	-
"	724	"	-	1230	"	" " "	" " "	17	6' Beam T.	On Leo Re	-
1B	725	12	1452	1457	69	15 41 00	109 16 12	18.2	1 n	" " "	-
2	726	12	1700	1745	237	15 41 25	109 34 35	32	1 n	" " "	-
2A	727	12	2005	2015	332	15 42 50	109 52 55	48	2 n(SB-205)	" " "	SIO 61-668
"	728	"	-	2100	"	" " "	" " "	"	DIP	" " "	-
2B	none	12	2310	-	353	15 44 25	110 11 00	64	none	" " "	-
3	729	13	0045	0136	246	15 46 00	110 29 00	81	1 n	" " "	-
3A	none	13	0336	-	415	15 47 40	110 47 25	24	none	Triton Is.	-
3B	none	13	0521	-	530	15 49 00	111 06 00	6	none	" "	-
4	730	13	0722	0930	506	15 40 30	111 09 20	7	1 n	" "	-
"	731	"	"	"	"	" " "	" " "	"	½ n(in series)	" "	-
4A	none	13	1057	-	600	15 42 05	111 26 00	14.5	none	" "	-
4B	none	13	1241	-	700	15 42 15	111 42 15	30	none	" "	-
5	732	13	1428	1550	696	15 42 05	112 01 10	48	DIP	" "	-
"	733	"	-	1556	"	" " "	" " "	"	1 n	" "	-
5A	none	13	1802	-	810	15 40 00	112 20 00	23	none	Bombay Reef	-
5A <sub>1</sub>	734	13	1925	1939	-	15 40 05	112 09 05	28	1 n	" "	SIO 61-623
"	735	"	-	2006	"	" " "	" " "	"	2 n(SB-206)	" "	SIO 61-624
"	736	"	-	2100	"	" " "	" " "	"	DIP	" "	SIO 61-625
5A <sub>2</sub>	737	13	2236	2245	140	15 43 30	112 13 45	22	1 n	" "	-
5B	none	14	0035	-	249	15 42 55	112 31 00	18	none	" "	-
6	738	14	0214	0330	1370	15 42 30	112 47 40	23	1 n	" "	-
"	739	"	-	0315	"	" " "	" " "	"	DIP	" "	SIO 61-626

Hydro. Sta. SB-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
"	740	"	-	0330	"	" " "	" " "	"	FeD	" "	-
6A	none	14	0519	-	1484	15 27 45	112 52 55	39	none	" "	-
6B	none	14	0701	-	2027	15 13 40	112 57 50	50	none	Maselesfield Bank	-
7	741	14	0841	10 26	1910	14 59 00	113 03 20	54	1 m	" "	-
7A	none	14	1222	-	1340	14 44 05	113 08 00	60	none	" "	-
7B	none	14	1406	-	1430	14 29 00	113 14 00	70	none	" "	-
8	742	14	1550	1727	1589	14 13 20	113 19 10	81	1 m	" "	-
8A	742	14	1937	1945	2300	13 57 40	113 22 00	94	2 m (SB-207) (3000 MHO, fouled)	" "	SIO 61-572
"	744	"	-	2000	"	" " "	" " "	"	DIP	" "	SIO 61-620
8B	none	15	0540	-	2282	13 41 15	113 24 45	109	none	" "	-
9	745	15	1724	1010	2280	13 25 00	113 27 00	124	1 m	" "	-
"	746	"	-	1300	"	" " "	" " "	"	DIP	" "	SIO 61-669
"	747	"	-	1044	"	" " "	" " "	"	1 m (4252 MHO)	" "	-
9A	none	15	1752	-	2400	13 26 05	113 11 30	225	none	Cap Varella	-
9B	none	15	1960	-	1500	13 26 05	112 54 35	210	none	" "	-
10	none	15	2121	-	1300	13 26 00	112 38 05	193	none	" "	-
"	748	16	-	0039	"	" " "	" " "	"	1 m	" "	-
"	749	"	-	"	"	" " "	" " "	"	1/2 m (in series)"	" "	-
"	750	"	-	0000	"	" " "	" " "	"	DIP	" "	SIO 61-670
10A	none	16	0238	-	1550	13 26 00	112 22 20	178	none	" "	-
10B	none	16	0422	-	1100	13 26 00	112 06 15	162	none	" "	-
11	751	16	0611	0720	1200	13 26 00	111 49 50	146	1 m	" "	-
11A	none	16	0916	-	1600	13 26 00	111 33 30	129	none	" "	-
11B	none	16	1105	-	1600	13 26 00	111 17 40	112	none	" "	-
12	752	16	1312	1322	1600	13 23 40	111 01 20	95	1 m	" "	-
12A	none	16	1734	-	1600	13 20 40	110 47 30	82	none	" "	-
12B	none	16	1956	-	1550	13 18 15	110 35 40	71	none	" "	-
12C	none	16	2243	-	1500	13 16 50	110 27 15	63	none	" "	-
12D	none	17	0200	-	1400	13 15 00	110 19 00	55	none	" "	-
12E	none	17	0500	-	1200	13 13 00	110 11 00	48	none	" "	-
13	none	17	0540	-	1200	13 12 50	110 09 40	45	none	" (no net tow)	-
13A	none	17	1018	-	900	13 10 00	109 56 30	33	none	" "	-
13B	none	17	1327	-	110	13 06 00	109 41 00	18	none	" "	-
14	753	17	1540	1642	78	13 04 30	109 33 00	11	1 m	" "	-
"	754	"	-	"	"	" " "	" " "	"	1/2 m (in series)"	" "	-
"	755	"	1900	1902	70	12 32 30	109 30 30	4 1/2	2 m (SB-208)	Mai Ganh	-
"	756	18	-	1000	5	12 12 00	109 13 00	1/2	DIP	Nhatrang	SIO 61-671
"	757	"	-	1330	"	" " "	" " "	"	Line (& hook)	" "	-
<u>Nhatrang Bay</u>											
S11	758	19	0825	1826	-	12 09 22	109 19 33	-	v v grab	Lei-11	-
S12	759	"	0905	0905	-	12 08 32	109 19 33	-	v v grab	Lei-12	-
S13	760	"	0943	0943	-	12 07 50	109 19 03	-	v v grab	Lei-13	-
S14	761	"	1028	1025	-	12 07 12	109 19 30	-	v v grab	Lei-14	-
S15	762	"	1043	1043	-	12 07 10	109 18 40	-	v v grab	Lei-15	-
"	763	"	-	1055	-	" " "	" " "	-	DIP	-	-
S16	764	"	1121	1121	-	12 07 48	109 18 14	-	v v grab	Lei-16	-
S17	765	"	1231	1235	-	12 06 29	109 18 13	-	v v grab	Lei-17	-
S18	766	"	1300	1305	-	12 04 52	109 16 45	-	v v grab	Lei-18	-
S19	767	"	1331	1340	-	12 05 05	109 17 33	-	P. grab	Lei-19	-
S20	768	"	1410	1411	-	12 05 28	109 18 56	-	v v grab	Lei-20	-
S21	769	"	1434	1434	-	12 05 42	109 19 44	-	v v grab	Lei-21	-
S22	770	"	1510	1510	-	12 04 53	109 18 21	-	v v grab	Lei-22	-
S23	771	"	1546	1546	-	12 04 10	109 18 42	-	v v grab	Lei-23	-
S24	772	"	1622	1622	-	12 03 32	109 19 15	-	v v grab	Lei-24	-
none	773	20	-	0100	-	-	-	-	DIP	-	-
S25	774	"	0840	0840	-	12 05 41	109 18 08	-	v v grab	Lei-25	-

Hydro. Sta. SB-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
(cruise track pattern continued)											
15	775	20	0949	1019	51	12 09 40	109 24 00	6.3	1 m	Hon Lon Is.	-
"	776	"	"	"	"	" " "	" " "	"	1/2 m (in series)	" " "	-
"	777	"	"	1040	"	" " "	" " "	"	6' Beam T.	" " "	SIO 61-672
15A	778	20	1305	1307	76	12 00 35	109 37 40	20.4	6' Beam T. (net fouled & ripped)	" " "	-
15B	none	20	1725	-	885	11 56 00	109 52 20	35.0	none	" " "	-
16	779	20	1906	2229	1250	11 51 15	110 08 40	51.5	1 m (net lost)	" " "	-
"	780	"	-	"	"	" " "	" " "	"	1/2 m (in series)	" " "	-
16A	none	21	0053	-	1550	11 46 35	110 24 25	67.7	none	" " "	-
16B	none	21	0313	-	1590	11 42 15	110 40 40	84.5	none	" " "	-
17	781	21	0534	0647	1600	11 37 40	110 56 40	100.5	1 m	" " "	-
"	782	"	-	0730	"	" " "	" " "	"	PoD	" " "	-
17A	none	21	0959	-	1780	11 33 25	111 13 35	117.2	none	" " "	-
17B	none	21	1220	-	1950	11 28 00	111 23 00	128.0	none	" " "	-
18	783	21	1527	1825	2180	11 11 00	111 35 40	146.0	1 m	" " "	-
18A	none	21	2120	-	2200	10 54 35	111 37 55	140.0	none	Spratley Is.	-
18B	none	21	2350	-	2200	10 40 00	111 41 00	123.0	none	" " "	-
19	784	22	0250	0421	2250	10 29 50	111 50 20	111.5	1 m	" " "	-
19A	none	22	0708	-	2200	10 19 45	112 00 45	102.5	none	" " "	-
19B	none	22	0949	-	1150	10 09 10	112 11 10	95.0	none	" " "	-
20	785	22	1217	1509	1280	09 59 20	112 21 15	85.8	1 m	" " "	-
"	786	"	-	1325	"	" " "	" " "	"	DIP	" " "	-
20A	none	22	1716	-	1750	09 46 15	112 15 55	71.2	none	" " "	-
20B	787	22	1907	1918	1250	09 36 40	112 10 40	60.3	2 m (SB-209)	" " "	SIO 61-673
21	788	22	2249	2330	1100	09 27 00	112 04 30	60.0	DIP	" " "	SIO 61-628
"	789	23	-	0002	"	" " "	" " "	"	1 m	" " "	-
21A	none	23	0209	-	900	09 17 20	111 58 15	39.3	none	" " "	-
21B	none	23	0359	-	1000	09 07 10	111 51 50	29.3	none	" " "	-
22	790	23	0549	0725	650	08 56 25	111 45 10	20.5	1 m	" " "	-
22A	none	23	0950	-	800	08 46 45	111 52 40	8.8	none	" " "	-
22B	791	23	1140	1140	700	08 38 15	111 53 55	1.2	1 m	" " "	-
22C	none	23	1257	-	800	08 35 00	111 47 15	8.0	none	" " "	-
23	792	23	1446	1552	820	08 24 05	111 40 25	20.0	1 m	" " "	-
23A	none	23	1756	-	610	08 35 30	111 30 30	24.1	none	" " "	-
23B	793	23	1941	1945	750	08 46 00	111 19 30	35.7	2 m (SB-210)	" " "	SIO 61-633
"	794	"	-	2000	"	" " "	" " "	"	DIP	" " "	SIO 61-629
24	none	23	2320	-	1000	08 56 00	111 08 30	49.8	none	" " "	-
"	795	24	-	0038	"	" " "	" " "	"	1 m	" " "	-
"	796	"	-	0022	"	" " "	" " "	"	DIP	" " "	SIO 61-630
24A	none	24	0252	-	1150	09 08 30	110 56 30	65.0	none	" " "	-
24B	none	24	0452	-	1100	09 19 00	110 44 30	81.0	none	" " "	-
25	797	24	0659	0808	1600	09 26 30	110 34 30	93.0	1 m	" " "	-
25A	none	24	1031	-	1550	09 33 00	110 26 00	103.3	none	" " "	-
25B	none	24	1236	-	1480	09 42 00	110 13 45	119.0	none	" " "	-
26	798	24	1515	1713	850	09 51 15	110 01 30	134.0	1 m	" " "	-
"	799	"	-	1645	"	" " "	" " "	"	DIP	" " "	-
26A	800	24	2013	1145	250	10 02 15	109 48 00	91.8	DIP	Mai Sungtran	SIO 61-631
"	801	"	-	2100	"	" " "	" " "	"	2.5' dredge	" " "	-
"	(geol.)	"	-	-	495 m	" " "	" " "	"	NEL	" " "	#1448
"	802	25	-	0013	"	" " "	" " "	"	2 m (SB-211) (800 MNO)	" " "	SIO 61-674
26B	none	25	-	0343	550	10 10 30	109 37 15	79.0	none	" " "	-
27	803	25	0550	0647	150	10 18 00	109 27 00	70.5	1 m	" " "	-
27A	none	25	0900	-	70	10 30 00	109 14 00	50.9	none	Pte. Lagan	-
27B	none	25	1148	-	62	10 41 30	109 06 00	37.1	none	" " "	-
28	804	25	-	1439	25	10 58 45	108 52 30	15.2	1 m	" " "	-
"	805	"	-	1457	"	" " "	" " "	"	P. grab	" " "	-

Hydro. Sta. S8-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
"	806	"	-	1513	"	" " "	" " "	"	v V grab	" "	-
28A	none	25	1945	-	17.0	10 40 30	108 18 20	14.3	none	Pt. Vinay Bane Madge	-
"	807	"	2032	2035	"	" " "	" " "	"	2 m(S8-212)	S. side	" " "
"	808	"	-	2030	12.5	" " "	" " "	"	DIP	" " "	" " "
28B	809	30	1200	1708	9.5	09 59 00	107 05 15	20.0	P. grab	Thoi Thuan	-
29	810	30	1845	1902	12.5	09 43 00	107 03 00	-	1 m	-	-
29A	none	30	2108	-	17	09 29 00	107 11 00	-	none	-	-
29B	none	30	2315	-	19	09 15 00	107 18 00	-	none	-	-
30	811	X-1	0128	0156	20	08 59 00	107 25 00	-	1 m	-	-
30A	none	1	0429	-	25	08 18 15	107 30 30	-	none	-	-
30B	none	1	0644	-	29	08 25 30	107 38 00	-	none	-	-
31	812	1	0843	0905	31	08 15 00	107 45 00	-	1 m	-	-
31A	none	1	1235	-	31	08 04 30	107 42 45	-	none	-	-
31B	none	1	1543	-	33	08 00 00	107 41 15	-	none	-	-
32	813	1	1849	1918	30	07 56 00	107 41 30	-	1 m	-	-
32A	none	2	0000	-	30	07 41 00	107 30 00	-	none	-	-
32B	none	2	0436	-	28	07 26 00	107 15 00	-	none	-	-
33	814	2	0800	0825	30	07 26 45	107 23 30	-	1 m	-	-
"	815	"	-	0830	"	" " "	" " "	-	FeD	-	-
33A	none	2	1045	-	32.5	07 30 45	107 37 15	-	none	-	-
33B	none	2	1230	-	37	07 36 15	107 55 00	-	none	-	-
34	816	2	1456	1529	42	07 40 00	108 06 00	-	1 m	-	-
34A	817	2	1920	1932	44	07 27 00	108 12 30	-	2 m(S8-213)	-	-
"	818	"	-	2014	"	" " "	" " "	-	2.5' dredge	-	-
34B	none	3	1035	-	47	07 15 30	108 19 00	-	none	-	-
35	819	3	0414	0457	50	07 04 00	108 26 00	-	1 m (net lost)-	-	-
35A	none	3	0830	-	47	06 53 30	108 11 00	-	none	-	-
35B	none	3	1055	-	63	06 43 30	107 58 00	-	none	-	-
36	821	3	1356	1419	40	06 33 15	107 46 00	-	1/2 m	-	-
"	822	"	-	1443	"	" " "	" " "	-	2.5' dredge	-	-
"	823	"	-	1900	"	" " "	" " "	-	DIP	-	-
36A	824	3	2000	2007	37	06 28 00	107 40 00	-	2 m(S8-214)	-	SID 61-675
36B	none	4	0000	-	35	06 18 00	107 27 15	-	none	-	-
37	825	4	0400	0435	32	06 09 00	107 18 00	-	1 m	-	-
37A	none	4	0840	-	30	05 56 45	107 03 00	-	none	-	-
37B	none	4	1246	-	37	05 47 00	106 51 00	-	none	-	-
38	826	4	1745	1822	30	05 28 50	106 37 40	-	1 m	-	-
"	827	"	-	1835	"	" " "	" " "	-	DIP	-	-
"	828	"	-	1845	"	" " "	" " "	-	2.5' dredge	-	-
"	829	"	-	1924	"	" " "	" " "	-	2 m(S8-215)	-	-
"	830	"	-	1930	"	" " "	" " "	-	FeD	-	-
38A	none	4	2234	-	36	05 26 35	106 21 40	-	none	-	-
38B	none	5	0050	-	42	05 23 55	106 05 10	-	none	-	-
39	none	5	0305	-	41	05 23 00	105 50 25	-	none	-	-
"	831	"	-	0326	"	" " "	" " "	-	1 m	-	-
39A	none	5	0548	-	35	05 40 10	105 49 15	-	none	-	-
39B	none	5	0753	-	31	05 56 40	105 48 10	-	none	-	-
40	832	5	1003	1026	27	06 14 50	105 47 10	-	1 m	-	-
"	833	"	-	1100	"	" " "	" " "	-	6' Beam T.	-	-
"	(geol.)	"	-	-	54 m	" " "	" " "	-	NEL	-	#1109
40A	none	5	1420	-	27	06 31 15	105 40 45	-	none	-	-
40B	none	5	1647	-	23	06 45 35	105 34 00	-	none	-	-
41	834	5	1845	1905	21 1/2	07 00 15	105 27 40	-	1 m	-	-
"	835	"	1923	1923	"	" " "	" " "	-	P. grab	-	-
"	836	"	-	1933	"	" " "	" " "	-	2 m(S8-216)	-	-
41A	none	5	2224	-	21	07 10 30	105 16 30	-	none	-	-

Hydro. Sta. S8-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish or NEL No.
41B	none	6	0041	-	20	07 23 45	105 06 00	-	none	-	-
42	837	6	0247	0906	19	07 42 05	104 58 20	-	1 n	-	-
"	838	"	-	0900	"	" " "	" " "	-	DIP	-	-
"	899	"	-	0919	"	" " "	" " "	-	P. grab	-	-
42A	none	6	0901	-	17½	07 53 00	104 56 05	-	none	-	-
42B	none	6	0637	-	15½	08 06 45	104 53 40	-	none	-	-
43	840	6	0830	0835	14½	08 20 25	104 50 40	-	P. grab	-	-
"	841	"	-	0859	"	" " "	" " "	-	1 n	-	-

Gulf of Thailand

none	842	6	1812	1815	12½	09 15 00	104 06 30	30	P. grab	Iles de Peule Dana -	-
none	843	7	1936	1933	15	12 11 15	101 08 15	21.5	P. grab	Ke Chuang	-

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. No. S8-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions		Hydro. Sta. No. S8-	Bio. Sta. No. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions	
					Amt. 10ths	Cloud Type						Amt. 10ths	Cloud Type
U1	705	17.2	294	153	10	AS Cu	20	785	123	552	86.9	10	SC Cu
U2	707	16.4	284	144	5	SC AS	21	789	128	535	52.3	-	night
1	719	35.3	251	172	3	AS AC	22	790	153	495	36.4	10	AC SC AS
1A	723	78.6	373	131	1	AS Cu	22B	791	128	524	2617	10	SC AC Cu
1B	725	103	494	64.6	1	AS CB	23	792	134	516	58.2	10	AS SC AC
2	726	100	516	77.6	4	SC AS Cu	***24	795	-	551	5719	-	night
3	729	128	487	100	-	night	25	797	136	558	35.8	5	AS Cu AC
4	730	100	513	50.7	5	AC AS	26	798	139	525	53.2	9	AS Cu
5	732	136	488	63.5	2	Cu	27	803	131	506	83.1	10	AS SC
5A1	734	144	497	82.5	-	night	28	804	25	345	102	7	SC AS AC
5A2	737	141	491	112	-	night	***29	810	17.2	300	-	-	night
6	738	128	480	83.2	-	night	30	811	25.8	297	306	-	night(cldy)
7	741	131	491	46.9	2	AS Cu	***31	812	51.1	356	-	10	AS SC Cu
8	742	128	482	184	7	AS AC	32	813	44.3	338	174	-	night
9	745	139	466	92.5	4	Cl Cu	33	814	44.0	377	140	10	AC FC
* 9X	747	3840	-	-	4-10	-	34	816	70.7	478	73.5	10	AS Cu AC
10	748	136	434	80.5	-	night	**35	819	73.9	-	-	-	night
11	751	131	487	47.1	9	Cu NS	37	825	48.2	353	142	-	night
12	752	149	465	38.7	10	AC FC	38	826	46.0	357	67.2	8	FC AS Cu
14	753	95.0	474	95.0	10	SC NS	39	831	67.2	501	98	-	night
15	775	84.7	414	126	4	AS Cu	40	832	49	297	202	9	Cu AS AC
**16	779	141	-	-	-	night	***41	834	28.9	426	-	-	night
17	781	128	495	50.5	10	Cu FC AS	42	837	27.3	334	200	-	night
18	782	136	489	85.7	10	Cu FS SC	43	841	16.1	274	117	8	AS Cu AC
19	784	141	379	81.2	-	night							

\* No meter reading obtained  
 \*\* Net, with meter and sample, lost

\*\*\* Angle not recorded  
 \*\*\*\* Too many salps. Volume not measured.

## Cruise S9. Gulf of Thailand

Cruise S9 is the first part of two special surveys of the Gulf of Thailand (Cruise S9A is the second part). It was designed for the special purpose of broadly spaced more nearly synoptic coverage of physical and chemical oceanographic data than on previous cruises (S9A was designed with closely spaced biological stations in the northern Gulf only). It compares in pattern with the preceding regular Gulf surveys in that the four northernmost lines were reworked; three additional shorter lines, parallel to, equidistantly spaced between these four lines and lying in the eastern half of the Gulf were also worked.

Four anchor stations (S9-8, S9-15, S9-18, S9-33) at selected locations were occupied each for a period of 24-25 hours (Robinson, 1974a\*; Faughn and Taft, 1967). Anchorage at each was in approximately 30 fathoms using 75 fathoms of chain to the starboard anchor. Except for occasional short squalls with winds of 25 to 40 MPH, weather and sea conditions were favorable for anchor station operations, the ship riding usually to the prevailing current. Each anchor station consisted of:

- a serial hydrographic cast every 3 hours,
- hourly BT, weather and current (drift spar) observations,
- 4 to 6 1 m net tows, drifted from stern on 15 m line for 1 hour,
- 4 Petersen grabs.

Microplankton was sampled at 3-hour intervals using a 20 cm fine-mesh net in a vertical, bottom to surface, haul at two of the anchor stations.

Due to the unfortunate failure of a current meter to arrive in time for use on these anchor stations, a drift spar was rigged for determination of current speed, its direction being related to the ship's compass heading as modified by the instantaneous angle of the spar from the center line of the vessel. Each tabulated speed represents the average of three such determinations. The reliability of these current data appears warranted by a check made on Anchor Station No. 4 on which the reported current direction was compared with a plot of the average vessel heading from the gyro-actuated course recorder; the reported current speed from a 1 ¼-hour interval was compared with that of a special free-drifting drogue whose distance from the vessel was determined by sextant angle computation, its drift direction being determined by direct observation of true bearing from the vessel. The results compared favorably with those from drift spar.

Physical, chemical and biological procedures at regular hydrographic stations on this cruise followed those of the preceding cruises.

Itinerary:

- depart Bangkok, November 9, 1960
- (one stop at Songkhla, November 17)
- return Bangkok, November 25.

41 Hydrographic Stations:

Physical:

- serial hydrographic cast at each station,
- BT observations at each station, as well as at two equally spaced locations between consecutive stations,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

Chemical:

- dissolved oxygen, salinity and phosphate concentration later determined from water samples taken with Nansen bottles at each level in each hydrographic cast.

Biological:

- 67 1 m oblique (except where drifted at anchor stations) net tows,
- 4 2 m (all at night) stramin net tows,



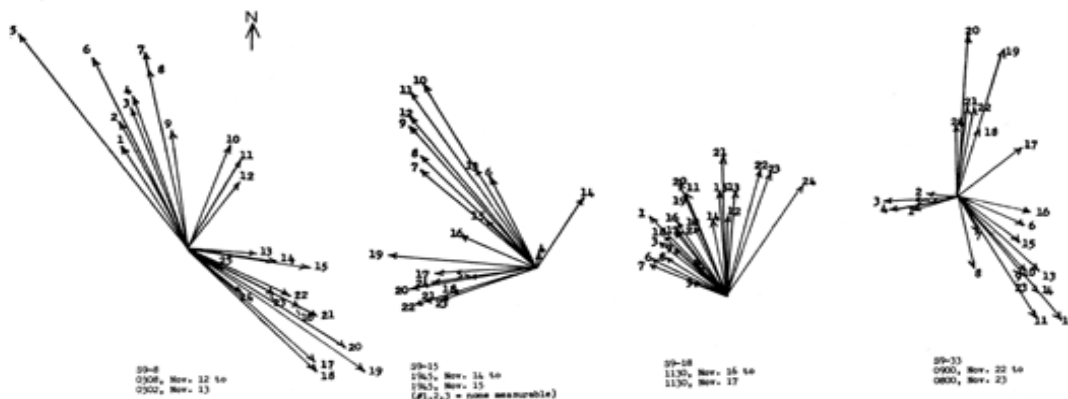
20 20 cm (phytoplankton) vertical net tows,  
41 Petersen grabs,  
6 6' Beam trawls.

**Geological:**

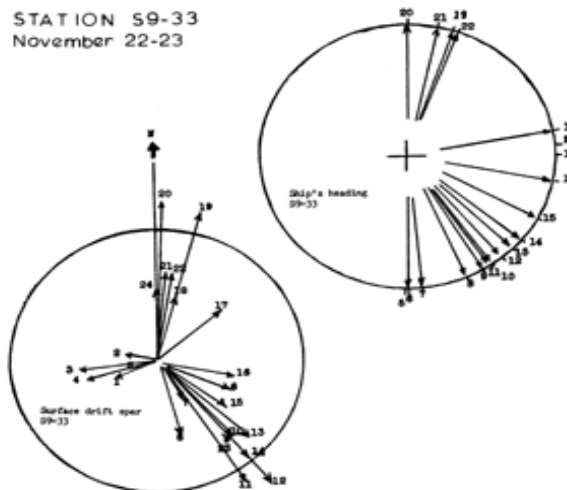
(biological grabs and trawls)  
— continuous fathometer recording.

# ANCHOR STATIONS NAGA Cruise S9 November, 1960

Surface Drift Spur  
Hourly observations numbered consecutively.  
1 cm = 0.25 knot



## STATION S9-33 November 22-23



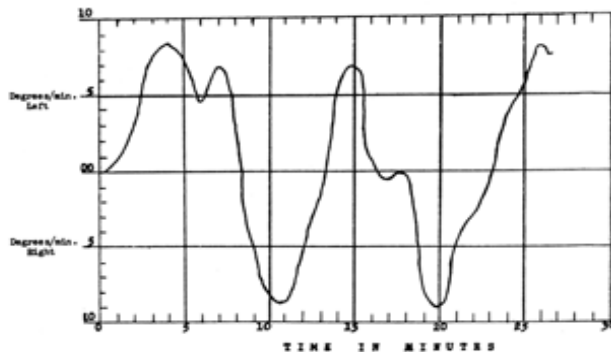
Surface drift spur at S9-33 (same as shown above) compared with average ship's head from course recorder at corresponding observation times.

Local Observation Time	Observation Number	Average (of 3) ship's heading from Source Recorder	(A) Reverse ship's heading	(B) Observed current direction	Difference (rotational degrees) between (A) & (B)	Remarks
0900	1	not observed				
1000	2	"				
1100	3	"				
1200	4	"				
1300	5	350 $\frac{1}{2}$	170 $\frac{1}{2}$	262	+ 8 $\frac{1}{2}$	--- ? (B)
1400	6	350 $\frac{1}{2}$	170 $\frac{1}{2}$	113	- 6 $\frac{1}{2}$	--- " "
1500	7	354	174	150	- 24	
1600	8	337	157	168	+ 11	
1700	9	329	149	162	- 7	
1800	10	326	146	179	- 7	
1900	11	327	147	149	+ 2	
2000	12	319	139	142	+ 3	
2100	13	313	133	136	+ 1	
2200	14	308	128	142	+ 14	
2300	15	297	117	127	+ 10	
2400	16	279	099	101	+ 2	
0100	17	258	098	048	- 30	
0200	18	270	090	015	- 75	--- ship riding to wind squall
0300	19	196	016	015	- 1	
0400	20	179	059	003	+ 4	
0500	21	190	040	005	- 5	
0600	22	198	018	009	- 9	
0700	23	265	085	142	+ 57	--- bearing in anchor to short stay underway
0800	24	208	028	359	- 29	
0900	-	(090)	-	-	-	

### NAGA S9-33, November 22, 1960

Local Clock Time	Time (minutes)	True bearing from ship	Angle to horizontal	Computed distance (feet)	Drift speed (ft./min.)	Current speed (knots)
1530	00	175 $^{\circ}$				
1543	13	171.3 $^{\circ}$	L $^{\circ}$ 37.7 $^{\circ}$	236.65	18.05	0.17
1551	21	168.2 $^{\circ}$	3 $^{\circ}$ 10.0 $^{\circ}$	363.63	18.25	0.16
1610	40	166.5 $^{\circ}$	1 $^{\circ}$ 31.7 $^{\circ}$	712.14	17.80	0.17
1628	48	166 $^{\circ}$	1 $^{\circ}$ 21.4 $^{\circ}$	802.29	18.44	0.18
1638	49	165 $^{\circ}$	1 $^{\circ}$ 09.3 $^{\circ}$	942.44	19.02	0.186
1648	58	164.2 $^{\circ}$	1 $^{\circ}$ 02.3 $^{\circ}$	1048.38	19.27	0.188
1632	61	163 $^{\circ}$	0 $^{\circ}$ 52.6 $^{\circ}$	1241.78	20.35	0.199
1641	71	163.5 $^{\circ}$	0 $^{\circ}$ 44.8 $^{\circ}$	1438.00	20.53	0.201
1643	73	163 $^{\circ}$	0 $^{\circ}$ 43.2 $^{\circ}$	1512.02	20.71	0.203

Direction and speed of current as determined in a free floating drogue from (a) distance from ship computed from sextant angle and (b) direction from direct observation of ship's true bearing. (Compare with #7,8,9 above).



S9-33  
1200-1230, Nov. 22  
Curve of ship's rate of swing, anchored in 30 fathoms to 75 fathoms of chain to starboard.

Hydro. Sta. S9-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<u>Gulf of Thailand</u>											
U1	844	XI-9	1623	1628	11	12 55 12	100 27 18	12.5	P. grab	Ko Luam Yai	-
"	845	"	-	1645	11	12 56 30	100 26 30	13.0	6' Beam T.	-	-
"	846	"	-	1834	-	12 43 18	100 30 00	35.1	2" (S9-201)	Mae Nam	SIO 61-676
U2	none	9	2124	-	12	12 27 30	100 23 05	23.0	none	Pranburi	-
U3	none	9	2306	-	14	12 11 45	100 20 30	19.5	none	"	-
U4	none	10	0048	-	16.5	11 55 24	100 18 00	30	none	Prachuap Khiri Khan	-
1	847	10	0229	0305	23.0	11 36 30	100 16 00	28.5	1 "	" "	" -
"	847A	"	-	0234	"	" " "	" " "	"	P. grab	" "	" -
1A	none	10	0458	-	23	11 19 00	100 13 30	36.3	none	" "	" -
"	848	"	-	0540	-	11 13 06	100 13 30	39.5	FoD	Ko Thalu	-
1B	none	10	0643	-	25	11 02 24	100 11 30	41	none	Laem Yai	-
1C	none	10	0827	-	27	10 45 00	100 09 30	39.8	none	" "	-
2	849	10	0934	1005	28	10 33 00	100 08 40	32.0	P. grab	Ko Tao	-
"	850	"	-	1045	"	" " "	" " "	"	1 "	" "	-
"	851	"	-	1040	"	" " "	" " "	"	DIP	" "	-
2A	none	10	1227	-	28	10 18 30	100 15 00	27	none	" "	-
2B	852	10	1403	1412	30	10 04 10	100 19 10	28	P. grab	" "	-
"	853	"	-	1426	"	" " "	" " "	"	6' Beam	" "	SIO 61-677
3	854	10	1643	1652	26	09 49 54	100 25 54	20.9	P. grab	Ko Phangan	-
"	855	"	-	1741	"	" " "	" " "	"	1 "	" "	-
"	856	"	-	1800	"	" " "	" " "	"	bird	" "	-
3A	none	10	1930	-	19	09 31 54	100 25 18	18.8	none	Ko Samui	-
3B	none	10	2120	-	14	09 14 00	100 24 25	24	none	" "	-
3C	none	10	2308	-	13	08 53 00	100 23 36	28	none	Siehen	-
4	857	11	0052	0130	11	08 34 10	100 22 45	13	20 cm	Laem Talumphak	-
"	858	"	-	0143	"	" " "	" " "	"	1 "	" "	-
4A	none	11	0323	-	14	08 45 36	100 31 48	27	none	" "	-
4B	none	11	0450	-	14	08 56 54	100 41 00	41	none	" "	-
5	859	11	0622	0631	17	09 08 00	100 49 00	48	P. grab	Ko Samui	-
"	860	"	-	0655	"	" " "	" " "	"	1 "	" "	-
5A	none	11	0840	-	26	09 19 06	100 55 48	51	none	" "	-
5B	none	11	1011	-	30	09 33 00	101 04 48	60	none	" "	-
6	861	11	1215	1222	-	09 23 30	101 15 12	70.2	P. grab	" "	-
"	862	"	-	1252	"	" " "	" " "	"	1 "	" "	-
"	863	"	-	1315	"	" " "	" " "	"	6' Beam T.	" "	-
6A	none	11	1635	-	34	09 39 00	101 33 00	86.8	none	" "	-
6B	none	11	1758	-	-	09 48 00	101 42 48	71.8	none	Peulo Wai	-
"	864	"	-	1906	-	09 53 06	101 48 30	65.5	2" (S9-202)	" "	-
7	865	11	1930	1940	37	09 54 12	101 50 06	64.0	DIP	" "	-
"	866	"	-	2017	"	" " "	" " "	"	1 "	" "	-
7A	none	11	2155	-	35	10 04 06	102 00 42	81	none	Kas Rong	-
7B	none	11	2337	-	34	10 13 06	102 10 18	68	none	" "	-
8(1)	867	12	-	0218	32	10 21 12	102 19 12	57	20 cm	" "	-
Anchor Station No. 1 (Hydrocast/1 hr.; BT/1/2 hr.)											
8	868	12	-	0450	32	10 21 12	102 19 12	57	20 cm	"	-
"	869	"	-	0647	"	" " "	" " "	"	20 cm	"	-
"	870	"	-	0802	"	" " "	" " "	"	1 "	"	-
"	871	"	-	0815	"	" " "	" " "	"	DIP	"	SIO 61-678
"	872	"	-	0825	"	" " "	" " "	"	P. grab	"	-
"	873	"	-	0847	"	" " "	" " "	"	20 cm	"	-
"	874	"	-	0955	"	" " "	" " "	"	P. grab	"	-
"	875	"	-	1043	"	" " "	" " "	"	20 cm	"	-
"	876	"	-	1152	"	" " "	" " "	"	1 "	"	-
"	877	"	-	1239	"	" " "	" " "	"	20 cm	"	-
"	878	"	-	1250	"	" " "	" " "	"	P. grab	"	-

Hydro. Sta. S9-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
	879	"	-	1509	"	"	"	"	20 em	"	-
	879A	"	-	1602	"	"	"	"	P. grab	"	-
	880	"	-	1634	"	"	"	"	20 em	"	-
	881	"	-	1752	"	"	"	"	1 m	"	-
	882	"	-	2028	"	"	"	"	20 em	"	-
	883	"	-	1800	"	"	"	"	DIP	"	-
	884	"	-	2227	"	"	"	"	20 em	"	-
	884A	"	-	2335	"	"	"	"	DIP	"	-
	885	13	-	0025	"	"	"	"	20 em	"	-
	886	"	-	0115	"	10 21 12	102 19 12	"	DIP	"	-
	887	"	-	0110	"	"	"	"	1 m	"	SIO 61-679
	888	"	-	0247	"	"	"	"	20 em	"	-
8A	none	13	0643	-	"	10 32 18	102 41 42	32.0	none	Kas Rong	-
8B	none	13	0752	-	"	10 38 00	102 51 30	20.3	none	"	-
9	889	13	0912	0915	16	10 42 06	103 03 06	8	P. grab	"	-
"	890	"	-	0938	"	"	"	"	1 m	"	-
"	891	"	-	0940	"	"	"	"	DIP	"	SIO 61-680
9A	892	13	1206	1210	13	10 27 48	103 16 00	6	TROLL	Kas Rong Sam Lem	-
10	893	13	1427	1440	14	10 12 48	103 32 30	20.5	P. grab	Ile de Phu Quoc	-
"	894	"	-	1454	"	"	"	"	1 m	"	-
"	895	"	-	1518	"	"	"	"	6' Beam T.	"	-
10A	none	13	1704	-	17	10 04 42	103 25 00	30.2	none	"	-
11	896	13	1804	1823	18	09 56 24	103 17 00	41.5	1 m	"	-
"	897	"	-	1815	"	"	"	"	DIP	"	-
"	898	"	-	1850	"	"	"	"	Z(39-203)	"	-
11A	none	13	2105	-	21	09 47 00	103 05 00	37.1	none	Peule Panjang Is.	-
11B	none	13	2233	-	25	09 41 54	102 53 06	41.4	none	"	-
12	899	14	0005	0032	31	09 35 54	102 40 12	50.1	1 m	"	-
12A	none	14	0722	-	-	09 58 24	103 48 20	12	none	"	-
13	900	14	0854	0902	18	09 48 12	103 54 00	9	P. grab	Ile d'Am Thoi	-
"	901	"	-	0920	"	"	"	"	1 m	"	-
"	902	"	-	0930	"	"	"	"	1 m	"	-
"	903	"	-	1015	-	09 44 24	103 50 42	-	TROLL	"	-
"	904	"	-	1220	-	09 30 30	103 34 30	-	TROLL	"	-
13A	none	14	1118	-	16	09 38 30	103 43 42	28.8	none	"	-
13B	none	14	1236	-	22.0	09 29 12	103 33 00	42	none	"	-
14	905	14	1405	1425	23.5	09 18 06	103 24 00	3	P. grab	Peule Panjang	-
"	906	"	-	1430	"	"	"	"	1 m	"	-
"	907	"	-	1443	"	"	"	"	1 m	"	-
14A	908	14	-	1608	26	09 12 06	103 15 48	13	DIP	Peule Panjang Is.	SIO 61-681
14B	none	14	1724	-	25	09 04 30	103 03 54	26.5	none	"	-
15	909	14	1842	1938	33	08 57 00	102 53 18	40.1	20 em	"	-
Anchor Station No. 2											
15	910	"	-	1930	"	"	"	"	DIP	"	SIO 61-682
	911	"	-	2100	"	"	"	"	1 m	"	-
	912	"	-	2240	"	"	"	"	20 em	"	-
	913	"	-	2330	"	"	"	"	DIP	"	-
	914	15	-	0053	"	"	"	"	1 m	"	-
	915	"	-	0124	"	"	"	"	20 em	"	-
	916	"	-	0430	"	"	"	"	20 em	"	-
	916A	"	-	0500	"	"	"	"	handline	"	-
	917	"	-	0519	"	"	"	"	1 m	"	-
	918	"	-	0721	"	"	"	"	P. grab	"	-
	919	"	-	0737	"	"	"	"	20 em	"	-
	920	"	-	0915	"	"	"	"	P. grab	"	-
	921	"	-	0912	"	"	"	"	1 m	"	-
	922	"	-	1037	"	"	"	"	20 em	"	-

Hydro. Sta. S9-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
	923	"	-	1223	"	" " "	" " "	"	P. grab	" " "	" -
	924	"	-	1228	"	" " "	" " "	"	1 m	" " "	" -
	925	"	-	1326	"	" " "	" " "	"	20 cm	" " "	" -
	926	"	-	1632	"	" " "	" " "	"	20 cm	" " "	" -
	927	"	-	1615	"	" " "	" " "	"	P. grab	" " "	" -
	928	"	-	1705	"	" " "	" " "	"	1 m	" " "	" -
	929	"	-	2002	"	" " "	" " "	"	2 m (S9-204)	" " "	" -
15A	none	15	2141	-	38	08 51 06	102 42 48	52	none	" " "	" -
15B	none	15	2304	-	39	08 42 30	102 30 58	66	none	" " "	" -
16	930	16	0027	0054	40	08 34 18	102 19 48	81	1 m	" " "	" -
"	931	"	-	0104	-	" " "	" " "	"	1 m	" " "	" -
16A	none	16	0242	-	40	08 26 24	102 08 00	103	none	Pattani Is.	-
16B	none	16	0406	-	40	08 18 00	101 56 18	90	none	" " "	-
17	932	16	0533	0615	35	08 09 24	101 44 12	77	1 m	" " "	-
"	933	"	-	0622	27	" " "	" " "	"	1 m	" " "	-
17A	none	16	0754	-	27	07 58 54	101 36 00	64	none	" " "	-
17B	none	16	0917	-	25.5	07 48 24	101 28 00	52	none	" " "	-
Anchor Station No. 3											
18	934	16	1035	1057	25	07 38 42	101 19 42	41	1 m	Ban Lam Pho, (Pattani)	-
	935	"	-	1112	"	" " "	" " "	"	P. grab	" " "	-
	936	"	-	1050	"	" " "	" " "	"	handline	" " "	-
	937	"	-	1235	"	" " "	" " "	"	P. grab	" " "	-
	938	"	-	1545	"	" " "	" " "	"	P. grab	" " "	-
	939	"	-	1630	"	" " "	" " "	"	DIP	" " "	-
	940	"	-	1709	"	" " "	" " "	"	1 m	" " "	-
	941	"	-	1900	"	" " "	" " "	"	DIP	" " "	SID 61-683
	942	"	-	2115	"	" " "	" " "	"	1 m	" " "	-
	943	17	-	0223	"	" " "	" " "	"	1 m	" " "	-
	944	"	-	0815	"	" " "	" " "	"	P. grab	" " "	-
	945	"	-	0917	"	" " "	" " "	"	1 m	" " "	-
	946	"	-	0930	"	" " "	" " "	"	DIP	" " "	-
	947	"	-	1134	"	" " "	" " "	"	1 m	" " "	-
18A	none	17	1302	-	20	07 33 48	101 08 00	38	none	Songkhla	-
18B	none	17	1423	-	10	07 27 24	100 55 54	25	none	" " "	-
	948	"	-	1800	4	07 15 00	100 35 00	1.9	P. grab	" (anchor)	-
	949	"	-	2000	"	" " "	" " "	"	DIP	" " "	SID 61-684
	950	18	-	0800	"	" " "	" " "	"	DIP	" " "	-
	951	"	-	1845	"	" " "	" " "	"	P. grab	" " "	-
	952	"	-	1900	"	" " "	" " "	"	DIP	" " "	SID 61-685
	953	"	-	2020	"	" " "	" " "	"	Crab Net(85 cm)	" " "	-
19	954	"	2225	2249	10	07 21 30	100 42 00	11	1 m	" " "	-
"	955	"	-	2240	"	" " "	" " "	"	DIP	" " "	-
19A	none	19	0908	-	12.5	08 57 36	100 06 12	11	none	Sichon, Surat Thani	-
20	956	19	1111	1145	11.5	09 17 30	100 06 42	10	P. grab	Ke Sami	-
"	957	"	-	1155	"	" " "	" " "	11	1 m	" " "	-
20A	none	19	1427	-	16.0	09 32 54	100 18 00	11.8	none	" " "	-
20B	none	19	1724	-	26	10 00 00	100 13 24	22.5	none	Koh Tao	-
20C	none	19	1909	-	21	10 04 18	99 59 24	8	none	" " "	-
"	958	"	2040	1920	"	" " "	" " "	"	FD	" " "	-
20D	none	19	2040	-	20	09 59 00	99 44 12	7	none	" " "	-
21	959	19	2222	2247	22	10 13 30	99 35 48	20.5	1 m	Leag Tien, Chumphon	-
"	960	"	-	2250	"	" " "	" " "	"	DIP	" " "	-

Hydro. Sta. S9-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
21A	none	20	0011	-	27	10 20 24	99 45 30	31	none	Chumphora	-
21B	none	20	0130	-	30	10 27 48	99 56 00	35	none	"	-
21C	none	20	0255	-	31	10 35 30	100 07 42	40	none	"	-
21D	none	20	0419	-	28	10 44 18	100 20 30	50	none	"	-
21E	none	20	0543	-	30	10 52 36	100 32 00	60	none	"	-
22	961	20	0658	0738	31	10 58 36	100 32 00	70	P. grab	Prashuab Khirikhan	-
"	962	"	-	0750	"	" " "	" " "	"	1 m	"	-
22A	none	20	0904	-	32	11 04 48	100 50 42	76	none	"	-
22B	none	20	1050	-	33	11 14 30	101 05 48	82	none	"	-
23	963	20	1200	1226	33	11 20 12	101 14 42	73	P. grab	Ke Chang	-
"	964	"	-	1237	"	" " "	" " "	"	1 m	"	-
23A	none	20	1342	-	31	11 24 12	101 22 06	65	none	"	-
23B	none	20	1434	-	32	11 28 00	101 30 06	56.5	none	"	-
24	965	20	1525	1614	32	11 31 54	101 37 24	48.1	P. grab	"	-
"	966	"	-	1610	"	" " "	" " "	"	1 m	"	-
"	967	"	-	1624	"	" " "	" " "	"	DIP	"	-
25	968	20	1757	1826	30	11 39 30	101 47 00	36	1 m	"	-
25A	none	20	2013	-	25.5	11 47 50	102 00 42	20.5	none	"	-
26	969	20	2140	2212	15	11 54 36	102 13 30	6	1 m	"	-
"	970	"	-	2210	"	" " "	" " "	"	DIP	"	-
26A	none	20	2349	-	19	11 43 50	102 21 36	10.5	none	Ke Kut	-
26B	none	21	0111	-	17	11 33 15	102 29 20	4	none	"	-
27	971	21	0233	0310	20	11 23 15	102 37 00	10.5	1 m	"	-
27A	none	21	0444	-	26	11 16 12	102 27 42	19	none	"	-
27B	none	21	0558	-	32	11 09 48	102 18 24	29	none	"	-
"	972	"	-	0647	33	11 04 30	102 11 24	38	FeD	"	-
28	973	21	0711	0735	32	11 03 30	102 10 00	39.3	P. grab	"	-
"	974	"	-	0748	"	" " "	" " "	"	1 m	"	-
28A	none	21	0907	-	31	10 56 30	102 01 12	50	none	"	-
28B	none	21	1017	-	31.5	10 49 48	101 50 54	60.5	none	"	-
29	975	21	1127	1206	33.5	10 42 30	101 43 18	73.0	P. grab	"	-
"	976	"	-	1217	"	" " "	" " "	"	1 m	"	-
29A	none	21	1417	-	34.5	10 56 30	101 36 06	68	none	"	-
29B	none	21	1544	-	33.0	11 09 20	101 28 12	68.3	none	Ke Kut Is.	-
29C	none	21	1724	-	31	11 23 00	101 20 48	71.3	none	"	-
30	977	21	1908	1933	29	11 36 12	101 12 36	68.5	1 m	Ke Chang Is.	-
"	978	"	-	1925	"	" " "	" " "	"	DIP	"	-
30A	none	21	2057	-	27	11 47 30	101 15 15	48.8	none	Laem Ya	-
30B	none	21	2158	-	25	11 53 42	101 20 54	42.5	none	"	-
31	979	21	2300	2329	22.5	11 59 30	101 26 36	35.5	1 m	"	SID 61-686
"	979A	"	-	2325	"	" " "	" " "	44	DIP	"	-
31A	none	22	0036	-	23.5	12 06 42	101 32 24	29.5	none	"	-
31B	none	22	0138	-	19.5	12 11 42	101 38 06	27	none	"	-
32	980	22	0239	0303	15.0	12 17 30	101 43 30	19	1 m	Ke Chang Sabo	-
"	981	"	-	0245	"	" " "	" " "	"	FeD	"	-
33	982	22	0755	0813	30	11 37 06	101 46 36	38	1 m	Ke Chang Is.	-
Anchor Station No. 4											
33	983	"	-	0852	"	" " "	" " "	"	P. grab	"	-
"	984	"	-	0935	"	" " "	" " "	"	P. grab	"	-
"	985	"	-	1140	"	" " "	" " "	"	P. grab	"	-
"	986	"	-	0830	"	" " "	" " "	"	handline	"	-
"	987	"	-	0900	"	" " "	" " "	"	DIP	"	-
"	988	"	-	1000	"	" " "	" " "	"	drift leg	"	-
"	989	"	-	1445	"	" " "	" " "	"	P. grab	"	-
"	990	"	-	1615	"	" " "	" " "	"	1 m	"	-
"	991	"	-	1740	"	" " "	" " "	"	DIP	"	-
"	992	"	-	2029	"	" " "	" " "	"	1 m	"	-

Hydro. Sta. S9-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
	993	23	-	0512	"	" " "	" " "	"	1 m	" " "	-
	994	"	-	0735	"	" " "	" " "	"	P. grab	" " "	-
34	995	23	-	1415	16	12 22 07	101 25 06	9.3	P. grab	Ke Samet	-
"	996	"	-	1419	11	" " "	" " "	"	1 m	" " "	-
34A	none	23	1548	-	14	12 15 15	101 13 18	20.9	none	Hin Khao	-
34B	none	23	1711	-	17	12 07 30	101 02 12	23.5	none	Ke Chuang	-
35	997	23	1833	1858	17	12 01 05	100 50 30	-	1 m	" "	-
35A	none	23	2029	-	17	11 54 15	100 39 30	-	none	-	-
35B	none	23	2155	-	20	11 46 05	100 27 35	-	none	-	-
36	998	23	2322	2352	21	11 39 35	100 16 00	-	1 m	-	-
"	999	"	-	2345	"	" " "	" " "	-	DIP	-	-
36A	none	24	0122	-	22 $\frac{1}{2}$	11 32 00	100 04 30	-	none	-	-
36B	none	24	0247	-	22	11 25 00	99 53 00	-	none	-	-
37	1000	24	0405	0436	20	11 17 55	99 42 00	-	1 m	-	-
37A	none	24	0645	-	17	11 26 10	99 49 05	-	none	-	-
37B	none	24	0901	-	15	11 43 45	99 59 08	-	none	-	-
37C	none	24	1106	-	13	12 03 00	100 07 54	-	none	-	-
38	1001	24	1332	1350	13	12 19 40	100 20 20	20.0	1 m	Ke Karam	-
"	1002	"	-	1405	13	" " "	" " "	"	P. grab	" " "	-
39	1003	24	1535	1557	14	12 21 30	100 36 00	22.0	1 m	Ke Kram Yai	-
"	1004	"	-	1610	"	" " "	" " "	"	P. grab	" " "	-
40	1005	24	1755	1826	14	12 39 00	100 36 13	10.0	1 m	" " "	-
"	1006	"	-	1838	"	" " "	" " "	"	P. grab	" " "	-
41	1007	24	2045	2114	17	12 59 00	100 36 00	4.0	1 m	Ke Phai	-
none	1008	25	-	0340	-	-	-	-	DIP	" " "	-

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. S9-	Bio. Sta. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup>	Sky		Hydro. Sta. S9-	Bio. Sta. 60-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup>	Sky	
					Conditions	Cloud						Conditions	Cloud
1	847	0-32	248	100	-	night	18(4a)	942	0-5	210	580	-	night
2	850	0-51	306	39	7	Cu AS AC	18-6	943	0-5	176	284	-	night
3	855	0-38	341	-	8	Cu AS SC	18(8a)	945	0-5	301	421	4	AS SC
4	858	0-15	278	187	-	night	18-9	947	0-46	302	444	10	AS SC
5	860	0-27	344	-	3	CS SC AS	19	954	0-17	251	290	-	night
6	862	0-56	406	136	8	AS Cu AC CS	20	957	0-14	257	506	10	SC AS
7	866	0-48	435	113	-	night	21	959	0-35	373	128	-	night
8-6	870	0-5	567	53	10	-	22	962	0-53	371	215	2	AC AS
8-10	876	0-5	247	81	10	-	23	964	0-56	416	161	9	AS AC SC
8-13	881	0-5	440	362	9	AS SC	24	966	0-52	396	247	7	AS FC AC
8-17	887	0-5	60.7	527	-	night	25	968	0-52	342	336	-	night
9	890	0-22	343	382	9	AS SC	26	969	0-26	268	523	-	night
10	894	0-17	322	325	5	AS SC Ci	27	971	0-20	385	650	-	night
11	896	0-25	352	403	6	Ci SC	28	974	0-48	360	584	10	AS Cu SC
12	899	0-57	353	209	-	night	29	976	0-66	438	96	9	AS AC
13(1)	901	0-37	171	409	3	Ci SC	30	977	0-54	353	227	-	night
13(2)	902	0-27	340	501	3	Ci SC	31	979	0-38	238	181	-	night
14(1)	906	0-11	180	1840	7	AS Cu	32	980	0-20	358	1955	-	night
14(2)	907	0-42	319	606	7	AS Cu Cu	33-1	982	0-10	239	263	3	AS AC
15(1)	911	0-5	256	528	-	night	33-3b	990	0-10	44	273	4	AS AC SC
15(3)	914	0-5	87.1	908	-	night	33-5	992	0-10	186	430	-	night
15(4)	917	0-5	264	423	-	night	33-8	993	0-10	523	229	10	AS AC
15(5b)	921	0-5	221	796	10	SC AC	34	996	0-28	314	573	8	CB SC AS AC
15(6b)	924	0-5	-	-	10	SC	35	997	0-29	353	188	-	night
15(8a)	928	0-5	186	65	10	AS SC	36	998	0-40	310	178	-	night
16(1)	930	0-8	173	426	-	night	37	1000	0-29	270	111	-	night
16(2)	931	0-57	558	177	-	night	38	1001	0-22	264	497	10	SC NS FC
17(1)	932	0-11	160	87	3	AS SC	39	1003	0-19	316	950	9	AS SC AC
17(2)	933	0-53	349	86	3	AS SC	40	1005	0-25	314	574	3	AS AC FC
18-1	934	0-5	142	346	7	AS Cu	41	1007	0-20	283	374	-	night
18-3	940	0-5	87.8	695	3	CiCu CB							

## Cruise S9A. Gulf of Thailand

Cruise S9A was the second part of this special Gulf of Thailand survey. Its purpose was the collection of biological samples from midwater and bottom surfaces in the upper half of the Gulf. The station pattern followed a base line beginning at the center of the north end of the Gulf running southward as an approximate transect of the Gulf to Latitude 11° N. The track then followed lines perpendicular to the base line working northwards in a zig-zag. The base line thus chosen followed a sediment change from shallow water muddy sands, rich in organic debris, to clay at depths of 60 m as indicated by the rather scattered samples obtained on cruise S9.

The regular stations occupied on this cruise omitted routine hydrographic casts and 1 m net tows. Twenty-nine Petersen grab samples were taken en route to the first bottom trawl station; thirty-eight more were taken along the cruise track. Nineteen bottom trawl stations were occupied. A midwater plankton 2 m stramin net was towed each night.

### Itinerary:

depart Bangkok, December 8, 1960,  
(5 hour anchorage at Station S9A-15)  
return Bangkok, December 14.

### 20 Oceanographic Stations:

#### Physical:

(no hydrographic casts)  
— BT observations at each trawl and grab station and at other selected sites,  
— weather observations to accompany each BT observation,  
— surface temperature as continuous function of distance throughout.

#### Chemical:

(none)

#### Biological:

(no 1 m net tows)  
6 2 m (all at night) stramin net tows,  
67 Petersen grabs,  
1 6' Beam trawl,  
5 7' Beam trawls,  
13 16' Otter trawls.

#### Geological:

(biological grabs and trawls: see Bottom Samples)  
— continuous fathometer recording



Ocean-Bio. Sta. S9A-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<u>Gulf of Thailand</u>											
1	1009	XII-8	1500	1505	6	13 13 18	100 26 36	22	P. grab	Ke Si Chang	-
1A	1010	8	1535	1540	8	13 08 26	100 26 12	21.5	P. grab	" " "	-
1B	1011	8	1615	1625	9	13 03 31	100 26 12	15.3	P. grab	Ke Phai	-
1C	1012	8	1659	1705	11	12 58 55	100 26 28	13.6	P. grab	" "	-
1D	1013	8	1739	1746	11	12 53 25	100 26 54	13.5	P. grab	" "	-
1E	1014	8	1822	1833	12	12 48 18	100 27 15	15.1	P. grab	" "	-
1F	1015	8	1907	1912	13	12 43 28	100 27 48	18.3	P. grab	Ke Krom Tai	-
"	1016	"	-	1923	"	" " "	" " "	"	2 m.(S9A-201)	" " "	-
1G	1017	8	2027	2030	13½	12 37 20	100 26 45	20	P. grab	" " "	-
1H	1018	8	2103	2114	14	12 33 00	100 27 30	21	P. grab	" " "	-
"	1019	"	-	2115	"	" " "	" " "	"	DIP	" " "	-
1I	1020	8	2146	2154	14	12 27 05	100 28 30	25	P. grab	Sattakip	-
1J	1021	8	2221	2225	13	12 23 30	100 29 05	27	P. grab	"	-
1K	1022	8	2303	2300	14	12 18 15	100 29 30	30	P. grab	"	-
1L	1023	8	2344	2355	14½	12 13 20	100 30 50	31	P. grab	Ke Chuang	-
1M	1024	9	0053	0056	15	12 08 40	100 32 20	33	P. grab	" "	-
1N	1025	9	0201	0204	16	12 03 50	100 33 45	36	p. grab	" "	-
1-O	1026	9	0312	0316	17	11 59 55	100 35 15	39	P. grab	" "	-
1P	1027	9	0419	0431	18	11 54 10	100 36 35	42	P. grab	" "	-
1Q	1028	9	0539	0546	18	11 49 30	100 38 00	46	P. grab	" "	-
1R	1029	9	0709	0720	20	11 46 05	100 41 25	48	P. grab	" "	-
1S	1030	9	0840	0843	22	11 41 35	100 45 30	50	P. grab	" "	-
1T	1031	9	0951	1000	23	11 40 54	100 46 18	56.8	P. grab	Frachab Khir-Sun -	-
1U	1032	9	1106	1110	24	11 37 54	100 49 00	60	P. grab	" "	-
1V	1033	9	1217	1218	25	11 34 30	100 51 48	56.8	P. grab	Ke Chuang	-
1W	1034	9	1430	1432	28.5	11 26 00	100 57 00	64.9	P. grab	" "	-
1X	1035	9	1605	1614	30	11 18 12	101 00 30	72	P. grab	" "	-
1Y	1036	9	1716	1722	31	11 12 12	101 02 30	78.8	P. grab	" "	-
1Z	1037	9	1804	1813	32	11 09 36	101 04 00	82	P. grab	" "	-
1Z <sub>1</sub>	1038	9	1900	1911	33	11 05 00	101 05 42	85.8	P. grab	" "	-
"	1039	"	-	1919	"	11 03 00	101 06 18	87.8	2 m.(S9A-202)	" "	-
1Z <sub>2</sub>	1040	9	2029	2034	32	11 02 18	101 09 25	88.5	P. grab	Ke Kut	-
2	1041	9	2128	2136	32	11 00 00	101 15 00	84.5	P. grab	" "	-
"	1042	"	-	2156	"	11 01 00	101 17 06	84.5	6' Beam T.	" "	-
2A	none	10	0028	-	34	11 03 05	101 21 00	77.0	none	" "	-
2B	1043	10	0157	0203	34	11 08 00	101 30 00	67.5	P. grab	" "	-
2C	none	10	0329	-	33	11 12 12	101 38 06	53.5	none	" "	-
3	1044	10	0517	0523	35	11 17 54	101 48 00	47.4	P. grab	-	-
3A	none	10	0122	-	33	11 21 30	101 56 30	38.1	none	-	-
3B	1045	10	1014	1017	33	11 25 00	102 10 12	24.1	P. grab	-	-
"	1046	"	-	1023	"	11 25 00	102 12 12	22.2	7' Beam T.	-	-
3C	none	10	1230	-	22	11 27 06	102 26 48	13.8	none	-	-
4	1047	10	1341	1345	20	11 27 18	102 32 00	7.5	P. grab	Ke Kut	-
4A	1048	10	1500	1501	18	11 36 42	102 26 00	5.7	P. grab	" "	-
"	1049	"	-	1615	"	" " "	" " "	"	7' Beam T.	" "	-
"	1050	"	-	1907	18	11 48 47	102 18 16	8.5	2 m.(S9A-203)	-	-
5	1051	10	2058	2059	14	11 59 24	102 11 06	6.8	P. grab	Ke Chang	-
"	1052	"	-	2115	"	" " "	" " "	"	7' Beam T.	" "	-
"	1053	"	-	2200	"	" " "	" " "	"	FeD	" "	-
5A	1054	11	0010	0014	27	11 50 50	101 51 40	27.9	P. grab	" "	-
6	1055	11	0224	0230	31	11 43 00	101 33 07	47.1	P. grab	" "	-
"	1056	"	-	-	"	" " "	" " "	"	7' Beam T.	" "	SID 61-687
6A	none	11	0509	-	33	11 37 45	101 20 54	61.0	none	" "	-
6B	1057	11	0617	0620	30	11 33 06	101 11 20	59.0	P. grab	Ke Chuang	-
6C	none	11	0730	-	30	11 28 15	100 59 40	63.0	none	" "	-
7	1058	11	0821	0830	25	11 33 25	100 53 30	57.2	P. grab	" "	-
"	1059	"	-	1844	"	" " "	" " "	"	7' Beam T.	" "	-

Ocean. Sta. S9A-	Bio. Sta. 60-	Date 1960	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
7A	none	11	1121	-	24	11 28 55	100 43 06	56.3	none	Prachwab Khirikhan	-
7B	1060	11	1223	1225	25	11 25 50	100 35 55	51.0	P. grab	" "	-
7C	none	11	1329	-	25.5	11 22 50	100 24 55	42.5	none	" "	-
8	1061	11	1428	1433	25	11 20 48	100 14 50	36.4	P. grab	" "	-
"	1062	"	-	1443	"	" " "	" " "	"	16' Otter T.	" "	-
8A	none	11	1627	-	23	11 19 00	100 05 42	32.1	none	" "	-
8B	1063	11	1729	1733	22	11 17 12	99 55 00	19.9	P. grab	Laem Mae Ranyung-	-
8C	1064	11	1830	1841	20	11 14 50	99 44 00	8.5	2 n (S9A-204)	" "	-
9	1065	11	1930	1930	19	11 13 50	99 41 30	6.7	16' Otter T.	" "	-
"	1066	"	-	2040	"	" " "	" " "	"	P. grab	" "	-
10	1067	11	2345	2348	12 1/2	11 30 00	99 47 12	9.3	P. grab	Laem Km	-
"	1068	12	-	0003	"	" " "	" " "	"	16' Otter T.	" "	SID 61-688
"	1069	"	-	0045	"	" " "	" " "	"	DIP	" "	-
11	none	12	0510	-	10.5	11 51 15	99 54 45	4.4	none	Ban Menglai	-
"	1070	"	-	0514	"	" " "	" " "	"	P. grab	" "	-
"	1071	"	-	0528	"	" " "	" " "	"	16' Otter T.	" "	-
11A	none	12	0723	-	17	11 58 00	100 07 17	18.3	none	" "	-
11B	1072	12	0833	0837	16	12 02 17	100 16 12	16.9	P. grab	Ke Sattakut	-
11C	none	12	0952	-	17	12 06 55	100 26 00	24.3	none	" "	-
12	1073	12	1054	1058	17	12 08 18	100 35 06	31.3	P. grab	Ke Chuang	-
"	1074	"	-	1107	-	12 09 55	100 50 36	31.3	16' Otter T.	" "	SID 61-689
12A	none	12	1314	-	19	12 09 55	100 50 36	21.8	none	" "	-
12B	1075	12	1445	1448	15.5	12 14 06	101 04 00	17.9	P. grab	" "	-
12C	none	12	1620	-	16	12 17 12	101 18 45	16.3	none	Ke Samet	-
13	none	12	1736	-	17	12 21 18	101 31 55	11.2	none	" "	-
"	1076	"	-	1740	"	" " "	" " "	"	P. grab	" "	-
"	1077	"	-	1803	"	" " "	" " "	"	16' Otter T.	" "	SID 61-635
13A	1078	12	-	1946	"	12 18 15	101 25 06	13.4	P. grab	" "	-
"	1079	"	-	1957	"	" " "	101 22 18	"	2 n (S9A-205)	" "	-
13B	1080	12	2114	2119	18	12 18 30	101 15 18	17.2	P. grab	" "	-
13C	1081	12	2213	2216	16	12 19 20	101 07 14	14.5	P. grab	Ke Chuang	-
13D	1082	12	2332	2339	16	12 19 16	100 55 06	11.3	P. grab	" "	-
14	1083	13	0051	0055	16	12 19 15	100 43 40	17.8	P. grab	" "	-
"	1084	"	-	0100	"	" " "	" " "	"	FeD	" "	-
"	1085	"	-	0109	"	" " "	" " "	"	16' Otter T.	" "	-
14A	1086	13	0236	0242	15	12 19 00	100 36 45	23.7	P. grab	" "	-
15	1087	13	0336	0808	15	12 18 20	100 29 24	30.6	P. grab	" "	-
"	1088	"	-	0825	"	" " "	" " "	"	16' Otter T.	" "	-
15A	1089	13	0940	0945	16	12 17 50	100 23 25	22.8	P. grab	Khae Kalek	-
16	1090	13	1045	1050	16.5	12 17 28	100 18 40	17.2	P. grab	Ke Sattakut	-
"	1091	"	-	1055	"	" " "	" " "	"	16' Otter T.	" "	-
16A	1092	13	1242	1247	18	12 16 45	100 13 05	11.6	P. grab	" "	-
17	1093	13	1352	1356	12.5	12 16 45	100 07 15	6.4	P. grab	Ke Keram	-
"	1094	"	-	1411	"	" " "	" " "	"	16' Otter T.	" "	SID 61-690
17A	1095	13	1627	1630	17	12 28 00	100 11 46	12.5	P. grab	Khae Takiap	-
18	1096	13	1750	1800	16	12 39 25	100 15 45	18.5	P. grab	" "	-
"	1097	"	-	1808	"	" " "	" " "	"	16' Otter T.	" "	-
"	1098	"	-	1900	"	" " "	" " "	"	FeD	" "	-
18A	1099	13	1950	1958	15	12 49 25	100 20 10	18.5	P. grab	Laem Phak Bia	-
"	1100	"	-	2007	"	" " "	" " "	"	2 n (S9A-206)	" "	-
19	1101	13	2245	2255	10.5	13 05 50	100 26 10	20.5	P. grab	" "	-
"	1102	13	-	2250	10.5	13 05 50	100 26 10	20.5	FeD	" "	-
"	1103	"	-	2301	"	" " "	" " "	"	16' Otter T.	" "	-
19A	1104	14	-	0118	9	13 13 40	100 09 30	21.2	P. grab	" "	-
20	1105	14	-	0311	5.5	13 21 45	100 32 43	19.3	P. grab	Ke Sichang	-
"	1106	"	-	0322	"	" " "	" " "	"	16' Otter T.	" "	-

## Cruise S9A Bottom Samples

(collected with the Petersen grab)

Bio. Sta. No.	Collection No.	Volume Sediment (liters)	Volume Dead Shells (liters)	Type	Bio. Sta. No.	Collection No.	Volume Sediment (liters)	Volume Dead Shells (liters)	Type
1009	561	16	0.2	soft mud, fine sand	1048	598	10	0.2	sandy mud
1010	562	11	0.4	soft mud, fine sand	1051	600	20	0.1	soft mud
1011	563	10	0.5	muddy sand	1054	603	15	0.3	soft sandy mud, pebbles
1012	564	5	0.9	muddy sand	1055	604	15	0.4	sandy mud
1013	565	6	0.8	muddy sand	1057	606	25	-	green-gray mud
1014	566	6	0.8	muddy sand	1058	607	27	0.1	soft mud
1015	567	5	0.9	muddy sand, pebbles	1060	609	5	0.1	soft mud
1017	568	3	1.3	muddy sand, pebbles	1061	610	5	0.2	sandy mud
1018	569	5	0.9	muddy sand	1063	612	10	0.1	sandy mud
1020	571	5	0.7	muddy sand	1066	614	20	-	green-gray mud (H <sub>2</sub> S)
1021	572	5	0.9	muddy sand	1067	615	10	0.1	green-gray mud
1022	573	6	0.3	muddy sand, pebbles	1070	618	-	0.6	sandy mud
1023	574	2	0.8	muddy sand, pebbles	1072	620	8	0.2	sandy mud
1024	575	5	0.3	muddy sand	1073	621	3	0.6	muddy sand
1025	576	5	-	sandy mud	1075	623	7	-	muddy sand
1026	577	4	1.0	sandy mud	1076	624	12	1.0	soft mud
1027	578	2	1.2	sandy mud	1078	626	7	0.5	sandy mud
1028	579	1	0.5	sandy mud	1080	628	13	0.4	muddy sand
1029	580	3	0.3	sandy mud	1081	629	3	0.9	muddy sand
1030	581	6	0.2	sandy mud	1082	630	3	1.0	muddy sand, pebbles
1031	582	6	0.1	sandy mud	1083	631	5	0.8	muddy sand, plant debris
1032	583	12	0.1	sandy mud	1086	634	5	0.5	muddy sand
1033	584	15	0.1	green-gray mud	1087	635	6	0.9	muddy sand
1034	585	23	0.1	green-gray mud	1089	637	8	0.4	muddy sand
1035	586	20	0.1	green-gray mud	1090	638	4	0.4	muddy sand
1036	587	23	0.4	green-gray mud	1092	640	-	0.4	muddy sand
1037	588	23	0.1	green-gray mud	1093	641	7	0.2	mud
1038	589	17	1.4	sandy mud, pebbles	1095	643	9	0.1	sandy mud
1040	590	12	1.3	sandy mud	1096	644	5	-	muddy sand, pebbles
1041	591	19	0.4	sandy mud, clay	1099	647	10	0.4	muddy sand
1043	593	23	0.3	mud	1101	648	5	0.4	muddy sand
1044	594	-	-	mud	1104	651	15	0.2	green-gray mud
1045	595	20	0.2	sandy mud	1105	652	20	0.1	green-gray mud
1047	597	10	0.1	sandy mud					

## Cruise S10. South China Sea

The first leg of cruise S10, en route Nhatrang from Bangkok, included seven underway stations for biological collections (S10-U1 through S10-U7). A special bottom survey collection (S10-U8 through S10-U24) was made in outer Nhatrang Bay. Seven more biological collections (S10-U25 through S10-U31) were made enroute to the first routine survey (South China Sea) station. Adverse weather and sea conditions limited the intended extent of the South China Sea survey, as is indicated on the map of the Cruise Track and Station Pattern. Upon the return to Nhatrang and following a short study of internal wave action (S10-SH1 through S10-SH7) off the Bay entrance, the next leg of the cruise was run directly to Saigon occupying only three biological stations (biological station-numbers only).

The remainder of the cruise (Saigon to Bangkok, S10-U32 through S10-U77) included; two special BT observations between Poulo Condores and Poulo Obi in a discolored water area from the Mekong River, net hauls from north of Pointe de Ca Mau across lines of increased surface temperatures, intensive surveys with bottom sampling, net hauls and BT records in an area just west of Phu Quoc Island and in an area off Ko Chang (eastward then northward).

The seventeen bottom samples collected with van Veen or petersen grabs from outer Nhatrang Bay were all of fine mud. Both types of grabs were also used for sampling in the larger survey areas (South China Sea and Gulf of Thailand). One bottom sample was collected with a 7' Beam trawl off Cap An Hoa; three samples were collected with a 16' Otter trawl from the Gulf of Thailand.

Collections using a 1 m net (oblique tow) were made at most routine hydrographic survey stations and at many underway stations. A 2 m net tow collection was made each night when possible.

### Itinerary:

- depart Bangkok, January 10, 1961—arrive Nhatrang, January 19,  
(outer Nhatrang Bay bottom survey, January 21-22)
- depart Nhatrang, January 23—return Nhatrang, January 29,  
(internal wave study off Nhatrang Bay, January 31)
- depart Nhatrang, February 1—arrive Saigon, February 3,  
depart Saigon, February 8—return Bangkok, February 13.

### 49 Hydrographic Station:

#### Physical:

- serial hydrographic casts were made at the bottom sampling stations in Nhatrang Bay (S10-U8—S10-U24), four stations (S10-U28, -U29, -U30, -U31) en route to the first routine station, at each station on the first leg of the cruise track (S10-1—S10-21) and at seven stations (S10-SH1—S10-SH7) occupied for the internal wave study,
- BT observations at each hydrographic station, as well as at two equally spaced locations between consecutive stations, at a few special (visible) water mass boundaries, at periodic intervals during the Bay of Nhatrang survey, and along two 60-mile sections in the eastern Gulf of Thailand,
- weather observations to accompany each BT observation,
- surface temperature as continuous function of distance throughout.

#### Chemical:

- dissolved oxygen, salinity and phosphate concentration later determined from water samples taken with Nansen bottles at each level of each hydrographic cast.

#### Biological:

- 74 1 m oblique net tows,
- 9 2 m (all at night) stramin net tows,
- 1 7' Beam trawl,

3 16' Otter trawls,  
45 Petersen grabs,  
7 van Veen grabs.

Geological:

(biological trawls and grabs)  
— continuous fathometer recording.

Hydro. Sta. S10-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<u>Gulf of Thailand</u>											
U1	1	I-11	1900	1904	20	12 33 36	100 46 30	7.1	P. grab	Laem Pu Chae	-
"	2	"	-	1925	"	" " "	" " "	"	1 m	" " "	-
"	3	"	-	1940	"	" " "	" " "	"	2 m(S10-201)	" " "	-
U2	4	12	0600	0615	30	11 30 00	102 04 06	28.0	P. grab	Ke Kut	-
"	5	"	-	0634	"	" " "	" " "	"	1 m	" " "	-
U3	6	12	1200	1216	25	11 05 18	102 34 30	27.0	1 m	Kas Kong	-
U4	7	12	1800	1810	16	10 28 24	103 16 12	5.0	P. grab	Kas Hong Sam Lam	-
"	8	"	-	1818	"	" " "	" " "	"	1 m	" " " " "	-
"	9	"	-	1842	"	" " "	" " "	"	2 m(S10-202)	" " " " "	-
U5	10	13	0000	0014	17	09 44 24	103 44 00	23.5	1 m	Ile du Phu Quee	-
"	11	"	-	0015	"	" " "	" " "	"	FeD	" " " " "	-
U6	12	13	0600	0614	15	08 55 48	104 14 06	17.2	1 m	False Poule Obi	-
U7	13	13	1200	1213	10.5	08 18 12	104 42 00	11.0	1 m	Poule Obi	-
<u>Nhatrang Bay</u>											
U8	14	21	0852	0900	20	12 18 14	109 20 00	-	vV grab	S26	-
U9	15	"	0916	0936	"	12 18 57	109 19 31	-	vV grab	S28	-
U10	16	"	0958	1004	"	12 19 10	109 20 02	-	vV grab	S27	-
U11	17	"	1038	1043	"	12 19 36	109 19 05	-	vV grab	S29	-
U12	18	"	1108	1124	18	12 19 53	109 19 56	-	vV grab	S30	-
U13	19	"	1147	1152	16	12 20 23	109 19 02	-	vV grab	S31	-
U14	20	"	1249	1256	"	12 20 42	109 20 04	-	vV grab	S32	-
U15	21	"	1401	1421	21	12 20 11	109 20 42	-	P. grab	S33	-
U16	22	"	1458	1503	19	12 21 00	109 20 49	-	P. grab	S34	-
U17	23	"	1536	1540	18	12 20 30	109 21 30	-	P. grab	S36	-
U18	24	22	1003	1010	19½	12 21 17	109 21 37	-	P. grab	S35	-
U19	25	"	1056	1047	23	12 20 55	109 22 12	-	P. grab	S37	-
U20	26	"	1134	1138	24	12 20 05	109 22 07	-	P. grab	S38	-
U21	27	"	1213	1218	23	12 19 16	109 22 04	-	P. grab	S39	-
U22	28	"	1244	1250	22	12 19 42	109 21 23	-	P. grab	S40	-
U23	29	"	1317	1318	20	12 19 37	109 20 42	-	P. grab	S41	-
U24	30	"	1407	1409	"	12 18 14	109 20 00	-	P. grab	S26(repeat)	-
<u>South China Sea</u>											
U25	31	23	1933	1948	67	13 36 39	109 26 02	4.9	P. grab	Poule Gombir	-
"	32	"	-	1955	"	" " "	" " "	"	1 m	" " "	-
"	33	"	-	2019	"	" " "	" " "	"	2 m(S10-203)	" " "	-
"	34	"	-	2000	"	" " "	" " "	"	DIP	" " "	-
U26	none	23	2150	-	61	13 37 45	109 24 51	3.8	none	" " "	-
U27	35	24	0834	0835	45	15 13 32	109 02 29	6.5	P. grab	Cap Batangan	-
"	36	"	-	0838	"	" " "	" " "	"	1 m	" " "	-
U28	37	24	1205	1235	20	15 33 06	108 42 48	3.5	P. grab	Cap An Hoa	-
"	38	"	-	1244	"	" " "	" " "	"	1 m	" " "	-
U29	39	24	1325	1342	17	15 36 00	108 29 36	5.5	P. grab	" " "	-
"	40	"	-	1341	"	" " "	" " "	"	1 m	" " "	-
U30	41	24	1455	1507	10	15 40 06	108 33 36	3.0	P. grab	" " "	-
"	42	"	-	1520	"	" " "	" " "	"	1 m	" " "	-
U31	43	24	1606	1619	17	15 41 00	108 39 18	5.4	P. grab	" " "	-
"	44	"	-	1627	"	" " "	" " "	"	1 m	" " "	-
"	45	"	-	1646	"	" " "	" " "	"	7' Beam T.	" " "	SD 61-691
1	46	24	1803	1836	23	15 40 24	108 43 12	9.9	P. grab	" " "	-
"	47	"	-	1847	"	" " "	" " "	"	1 m	" " "	-
"	48	"	-	1800	"	" " "	" " "	"	DIP	" " "	-
"	49	"	-	1910	"	" " "	" " "	"	2 m(S10-204)	" " "	-
1A	50	24	2037	2045	36	15 39 00	108 54 54	17	P. grab	Culao Ho Is.	-
"	51	"	-	2147	"	" " "	" " "	"	1 m	" " " "	-

Hydro. Sta. S10-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth fm	Lat N.	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
1B	52	24	2208	2223	55	15 37 54	109 06 00	12.9	P. grab	" " "	-
"	53	"	-	2232	"	" " "	" " "	"	1 m	" " "	-
2 & 2A	54	24	2345	0127	70	15 37 00	109 19 36	13	1 m	" " "	-
2B	none	25	0300	-	95	15 36 00	109 25 54	20	none	" " "	-
2C	none	25	0407	-	225	15 34 12	109 37 00	29	none	" " "	-
3	55	25	?	0543	280	15 33 12	109 46 54	38	1 m	" " "	-
3A	none	25	0857	-	300	15 34 12	110 00 00	50	none	" " "	-
3B	none	25	1034	-	270	15 36 54	110 13 54	63.7	none	" " "	-
4	56	25	1210	1308	245	15 43 00	110 29 54	41	1 m	Triton Is.	-
4A	none	25	1450	-	420	15 43 00	110 40 06	32	none	" " "	-
4B	none	25	1610	-	412	15 43 00	110 51 06	21.2	none	" " "	-
5	57	25	1730	1945	495	15 43 00	111 01 25	13.5	1 m	" " "	-
"	58	"	-	1900	"	" " "	" " "	"	FeD	" " "	-
"	59	"	-	"	"	" " "	" " "	"	DIP	" " "	-
"	60	"	-	2010	"	" " "	" " "	"	2 m (S10-205) (800 MGD)	" " "	-
5A	none	25	2335	-	525	15 41 18	111 15 30	12	none	" " "	-
5B	none	26	0128	-	700	15 39 00	111 31 25	23	none	" " "	-
6	61	26	0322	0334	730	15 37 15	111 47 45	38	1 m	" " "	-
"	62	"	-	0350	"	" " "	" " "	"	DIP	" " "	S10 61-692
6A	none	26	0712	-	655	15 28 00	111 47 54	42.8	none	" " "	-
6B	none	26	0830	-	-	15 16 54	111 46 12	49	none	" " "	-
7	63	26	0943	1127	780	15 06 12	111 45 18	77	1 m	" " "	-
7A	none	26	1326	-	940	14 54 55	111 45 06	66	none	" " "	-
7B	none	26	1442	-	980	14 44 00	111 45 06	76	none	" " "	-
8	64	26	1557	1827	1050	14 33 00	111 43 00	85	1 m	" " "	-
"	65	"	-	1848	"	" " "	" " "	"	2 m (S10-206) (800 MGD)	" " "	-
8A	none	26	2106	-	1100	14 33 00	111 36 00	83	none	" " "	-
8B	none	26	2218	-	1150	14 33 00	111 24 54	80.4	none	" " "	-
9	none	26	2335	-	910	14 33 48	111 12 55	79	none	" " "	-
"	66	"	-	2341	"	" " "	" " "	"	1 m	" " "	-
"	67	27	-	0105	"	" " "	" " "	"	FeD	" " "	-
9A	none	27	0231	-	760	14 33 48	111 01 00	79.5	none	" " "	-
9B	none	27	0346	-	750	14 33 36	110 49 12	81.8	none	" " "	-
10	68	27	0504	0509	650	14 34 00	110 37 00	80	1 m	the six Baffles	-
10A	none	27	0829	-	500	14 33 36	110 25 18	69	none	" " "	-
11	none	27	0943	-	245	14 33 00	110 15 30	60	none	" " "	-
"	69	"	-	1000	"	" " "	" " "	"	1 m	" " "	-
11A	none	27	1210	-	258	14 32 45	110 04 00	49	none	" " "	-
11B	none	27	1325	-	296	14 32 45	109 53 00	41.6	none	" " "	-
12	70	27	1438	1526	170	14 31 00	109 42 00	31	1 m	" " "	-
12A	none	27	1651	-	105	14 29 00	109 32 00	24	none	" " "	-
12B	71	27	1809	1815	60	14 27 00	109 22 18	18	P. grab	" " "	-
"	72	"	-	1844	"	" " "	" " "	"	1 m	" " "	-
"	73	"	-	1910	"	" " "	" " "	"	2 m (S10-207)	" " "	-
13	74	24	2042	2123	30	14 24 45	109 10 24	17.5	P. grab	" " "	-
"	75	"	-	2131	"	" " "	" " "	"	1 m	" " "	-
14	76	28	0241	0248	35	13 27 00	109 20 00	41.2	P. grab	" " "	-
"	77	"	-	0314	"	" " "	" " "	"	1 m	" " "	-
14A	none	28	0447	-	97	13 26 36	109 33 55	14	none	Pointe Ong Dian	-
15	78	28	0556	0606	150	13 26 40	109 43 58	24	1 m	" " "	-
15A	none	28	0556	-	?	13 27 00	109 43 30	24	none	" " "	-
15B	none	28	0813	-	990	13 26 35	109 54 00	32	none	" " "	-
16	79	28	0925	0945	1250	13 37 00	110 04 30	44	1 m	" " "	-
16A	none	28	1205	1436	1400	13 27 50	110 15 00	54	none	" " "	-
17	80	28	1319	1436	1480	13 26 55	110 25 00	64	1 m	" " "	-
17A	81	28	1821	1836	1450	12 53 00	110 27 20	75	2 m (S10-208) (800 MGD)	" " "	-
17B	82	28	2326	2333	1430	12 20 58	110 25 00	92.5	1 m	" " "	-

Hydro. Sta. S10-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
18	83	29	0056	0145	1400	12 20 58	110 14 58	86	FeD	" " " "	-
"	84	"	-	0218	"	" " "	" " "	"	1 m	" " " "	-
18A	85	29	0335	0346	1200	12 20 55	110 04 25	80	1 m	" " " "	-
19	86	29	0505	0512	880	12 20 58	109 54 00	74.5	1 m	" " " "	-
"	87	"	-	0530	"	" " "	" " "	"	FeD	" " " "	-
19A	88	29	0802	0812	75	12 20 58	109 44 06	70.8	1 m	" " " "	-
"	89	"	-	0830	"	" " "	" " "	"	P. grab	" " " "	-
20	90	29	0918	0929	"	12 21 55	109 34 00	67	1 m	" " " "	-
"	91	"	-	1015	"	" " "	" " "	"	P. grab	" " " "	-
20A	92	29	1101	1104	-	12 21 06	109 28 00	66.5	P. grab	" " " "	-
21	93	29	1145	1216	26	12 21 30	109 23 42	1.2	P. grab	Hen Chala	-
"	94	"	-	1226	"	" " "	" " "	"	1 m	" " " "	-
21A	none	29	1306	-	22	12 18 50	109 26 40	5.4	none	" " " "	-
(Internal Wave Study Stations)											
SH1	-	31	0548	-	36	12 18 00	109 24 35	3.5	-	Hen Chala	-
SH1A	-	"	0643	-	55	12 18 30	109 26 42	5	-	" " " "	-
SH1B	-	"	0731	-	25	12 18 48	109 22 25	2.4	-	" " " "	-
SH2	-	"	0750	-	40	12 18 24	109 24 42	3.6	-	" " " "	-
SH2A	-	"	0834	-	60	12 18 32	109 27 06	5.4	-	" " " "	-
SH2B	-	"	0910	-	25	12 18 26	109 22 18	3	-	" " " "	-
SH3	-	"	0935	-	41	12 18 42	109 24 45	3.6	-	" " " "	-
SH3A	-	"	1020	-	58	12 18 28	109 26 55	5.4	-	" " " "	-
SH3B	-	"	1104	-	26	12 18 27	109 22 15	3	-	" " " "	-
SH4	-	"	1148	-	39	12 18 27	109 24 40	3.6	-	" " " "	-
SH4A	-	"	1235	-	58	12 18 35	109 26 55	5.4	-	" " " "	-
SH4B	-	"	1325	-	25	12 18 28	109 22 17	3	-	" " " "	-
SH5	-	"	1348	-	40	12 18 26	109 24 42	3.6	-	" " " "	-
SH5A	-	"	1440	-	57	12 18 29	109 26 53	5.4	-	" " " "	-
SH5B	-	"	1521	-	25	12 18 29	109 22 21	3	-	" " " "	-
SH6	-	"	1547	-	39	12 18 25	109 24 36	3.6	-	" " " "	-
SH6A	-	"	1637	-	55	12 18 24	109 27 12	5.4	-	" " " "	-
SH6B	-	"	1712	-	25	12 18 20	109 26 06	3	-	" " " "	-
SH7	-	"	1748	-	39	12 18 20	109 24 36	3.6	-	" " " "	-
SH7A	-	"	1832	-	57	12 18 42	109 27 59	5.1	-	" " " "	-
SH7B	-	"	1910	-	25	12 17 55	109 22 00	3.4	-	" " " "	-
none	95	II-1	1320	1323	40	11 49 52	109 16 53	2.1	P. grab	Tagne Is.	-
none	96	1	1350	1351	43	11 47 58	109 15 51	2.2	P. grab	" " " "	-
none	97	1	1421	1423	37	11 45 32	109 14 44	1.4	P. grab	Kui Devaiah	-
U32	98	9	0900	0914	16	08 27 00	105 48 20	45.4	1 m	Petite Comere	-
U33	none	9	1021	-	"	08 27 15	105 42 48	51	none	" " " "	-
U34	none	9	1031	-	"	08 26 15	105 42 18	51.5	none	" " " "	-
U35	99	9	1143	1154	"	08 25 12	105 33 55	43.6	1 m	Peule Obi	-
U36	100	9	1401	1409	15	08 22 42	105 15 25	25.4	1 m	" " " "	-
U37	101	9	1653	1706	15	08 20 54	104 40 30	4.6	1 m	" " " "	-
"	102	"	1834	1851	14	08 26 42	104 37 28	11.8	2 m (S10-208)	" " " "	-
<u>Gulf of Thailand</u>											
U38	103	9	2133	2145	11	08 45 00	104 21 36	23.3	1 m	Peinte de Cam Mau	-
U39	104	9	2355	0007	15	09 01 18	104 10 30	41	1 m	" " " "	-
"	105	"	-	0010	"	" " "	" " "	"	FeD	" " " "	-
U40	106	10	0225	0234	15	09 19 00	103 58 18	28.3	P. grab	Peule Panjang	-
"	107	"	-	0252	"	" " "	" " "	"	1 m	" " " "	-
"	108	"	-	0501	"	" " "	" " "	"	FeD	" " " "	-
U41	109	10	0517	0527	15	09 40 00	103 43 48	32	P. grab	Ile de Phu Quee	-
"	110	"	-	0540	"	" " "	" " "	"	1 m	" " " "	-



Hydro. Sta. S10-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth fm	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
U42	111	10	0826	0832	11.5	10 00 00	103 50 15	11	P. grab	Hon Dea	-
"	112	"	-	0847	"	" " "	" " "	"	1 m	" " "	-
"	113	"	-	0920	"	" " "	" " "	"	16' Otter T.	" " "	-
"	114	"	-	0930	"	" " "	" " "	"	DIP	" " "	SID 61-693
U43	115	10	1144	1148	12	09 59 36	103 33 48	26	P. grab	Ile de Phu Quee	-
"	116	"	-	1158	"	" " "	" " "	"	1 m	" " " "	-
U44	117	10	1333	1340	17	09 59 12	103 21 30	38	P. grab	" " " "	-
"	118	"	-	1347	"	" " "	" " "	"	1 m	" " " "	-
U45	119	10	1458	1503	17	10 11 42	103 27 12	19	P. grab	Ile de la Baie	-
"	120	"	-	1513	"	" " "	" " "	"	1 m	" " " "	-
U46	121	10	1632	1643	12	10 11 18	103 39 42	15	P. grab	Ile de Phu Quee	-
"	122	"	-	1649	"	" " "	" " "	"	1 m	" " " "	-
U47	123	10	1757	1810	9	10 12 36	103 50 18	6	P. grab	" " " "	-
"	124	"	-	1821	"	" " "	" " "	"	1 m	" " " "	-
U48	none	10	1854	-	8	10 12 30	103 52 54	5	none	" " " "	-
U49	125	10	1911	1920	6	10 12 42	103 55 15	2.5	P. grab	" " " "	-
"	126	"	-	1927	"	" " "	" " "	"	1 m	" " " "	-
"	127	"	-	1945	"	" " "	" " "	"	16' Otter T.	" " " "	-
"	128	"	-	1918	"	" " "	" " "	"	16' Otter T.	" " " "	SID 61-694
"	129	"	-	1930	"	" " "	" " "	"	DIP	" " " "	-
U50	130	10	2205	2214	12.5	10 18 50	103 47 55	4	P. grab	" " " "	-
"	131	"	-	2225	"	" " "	" " "	"	1 m	" " " "	-
U51	132	10	2310	2317	12.5	10 20 00	103 39 35	9	P. grab	Ile a I'Kan	-
"	133	"	-	2330	"	" " "	" " "	"	DIP	" " " "	SID 61-695
"	134	"	-	2334	"	" " "	" " "	"	1 m	" " " "	-
U52	135	11	0030	0034	13	10 20 06	103 29 42	10	P. grab	Ile Sud Ouset	-
"	136	"	-	0043	"	" " "	" " "	"	1 m	" " " "	-
U53	137	11	0147	0153	12.5	10 20 30	103 20 12	11.5	P. grab	Kas Tang	-
"	138	"	-	0159	"	" " "	" " "	"	1 m	" " " "	-
U54	139	11	0356	0401	12.5	10 36 24	103 11 00	6	1 m	Kas Hong	-
U55	140	11	0558	0607	-	10 51 30	103 01 00	4.5	1 m	Kas Semit	-
U56	none	11	1400	-	27	11 15 54	102 23 54	21.5	none	Ke Kut	-
U57	none	11	1500	-	25	11 33 45	102 17 30	14.0	none	" "	-
U58	none	11	1800	-	18	11 50 42	102 11 30	10	none	Ke Chang	-
U59	141	11	1956	2007	7.5	12 08 45	102 11 55	2.3	1 m	" "	-
"	142	"	-	2000	"	" " "	" " "	"	DIP	" " "	-
U60	143	11	2040	2049	10	12 07 30	102 09 00	6.4	1 m	" "	-
U61	144	11	2126	2133	12.5	12 05 45	102 04 10	11	1 m	" "	-
U62	145	11	2213	2219	15	12 04 10	101 59 18	16	1 m	" "	-
"	146	"	-	2225	"	" " "	" " "	"	DIP	" " "	SID 61-634
U63	147	11	2301	2308	19	12 02 12	101 53 36	22	1 m	" "	-
U64	148	12	0021	0027	24	11 58 40	101 43 05	33	1 m	" "	-
U65	149	12	0138	0155	25	11 55 00	101 32 25	44	1 m	" "	-
U66	150	12	0307	0307	24	11 51 10	101 21 00	55.8	1 m	" "	-
U67	151	12	0423	0427	26	11 47 35	101 10 45	66.3	1 m	" "	-
U68	152	12	0821	0852	26	11 55 10	101 05 00	36	1 m	Ke Chuang	-
U69	none	12	0936	-	19	11 59 30	101 02 20	31	none	" "	-
U70	none	12	1010	-	16.6	12 06 35	100 57 40	24.5	none	" "	-
U71	153	12	1026	1036	16.6	12 07 35	100 56 50	23.5	1 m	" "	-
U72	none	12	1136	-	16	12 11 05	100 54 20	21	none	" "	-
U73	none	12	1223	-	15	12 15 00	100 51 00	18	none	" "	-
U74	154	12	1300	1306	13.5	12 19 35	100 48 15	14.5	1 m	" "	-
U75	none	12	1346	-	15	12 24 10	100 46 00	13	none	" "	-
U76	none	12	1421	-	13	12 29 00	100 45 05	12	none	Sattahip	-
U77	155	12	1458	1504	17	12 32 50	100 41 30	11.5	1 m	" "	-
none	156	12	-	2200	-	13 20	100 35	-	DIP	-	-

1 m Net Tows (see also Snyder and Fleminger, 1972)

Hydro. Sta. No. S10-	Bio. Sta. No. 61-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions		Hydro. Sta. No. S10-	Bio. Sta. No. 61-	Depth haul m	Cubic m Water Filtered	Vol. Plankton/ 1000 m <sup>3</sup> cc	Sky Conditions	
					Amt. 10ths	Cloud Type						Amt. 10ths	Cloud Type
U1	1	0-33	324	167	-	night	19A	88	0-70	517	68	10	Cu CN
U2	5	0-52	359	112	2	AS Cu	20	90	0-115	674	81	4	SC AC
U3	6	0-46	385	125	1	AC FC	21	94	0-30	619	60	10	SC Cu
U4	8	0-23	403	694	1	AC	U32	98	0-19	287	174	8	AC AS
U5	10	0-28	336	533	-	night	U35	99	0-20	270	137	9	AS SC AC
U6	12	0-22	262	1109	10	SC FC	U36	100	0-24	342	99	8	AS FC AC
U7	13	0-14	235	145	1	SC AS	U37	101	0-23	488	31	8	FC AC
U25	32	0-103	564	62	-	night	U38	103	0-13	334	-	-	night
U27	36	0-63	506	69	5	Cu CS	U39	104	0-19	279	176	-	night
U28	38	0-22	574	64	1	Cu CS	U40	107	0-21	374	184	-	night
U29	40	0-31	516	99	1	Cu CS	U41	110	0-27	372	183	-	night
U30	42	0-16	331	166	4	AS Cu	U42	112	0-17	355	338	5	Cu AC AS
U31	44	0-28	459	-	4	AS Cu	U43	116	0-15	351	342	4	Cu AC AS
1	47	0-25	673	74	-	night	U44	118	0-20	361	180	2	AS
1A	51	0-41	510	100	-	night	U45	120	0-22	293	239	3	AS
1B	53	0-90	471	106	-	night	U46	122	0-22	259	707	2	AS-SC
2	54	0-109	565	62	-	night	U47	124	0-11	399	289	-	night
3	55	0-164	609	57	5	Cu	U49	126	0-12	312	627	-	night
4	56	0-141	621	24	4	AC	U50	131	0-17	350	535	-	night
5	57	0-129	618	63	-	night	U51	134	0-14	349	456	-	night
6	61	0-129	689	52	-	night	U52	136	0-18	276	185	-	night
7	63	0-115	647	24	9	SC AC Cu	U53	138	0-16	280	464	-	night
8	64	0-146	614	29	6	Cu SC	U54	139	0-18	305	318	-	night
9	66	0-141	671	54	-	night	U55	140	0-23	473	137	-	dnun
10	68	0-140	663	60	-	night	U59	141	0-11	292	343	-	night
11	69	0-129	621	53	8	AS AC Cu	U60	143	0-13	288	241	-	night
12	70	0-141	657	52	9	SC Cu	U61	144	0-19	312	167	-	night
12B	72	0-106	654	57	9	Cu SC	U62	145	0-23	354	118	-	night
13	75	0-41	295	136	-	night	U63	147	0-32	346	116	-	night
14	77	0-57	432	77	-	night	U64	148	0-32	363	272	-	night
15	78	0-141	664	36	10	CN	U65	149	0-33	319	179	-	night
16	79	0-141	667	36	8	Cu SC	U66	150	0-32	307	170	-	night
17	80	0-120	631	57	10	SC	U67	151	0-28	302	222	-	night
17B	82	0-136	641	50	-	night	U68	152	0-46	430	325	9	AS SC
18	84	0-129	664	51	-	night	U71	153	0-28	332	193	7	AS
18A	85	0-115	690	46	-	night	U74	154	0-15	378	108	5	AS(haze)
19	86	0-115	687	73	-	night	U77	155	0-20	408	117	8	(haze)

## Cruise S11 (A-E). South China, Timor, Banda, Mollucca, Celebes and Sulu Seas, Pacific Ocean

Cruise S11 included the entire return voyage of the *Stranger* from Bangkok to San Diego, California, some 11,000 miles of survey requiring over three months. The cruise was divided into five legs, S11A-E (see Itinerary below).

The first leg, S11A, consisted of two parts, the first, a survey of the route from Bangkok to Darwin, Australia, by way of the south coast of Java and the Timor Sea, including bathythermographs, 1 m net tows, nightly 2 m stramin net tows where possible and bottom sampling with Petersen grab and chain dredge near Krakatoa Island. The second part of S11A included a survey of the Timor Sea for the collection of both physical data and geological material (for oceanography see Robinson, 1974b\*: for geology see van Andel and Veevers, 1967\*). Bottom sampling included the use of shell and chain dredges and one 16' Otter trawl.

The second leg of the cruise, S11B, was a survey of the route from Darwin to Manila, Phillipine Islands, by way of the Timor, Banda, Molucca, Celebes and Sulu Seas. The survey included bathythermographs, 1 m net tows and nightly 2 m net tows.

S11C consisted of a survey of the route from Manila to Guam, Marianas Islands, and included bathythermographs and nightly 2 m net tows (no 1 m net tows).

S11D and S11E respectively constituted the remaining two legs of the cruise: Guam to Honolulu, Hawaii, Honolulu to San Diego. Both included routine surveys of bathythermographs. One 2 m net tow was made on S11D, four on S11E (no 1 m net tows on either leg).

### Itinerary:

(S11A) depart Bangkok, March 15, 1961—arrive Darwin, April 4, depart Darwin, April 6—return Darwin, April 21,

(S11B) depart Darwin, April 23—arrive Manila, May 3,

(S11C) depart Manila, May 6—arrive Guam, May 20,

(S11D) depart Guam, May 23—arrive Honolulu, June 10,

(S11E) depart Honolulu, June 13—arrive San Diego, June 24.

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### S11A Stations (no hydrographic casts):

#### part 1 (192 BT's)

##### Physical:

- BT observations at each oceanographic station,
- weather observations to accompany each BT,
- surface temperature as continuous function of distance throughout.

##### Biological:

- 34 1 m oblique net tows,
- 8 2 m (all at night) stramin net tows,
- 1 Petersen grab

##### Geological:

- 1 chain dredge,
- continuous fathometer readings.

#### part 2 (211 BT's)

##### Physical:

- BT observations at each oceanographic station,
- whether observations to accompany each BT,
- surface temperature as continuous function of distance throughout.

##### Biological:

- 1 16' Otter trawl.

Geological:

- 2 chain dredges,
- 31 shell dredges,
- continuous fathometer recording.

S11B Stations (no hydrographic casts, 92 BT's):

Physical:

- BT observations at each oceanographic station,
- weather observations to accompany each BT,
- surface temperature as continuous function of distance throughout.

Biological:

- 28 1 m oblique net tows,
- 8 2 m (all at night) stramin net tows.

Geological:

- continuous fathometer recording.

S11C Stations (no hydrographic casts, 126 BT's):

Physical:

- BT and weather observations and surface temperature as described above.

Biological:

- 21 2 m (all at night) stramin net tows.

Geological:

- continuous fathometer recording.

S11D Stations (no hydrographic casts, 119 BT's):

Physical:

- BT and weather observations and surface temperature as described above.

Biological:

- 1 2 m (night) stramin net tow.

Geological:

- continuous fathometer recording.

S11E Stations (no hydrographic casts, 107 BT's):

Physical:

- BT and weather observations and surface temperature as described above.

Biological:

- 4 2 m (all at night) stramin net tows.

Geological:

- continuous fathometer recording.

Sta. S11A-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<b>Gulf of Thailand (depart Bangkok, March 15, 1961)</b>											
			zone <sup>m</sup> -7								
1	none	III-15	1442	-	8	13 23.2	100 35.1	-	none	-	-
1	none	15	1810	-	24.4	12 54.8	100 34.3	-	none	-	-
2	none	15	2007	-	24.4	12 33.8	100 31.8	-	none	-	-
3	none	15	2207	-	24	12 18.0	100 31.3	-	none	-	-
4	none	16	0006	-	30.5	12 18.0	100 30.3	-	none	-	-
"	156	"	-	0015	"	"	"	30.0	FeD	Settahib	-
5	none	16	0203	-	40	11 41.8	100 28.3	-	none	-	-
6	none	16	0403	-	46	11 21.1	100 27.0	-	none	-	-
7	none	16	0602	-	51	11 02.0	100 25.3	-	none	-	-
8	157	16	0802	0841	55	10 43.0	100 22.3	57.0	1 m	Chusphorn	-
9	158	16	1022	1032	55	10 30.5	100 14.0	49	1 m	"	-
"	159	"	-	1230	"	"	"	"	DIP	"(b.g. algae)	-
10	160	16	1256	1340	53	10 10.0	100 12.3	21.5	1 m	Ko Tao	-
11	161	16	1556	1615	48	09 50.0	100 15.5	12.5	1 m	Ko Phangan	-
12	162	16	1832	1846	31	09 30.0	100 15.5	10.0	1 m	Ko Samui	-
"	163	"	-	2011	-	09 18.0	100 17.0	14.5	2 m (S11A-201)	" "	-
13	164	16	2129	2132	31	09 10.2	100 15.3	20.0	1 m	" "	-
14	none	16	2355	-	33	08 56.3	100 25.2	-	none	-	-
15	none	17	0205	-	29.3	08 42.5	100 35.3	-	none	-	-
16	none	17	0413	-	22	08 25.5	100 37.2	-	none	-	-
17	none	17	0629	-	27	08 11.5	100 51.7	-	none	-	-
"	165	"	-	0644	-	-	-	-	FeD	-	-
18	166	17	0832	0900	46	07 58.0	101 05.8	47	1 m	Nakorn Seidhamaraj	-
19	none	17	1120	-	49	07 46.6	101 20.0	-	none	-	-
20	167	17	1327	1336	46	07 31.0	101 34.4	37.5	1 m	Pattani	-
21	none	17	1549	-	49	07 17.3	101 48.5	-	none	-	-
22	168	17	1710	1717	46	07 09.0	101 57.3	30	1 m	"	-
"	169	"	-	1700	"	"	"	"	DIP	"(b.g. algae)	-
22A	170	17	1740	1745	46	07 09.0	101 57.0	"	1 m	"	-
23	171	17	1958	2006	48	06 55.3	102 11.3	35	1 m	Sai Buri	-
"	172	"	-	2019	"	"	"	"	2 m (S11A-202)	" "	-
24	none	17	2252	-	49	06 42.5	102 25.0	-	none	-	-
25	none	18	0100	-	42	06 29.3	102 28.4	-	none	-	-
26	none	18	0908	-	55	06 16.8	102 42.2	-	none	-	-
27	none	18	0514	-	49	06 05.2	103 04.9	-	none	-	-
<b>South China Sea</b>											
28	173	18	0720	0730	55	05 50.3	103 17.8	16.5	1 m	Pulan Hedong	-
29	none	18	0945	-	60	05 30.0	103 33.0	-	none	-	-
30	none	18	1150	-	64	05 05.8	103 45.9	-	none	-	-
31	174	18	1405	1416	60	04 47.0	103 49.8	22.0	1 m	Tg Dungun	-
32	none	18	1635	-	49.0	04 25.5	103 56.3	-	none	-	-
33	none	18	1702	-	60.0	04 25.6	103 57.3	-	none	-	-
33A	none	18	1714	-	"	"	"	-	none	-	-
33B	none	18	1715	-	"	"	"	-	none	-	-
34	175	18	1921	1936	46	04 00.5	104 02.5	37.0	1 m	Galang	-
"	176	"	-	1956	"	"	"	"	2 m (S11A-203)	"	-
"	177	"	-	2000	"	"	"	"	DIP	"	-
35	none	18	2229	-	46	03 42.9	104 11.0	-	none	-	-
36	none	19	0038	-	55	03 22.7	104 17.5	-	none	-	-
37	none	19	0244	-	55	03 04.0	104 27.7	-	none	-	-
38	none	19	0450	-	58	02 48.2	104 39.3	-	none	-	-
39	none	19	0654	-	55	02 26.0	104 41.8	-	none	-	-
39A	178	19	0740	0752	55	02 21.3	104 44.2	12.0	1 m	Pulan Aur	-
40	none	19	1001	-	55	02 09.1	104 57.6	-	none	-	-
41	none	19	1208	-	49	01 56.8	105 09.9	-	none	-	-
42	179	19	1419	1426	44	01 47.5	105 20.2	57.0	1 m	Bintan	-
43	none	19	1637	-	55	01 34.4	105 32.1	-	none	"	-

Sta. S11A-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
44	180	19	1837	1849	55	01 22.1	105 44.6	69.0	1 m	"	-
"	181	"	-	1905	"	01 20.5	105 45.3	"	2 m (S11A-204)	"	-
45	none	19	2135	-	55	01 07.2	106 00.0	-	none	-	-
46	none	19	2343	-	49	00 53.2	106 14.0	-	none	-	-
47	none	20	0155	-	51	00 39.3	106 28.2	-	none	-	-
48	none	20	0400	-	49	00 25.7	106 42.5	-	none	-	-
49	none	20	0606	-	51	00 11.2	106 57.0	-	none	-	-
Lat S											
50	none	20	1820	-	46	00 00.5	107 17.2	-	none	-	-
51	none	20	2045	-	37	00 17.0	107 30.2	-	none	-	-
52	none	20	2253	-	37	00 34.0	107 43.4	-	none	-	-
53	none	21	0057	-	44	00 50.4	107 56.3	-	none	-	-
54	none	21	0302	-	34	01 07.2	108 09.5	-	none	-	-
55	none	21	0509	-	33	01 23.7	108 23.1	-	none	-	-
56	182	21	0648	0652	33	01 37.9	108 34.5	7.75	1 m	Serrotee Is. (Karimata St.)	-
57	183	21	0748	0752	37	01 46.1	108 37.8	4.2	1 m	"	-
58	184	21	0910	-	27	01 53.0	108 46.3	9.5	1 m	"	-
59	none	21	1127	-	27	02 08.4	109 03.2	-	none	-	-
60	none	21	1335	-	28	02 25.2	109 18.9	-	none	-	-
61	none	21	1541	-	24	02 38.9	109 31.8	-	none	-	-
62	none	21	1743	-	24	02 57.2	109 28.8	-	none	-	-
Java Sea											
63	185	21	1950	1956	24	03 16.2	109 23.0	51	2 m (S11A-205)	Bawal Is.	-
64	none	21	2329	-	31	03 39.7	109 12.8	-	none	-	-
65	none	22	0040	-	27	03 50.5	108 53.2	-	none	-	-
66	none	22	0246	-	31	03 59.5	108 35.2	-	none	-	-
67	none	22	0450	-	35	04 15.4	108 15.8	-	none	-	-
68	none	22	0657	-	27	04 28.6	107 56.7	-	none	-	-
69	none	22	0904	-	29	04 32.5	107 51.0	-	none	-	-
70	none	22	1110	-	27	04 44.6	107 33.6	-	none	-	-
71	none	22	1317	-	22	04 59.0	107 12.4	-	none	-	-
72	186	22	1526	1536	20	05 11.6	106 54.0	62.0	1 m	Sumatra	-
73	none	22	1749	-	17	05 13.2	106 37.9	-	none	"	-
74	187	22	2103	2110	26	05 26.4	106 05.2	15.0	1 m	"	-
"	188	"	-	2230	18	05 30.9	106 01.0	-	DIP	Sunda Str. (No. entz)	-
75	189	23	0732	0738	57	05 46.7	105 58.0	7.5	1 m	" (Java)	-
76	none	23	0824	-	82	05 52.7	105 56.6	-	none	"	-
76A	none	23	0831	-	91	05 53.0	105 56.3	-	none	"	-
76B	none	23	0835	-	91	05 53.2	105 56.0	-	none	"	-
77	none	23	0906	-	53	05 56.8	105 56.6	-	none	"	-
78	none	23	0947	-	64	06 03.5	105 51.6	-	none	"	-
79	190	23	1040	1050	46	06 08.2	105 44.2	7.3	1 m	"	-
80	none	23	1150	-	60	06 09.2	105 35.3	-	none	"	-
81	191	23	1233	1237	75	06 08.2	105 29.1	1.0	P. grab	" (Krakatoa)	-
82	192	23	1317	1343	91	06 11.2	105 29.3	2.0	chain dredge	"	-
83	none	23	1521	-	91	06 23.7	105 24.3	-	none	"	-
83A	193	"	1535	1538	"	"	"	16.0	1 m	" (Java)	-
84	none	23	1626	-	77	06 31.2	105 22.1	-	none	"	-
85	194	23	1655	1718	73	06 36.1	105 19.4	3.4	1 m	" (Prinsen Is)	-
86	none	23	1840	-	91	06 42.5	105 12.3	-	none	"	-
87	195	23	1950	1923	704	06 45.5	105 10.0	2.0	1 m	" (Java)	-
"	196	"	-	2004	"	"	"	"	2 m (S11A-206)	"	-
88	none	23	2331	-	1234	06 59.0	105 16.5	-	none	-	-
89	none	24	0145	-	1006	07 08.3	105 28.5	-	none	-	-
90	none	24	0408	-	2468	07 15.5	105 38.6	-	none	-	-
91	197	24	0628	0630	2468	07 25.8	105 58.0	24	FoD	Java	-
92	none	24	0831	-	750	07 32.2	106 19.0	-	none	-	-

Sta. S11A-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. S	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
93	none	24	1042	-	1737	07 35.5	106 36.2	-	none	-	-
94	none	24	1303	-	2651	07 41.0	106 52.9	-	none	-	-
95	none	24	1513	-	2377	07 42.5	107 10.4	-	none	-	-
96	none	24	1724	-	1829	07 45.7	107 27.2	-	none	-	-
97	none	24	1945	-	1006	07 49.8	107 44.5	-	none	-	-
98	none	24	2153	-	91	07 53.0	108 00.5	-	none	-	-
99	none	25	0001	-	117	07 57.5	108 15.5	-	none	-	-
100	none	25	0215	-	130	08 01.2	108 29.3	-	none	-	-
101	none	25	0418	-	130	08 05.5	108 38.6	-	none	-	-
102	none	25	0641	-	176	08 08.3	108 52.2	-	none	-	-
103	none	25	0850	-	223	08 11.1	109 08.2	-	none	-	-
104	none	25	1058	-	1737	08 15.4	109 22.2	-	none	-	-
105	none	25	1310	-	732	08 19.0	109 37.2	-	none	-	-
106	none	25	1520	-	823	08 18.9	109 52.5	-	none	-	-
107	none	25	1731	-	594	08 19.0	110 10.5	-	none	-	-
108	none	25	1936	-	430	08 20.5	110 26.5	-	none	-	-
109	none	25	2146	-	274	08 22.8	110 38.7	-	none	-	-
110	none	25	2354	-	278	08 25.4	110 51.6	-	none	-	-
111	none	26	0205	-	344	08 28.0	111 04.0	-	none	-	-
112	none	26	0415	-	327	08 32.2	111 17.0	-	none	-	-
113	none	26	0624	-	410	08 33.6	111 31.7	-	none	-	-
114	none	26	0832	-	543	08 37.0	111 50.5	-	none	-	-
115	none	26	1042	-	719	08 38.8	112 03.4	-	none	-	-
<del>none</del> -8											
116	none	26	1351	-	1006	08 36.5	112 24.0	-	none	-	-
117	none	26	1602	-	1408	08 44.5	112 44.3	-	none	-	-
118	none	26	1811	-	1554	08 47.3	112 45.3	-	none	-	-
119	none	26	2027	-	1920	08 49.0	113 18.0	-	none	-	-
120	none	26	2238	-	1682	08 51.0	113 34.1	-	none	-	-
121	none	27	0048	-	2560	08 54.0	113 51.7	-	none	-	-
122	none	27	0300	-	1829	08 55.4	114 09.6	-	none	-	-
123	none	27	0512	-	1875	08 57.6	114 30.2	-	none	-	-
124	none	27	0716	-	1649	09 04.0	114 52.0	-	none	-	-
125	none	27	0930	-	1737	09 04.3	115 10.2	-	none	-	-
126	none	27	1141	-	1920	09 07.2	115 29.1	-	none	-	-
127	198	27	1242	1250	2195	09 11.3	115 32.7	21.5	1 =	Wasa Penida	-
127A	199	"	1328	1340	2286	" "	" "	"	1 =	" "	-
127B	none	"	1335	-	"	" "	" "	"	none	" "	-
127C	none	"	1402	-	2378	" "	" "	"	none	" "	-
128	none	27	1456	-	2543	09 12.2	115 37.5	-	none	-	-
129	none	27	1514	-	2506	09 13.6	115 39.2	-	none	-	-
129A	none	"	1522	-	"	" "	" "	-	none	-	-
129B	none	"	1533	-	"	" "	" "	-	none	-	-
129C	none	"	1542	-	"	" "	" "	-	none	-	-
130	none	27	1648	-	2834	09 12.0	115 48.2	-	none	-	-
131	none	27	1747	-	3027	09 13.0	115 55.0	-	none	-	-
132	none	27	1956	-	2926	09 20.0	116 13.2	-	none	-	-
133	none	27	2205	-	3292	09 22.3	116 33.7	-	none	-	-
134	none	28	0014	-	2908	09 26.0	116 53.0	-	none	-	-
135	none	28	0222	-	3054	09 30.3	117 06.8	-	none	-	-
136	none	28	0442	-	2743	09 36.4	117 21.6	-	none	-	-
137	none	28	0646	-	3200	09 39.7	117 36.7	-	none	-	-
138	none	28	0857	-	2560	09 43.1	117 55.0	-	none	-	-
139	none	28	1105	-	2651	09 45.5	118 12.5	-	none	-	-
140	none	28	1316	-	2012	09 46.5	118 30.5	-	none	-	-
141	none	28	1527	-	732	09 51.0	118 57.1	-	none	-	-
142	none	28	1738	-	795	09 57.9	119 16.1	-	none	-	-
143	none	28	1942	-	1646	10 07.0	119 29.2	-	none	-	-

Sta. S11A-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. S	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
144	none	28	2148	-	1509	10 16.2	119 42.0	-	none	-	-
145	none	28	2357	-	640	10 26.1	119 56.2	-	none	-	-
146	none	29	0207	-	1920	10 33.0	120 11.5	-	none	-	-
147	none	29	0417	-	1646	10 39.1	120 27.4	-	none	-	-
148	none	29	0626	-	1371	10 46.5	120 41.0	-	none	-	-
149	none	29	0837	-	1097	10 52.0	121 04.6	-	none	-	-
150	none	29	1052	-	914	10 56.1	121 24.1	-	none	-	-
151	none	29	1258	-	1646	10 59.1	121 41.9	-	none	-	-
152	200	29	1510	1515	1372	11 02.0	121 55.0	26.5	DIP	Saam Is.	-
153	none	29	1724	-	1591	11 08.1	122 20.2	-	none	-	-
"	201	"	-	1815	550 fm	11 11.5	122 29.5	24.5	FoD	Roti Is.	-
154	none	29	1930	-	1280	11 12.7	122 39.4	-	none	-	-
155	none	29	2136	-	1463	11 10.9	122 57.3	-	none	-	-
156	none	29	2348	-	2103	11 01.8	123 14.7	-	none	-	-
157	none	30	0159	-	1829	10 52.5	123 31.6	-	none	-	-
158	none	30	0408	-	1737	10 40.5	123 50.1	-	none	-	-
159	none	30	0622	-	1829	10 33.0	124 05.2	-	none	-	-
160	202	30	0826	0902	1207	10 29.0	124 14.2	17.5	1 m	Timor Is.	-
161	none	30	1228	-	1481	10 25.5	124 22.5	-	none	" "	-
162	none	30	1439	-	1829	10 20.7	124 32.1	-	none	" "	-
163	none	30	1650	-	1097	10 12.5	124 43.0	-	none	" "	-
164	203	30	1908	1915	1188	10 06.2	124 54.8	17.5	1 m	" "	-
"	204	"	-	1935	"	" "	" "	"	1 m	" "	-
165	none	30	2227	-	-	09 59.5	125 05.0	-	none	-	-
166	none	31	0040	-	-	09 53.1	125 15.5	-	none	-	-
167	none	31	0245	-	-	09 46.8	125 25.5	-	none	-	-
168	none	31	0457	-	-	09 41.0	125 34.3	-	none	-	-
169	205	31	0712	0718	1000	09 35.2	125 43.6	23.0	1 m	Timor Is.	-
"	206	"	-	0745	"	" "	" "	"	1 m	" "	-
170	none	31	1045	-	-	09 27.0	125 55.0	-	none	-	-
171	none	31	1254	-	-	09 20.7	126 06.0	-	none	-	-
172	none	31	1523	-	1097	09 12.7	126 16.3	-	none	-	-
173	none	31	1732	-	1372	09 07.0	126 29.0	-	none	-	-
174	207	31	1937	1944	1097	09 02.0	126 41.0	12.0	2 m (S11A-207)	Timor Is.	-
175	none	31	2310	-	768	08 54.8	126 51.5	-	none	-	-
176	none	IV-1	0119	-	878	08 50.0	127 03.9	-	none	-	-
177	none	1	0326	-	1042	08 46.5	127 17.9	-	none	-	-
178	none	1	0539	-	1463	08 42.0	127 30.0	-	none	-	-
179	none	1	0748	-	1829	08 42.2	127 42.8	-	none	-	-
180	none	1	0947	-	1737	08 38.0	127 55.2	-	none	-	-
181	none	1	1206	-	1737	08 32.1	128 07.0	-	none	-	-
182	none	1	1415	-	2012	08 24.8	128 17.5	-	none	-	-
183	none	1	1622	-	2012	08 27.3	128 31.8	-	none	-	-
184	208	1	1831	1850	1463	08 37.7	128 47.2	24.0	2 m (S11A-208)	Sermata Is.	-
<del>none -9</del>											
185	none	1	2320	-	1783	08 49.2	129 04.2	-	none	-	-
186	none	2	0130	-	1737	09 00.0	129 20.2	-	none	-	-
187	none	2	0341	-	732	09 11.1	129 37.0	-	none	-	-
188	none	2	0552	-	493	09 22.7	129 53.6	-	none	-	-
189	none	2	0757	-	366	09 36.4	130 05.9	-	none	-	-
190	none	2	1006	-	225	09 54.2	130 05.9	-	none	-	-
191	none	2	1215	-	119	10 14.2	130 06.0	-	none	-	-
192	none	2	1427	-	55	10 34.0	130 05.0	-	none	-	-

Darwin, Australia (April 4-6)



Sta. S11A-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. S	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<u>Timor Sea (geological cruise, April 6-20)</u>											
V165	none	6	1546	-	32	12 11.0	130 16.0	-	none	-	-
V166	none	6	1657	-	37	12 12.0	130 05.4	-	none	-	-
V167	none	6	1808	-	43	12 13.1	129 55.1	-	none	-	-
V168	none	6	1917	-	49	12 14.7	129 44.6	-	none	-	-
V169	none	6	2025	-	60	12 15.3	129 32.9	-	none	-	-
V170	none	6	2134	-	66	12 16.9	129 23.7	-	none	-	-
V171	209	6	2245	2252	31	12 15.0	129 13.5	-	shell dredge	-	SID 61-697
"	210	"	-	2253	"	" "	" "	-	DIP	-	-
V172	none	7	0002	-	79	12 13.2	129 03.4	-	none	-	-
V173	none	7	0138	-	79	12 11.0	128 53.3	-	none	-	-
V174	none	7	0257	-	88	12 09.2	128 43.1	-	none	-	-
V175	none	7	0407	-	67	12 09.5	128 33.0	-	none	-	-
V176	none	7	0515	-	104	12 05.5	128 22.7	-	none	-	-
V177	none	7	0625	-	107	12 03.8	128 12.6	-	none	-	-
V178	none	7	0734	-	113	12 02.0	128 02.2	-	none	-	-
V179	none	7	0846	-	108	12 10.1	128 06.7	-	none	-	-
V180	none	7	0957	-	104	12 18.8	128 12.1	-	none	-	-
V181	none	7	1109	-	99	12 26.9	128 17.9	-	none	-	-
V182	none	7	1220	-	98	12 35.8	128 23.9	-	none	-	-
V183	none	7	1335	-	93	12 44.5	128 29.8	-	none	-	-
V184	none	7	1445	-	88	12 52.8	128 35.2	-	none	-	-
V185	none	7	1552	-	83	13 01.3	128 40.2	-	none	-	-
V186	none	7	1659	-	78	13 08.7	128 46.9	-	none	-	-
V187	none	7	1708	-	73	13 15.5	128 53.4	-	none	-	-
V188	none	7	1914	-	62	13 23.0	129 00.7	-	none	-	-
V189	none	7	2034	-	52	13 30.0	129 07.5	-	none	-	-
V190	none	7	2142	-	31	13 39.1	129 10.1	-	none	-	-
V191	none	7	2250	-	25	13 48.8	129 12.7	-	none	-	-
V192	211	7	no BT's	2329	24	13 53.0	129 14.0	-	shell dredge	-	-
V193	212	8	0009	0008	26	13 58.2	129 15.2	-	shell dredge	-	-
V194	none	8	0102	-	23	14 05.4	129 17.5	-	none	-	-
V195	none	8	0217	-	27	14 07.3	129 06.8	-	none	-	-
V196	none	8	0326	-	27	14 08.9	128 56.1	-	none	-	-
V197	none	8	0433	-	27	14 10.6	128 50.5	-	none	-	-
V198	none	8	0548	-	34	14 12.2	128 34.7	-	none	-	-
V199	none	8	0656	-	37	14 13.9	128 23.6	-	none	-	-
V200	none	8	0804	-	34	14 15.3	128 13.1	-	none	-	-
V201	none	8	0911	-	41	14 10.0	128 04.9	-	none	-	-
V202	none	8	1020	-	52	14 04.5	127 56.5	-	none	-	-
V203	none	8	1125	-	61	13 59.0	127 48.5	-	none	-	-
V204	none	8	1239	-	62	13 53.0	127 40.2	-	none	-	-
V205	none	8	1350	-	75	13 48.8	127 33.5	-	none	-	-
V206	none	8	1459	-	84	13 43.3	127 25.2	-	none	-	-
V207	none	8	1605	-	59	13 36.3	127 17.9	-	none	-	-
V208	none	8	1712	-	92	13 29.1	127 10.6	-	none	-	-
V209	213	8	1800	1758	270	13 21.5	127 01.3	-	shell dredge (no BT)	-	-
V210	214	8	1927	1926	82	13 17.6	126 51.3	-	shell dredge	-	-
"	215	"	-	1920	"	" "	" "	-	DIP	-	-
"	216	"	-	2027	76	" "	" "	-	FeD	-	-
V211	none	8	2137	-	75	13 08.0	126 29.8	-	none	-	-
V212	none	8	2253	-	71	13 08.88	126 20.5	-	none	-	-
V213	none	9	0002	-	64	12 59.3	126 10.8	-	none	-	-
V214	none	9	0110	-	64	12 55.0	126 01.2	-	none	-	-
V215	none	9	0219	-	77	12 50.5	125 51.5	-	none	-	-
V216	none	9	0327	-	89	12 46.2	125 42.0	-	none	-	-
V217	none	9	0437	-	90	12 41.8	125 32.2	-	none	-	-

Sta. S11A-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. S	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
V218	none	9	0549	-	95	12 37.5	125 22.8	-	none	-	-
V219	217	9	0659	0717	87	12 34.0	125 13.8	-	shell dredge	-	-
V220	none	9	0817	-	93	12 29.8	125 03.7	-	none	-	-
V221	none	9	0929	-	93	12 26.0	124 53.2	-	none	-	-
V222	none	9	1041	-	110	12 21.8	124 43.3	-	none	-	-
V223	none	9	1156	-	90	12 18.0	124 33.0	-	none	-	-
V224	none	9	1212	-	97	12 13.8	124 23.4	-	none	-	-
V225	none	9	1423	-	101	12 09.7	124 14.2	-	none	-	-
V226	218	9	1541	1429	102	12 03.5	124 03.0	-	shell dredge	-	-
V227	none	9	1646	-	91	11 58.6	123 53.5	-	none	-	-
V228	none	-	no BT's	-	-	-	-	-	-	-	-
V229	none	9	2013	-	-	11 57.9	123 50.2	-	none	-	-
V230	none	9	2120	-	177	11 53.0	123 38.8	-	none	-	-
V231	none	9	2258	-	33	11 48.2	123 26.8	-	none	-	-
V232	none	10	0006	-	195	11 39.5	123 20.0	-	none	-	-
V233	none	10	0155	-	713	11 32.2	123 13.5	-	none	-	-
V234	none	10	0320	-	1079	11 24.5	123 07.0	-	none	-	-
V235	none	10	0447	-	1756	11 16.0	123 00.0	-	none	-	-
V236	none	10	0705	-	878	11 08.0	122 53.2	-	none	-	-
V237	none	10	0800	-	164	11 04.0	122 53.5	-	none	-	-
V238	none	-	no BT's	-	-	-	-	-	none	-	-
V239	219	10	no BT's	1826	24	11 39 50	124 20 24	-	shell dredge	-	-
B240	none	-	no BT's	-	-	-	-	-	none	-	-
V241	220	10	no BT's	2334	150	11 50.0	124 48.7	-	shell dredge	-	-
V242	none	-	no BT's	-	-	-	-	-	none	-	-
V243	none	-	no BT's	-	-	-	-	-	none	-	-
V244	none	11	0542	-	585	11 22.4	124 12.3	-	none	-	-
V245	221	11	no BT's	0912	192	11 29.5	124 39.8	-	shell dredge	-	-
V246	none	-	no BT's	-	-	-	-	-	-	-	-
V247	222	11	1426	1426	102	11 29.5	125 20.0	-	shell dredge	-	-
V248	none	11	1532	-	256	11 22.0	125 13.3	-	none	-	-
V249	none	11	1649	-	439	11 14.2	125 06.9	-	none	-	-
V250	none	11	1802	-	503	11 06.7	125 00.0	-	none	-	-
V251	none	11	1917	-	550	10 59.0	124 53.7	-	none	-	-
V252	none	11	2035	-	835	10 51.5	124 45.8	-	none	-	-
V253	none	11	2155	-	1280	10 46.2	124 34.5	-	none	-	-
V254	223	11-12	2337	0015	1883	10 40.8	124 24.0	-	DIP	-	SIO 61-534
V255	224	12	0145	0150	1792	10 33.5	124 16.8	-	FeD	-	-
V256	225	12	0418	0415	713	10 26.0	124 09.8	-	DIP	-	SIO 61-698
V257	none	12	0541	-	375	10 18.7	124 02.3	-	none	-	-
V258	none	12	1511	-	540	10 53.9	125 19.9	-	none	-	-
V259	none	12	1712	-	366	10 57.5	125 28.3	-	none	-	-
V260	226	12	-	1837	342	11 00.0	125 33.8	-	chain dredge	-	-
V261	none	12	2059	-	115	11 09.4	125 42.8	-	none	-	-
V262	none	12	2208	-	91	11 10.1	125 50.0	-	none	-	-
V263	none	12	2317	-	91	11 16.0	125 57.9	-	none	-	-
V264	none	13	0029	-	84	11 21.9	126 06.1	-	none	-	-
V265	none	13	0137	-	79	11 27.8	126 13.9	-	none	-	-
V266	none	13	0246	-	61	11 33.2	126 22.0	-	none	-	-
V267	none	13	0354	-	91	11 37.5	126 30.9	-	none	-	-
V268	227	13	no BT's	0428	91	11 38.5	126 32.8	-	shell dredge	-	-
V269	none	13	0550	-	98.8	11 43.0	126 42.2	-	none	-	-
V270	none	13	0659	-	102	11 46.7	126 51.8	-	none	-	-
V271	none	13	0807	-	115	11 51.1	127 01.0	-	none	-	-
V272	none	13	0918	-	99	11 55.2	127 09.7	-	none	-	-
V273	none	13	1028	-	106	11 59.8	127 18.8	-	none	-	-
V274	none	13	1136	-	113	12 04.2	127 27.6	-	none	-	-

Sta. S11A-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth n	Lat. S	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
V275	none	13	1245	-	117	12 08.9	127 37.7	-	none	-	-
V276	none	13	1355	-	117	12 13.8	127 47.2	-	none	-	-
V277	none	13	1611	-	119	11 57.4	127 38.9	-	none	-	-
V278	228	13	1802	1822	121	11 49.0	127 33.3	-	16' otter T.	-	SIO 61-699
V279	none	13	2003	-	121	11 38.7	127 27.3	-	none	-	-
V280	none	13	2113	-	113	11 32.8	127 19.3	-	none	-	-
V281	none	13	2122	-	106	11 26.6	127 11.1	-	none	-	-
V282	none	13	2330	-	106	11 20.4	127 03.2	-	none	-	-
V283	229	14	0039	0059	70	11 15.2	126 54.9	-	shell dredge	-	-
V284	none	14	0212	-	124	11 08.4	126 46.9	-	none	-	-
V285	none	14	0324	-	91	11 02.0	126 39.8	-	none	-	-
V286	none	14	0432	-	79	10 55.7	126 30.7	-	none	-	-
V287	none	14	0542	-	97	10 49.6	126 22.5	-	none	-	-
V288	none	14	0656	-	274	10 43.3	126 14.6	-	none	-	-
V289	none	14	0810	-	329	10 36.4	126 07.5	-	none	-	-
V290	none	14	0918	-	474	10 30.6	126 00.3	-	none	-	-
V291	none	14	1035	-	645	10 24.8	125 53.2	-	none	-	-
V292	none	14	1151	-	1030	10 19.2	125 45.9	-	none	-	-
V293	none	14	1321	-	1518	10 13.0	125 38.1	-	none	-	-
V294	none	14	1512	-	2149	10 08.8	125 28.5	-	none	-	-
V295	none	14	1712	-	2527	10 03.5	125 17.5	-	none	-	-
V296	230	14	1919	2000	1792	09 58.5	125 10.7	-	DIP	-	SIO 61-535
V297	none	14	2138	-	841	09 49.6	125 00.0	-	none	-	-
V298	none	14	2243	-	183	09 45.2	124 57.0	-	none	-	-
V299	none	15	0056	-	260	09 29.3	125 10.4	-	none	-	-
V300	231	15	no BT	1110	31	10 25 05	126 33 15	-	shell dredge	-	-
V301	none	15	1302	-	78	10 34.2	126 45.8	-	none	-	-
V302	232	15	1412	1413	95	10 24.6	126 44.0	-	shell dredge	-	SIO 61-704
V303	233	15	1534	1540	155	10 15.7	126 42.7	-	shell dredge	-	-
V304	234	15	1655	1640	68	10 13.0	126 42.3	-	shell dredge	-	-
V305	none	15	1800	-	914	10 03.5	126 40.5	-	none	-	-
V306	235	15	1923	1945	1669	09 54.4	126 39.0	-	DIP	-	SIO 61-536
V307	none	15	2134	-	2432	09 44.0	126 36.0	-	none	-	-
V308	236	15-16	2320	0000	2737	09 39.9	126 34.8	-	DIP	-	SIO 61-537
V309	237	16	0129	0140	1991	09 29.6	126 31.5	-	DIP	-	SIO 61-538
V310	238	16	0324	0330	1463	09 19.3	126 28.8	-	DIP	-	-
V311	none	16	0453	-	878	09 07.0	126 24.8	-	none	-	-
V312	none	16	0542	-	183	09 02.3	126 23.4	-	none	-	-
V313	none	16	no BT's	-	-	-	-	-	none	-	-
V314	none	16	1843	-	98	09 54.0	127 52.8	-	none	-	-
V315	none	16	2020	-	276	09 44.7	127 52.2	-	none	-	-
V316	none	16	2135	-	978	09 35.2	127 49.7	-	none	-	-
V317	239	16	2258	2330	1695	09 26.0	127 47.9	-	FD	-	-
V318	none	17	0048	-	2195	09 16.7	127 46.4	-	none	-	-
V319	none	17	0236	-	3200	09 08.2	127 45.0	-	none	-	-
"	none	"	0354	-	"	"	"	-	none	-	-
"	240	17	-	0500	3200	09 02 24	127 42 18	-	DIP	-	SIO 61-539
"	none	17	0839	-	3200	09 08.2	127 45.0	-	none	-	-
V320	241	17	1038	1040	2132	09 02.4	127 42.3	-	DIP	-	SIO 61-700
V321	none	17	1228	-	2030	08 53.5	127 44.5	-	none	-	-
V322	none	17	1458	-	1893	08 43.5	127 41.2	-	none	-	-
V323	none	17	1621	-	1800	08 33.8	127 42.0	-	none	-	-
V324	none	17	1851	-	1500	08 22.8	127 44.5	-	none	-	-
V325	none	17	1948	-	1225	08 18.0	127 43.9	-	none	-	-
V326	none	18	0055	-	2000	08 27.2	128 27.8	-	none	-	-
V327	none	18	0243	-	1829	08 35.5	128 33.5	-	none	-	-
V328	none	18	0422	-	1781	08 43.0	128 40.6	-	none	-	-
V329	none	18	0603	-	2200	08 50.7	128 47.2	-	none	-	-

Sta. S11A-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. S	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
V330	none	18	0638	-	2699	08 58.8	128 53.8	-	none	-	-
V331	242	18	1036	1045	1500	09 06.8	129 00.0	-	DIB	-	-
V332	none	18	1202	-	809	09 14.8	129 06.8	-	none	-	-
V333	none	18	1404	-	538	09 22.5	129 12.2	-	none	-	-
V334	none	18	1530	-	419	09 30.5	129 19.3	-	none	-	-
V335	none	18	1644	-	360	09 37.6	129 25.6	-	none	-	-
V336	none	18	1754	-	311	09 45.7	129 32.4	-	none	-	-
V337	none	18	1907	-	243	09 42.4	129 40.2	-	none	-	-
V338	none	18	2038	-	150	10 00.0	129 46.9	-	none	-	-
V339	none	18	2149	-	130	10 08.0	129 51.5	-	none	-	-
V340	none	18	2311	-	113	10 18.0	129 57.0	-	none	-	-
V341	none	19	0019	-	89	10 26.0	130 01.5	-	none	-	-
V342	none	19	0127	-	69	10 34.0	130 06.0	-	none	-	-
V343	243	19	0233	0234	24	10 42.0	130 11.5	-	shell dredge	-	-
V344	none	-	no BT's	-	-	-	-	-	none	-	-
V345	none	19	0444	-	56	10 58.5	130 20.5	-	none	-	-
V346	none	19	0554	-	55	10 58.5	130 10.5	-	none	-	-
V347	none	-	no BT's	-	-	-	-	-	none	-	-
V348	none	19	0808	-	73	10 57.5	129 56.8	-	none	-	-
V349	244	19	0935	0935	79	10 57.1	129 41.3	-	shell dredge	-	-
V350	245	19	no BT's	1012	28	10 56.24	129 36.18	-	shell dredge	-	-
V351	246	19	1123	1124	71	10 56.3	129 25.9	-	shell dredge	-	-
V352	246(A)	19	1238	1236	27	10 55.8	129 15.5	-	shell dredge	-	-
V353	247	19	1348	1347	33	10 55.7	129 05.0	-	shell dredge	-	-
V354	248	19	1505	1505	40	10 55.4	128 54.8	-	shell dredge	-	-
V355	249	19	no BT's	1650	34-82	10 54.54	128 49.54	-	chain bag dredge	-	-
V356	250	19	1814	1815	34	10 57.0	128 42.0	-	shell dredge	-	-
V357	none	19	1927	-	67	10 58.1	128 31.2	-	none	-	-
V358	251	19	2043	2045	91	10 48.9	128 25.0	-	shell dredge	-	-
V359	none	19	2202	-	154	10 40.4	128 18.2	-	none	-	-
V360	none	19	2309	-	107	10 32.1	128 13.0	-	none	-	-
V361	none	20	0019	-	63	10 28.9	128 20.2	-	none	-	-
V362	252	20	0129	0130	77	10 25.3	128 28.0	-	shell dredge	-	-
V363	none	20	0339	-	205	10 21.8	128 35.3	-	none	-	-
V364	253	20	0452	0455	56	10 15.9	128 44.3	-	shell dredge	-	-
V365	none	20	0612	-	67	10 10.0	128 52.7	-	none	-	-
V366	none	20	0725	-	76	10 03.9	129 01.3	-	none	-	-
V367	none	20	0832	-	104	09 56.0	129 07.7	-	none	-	-
V368	none	20	0940	-	117	09 52.0	129 17.3	-	none	-	-
V369	254	20	no BT's	1039	97	09 58.30	129 18.12	-	shell dredge	-	-
V370	255	20	1200	1202	101	10 08.9	129 20.7	-	shell dredge	-	-
V371	none	20	1320	-	84	10 18.6	129 22.4	-	none	-	-
V372	none	20	1436	-	94	10 27.4	129 24.2	-	none	-	-
V373	none	20	1552	-	57	10 36.6	129 26.1	-	none	-	-
V374	none	20	1706	-	30	10 46.0	129 27.6	-	none	-	-
V375	none	20	1815	-	26	10 53.3	129 33.8	-	none	-	-
V376	256	20	1923	1936	82	11 00.5	129 40.5	-	shell dredge	-	-
V377	none	20	2056	-	71	11 10.0	129 43.3	-	none	-	-

Darwin, Australia, April 21-23

Sta. S11B-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. S	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<b>depart Darwin, April 21</b>											
none	257	IV-21	<del>none</del> -	2000	-	-	-	-	?	Bay of Darwin	-
none	258	23	-	1842	-	-	-	-	trawl line	Timor Sea	-
1	none	24	0002	-	24	10 48.0	129 41.5	-	none	-	-
2	none	24	0262	-	91	10 28.5	129 40.6	-	none	-	-
3	none	24	0416	-	101	10 08.7	129 39.0	-	none	-	-
4	none	24	0628	-	274	09 49.0	129 36.3	-	none	-	-
5	(see below)	24	0838	-	421	09 28.2	129 35.4	-	(see below)	-	-
5A	none	"	0852	-	"	"	"	-	none	BT test sta.	-
5B	none	"	0900	-	"	"	"	-	none	" " "	-
5C	none	"	0905	-	"	"	"	-	none	" " "	-
5D	none	"	0911	-	"	"	"	-	none	" " "	-
5E	none	"	0914	-	"	"	"	-	none	" " "	-
5F	none	"	0914	-	"	"	"	-	none	" " "	-
5	259	"	-	0930	"	"	"	-	1 m	-	-
6	none	24	1152	-	850	09 11.3	129 31.3	-	none	-	-
7	none	24	1401	-	2232	08 52.2	129 24.7	-	none	-	-
8	none	24	1614	-	1297	08 31.6	129 17.2	-	none	-	-
9	260	24	1820	1930	732	08 10.2	129 10.2	9.3	FoD	Serwata Is.	-
10	261	24	2030	2037	3292	07 52.0	129 05.2	21.3	1 m	" "	-
"	262	"	2101	2101	"	"	"	-	2 m (S11B-201)	" "	-
11	none	24	2355	-	4342	07 30.9	128 56.0	-	none	-	-
12	none	25	0208	-	2158	07 13.7	128 51.0	-	none	-	-
13	none	25	0429	-	3061	06 54.6	128 44.3	-	none	-	-
14	none	25	0640	-	4581	06 36.4	128 34.8	-	none	-	-
15	none	25	0849	-	4846	06 18.7	128 25.2	-	none	-	-
16	263	25	1104	1108	4865	06 00.7	128 15.3	46.0	1 m	Mai Is. (Serwata Is.)	-
17	264	25	1330	1334	4663	05 44.9	128 08.5	29.5	1 m	" "	-
18	none	25	1559	-	3568	05 28.8	128 05.4	-	none	" "	-
19	none	25	1807	-	4074	05 16.0	128 00.0	-	none	" "	-
20	265	25	2025	2028	4096	05 01.0	127 57.0	24.0	1 m	" (Banda S.)	-
"	266	"	-	2052	"	"	"	"	2 m (S11B-202)	" "	-
21	none	26	0016	-	-	04 46.0	127 55.8	-	none	-	-
22	none	26	0226	-	3402	04 32.0	127 53.8	-	none	-	-
23	none	26	0437	-	4178	04 16.0	127 52.2	-	none	-	-
24	267	26	0547	0552	4000-5000	04 06.0	127 50.8	20.5	1 m	Ariban Is. (Buru St.)	-
25	none	26	0818	-	3411	03 48.6	127 39.1	-	none	-	-
<b>zone -8</b>											
26	none	26	0906	-	3967	03 34.5	127 30.1	-	none	-	-
27	268	26	1102	1110	2496	03 20.4	127 21.0	6.0	1 m	Buru Is.	-
28	none	26	1305	-	1463	03 05.2	127 14.0	-	none	" "	-
29	269	25	1448	1503	1289	02 50.8	127 07.2	19.5	1 m	" "	-
30	none	26	1723	-	4398	02 34.1	126 53.8	-	none	-	-
31	270	26	1933	1939	2651	02 18.3	126 48.3	34.0	1 m	Itimatale Is. (Garan S.)	-
"	271	"	-	2001	"	"	"	"	2 m (S11B-203)	" "	-
32	none	26	2340	-	1573	01 53.9	126 46.0	-	none	-	-
33	none	27	0149	-	2523	01 33.2	126 46.2	-	none	-	-
34	none	27	0357	-	3393	01 13.5	126 40.1	-	none	-	-
35	none	27	0605	-	3475	00 52.1	126 34.0	-	none	-	-
36	272	27	0815	0826	2853	00 32.9	126 27.8	39.5	1 m	Pasirutia Is.	-
37	none	27	1045	-	2523	00 12.5	126 21.5	-	none	-	-
38	273	27	1255	1327	2578	00 08.0	126 15.0	48.5	1 m	Tifere Is.	-
<b>Lat. N</b>											
39	none	27	1551	-	2615	00 29.0	126 09.1	-	none	-	-
40	none	27	1754	-	1628	00 40.0	126 04.7	-	none	-	-
41	274	27	2002	2009	2018	00 56.2	125 56.3	12.2	1 m	Tifere Is.	-
"	275	"	-	2039	"	"	"	"	2 m (S11B-204)	" "	-
42	none	28	0003	-	1390	01 09.1	125 43.8	-	none	-	-

Sta. S11B-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
43	none	28	0212	-	1890	01 24.0	125 36.1	-	none	-	-
44	none	28	0429	-	1500	01 37.7	125 29.5	-	none	-	-
45	none	28	0637	-	1161	01 55.8	125 20.2	-	none	-	-
46	276	28	0840	0848	2121	02 13.0	125 09.9	12.5	1 m	Pairo, Sangi Is. - (Celebes S.)	-
47	none	28	1110	-	3164	02 29.8	125 00.5	-	none	-	-
48	277	28	1317	1329	3713	02 48.5	124 50.6	19.3	1 m	Makelalu, Sangi Is. -	-
49	none	28	1547	-	4224	03 08.2	124 38.8	-	none	-	-
50	278	28	1855	1907	4580	03 31.2	124 21.0	-	1 m	-	-
51	none	28	2127	-	4539	03 47.5	124 09.9	-	none	-	-
52	none	28	2336	-	4810	04 03.1	123 57.5	-	none	-	-
53	none	29	0145	-	4819	04 18.8	123 46.0	-	none	-	-
54	none	29	0353	-	4773	04 34.6	123 34.1	-	none	-	-
55	none	29	0605	-	4718	04 50.2	123 22.3	-	none	-	-
56	279	29	0816	0824	4649	05 06.0	123 10.9	90	1 m	Mindanao, P.I.	-
57	none	29	1044	-	4471	05 24.5	123 00.0	-	none	-	-
58	280	29	1253	1258	4325	05 48.0	122 47.0	53	1 m	Basilan Is.	-
59	none	29	1523	-	4243	06 09.0	122 40.0	-	none	-	-
60	none	29	1736	-	3922	06 26.0	122 35.0	-	none	-	-
61	281	29	1902	1910	1856	06 35.2	122 27.2	8.0	1 m	Basilan Is.	-
"	282	"	-	1941	"	"	"	"	2 m (S11B-205)	"	-
62	283	29	2230	2240	79	06 48.4	122 12.0	5.2	1 m	Coco Is.	-
63	284	30	0102	0109	33	06 52.0	121 52.4	7.0	1 m	Mindanao Is.	-
64	none	30	0327	-	280	07 08.9	121 51.3	-	none	-	-
65	none	30	0539	-	2049	07 28.9	121 51.5	-	none	-	-
66	285	30	0749	-	3885	07 46.4	121 48.0	-	1 m	-	-
67	none	30	1039	-	3986	08 05.8	121 48.8	-	none	-	-
68	286	30	1257	1243	4738	08 25.5	121 49.7	-	1 m	Sulu Sea	-
69	none	30	1507	-	4722	08 45.9	121 50.7	-	none	-	-
70	none	30	1717	-	4389	09 05.9	121 51.0	-	none	-	-
71	287	30	1926	1931	4019	09 25.6	121 51.5	-	1 m	-	-
"	288	"	-	1952	"	"	"	"	2 m (S11B-206)	"	-
72	none	30	2234	-	3566	09 47.8	121 52.6	-	none	-	-
73	none	V-1	0046	-	2414	10 07.8	121 53.0	-	none	-	-
74	none	1	0315	-	786	10 19.3	121 52.6	-	none	-	-
75	none	1	0521	-	1286	10 37.9	121 46.0	-	none	-	-
76	289	1	0732	0747	146	11 00.0	121 34.4	24.0	1 m	Panag Is.	-
77	none	1	1012	-	108	11 18.4	121 27.8	-	none	-	-
78	290	1	1219	1227	348	11 35.0	121 17.2	19.0	1 m	Sibay Is.	-
79	none	1	1448	-	210	11 58.8	120 57.9	-	none	-	-
80	none	1	1703	-	805	12 11.2	120 55.5	-	none	-	-
81	291	1	1904	1911	677	12 25.4	120 50.6	7	1 m	Mindoro Is.	-
"	292	"	-	1930	622	-	-	"	2 m (S11B-207)	"	-
82	none	1	2249	-	1326	12 43.8	120 42.0	-	none	-	-
83	none	2	0100	-	1024	12 55.1	120 37.0	-	none	-	-
84	none	2	0308	-	1125	13 05.1	120 32.6	-	none	-	-
85	none	2	0510	-	1561	13 09.9	120 24.6	-	none	-	-
86	293	2	0733	0736	2213	13 16.0	120 20.4	8.2	1 m	Mindoro Is.	-
87	none	2	0951	-	1783	13 23.2	120 15.6	-	none	-	-
88	294	2	1206	1217	3292	13 32 40	120 10.5	9.0	1 m	Lubang Is.	-
89	none	2	1437	-	2816	13 42 50	120 03 30	-	none	-	-
90	none	2	1647	-	860	13 52.0	119 57.4	-	none	-	-
91	295	2	1858	1901	2261	14 01.8	119 58.8	8.2	1 m	Cabra Is.	-
"	296	"	-	1920	"	"	"	"	2 m (S11B-208)	"	-
92	none	2	2242	-	1869	14 13.0	120 01.6	-	none	-	-
none	297	3	-	1700	-	-	-	-	DIP	Bay of Manila	-

Manila, Phillipine Islands, May 3-6

Sta. S11C-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
depart Manila, May 6											
1	none	V-6	1803	-	2012	14 36.2	119 59.5	-	none	-	-
2	298	6	2013	2020	622	14 53.9	119 51.5	12.0	2 = (S110-201)	W. of Luzon	SID 61-706
3	none	6	2321	-	1930	15 15.6	119 43.6	-	none	-	-
4	none	7	0129	-	2413	15 32.5	119 37.6	-	none	-	-
5	none	7	0339	-	1628	15 50.3	119 30.0	-	none	-	-
6	none	7	0552	-	1024	16 09.2	119 27.5	-	none	-	-
7	none	7	0757	-	1945	16 28.6	119 30.1	-	none	-	-
8	none	7	1006	-	2093	16 51.8	119 34.2	-	none	-	-
9	none	7	1214	-	2505	17 14.0	119 36.8	-	none	-	-
10	none	7	1422	-	2913	17 33.5	119 40.4	-	none	-	-
11	none	7	1630	-	2798	17 52.9	119 44.1	-	none	-	-
12	none	7	1840	-	2039	18 12.0	119 48.0	-	none	-	-
13	299	7	2049	2057	2600	18 31.9	119 50.6	41.0	2 = (S110-202)	W. of Luzon	SID 61-547
14	none	8	0014	-	3 585	18 53.0	119 52.0	-	none	-	-
15	none	8	0225	-	3475	19 12.0	119 53.9	-	none	-	-
16	none	8	0435	-	3266	19 31.0	119 56.9	-	none	-	-
17	none	8	0654	-	3621	19 50.0	119 56.9	-	none	-	-
18	300	8	0911	0843	3612	20 01.0	120 05.6	-	Troll line	-	-
"	301	"	-	0932	3694	" "	" "	-	Troll line	-	-
19	-	8	1117	-	3968	20 02.4	120 20.0	-	-	-	-
"	302	"	-	1205	3650	" "	" "	-	Troll line	-	-
"	303	"	-	1310	3700	" "	" "	-	Troll line	Luzon Str.	-
20	-	8	1338	-	3548	20 00.8	120 36.5	-	-	" "	-
"	304	"	-	1345	3446	" "	" "	-	Troll line	" "	-
"	305	"	-	1415	2926	" "	" "	-	Troll line	" "	-
"	307	"	-	1500	3000	-	-	-	Troll line	" "	-
21	none	8	1550	-	1692	20 03.7	120 54.4	-	none	" "	-
22	none	8	1757	-	3462	20 03.8	121 11.7	-	none	" "	-
23	306	8	2012	1858	3319	20 03.8	121 19.0	-	2 = (S110-203)	" "	SID 61-707
24	none	8	2222	-	1728	20 07.0	121 37.5	-	none	-	-
25	none	9	0024	-	1170	20 13.0	121 55.7	-	none	-	-
26	none	9	0237	-	1834	20 05.8	122 06.1	-	none	-	-
27	none	9	0447	-	3192	20 06.3	122 21.9	-	none	-	-
28	none	9	0657	-	3222	20 09.0	122 39.1	-	none	-	-
29	none	9	0905	-	-	20 07.0	122 55.9	-	none	-	-
30	none	9	1112	-	5088	20 04.8	123 11.5	-	none	-	-
31	308	9	1319	1454	5093	20 01.6	123 33.3	-	Troll line	Philippine Sea	-
32	none	9	1530	-	5240	19 59.2	123 52.9	-	none	-	-
33	none	9	1632	-	5257	19 58.0	123 59.0	-	none	-	-
34	309	9	1934	1942	5413	19 53.0	124 15.3	-	2 = (S110-204)	-	SID 61-548
"	310	"	-	2100	"	" "	" "	-	DIP	-	SID 61-549 SID 61-551
35	none	9	2358	-	5486	19 59.0	124 27.8	-	none	-	-
36	none	10	0208	-	5577	20 05.0	124 43.0	-	none	-	-
37	311	10	0402	0407	5674	20 12.0	125 00.0	-	2 = (S110-205)	-	SID 61-708
38	none	10	0713	-	5276	20 13.6	125 16.2	-	none	-	-
39	none	10	0924	-	5486	20 19.5	125 29.5	-	none	-	-
40	none	10	1132	-	5303	20 27.6	125 44.7	-	none	-	-
41	none	10	1342	-	5267	20 28.6	126 02.0	-	none	-	-
42	none	10	1550	-	5523	20 30.5	126 17.2	-	none	-	-
43	312	10	1802	1832	5385	20 35.6	126 33.2	-	2 = (S110-206)	-	SID 61-550
"	313	"	-	1845	"	" "	" "	-	DIP	-	SID 61-551
44	none	10	2247	-	5385	20 34.2	126 49.8	-	none	-	-
45	none	11	0058	-	5358	20 31.5	127 06.8	-	none	-	-
46	314	11	0307	0316	5312	20 28.8	127 24.1	-	2 = (S110-207)	-	SID 61-552
"	314(A)	"	-	0830	5577	" "	" "	-	FeD	-	-
47	none	11	0625	-	5577	20 26.4	127 39.8	-	none	-	-

Sta. S11C-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
48	none	11	0831	-	5577	20 24.0	127 56.6	-	none	-	-
49	none	11	1041	-	5267	20 27.0	128 15.8	-	none	-	-
50	none	11	1258	-	5258	20 37.5	128 38.0	-	none	-	-
			<del>none</del>	<del>-9</del>							
51	none	11	1607	-	5449	20 42.7	128 53.8	-	none	-	-
52	none	11	1817	-	5316	20 47.5	129 09.9	-	none	-	-
"	315	"	-	1922	5358	" "	" "	-	2 n(S110-208)	-	embod. with 316
53	316	11	2349	2143	5358	20 51.9	129 04.0	-	2 n(S110-209)	-	SID 61-553
54	none	12	0157	-	5688	20 57.5	129 19.7	-	none	-	-
55	none	12	0410	-	5558	21 03.5	129 35.0	-	none	-	-
56	none	12	0626	-	5404	21 09.3	129 58.7	-	none	-	-
57	none	12	0834	-	5589	21 15.0	130 11.3	-	none	-	-
58	none	12	1049	-	5559	21 20.6	130 29.3	-	none	-	-
59	none	12	1253	-	5614	21 24.9	130 51.6	-	none	-	-
60	317	12	1500	1604	5724	21 31.2	131 11.3	-	Troll	-	-
61	none	12	1711	-	5139	21 37.7	131 30.7	-	none	-	-
62	318	12	1909	1914	5566	21 42.8	131 45.0	-	2 n(S110-210)	-	SID 61-554
"	319	"	-	2126	"	" "	" "	-	2 n(S110-211)	-	SID 61-555
63	none	13	0150	-	5394	21 54.6	132 04.5	-	none	-	-
64	none	13	0357	-	5412	21 57.0	132 25.2	-	none	-	-
65	none	13	0606	-	5486	21 59.7	132 45.2	-	none	-	-
66	none	13	0813	-	5504	22 04.5	133 05.8	-	none	-	-
67	none	13	1024	-	5505	22 09.8	133 28.2	-	none	-	-
68	none	13	1232	-	5350	22 12.0	133 50.8	-	none	-	-
69	none	13	1443	-	5103	22 14.5	134 09.8	-	none	-	-
70	none	13	1648	-	5394	22 17.0	134 29.2	-	none	-	-
71	320	13	1856	1903	5139	22 19.7	134 46.8	-	2 n(S110-212)	-	SID 61-556
"	321	"	-	2132	"	" "	" "	-	2 n(S110-213)	-	SID 61-557
72	none	14	0148	-	4309	22 21.7	134 51.8	-	none	-	-
73	none	14	0401	-	4599	22 21.6	135 07.0	-	none	-	-
74	none	14	0608	-	4616	22221.6	135 20.2	-	none	-	-
75	none	14	0816	-	5079	22 21.6	135 33.6	-	none	-	-
76	none	14	1025	-	5176	22 17.2	135 46.4	-	none	-	-
77	none	14	1237	-	5569	22 09.4	136 00.1	-	none	-	-
78	none	14	1448	-	5523	22 03.6	136 14.0	-	none	-	-
79	none	14	1657	-	5212	21 57.6	136 27.6	-	none	-	-
80	322	14	1841	1852	3521	21 52.7	136 38.9	-	2 n(S110-214)	-	SID 61-558
"	323	"	-	2107	5319	" "	" "	-	2 n(S110-215)	-	SID 61-559
81	none	15	0127	-	2898	21 46.8	136 41.3	-	none	-	-
82	none	15	0337	-	3237	21 40.0	136 53.1	-	none	-	-
83	none	15	0602	-	4673	21 34.5	137 05.3	-	none	-	-
84	none	15	0811	-	4682	21 29.0	137 20.0	-	none	-	-
85	non3	15	1019	-	-	21 23.4	137 33.6	-	none	-	-
86	none	15	1229	-	4334	21 17.9	137 47.2	-	none	-	-
87	none	15	1436	-	-	21 14.8	137 59.8	-	none	-	-
88	none	15	1645	-	-	21 11.3	138 11.8	-	none	-	-
89	324	15	1836	1851	5120	21 08.8	138 22.2	-	2 n(S110-216)	-	SID 61-709
90	325	15	2317	2114	5000	21 15.0	138 04.5	-	2 n(S110-217)	-	SID 61-560
91	none	16	0128	-	-	21 07.0	138 16.3	-	none	-	-
92	none	16	0337	-	-	20 58.3	138 29.8	-	none	-	-
93	none	16	0558	-	-	20 51.6	138 42.2	-	none	-	-
94	none	16	0806	-	-	20 43.5	138 55.5	-	none	-	-
95	none	16	1014	-	-	20 35.8	139 08.2	-	none	-	-
96	none	16	1229	-	-	20 27.4	139 21.7	-	none	-	-
97	none	16	1429	-	-	20 16.7	139 32.2	-	none	-	-
98	none	16	1639	-	-	20 04.6	139 44.5	-	none	-	-
99	326	16	1825	1842	-	19 53.6	139 55.1	-	2 n(S110-218)	-	SID 61-561
"	327	"	-	1900	~ 5000	" "	" "	-	DIP	-	SID 61-562



Sta. S11C-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
100	328	16	2207	2029	-	19 46.1	139 55.2	-	2 m (S110-219)	-	SID 61-563
101	none	17	0015	-	-	19 35.2	140 10.0	-	none	-	-
102	none	17	0226	-	-	19 23.7	140 25.1	-	none	-	-
103	none	17	0430	-	-	19 12.6	140 39.2	-	none	-	-
104	none	17	0648	-	-	19 00.0	140 52.1	-	none	-	-
105	none	17	0857	-	-	18 48.3	140 59.2	-	none	-	-
106	none	17	1105	-	-	18 34.0	141 08.2	-	none	-	-
107	none	17	1315	-	-	18 11.5	141 21.2	-	none	-	-
108	none	17	1522	-	-	17 55.5	141 31.1	-	none	-	-
109	none	17	1737	-	-	17 39.4	141 40.7	-	none	-	-
110	329	17	1815	1831	-	17 34.8	141 43.8	-	2 m (S110-220)	-	-
"	330	"	-	1930	-	" "	" "	-	DIP	-	SID 61-564
<u>zone -10</u>											
111	none	17	2308	-	-	17 16.0	141 56.0	-	none	-	-
112	none	18	0116	-	-	17 01.2	142 06.6	-	none	-	-
113	none	18	0326	-	-	16 46.0	142 17.2	-	none	-	-
114	none	18	0533	-	-	16 30.8	142 27.3	-	none	-	-
115	none	18	0748	-	-	16 18.6	142 41.5	-	none	-	-
116	none	18	0954	-	-	16 06.2	142 55.0	-	none	-	-
117	none	18	1204	-	-	15 40.5	143 06.0	-	none	-	-
118	none	18	1410	-	-	15 23.8	143 16.0	-	none	-	-
119	none	18	1620	-	-	15 07.9	143 27.0	-	none	-	-
120	331	18	1826	1922	2000 fm	14 51.2	143 37.9	115	2 m (S110-221)	W. of Saipan & Tinian	-
"	332	"	-	1930	"	" "	" "	97	DIP	NW of Guam	SID 61-566
121	none	18	2026	-	-	14 44.0	142 42.8	-	none	-	-
122	none	18	2237	-	-	14 25.9	143 54.2	-	none	-	-
123	none	19	0045	-	-	14 11.5	144 03.2	-	none	-	-
124	none	19	0252	-	-	13 58.2	144 20.8	-	none	-	-
125	none	19	0458	-	-	13 44.9	144 29.8	-	none	-	-
126	none	19	0714	-	-	13 29.9	144 29.8	-	none	-	-

Guam, Mariana Islands, May 19-23

Sta. S11D-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<u>depart Guam, May 23</u>											
<u>zone -10</u>											
1	none	V-23	1201	-	1353	13 15.2	144 56.4	-	none	-	-
2	none	23	1409	-	2286	13 07.5	144 52.2	-	none	-	-
3	none	23	1618	-	-	13 00.0	145 09.6	-	none	-	-
4	none	23	1845	-	5486	12 58.2	145 30.0	-	none	-	-
5	none	23	2136	-	> 7864	12 49.0	145 50.7	-	none	-	-
6	none	23	2347	-	-	12 51.1	146 04.8	-	none	-	-
7	none	24	0153	-	-	12 53.3	146 19.1	-	none	-	-
8	none	24	0402	-	5852	12 55.9	146 33.9	-	none	-	-
9	none	24	0622	-	6584	12 58.4	146 43.9	-	none	-	-
10	none	24	0829	-	6035	13 01.0	147 02.7	-	none	-	-
11	none	24	1039	-	4760	12 58.0	147 16.4	-	none	-	-
12	none	24	1247	-	5669	12 55.8	147 30.6	-	none	-	-
13	none	24	1455	-	3200	12 58.2	147 44.1	-	none	-	-
14	none	24	1705	-	4297	13 01.5	147 57.5	-	none	-	-
15	333	24	1857	1901	5300	13 03.5	148 08.8	-	2 m (S11D-201)	SW of Guam	-
16	none	24	2200	-	3292	13 03.8	148 20.3	-	none	-	-
17	none	25	0005	-	5852	13 03.8	148 33.8	-	none	-	-
18	none	25	0216	-	5852	13 03.8	148 47.1	-	none	-	-
19	none	25	0423	-	6072	13 03.7	149 00.7	-	none	-	-
20	none	25	0629	-	6035	13 03.6	149 14.0	-	none	-	-
21	none	25	0836	-	6218	13 03.5	149 26.8	-	none	-	-

Sta. S11D-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. E	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
22	none	25	1045	--	6218	13 03.4	149 39.8	--	none	--	--
23	none	25	1251	--	6035	13 03.8	149 51.0	--	none	--	--
24	none	25	1458	--	6218	13 05.0	149 58.0	--	none	--	--
25	none	25	1910	--	6218	13 06.9	150 15.6	--	none	--	--
26	none	25	2317	--	5760	13 09.8	150 33.5	--	none	--	--
27	none	26	0327	--	5852	13 11.5	150 51.2	--	none	--	--
28	none	26	0749	--	6218	13 11.9	151 13.5	--	none	--	--
29	none	26	1152	--	6309	13 07.3	151 37.6	--	none	--	--
30	none	26	1600	--	6035	13 06.1	152 05.9	--	none	--	--
31	none	26	2008	--	6218	13 05.0	152 34.0	--	none	--	--
32	none	27	0017	--	--	13 04.5	153 05.0	--	none	--	--
33	none	27	0427	--	6126	13 03.5	153 35.9	--	none	--	--
34	none	27	0843	--	6126	13 01.0	154 09.1	--	none	--	--
35	none	27	1251	--	6126	12 58.1	154 46.9	--	none	--	--
36	none	27	1708	--	6218	12 58.8	155 22.0	--	none	--	--
37	none	27	2114	--	6309	12 59.5	155 58.2	--	none	--	--
38	none	28	0127	--	6218	13 00.3	156 26.1	--	none	--	--
39	none	28	0550	--	1600 fm	13 00.9	156 56.9	--	none	--	--
40	none	28	0959	--	6218	12 58.2	157 31.0	--	none	--	--
41	none	28	1408	--	5679	12 58.9	158 06.0	--	none	--	--
<u>zone -11</u>											
42	none	28	1907	--	5760	13 01.8	158 39.8	--	none	--	--
43	none	28	2321	--	6000	13 02.2	159 14.4	--	none	--	--
44	none	29	0328	--	5852	13 02.0	159 49.0	--	none	--	--
45	none	29	0919	--	5669	13 01.9	160 22.9	--	none	--	--
46	none	29	1329	--	5852	13 02.3	161 02.0	--	none	--	--
47	none	29	1739	--	4792	13 03.4	161 31.1	--	none	--	--
48	none	29	2145	--	5486	13 04.2	162 04.1	--	none	--	--
49	none	30	0155	--	4389	13 04.9	162 32.8	--	none	--	--
50	none	30	0612	--	4755	13 06.1	163 02.0	--	none	--	--
51	none	30	1023	--	5394	13 05.0	163 30.0	--	none	--	--
52	none	30	1433	--	5486	13 02.5	164 05.2	--	none	--	--
53	none	30	1837	--	3840	13 00.0	164 41.5	--	none	--	--
54	none	31	0009	--	5394	12 58.9	165 00.0	--	none	--	--
55	none	31	0419	--	5212	13 00.5	165 17.5	--	none	--	--
56	none	31	0818	--	4938	12 59.0	165 46.0	--	none	--	--
57	none	31	1234	--	5121	12 57.5	166 16.1	--	none	--	--
58	none	31	1640	--	5303	13 00.5	166 45.8	--	none	--	--
59	none	31	2044	--	4206	13 02.2	167 20.0	--	none	--	--
60	none	31	0056	--	5303	13 03.2	167 42.0	--	none	--	--
61	none	VI-1	0501	--	5303	13 04.3	168 05.0	--	none	--	--
62	none	1	0918	--	5303	13 05.0	168 22.9	--	none	--	--
63	none	1	1328	--	5577	13 05.5	168 43.2	--	none	--	--
64	none	1	1738	--	5577	13 05.0	169 00.2	--	none	--	--
65	none	1	2146	--	4663	13 04.0	169 25.3	--	none	--	--
66	none	2	0118	--	5486	13 03.1	169 57.5	--	none	--	--
67	none	2	0559	--	5669	13 03.0	170 30.0	--	none	--	--
68	none	2	1007	--	5760	13 01.1	171 02.0	--	none	--	--
69	none	2	1416	--	5595	12 58.3	171 32.8	--	none	--	--
70	none	2	1814	--	5577	12 58.0	171 58.7	--	none	--	--
<u>zone -12</u>											
71	none	2	2330	--	5669	12 58.6	172 31.0	--	none	--	--
72	none	3	0336	--	5760	12 58.3	173 03.8	--	none	--	--
73	none	3	0750	--	6035	12 59.0	173 40.0	--	none	--	--
74	none	3	1217	--	5852	13 00.8	173 18.5	--	none	--	--
75	none	3	1629	--	5706	13 01.0	174 52.0	--	none	--	--
76	none	3	2102	--	5394	13 01.2	175 28.5	--	none	--	--
77	335	4	0110	0415	5852	13 01.2	176 01.8	--	FeD	--	--
78	334	4	0518	0810	4938	13 01.0	176 34.6	--	FeD	--	--

Sta. S11D-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. W	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
79	none	4	0926	-	5943	13 08.8	177 16.0	-	none	-	-
80	none	4	1339	-	5943	13 14.8	177 54.2	-	none	-	-
81	none	4	1746	-	7040	13 21.2	178 30.0	-	none	-	-
82	none	4	2202	-	5669	13 31.0	179 11.3	-	none	-	-
83	none	4	0210	-	6035	13 45.1	179 48.5	-	none	-	-
zone = +12 (I,D,L <sub>2</sub> )						<u>Long. W</u>					
84	none	4	0636	-	5760	14 01.5	179 36.8	-	none	-	-
85	none	4	1052	-	5852	14 08.2	179 02.0	-	none	-	-
86	none	4	1458	-	5852	14 17.2	178 34.7	-	none	-	-
87	none	4	1902	-	5486	14 27.2	178 07.8	-	none	-	-
88	none	4	2309	-	4938	14 39.4	177 35.6	-	none	-	-
89	none	5	0318	-	4389	14 52.0	177 03.1	-	none	-	-
90	none	5	0740	-	5577	15 05.9	176 26.2	-	none	-	-
91	336	5	1142	1515	5577	15 21.4	175 50.0	-	FoD	-	-
92	none	5	1549	-	5577	15 35.5	175 11.2	-	none	-	-
93	none	5	1955	-	2651	15 46.7	174 38.0	-	none	-	-
94	337	6	0003	0245	5760	15 55.6	174 03.0	-	FoD	-	SIO 61-710
95	none	6	0410	-	5760	16 05.8	173 25.6	-	none	-	-
96	none	6	0825	-	5394	16 15.0	172 49.0	-	none	-	-
97	none	6	1241	-	3475	16 26.0	172 10.9	-	none	-	-
<del>zone</del> +11											
98	none	6	1746	-	5577	16 42.0	171 36.0	-	none	-	-
99	none	6	2151	-	5449	16 58.9	170 59.0	-	none	-	-
100	none	7	0157	-	5303	17 15.8	170 22.2	-	none	-	-
101	none	7	0620	-	5486	17 33.1	169 45.0	-	none	-	-
102	none	7	1027	-	5121	17 40.2	169 09.8	-	none	-	-
103	none	7	1439	-	5212	17 50.2	168 33.5	-	none	-	-
104	none	7	1844	-	5394	18 05.1	167 56.5	-	none	-	-
105	338	7	2300	2330	5303	18 15.2	167 23.0	-	FoD	off Johnson Is.-	-
106	none	8	0315	-	5486	18 24.1	166 49.3	-	none	-	-
107	none	8	0725	-	5669	18 35.2	166 08.1	-	none	-	-
108	none	8	1134	-	5770	18 45.0	165 30.8	-	none	-	-
109	none	8	1505	-	5486	18 58.0	164 55.3	-	none	-	-
110	none	8	1852	-	5577	19 09.8	164 32.0	-	none	-	-
111	none	8	2303	-	5431	19 24.1	163 44.0	-	none	-	-
112	none	9	0315	-	5394	19 39.5	163 05.2	-	none	-	-
113	none	9	0725	-	5213	19 53.8	162 26.0	-	none	-	-
114	none	9	1148	-	4938	20 03.0	161 40.8	-	none	-	-
115	none	9	1551	-	4938	20 16.9	160 58.2	-	none	-	-
116	none	9	1959	-	4846	20 30.4	160 16.5	-	none	-	-
117	none	10	0011	-	4755	20 43.8	159 36.0	-	none	-	-
118	none	10	0418	-	-	20 57.0	158 55.2	-	none	-	-
119	none	10	0824	-	2834	21 10.4	158 13.9	-	none	-	-

Honolulu, Hawaii, June 10-13

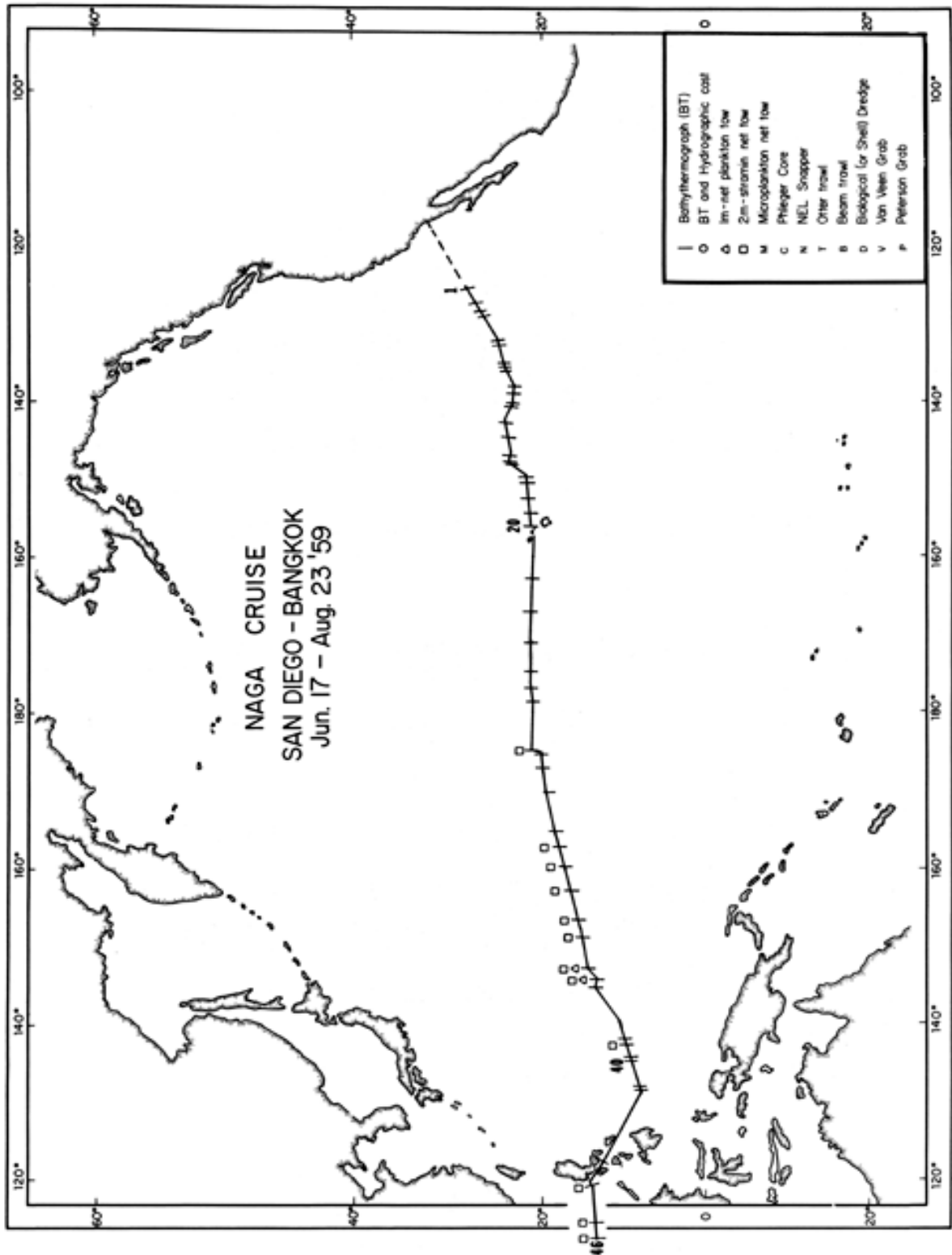
Sta. S11E-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. W	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
<b>depart Honolulu, June 13</b>											
			<u>zone= +11</u>								
1	none	VI-13	1402	-	732	21 13.4	157 36.5	-	none	-	-
2	none	13	1611	-	640	21 21.0	157 22.1	-	none	-	-
3	none	13	1821	-	3931	21 28.1	157 07.0	-	none	-	-
4	none	13	2030	-	4938	21 35.3	156 51.5	-	none	-	-
5	none	13	2233	-	5486	21 42.8	156 36.1	-	none	-	-
6	none	14	0042	-	5486	21 49.8	156 21.6	-	none	-	-
7	none	14	0253	-	5212	21 57.7	156 06.2	-	none	-	-
8	none	14	0503	-	4846	22 04.9	155 51.0	-	none	-	-
9	none	14	0715	-	4480	22 14.1	155 32.1	-	none	-	-
10	none	14	0923	-	4663	22 23.2	155 12.3	-	none	-	-
11	none	14	1132	-	4663	22 32.8	154 53.5	-	none	-	-
12	none	14	1340	-	4755	22 43.3	154 32.3	-	none	-	-
13	none	14	1547	-	4938	22 54.1	154 11.2	-	none	-	-
14	none	14	1753	-	4846	23 04.9	153 50.5	-	none	-	-
15	339	14	2017	1936	5039	23 14.1	153 33.3	-	2 n (S11E-201)	E. Hawaiian Is.	-
16	none	14	2222	-	5121	23 22.0	153 13.9	-	none	-	-
17	none	15	0033	-	5394	23 30.0	152 55.0	-	none	-	-
18	none	15	0241	-	5532	23 37.8	152 36.0	-	none	-	-
19	none	15	0448	-	5669	23 45.4	152 17.8	-	none	-	-
20	none	15	0711	-	5577	23 52.5	151 58.8	-	none	-	-
21	none	15	0919	-	5760	24 00.4	151 40.0	-	none	-	-
22	none	15	1130	-	5760	24 08.0	151 20.3	-	none	-	-
23	none	15	1348	-	5669	24 17.8	151 00.2	-	none	-	-
24	none	15	1554	-	5577	24 23.8	150 44.2	-	none	-	-
25	none	15	1802	-	5394	24 28.8	150 28.2	-	none	-	-
26	340	15	2011	1927	5486	24 31.7	150 18.8	-	2 n (S11E-202)	-	-
27	none	15	2218	-	5587	24 36.6	150 03.0	-	none	-	-
			<u>zone= +10</u>								
28	none	16	0024	-	5480	24 41.4	149 46.6	-	none	-	-
29	none	16	0231	-	5486	24 46.8	149 30.2	-	none	-	-
30	none	16	0446	-	5303	24 51.9	149 13.9	-	none	-	-
31	none	16	0657	-	5669	24 58.0	148 58.5	-	none	-	-
32	none	16	0908	-	5532	25 07.2	148 40.8	-	none	-	-
33	none	16	1112	-	5577	25 16.5	148 33.8	-	none	-	-
34	none	16	1321	-	5394	25 26.1	148 04.8	-	none	-	-
35	none	16	1535	-	5486	25 33.3	147 45.3	-	none	-	-
36	none	16	1743	-	5394	25 40.2	147 27.0	-	none	-	-
37	341	16	1951	2001	5486	25 47.2	147 08.2	-	2 n (S11E-203)	-	-
38	none	16	2245	-	5121	25 53.5	146 50.8	-	none	-	-
39	none	17	0055	-	5394	26 00.4	146 32.8	-	none	-	-
40	none	17	0300	-	5394	26 07.0	146 15.2	-	none	-	-
41	none	17	0507	-	5486	26 14.0	145 56.4	-	none	-	-
42	none	17	0714	-	5304	26 21.2	145 37.5	-	none	-	-
43	none	17	0922	-	5303	26 28.2	145 18.6	-	none	-	-
44	none	17	1130	-	5212	26 35.5	145 00.3	-	none	-	-
45	none	17	1348	-	5121	26 43.2	144 29.0	-	none	-	-
46	none	17	1555	-	5066	26 50.0	144 19.7	-	none	-	-
47	none	17	1759	-	5212	26 57.3	144 00.0	-	none	-	-
48	342	17	2005	2012	4938	27 03.5	143 40.0	-	2 n (S11E-304)	-	-
49	none	17	2252	-	4938	27 09.9	143 16.5	-	none	-	-
50	none	18	0101	-	4938	27 15.5	142 55.1	-	none	-	-
51	none	18	0310	-	5029	27 21.1	142 34.0	-	none	-	-
52	none	18	0519	-	5303	27 26.9	142 12.9	-	none	-	-
53	none	18	0731	-	5303	27 33.0	141 51.0	-	none	-	-
			<u>zone= +9</u>								
54	none	18	1040	-	4755	27 39.7	141 29.8	-	none	-	-
55	none	18	1252	-	5212	27 48.0	141 08.0	-	none	-	-

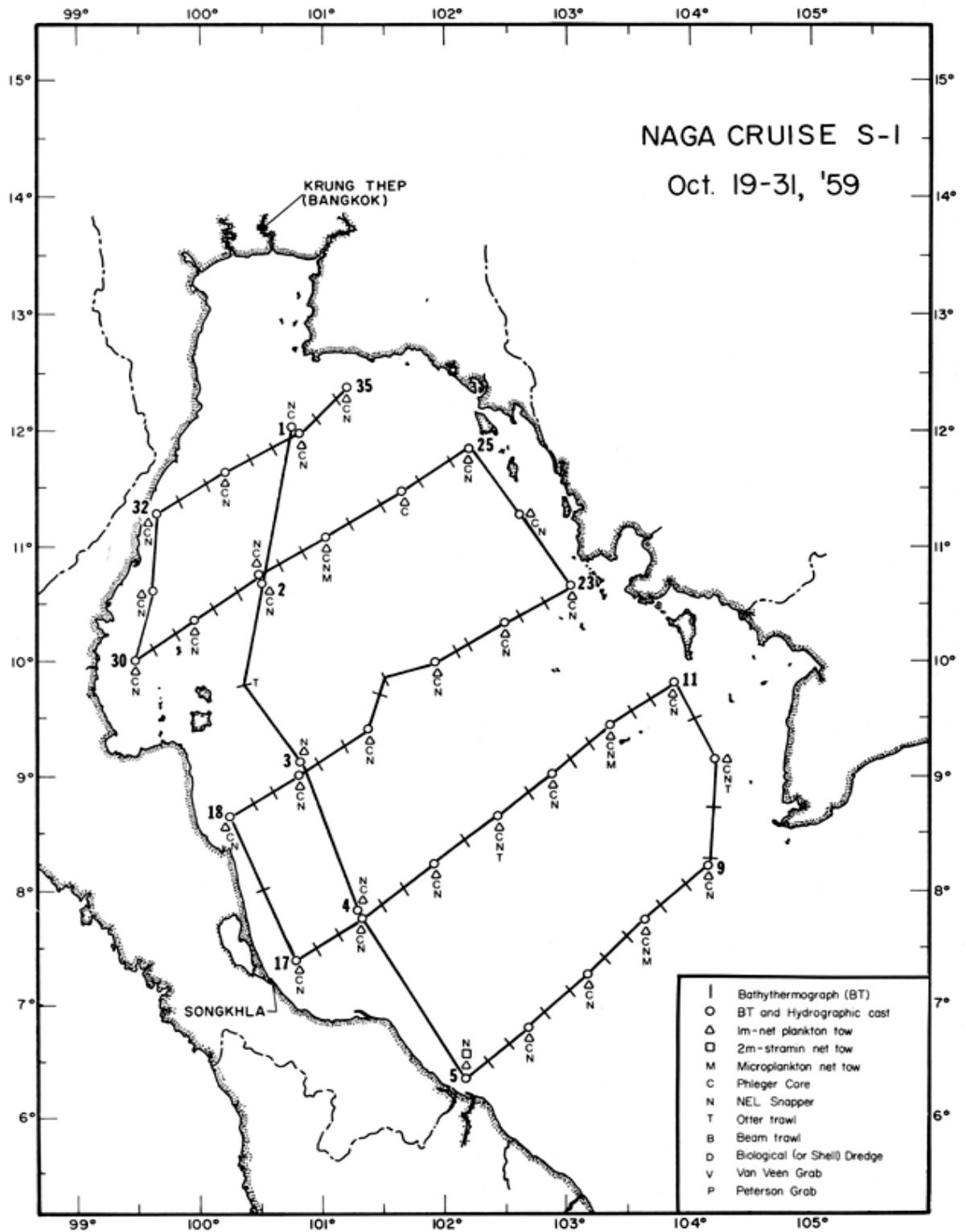
Sta. SILE-	Bio. Sta. 61-	Date 1961	Sta. Time	Bio. Sta. Time	Depth m	Lat. N	Long. W	Dist. from shore mi	Bio. Activity	Remarks	Fish No.
56	none	18	1459	-	5029	27 55.3	140 47.4	-	none	-	-
57	none	18	1706	-	5121	28 03.2	140 27.4	-	none	-	-
58	none	18	1914	-	5121	28 10.8	140 07.0	-	none	-	-
59	none	18	2129	-	5121	28 17.8	139 46.0	-	none	-	-
60	none	18	2335	-	5029	28 19.2	139 34.8	-	none	-	-
61	none	19	0138	-	5029	28 30.5	139 04.0	-	none	-	-
62	none	19	0346	-	4938	28 37.0	138 42.9	-	none	-	-
63	none	19	0555	-	4755	28 48.5	138 21.9	-	none	-	-
64	none	19	0805	-	4938	28 49.4	138 00.8	-	none	-	-
65	none	19	1011	-	4846	28 56.2	137 39.0	-	none	-	-
66	none	19	1208	-	4846	29 01.5	137 20.0	-	none	-	-
67	none	19	1415	-	4755	29 06.2	136 58.5	-	none	-	-
68	none	19	1620	-	4938	29 11.0	136 37.6	-	none	-	-
69	none	19	1827	-	5212	29 16.1	136 16.2	-	none	-	-
70	none	19	2033	-	4663	29 21.3	135 50.4	-	none	-	-
71	none	19	2241	-	3840	29 26.4	135 34.0	-	none	-	-
72	none	20	0049	-	4755	29 31.8	135 13.0	-	none	-	-
73	none	20	0300	-	4892	29 36.4	134 52.9	-	none	-	-
74	none	20	0506	-	2834	29 41.3	134 33.2	-	none	-	-
75	none	20	0709	-	4297	29 46.2	134 12.4	-	none	-	-
76	none	20	0919	-	4755	29 51.6	133 51.5	-	none	-	-
77	none	20	1154	-	4663	29 57.8	133 25.4	-	none	-	-
78	none	20	1400	-	4663	30 02.2	133 04.2	-	none	-	-
79	none	20	1610	-	4755	30 06.5	132 42.7	-	none	-	-
80	none	20	1822	-	4663	30 11.0	132 21.6	-	none	-	-
81	none	20	2023	-	4846	30 15.5	132 00.3	-	none	-	-
82	none	20	2230	-	4846	30 19.8	131 38.8	-	none	-	-
83	none	21	0036	-	4938	30 24.2	131 17.5	-	none	-	-
84	none	21	0243	-	4938	30 28.8	130 55.8	-	none	-	-
85	none	21	0452	-	5121	30 33.2	130 35.2	-	none	-	-
86	none	21	0702	-	4938	30 37.8	130 13.4	-	none	-	-
87	none	21	0912	-	4846	30 41.6	129 52.2	-	none	-	-
88	none	21	1141	-	5121	30 45.2	129 27.5	-	none	-	-
89	none	21	<del>1445</del>	-	4938	30 48.8	129 05.5	-	none	-	-
90	none	21	1654	-	4663	30 52.0	128 54.6	-	none	-	-
91	none	21	1904	-	4663	30 55.0	128 20.9	-	none	-	-
92	none	21	2114	-	3749	30 57.4	127 29.0	-	none	-	-
93	none	21	2323	-	4572	31 01.2	127 36.8	-	none	-	-
94	none	22	0131	-	4389	31 04.0	127 12.9	-	none	-	-
95	none	22	0340	-	4663	31 07.5	126 50.0	-	none	-	-
96	none	22	0548	-	4663	31 10.9	126 26.9	-	none	-	-
97	343	22	0755	-	4755	31 14.2	126 03.8	-	FeD	-	-
98	none	22	1003	-	4755	31 17.5	125 40.6	-	none	-	-
99	none	22	1212	-	4480	31 21.2	125 15.5	-	none	-	-
100	none	22	1431	-	4755	31 24.5	124 52.7	-	none	-	-
101	none	22	1641	-	4755	31 27.5	124 29.5	-	none	-	-
102	none	22	1848	-	4572	31 30.9	124 06.5	-	none	-	-
103	none	22	2054	-	4846	31 33.9	123 43.6	-	none	-	-
104	none	22	2300	-	4846	31 37.5	123 20.0	-	none	-	-
105	none	23	0108	-	4663	31 41.0	122 58.0	-	none	-	-
106	none	23	0318	-	4663	31 44.0	122 35.0	-	none	-	-
107	none	23	0528	-	4938	31 47.4	122 12.0	-	none	-	-

arrive San Diego, California, June 24, 1961

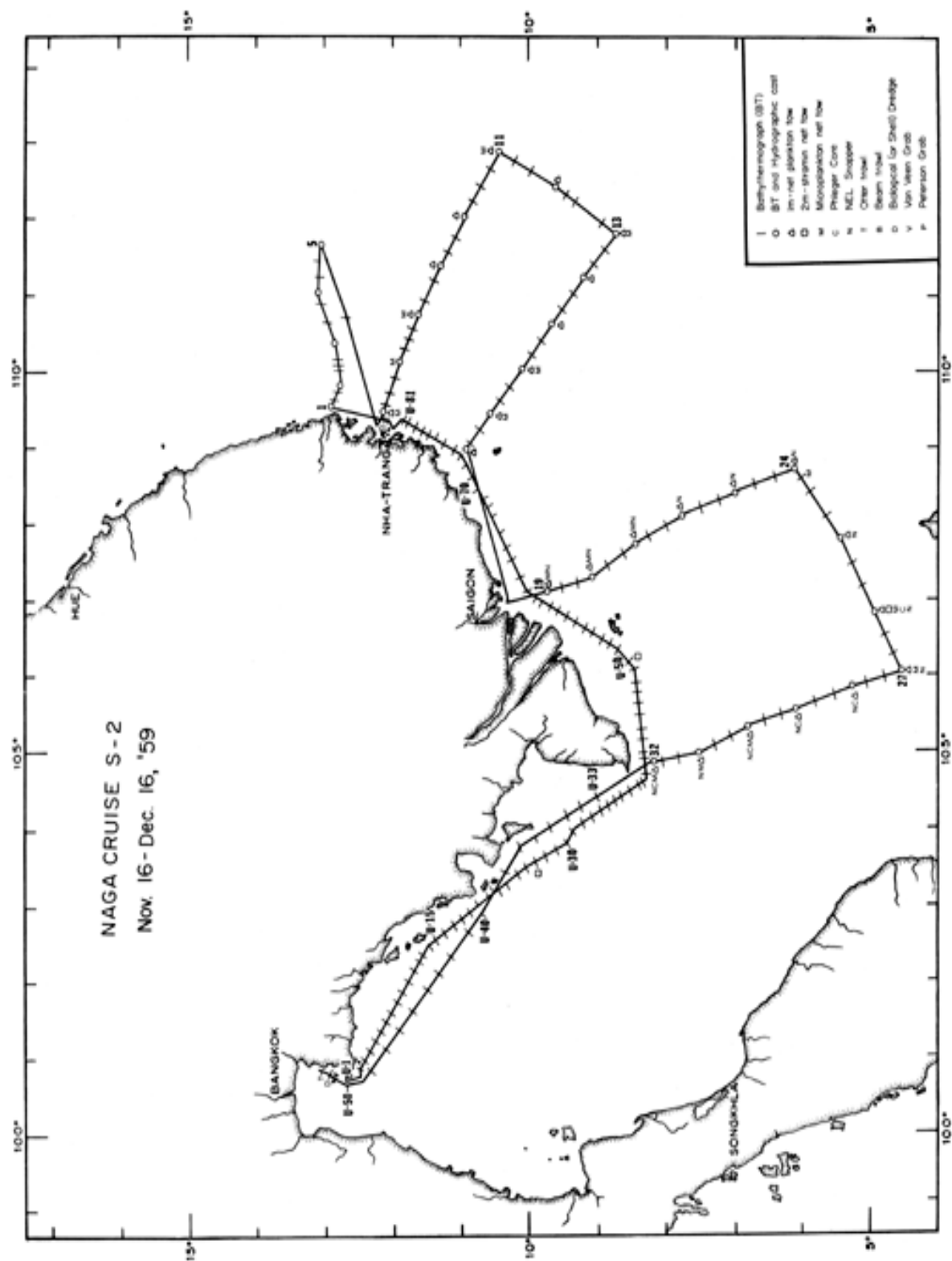
1 m Net Tows (see also Snyder and Fleming, 1972)

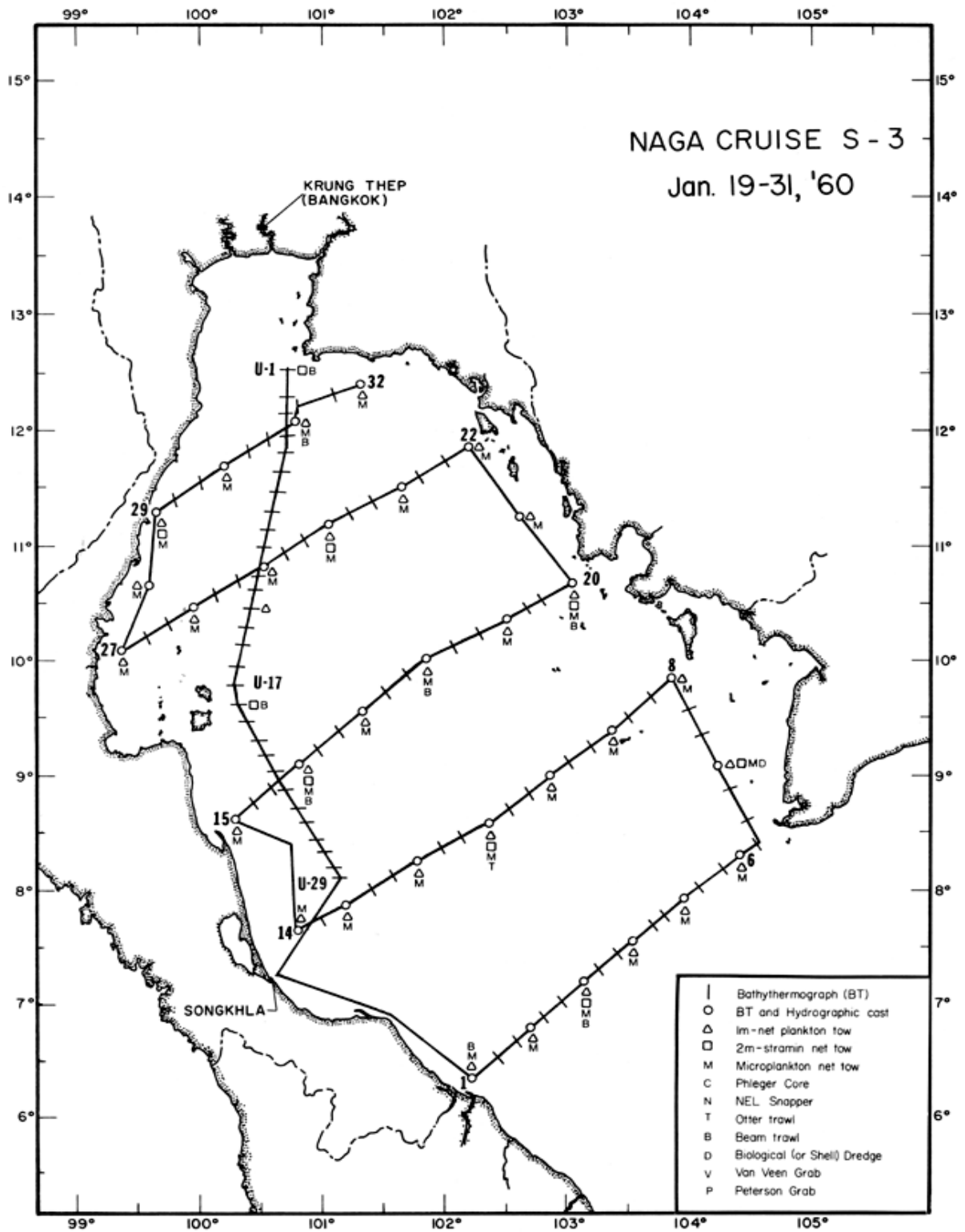
Oceanog. Sta. No.	Oceanog. Sta. No.	Blo. Sta. No.	Time	Depth haul MHO	Sky Conditions		Oceanog. Sta. No.	Blo. Sta. No.	Time	Depth haul MHO	Sky Conditions	
					Ant. 10ths	Cloud Type					Ant. 10ths	Cloud Type
8	157		0841-0849	70	6	AS Cu	5	259	0930-0944	200	5	SC Cu
9	158		1032-1040		8	NS SC	10	261	2037-2052	200	2	night
10	160		1342-1353		2	Cu	16	263	1108-1123	200	2	AC Cu AC
11	161		1615-1624	60	2	Cu AS	17	264	1334-1349	200	5	SC AC Cu
12	162		1846-1854	30	3	CS Cu	20	265	2028-2043	200		night
13	164		2132-2141	30	2	night	24	267	0552-0606	200		night
18	166		0900-0908	50	2	Cu	27	268	1110-1124	200	8	AS SC
20	167		1336-1344	60	8	Cu AC	29	269	1503-1518	200	10	AS SC
22	168		1717-1725		7	Cu	31	270	1939-1953	200		night
22A	170		1745-1753		7	Cu	36	272	0826-0840	200	10	NS FC
23	171		2006-2013	50		night	38	273	1327-1341	200	10	NS
28	173		0730-0740	60	8	Cu SC	41	274	2009-2023	200		night
31	174		1416-1429	85	4	Cu	46	276	0848-0903	200	9	NS
34	175		1936-1944	50		night	48	277	1329-1344	200	9	SC CS Cu
39A	178		0752-0802	60	4	SC Cu	50	278	1907-1921	200		night
42	179		1426-1434	50	6	Cu FC	56	279	0824-0838	200	10	AS SC
44	180		1849-1859	65		night	58	280	1258-1313	200	10	AS Cu SC
56	182		0652-0700	40	3	Cu AC AS	61	281	1920-1924	200		night
57	183		0752-0800	50	4	Cu AC C10Cu	62	283	2240-2249	200		night
58	184		0914-0920	30	8	Cu AC AS	63	284	0109-0117	40		night
72	186		1536-1543	20	8	SC NS Cu	66	285	0757-0811	200	2	Cu
74	187		2110-2118	25		night	68	286	1243-1257	200	9	AC AS
75	189		0738-0746	70			71	287	1931-1945	200		night
79	190		1050-1058	7	4	SC AC AS	76	289	0747-0801	180	10	AS AC
83	193		1534-1547	120	9	NS SC	78	290	1227-1242	200	8	AS AC Cu
85	194		1718-1728	90	9	AS AC NS	81	291	1911-1926	200		night
87	195		1923-1938	200		night	86	293	0736-0751	200	9	AS Cu
127	198		1250-1305	200	4	AS FC AC	88	294	1217-1231	200	1	Cu AS
127(a)	199		1340-1355	200	4	AS FC AC	91	295	1901-1915	200		night
160	202		0902-0916	200	2	Cu						
164	203		1915-1929	200		night						
164x	204		1935-2020	650		night						
169	205		0718-0732	200	3	Cu						
169x	206		0745-0831	650	2	Cu						

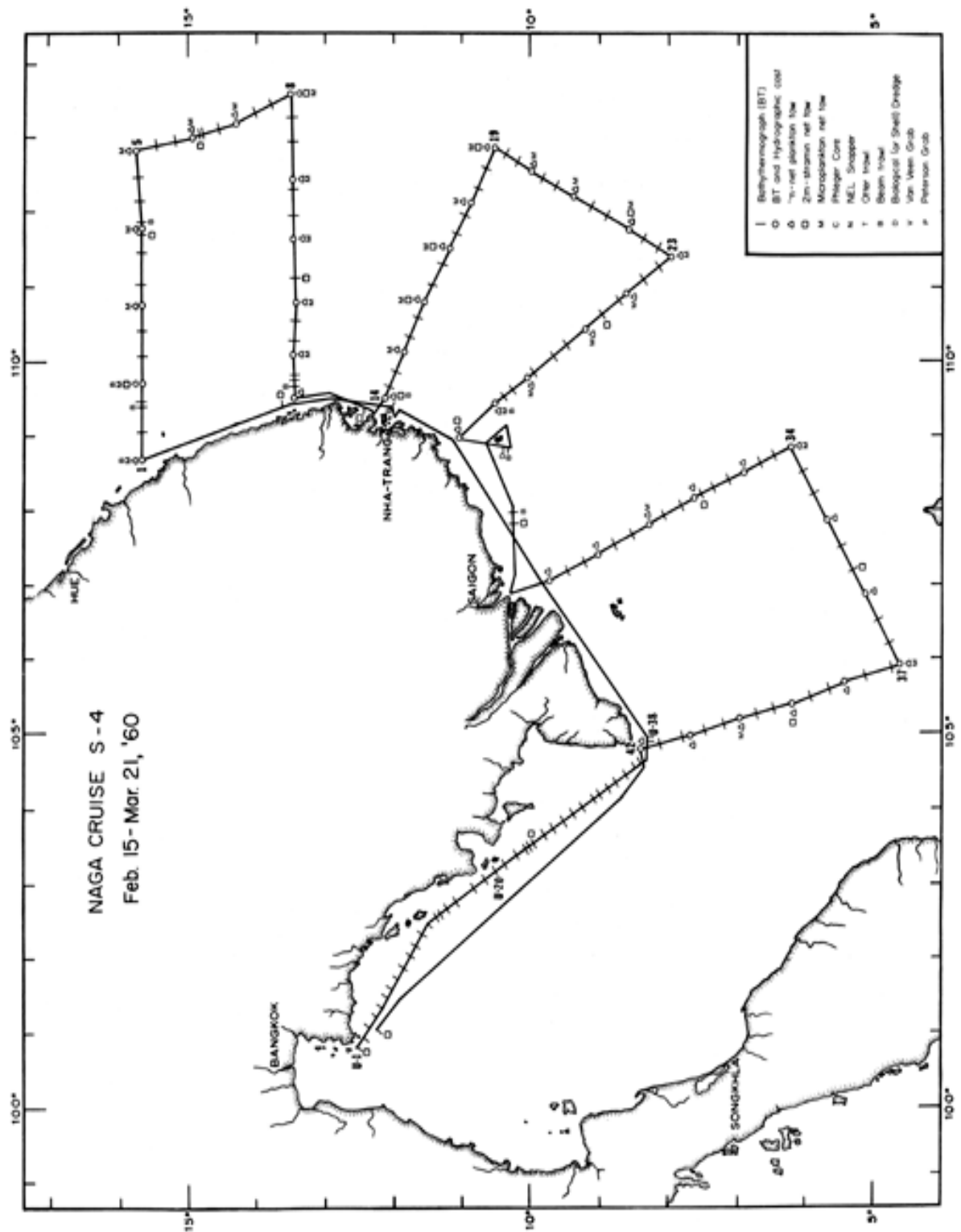


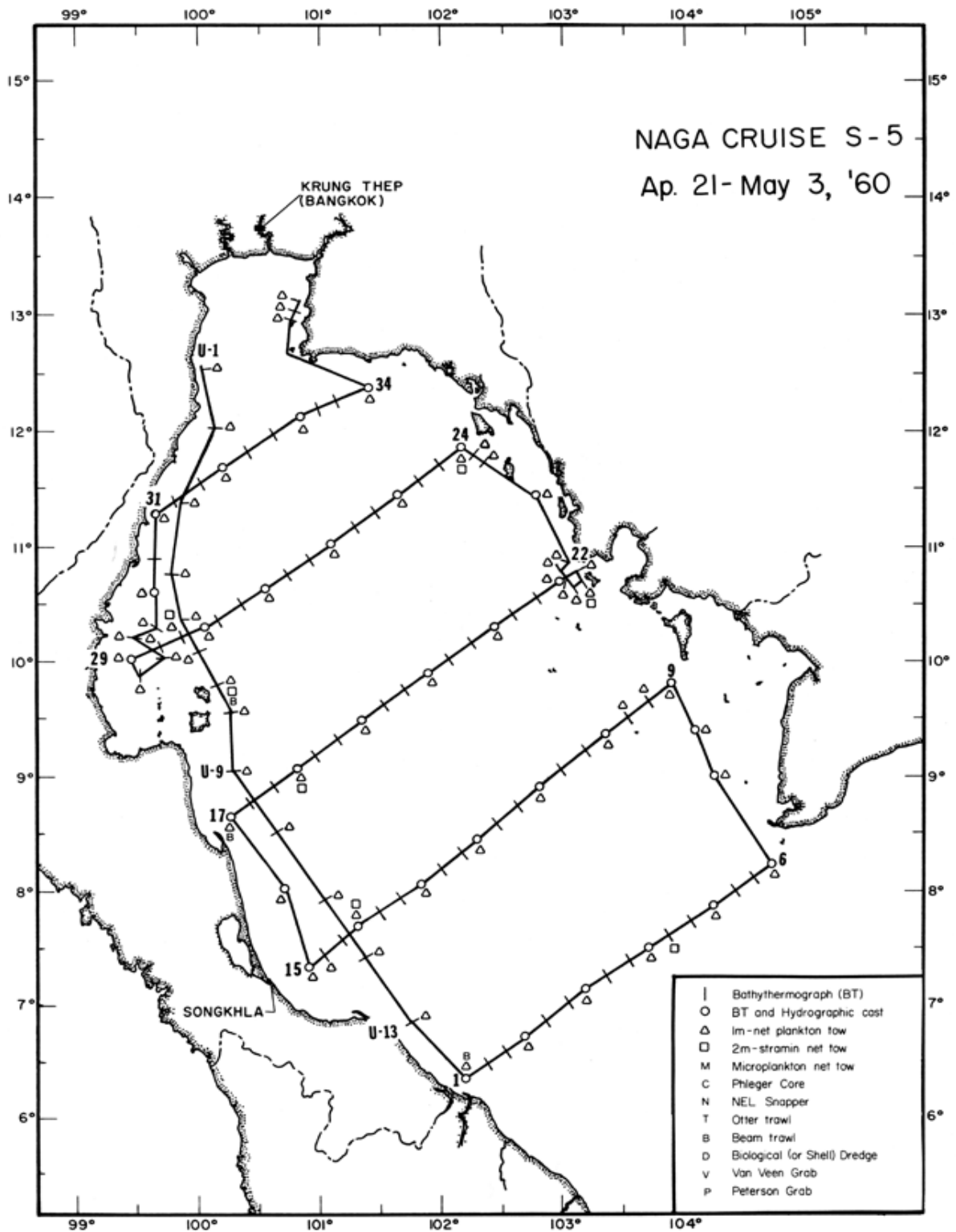


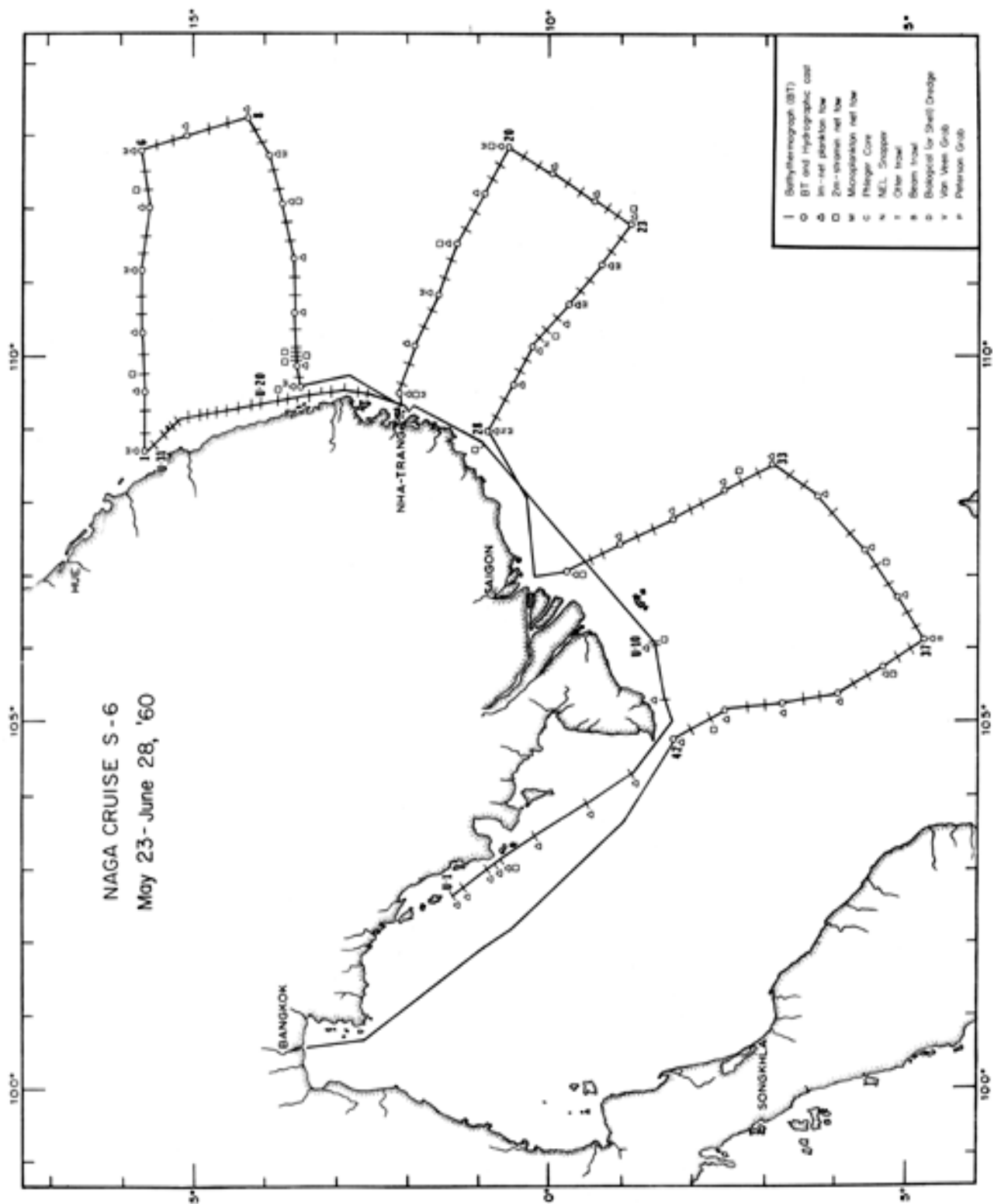


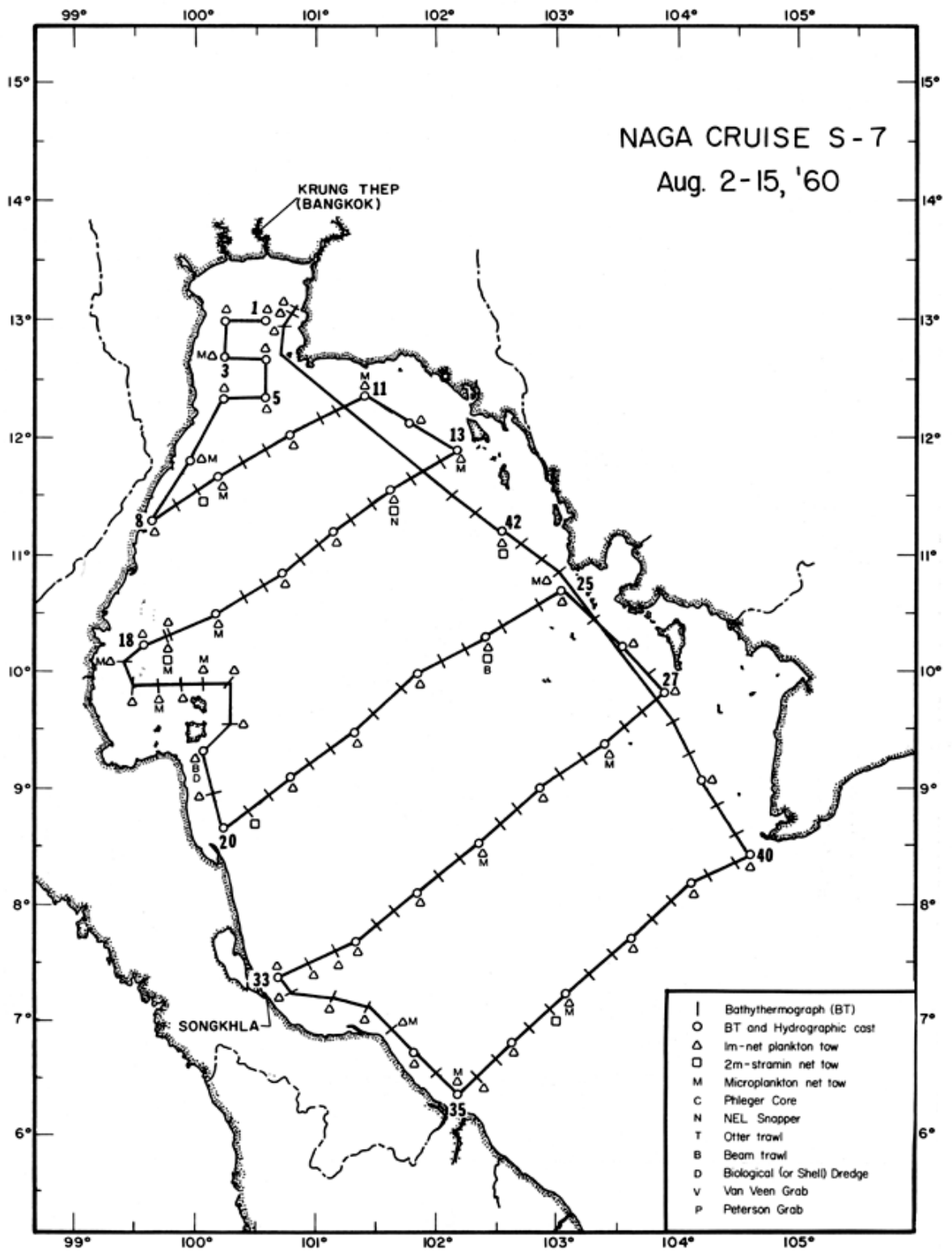


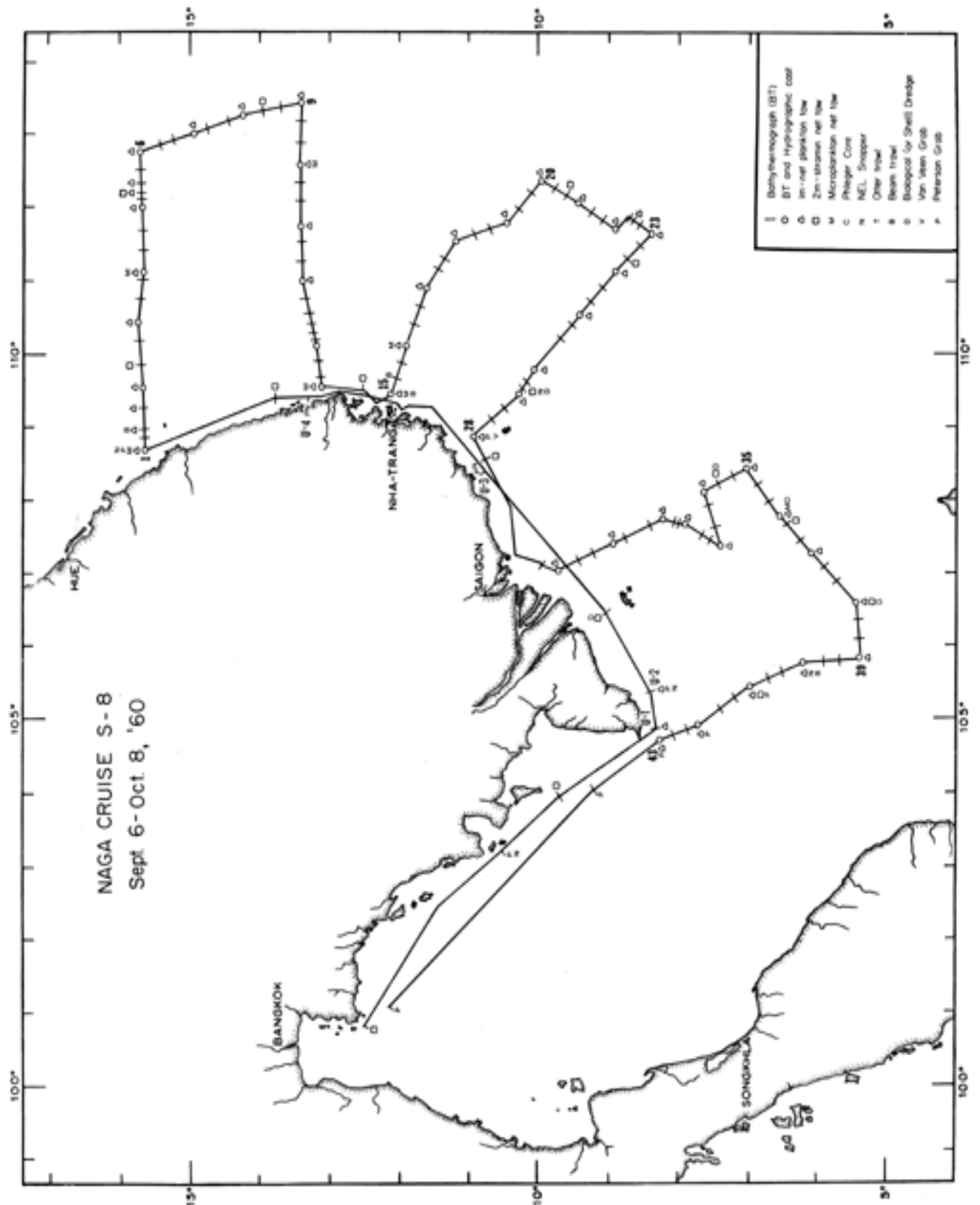


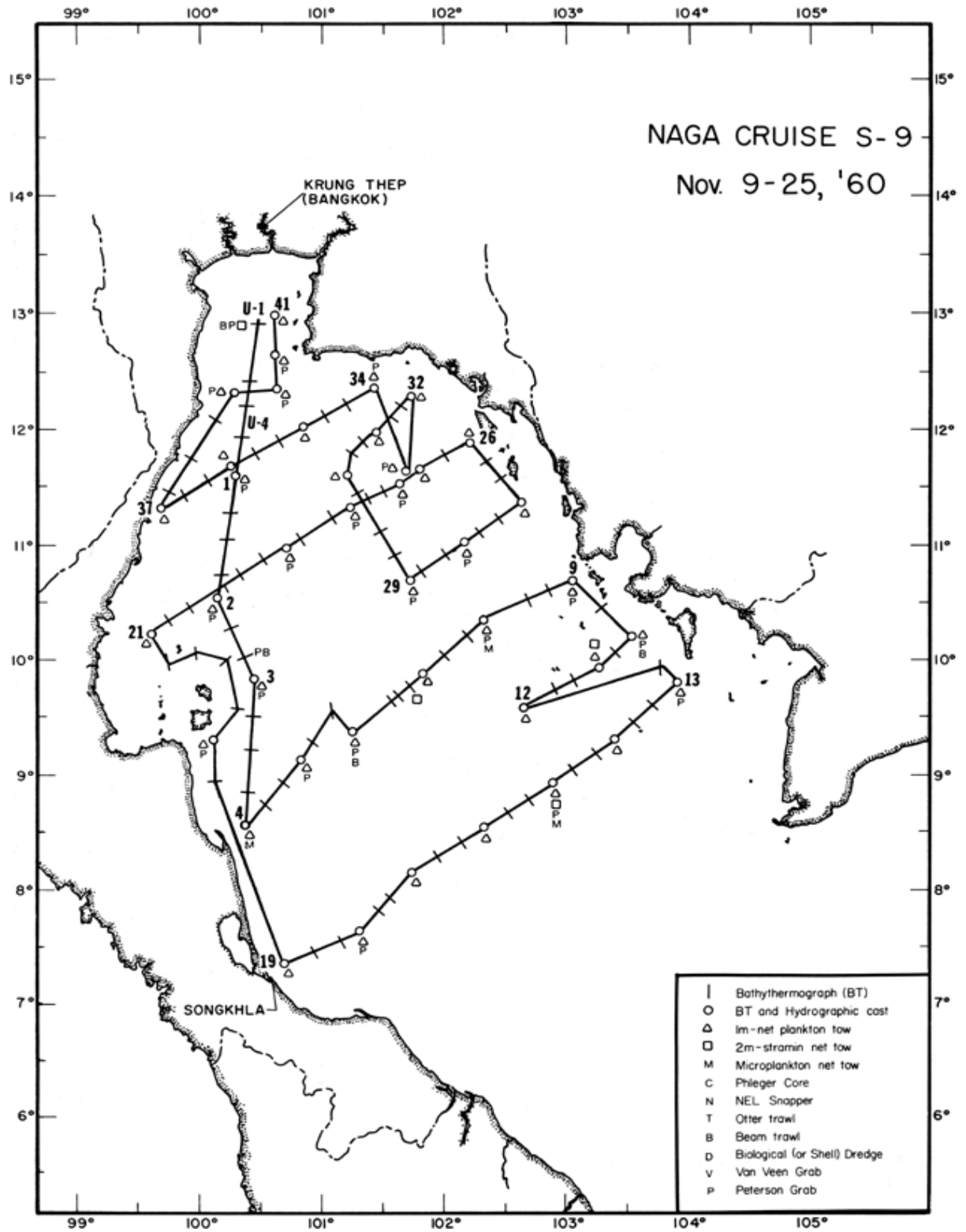




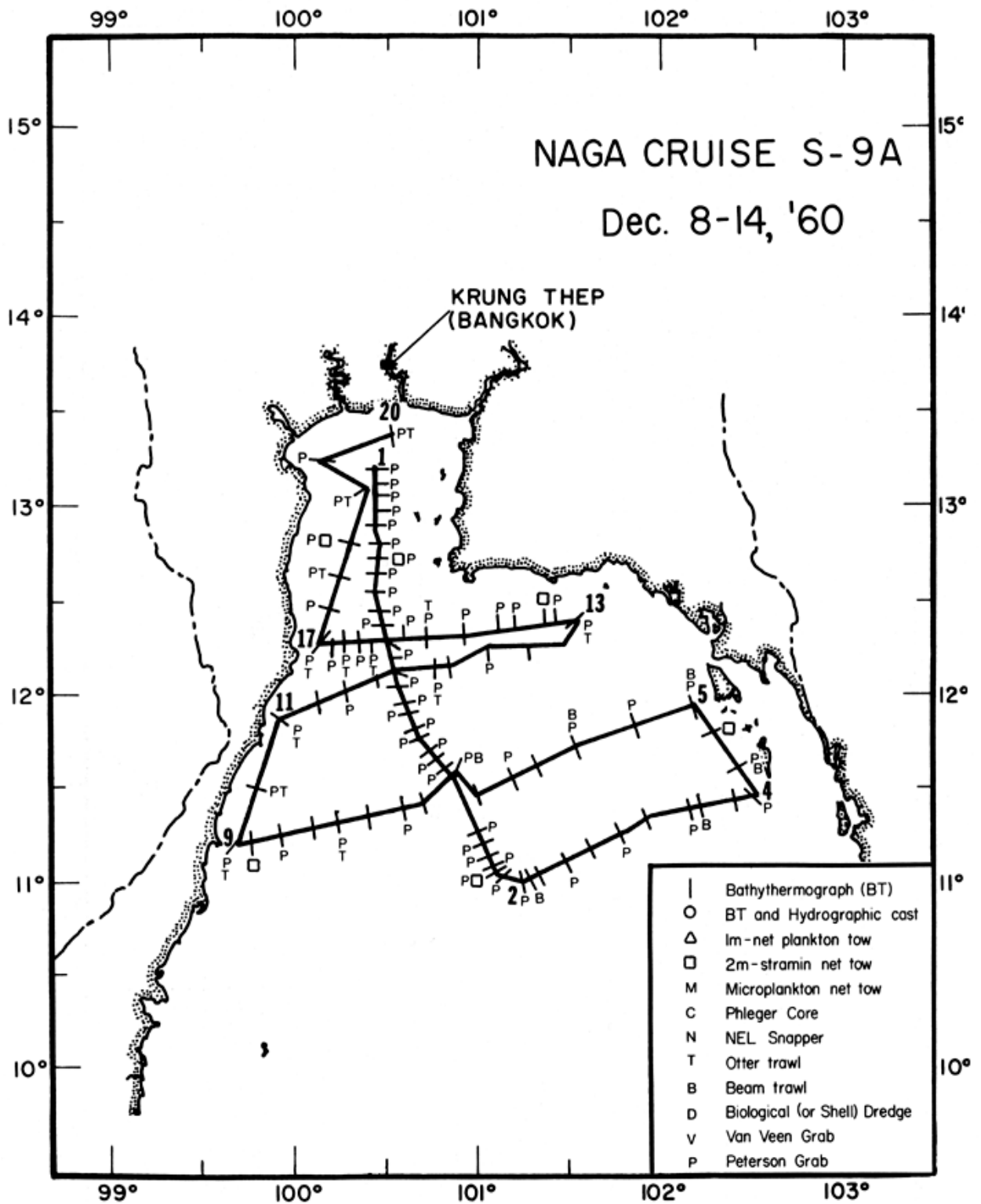


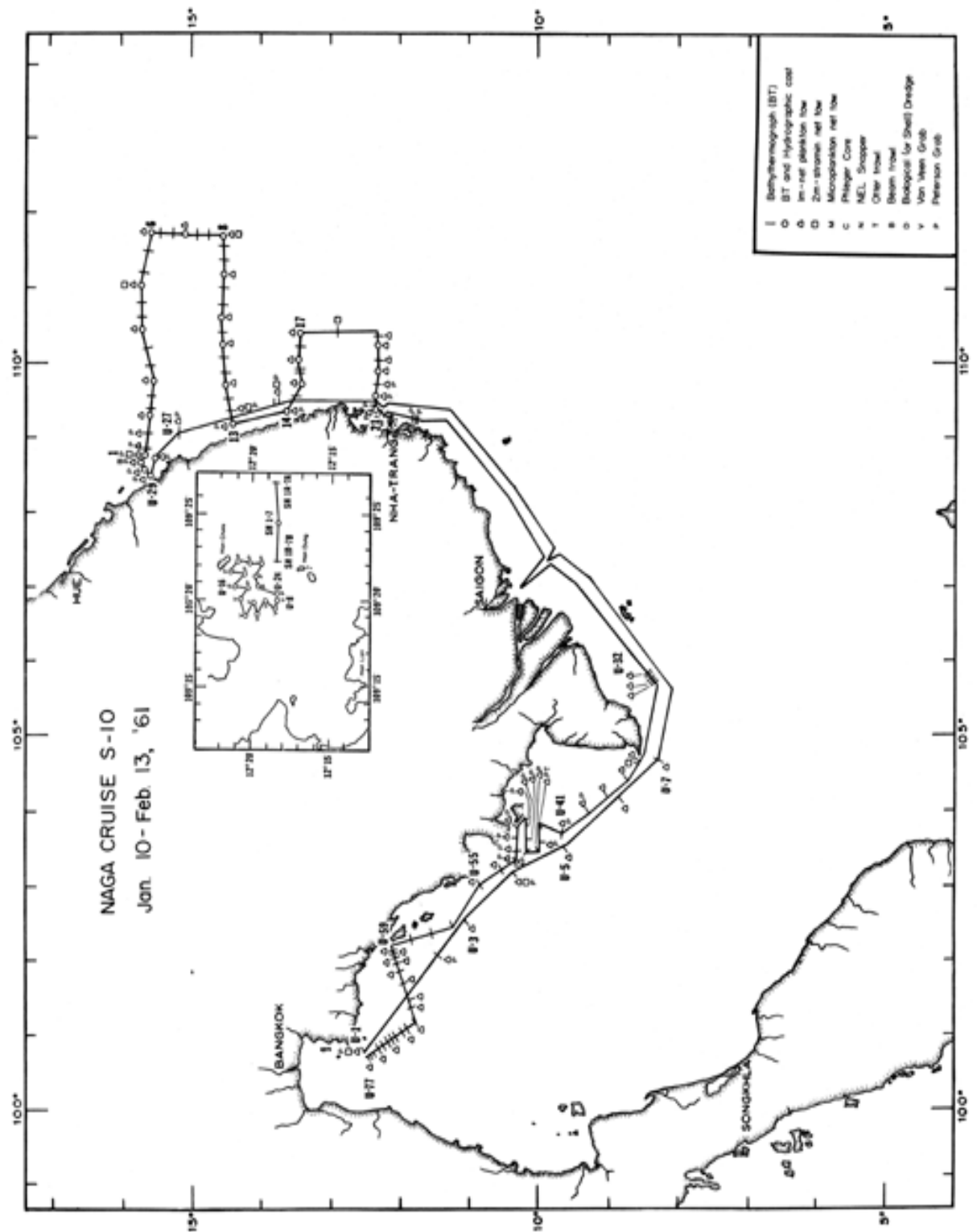


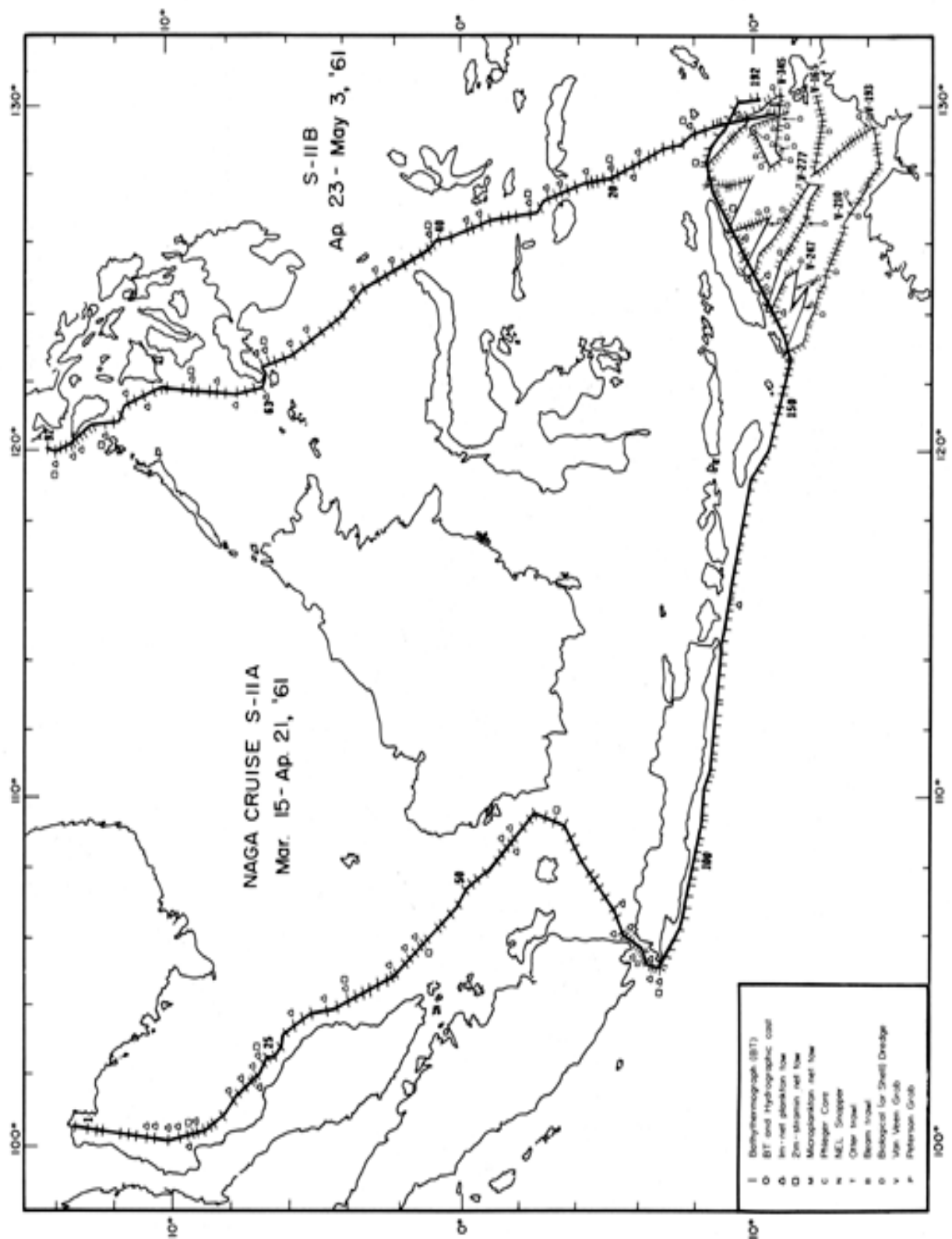


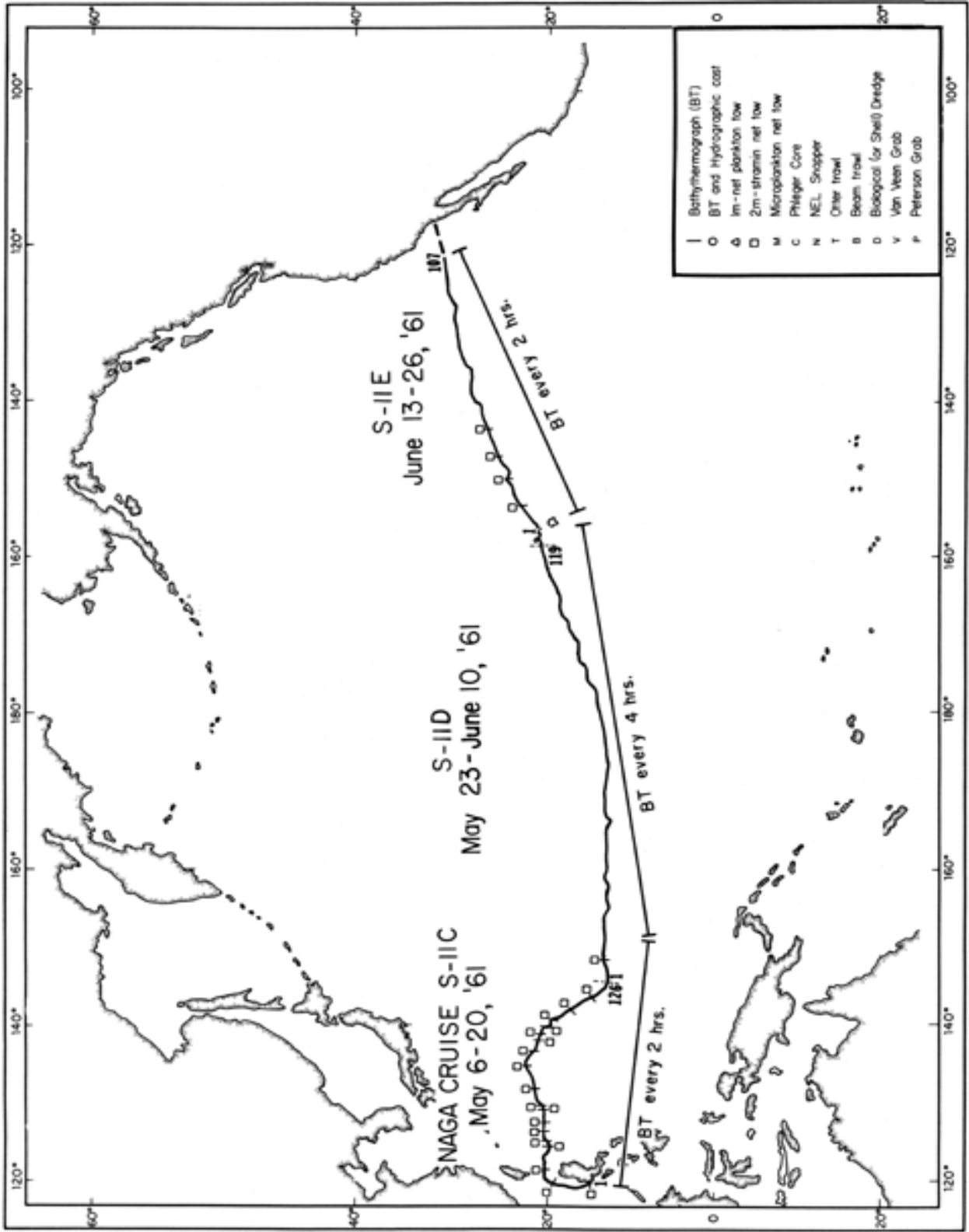












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## APPENDIX

This Appendix is arranged in the chronological order of hydrographic stations occupied on each of the Naga cruises; the cruises also appear in consecutive chronological order. Preceding the tabulated data is given for each station: ship's name, date, time (GCT hour), location (latitude and longitude), the depth of (sonic) sounding, wind direction and force, weather conditions, sea condition and wire angle. The time given is that of the messenger times and wire angles are given in the order of increasing depth.

The data from the hydrographic casts made on the Naga Expedition cruises S1, S2, S3, S4, S5, S6, S7, S8, S9 and S10 appear here as interpolated or as computed. The procedure of data processing is described by Klein (1973). The observed values of temperature ( $T$  in degrees of Centigrade), salinity ( $S$  in grams per kilogram, or [permil], obtained by chlorinity titration) and oxygen ( $O_2$  as dissolved oxygen in milliliters per liter) are tabulated at depths sampled ( $Z$  in meters): The density anomaly ( $\sigma_t$  function of salinity in grams per liter, Sverdrup, Johnson and Fleming, 1946) and the specific volume thermosteric anomaly ( $\sigma_T$  in centiliters per ton, Montgomery and Wooster, 1954) are computed from the tabulated data (except as explained below).

The temperature values given are the average of the corrected readings of the paired reversing thermometers in each Nansen bottle. Where agreement between the two was not within 0.1 °C an alternate value is given in a footnote. Unprotected reversing thermometers accompanied each Nansen bottle which was lowered 100 meters or more for depth determination.

The salinity values were obtained from chlorinity titration (U.S. Naval Oceanographic Office Publication No. 607, 1968). Where salinity bottle numbers appear to have been reversed on the data forms the salinity values have been tabulated in the order they appear with the footnote reference "possible transposition". In such case the dependent values of  $\sigma_t$  and  $\sigma_T$  which are entered between parentheses are tabulated as if the samples had been transposed.

The oxygen values represent dissolved oxygen content as determined by the Winkler method (*ibid.*).

In addition to the above-mentioned footnotes two special notations are used throughout the tabulation for values which were not accepted in the drawing of a property curve;

r: rejected value (where the value seems to be definitely wrong), or

u: uncertain value (where the value may be correct; occasionally it can influence the drawing of the property curve).

Where salinity values are followed by either of these notations, the dependent values for  $\sigma_t$  and  $\sigma_T$  are entered between parentheses and have been computed from the observed temperature value and a salinity value determined from the T-S diagram as described by Klein (1973).

A hyphen is used to indicate a missing observed value and, thus, the consequentially missing computed values.



INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; October 19, 1959; 1545 GCT; 12°03.5'N, 100°44'E; sounding, 34 m; wind, 360°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	28.04	30.86	4.46	19.30	842
5	28.04	30.87	4.53	19.31	842
10	28.66	33.16	3.88	20.82	696
20	28.54	33.15	3.61	20.85	693
25	28.54	33.12	3.65	20.83	695

STRANGER; October 20, 1959; 1515 GCT; 9°03'N, 100°48.5'E; sounding, 35 m; wind, 070°, force 4; weather, missing; sea, moderate; wire angle, 00°.

0	29.26	32.94	4.45	20.45	731
10	29.26	32.88	4.44	20.41	736
20	29.26	-	4.32	-	-
27	29.37	33.18	4.44	20.60	718

STRANGER; October 21, 1959; 1345 GCT; 6°22'N, 102°11.5'E; sounding, 25 m; wind, 070°, force 2; weather, missing; sea, slight; wire angle, 00°.

0	29.05	31.56	4.40	19.49	824
5	29.32	32.72	4.33	20.27	749
10	29.20	32.86	4.41	20.41	735
20	29.40c)	32.96	4.21	-	-

STRANGER; October 22, 1959; 0452 GCT; 7°18'N, 103°11'E; sounding, 53 m; wind, 110°, force 3; weather, overcast; sea, moderate; wire angle, 00°.

0	28.60	32.82	4.33	20.58	719
10	28.66	32.91	4.37	20.63	714
20	28.68	32.95	4.34	20.65	712
30	28.66	33.04	4.17	20.73	705
40	28.68	33.16	4.16	20.81	697

STRANGER; October 22, 1959; 1840 GCT; 8°15.5'N, 104°10'E; sounding, 24 m; wind, 070°, force 5; weather, missing; sea, moderate; wire angle, 00°.

0	28.58	31.89	4.37	19.89	785
5	28.58	31.91	4.33	19.91	784
10	28.67	32.05	4.33	19.98	776
15	28.66	32.21	4.30	20.11	765

STRANGER; October 23, 1959; 1126 GCT; 9°50'N, 103°52'E; sounding, 29 m; wind, 110°, force 5; weather, overcast; sea, slight; wire angle, 00°.

0	28.60	27.77	4.59	16.81	1083
5	28.56	28.30	4.52	17.22	1043
10	28.56	30.45	4.52	18.82	888
20	28.55	32.86	3.05	20.63	714

- a) Possible transposition.  
b) Alternate value, 26.18°C.  
c) Alternate value, 28.99°C.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; October 20, 1959; 0152 GCT; 10°43'N, 100°29'E; sounding, 56 m; wind, 020°, force 4; weather, partly cloudy; sea, slight; wire angle, 00°.

0	28.78	32.80	4.38	20.51	726
5	28.77	32.87	4.32	20.56	721
10	28.78	32.97a)	4.34	20.56	721
20	28.75	32.87a)	4.30	20.64	714
30	28.56	-	4.40	-	-
45	27.86	33.29	3.81	21.18	662

STRANGER; October 21, 1959; 0050 GCT; 7°50'N, 101°19'E; sounding, 46 m; wind, 070°, force 4; weather, overcast; sea, moderate; wire angle, 08°.

0	29.00	32.85	4.36	20.47	729
10	29.00	32.84	4.38	20.47	730
20	29.00	32.87	4.36	20.49	728
30	28.98	32.87	4.39	20.50	727
40	27.14b)	33.80	3.24	21.79	603

STRANGER; October 21, 1959; 2150 GCT; 6°49'N, 102°42'E; sounding, 46 m; wind, 080°, force 4; weather, missing; sea, moderate; wire angle, 00°.

0	28.82	32.99	4.36	20.64	714
10	28.80	32.95	4.38	20.62	716
20	28.80	32.95	4.64	20.62	716
30	28.80	32.99	4.42	20.64	713
38	28.77	33.13	4.00	20.76	702

STRANGER; October 22, 1959; 1138 GCT; 7°46'N, 103°40'E; sounding, 38 m; wind, 080°, force 6; weather, overcast; sea, rough; wire angle, 05°.

0	28.45	32.95	4.18	20.73	705
10	28.46	32.92	4.52	20.70	707
20	28.47	32.92	4.20	20.70	708
30	28.43	32.97	4.36	20.75	703

STRANGER; October 23, 1959; 0418 GCT; 9°10'N, 104°12.5'E; sounding, 23 m; wind, 350°, force 4; weather, cloudy; sea, slight; wire angle, 00°.

0	28.74	31.22	4.44	19.34	838
5	28.74	31.25	4.40	19.36	836
10	28.57	31.27	4.27	19.43	830
15	28.59	31.54	4.28	19.63	811

STRANGER; October 23, 1959; 1548 GCT; 9°28'N, 103°28'E; sounding, 43 m; wind, 080°, force 4; weather, missing; sea, moderate; wire angle, 00°.

0	28.46	32.12	4.59	20.10	765
4	28.45	32.08	4.45	20.08	767
18	28.47	32.12	4.47	20.10	765
28	28.46	32.14	4.47	20.12	763
38	28.31	33.10	3.81	20.89	690

S10  
NAGA  
S-1

1 2

3 4

5 6

7 8

9 10

11 12

S10  
NAGA  
S-1

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

13 14 STRANGER; October 23, 1959; 2153 GCT; 9°03.5'N, 102°53'E; sounding, 62 m; wind, 070°, force 4; weather, missing; sea, moderate; wire angle, 00°.

0	28.50	32.63	4.49	20.47	729
10	28.52	32.63	4.44	20.47	730
20	28.54	32.64	4.44	20.47	730
30	28.52	32.66	4.42	20.49	728
40	27.90	33.12	3.13	21.04	675
50	27.13	33.53	4.05	21.59	622

15 16 STRANGER; October 24, 1959; 1023 GCT; 8°15'N, 101°55'E; sounding, 66 m; wind, 130°, force 6; weather, overcast; sea, moderate; wire angle, 03°.

0	28.27	32.60	4.47	20.53	724
10	28.29	32.60	4.54	20.52	725
20	28.34	32.69	4.54	20.57	720
30	28.32	32.72	4.45	20.60	717
40	28.40	32.90	4.38	20.71	707
49	27.53	33.54	4.08	21.47	634

17 18 STRANGER; October 24, 1959; 2040 GCT; 7°25'N, 100°43.5'E; sounding, 24 m; wind, 080°, force 2; weather, missing; sea, slight; wire angle, 00°.

0	28.68	32.39	4.50	20.24	752
5	28.69	32.45	4.37	20.28	748
10	28.69	32.50	4.37	20.31	745
15	28.80b)	32.50	4.28	20.28	748

19 20 STRANGER; October 25, 1959; 1715 GCT; 9°07'N, 100°48'E; sounding, 35 m; wind, 100°, force 2; weather, missing; sea, slight; wire angle, 00°.

0	28.70	32.63		20.41	736
10	28.72	32.61		20.39	738
20	28.74	32.68		20.43	733
25	28.73	32.65		20.41	735

21 22 STRANGER; October 26, 1959; 0426 GCT; 10°01.5'N, 101°55'E; sounding, 70 m; wind, 040°, force 2; weather, overcast; sea, slight; wire angle, 00°.

0	28.66	32.48	4.49	20.31	745
10	28.61	32.46	4.32	20.31	745
20	28.62	32.48	4.37	20.32	744
30	28.60	32.46	4.47	20.31	745
40	28.48	32.50	4.42	20.38	738
50	28.45	32.50	4.42	20.39	737

23 24 STRANGER; October 26, 1959; 1604 GCT; 10°41'N, 103°01.5'E; sounding, 35 m; wind, 060°, force 4; weather, missing; sea, slight; wire angle, 00°.

0	28.76	31.81	4.38	19.77	797
10	28.89	32.01	4.45	19.88	786
15	28.84	32.93	4.03	20.59	719
20	28.65	33.13	3.49	20.80	698
25	28.63	33.15	3.58	20.82	696

a) Alternate value, 28.83°C.

b) Alternate value, 28.11°C.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; October 24, 1959; 0224 GCT; 8°40'N, 102°25.5'E; sounding, 73 m; wind, 060°, force 4; weather, cloudy; sea, moderate; wire angle, 08°.

0	28.35	32.61	4.40	20.51	726
10	28.34	32.60	4.44	20.50	726
25	28.37	32.64	4.51	20.52	725
40	28.45	32.74	4.44	20.57	720
49	27.88	33.42	4.10	21.27	653
64	26.70	33.67	2.92	21.83	599

STRANGER; October 24, 1959; 1545 GCT; 7°49'N, 101°19'E; sounding, 47 m; wind, 080°, force 2; weather, missing; sea, moderate; wire angle, 00°.

0	28.70	32.75	4.89	20.50	727
10	28.69	32.77	5.15	20.52	725
20	28.70	32.80	4.42	20.54	724
30	28.70a)	32.77	4.44	20.51	726
38	27.10	33.72	2.74	21.74	608

STRANGER; October 25, 1959; 1207 GCT; 8°40'N, 100°14.5'E; sounding, 19 m; wind, 050°, force 3; weather, missing; sea, moderate; wire angle, 00°.

0	28.61	31.18	4.54	19.35	837
6	28.64	31.24	4.65	19.39	834
12	28.95	32.25	4.35	20.04	771

STRANGER; October 25, 1959; 2300 GCT; 9°34'N, 101°22'E; sounding, 66 m; wind, 040°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	28.35	32.51	4.52	20.43	733
10	28.37	32.57	4.47	20.47	730
20	28.38	32.58	4.76	20.48	729
35	28.39	32.59	4.70	20.48	729
54	28.37	32.85	4.37	20.68	709

STRANGER; October 26, 1959; 0951 GCT; 10°21.5'N, 102°29'E; sounding, 63 m; wind, 060°, force 3; weather, cloudy; sea, slight; wire angle, 00°.

0	28.66	32.27	4.64	20.15	760
10	28.67	32.25	4.57	20.13	762
20	28.73	32.61	4.57	20.38	738
30	28.67	32.63	4.44	20.42	735
40	28.73	32.69	4.50	20.44	732
50	28.38	32.84	4.33	20.67	710

STRANGER; October 26, 1959; 2130 GCT; 11°17.5'N, 102°35.5'E; sounding, 41 m; wind, 030°, force 3; weather, missing; sea, moderate; wire angle, 00°.

0	28.78	30.84	4.47	19.04	867
10	29.00	31.30	4.59	19.31	841
20	28.58	32.80	4.40	20.58	720
30	28.32	32.90	4.40	20.74	704

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; October 28, 1959; 0406 GCT; 11°52.5'N, 102°11'E; sounding, 37 m; wind, 050°, force 2; weather, partly cloudy; sea, slight; wire angle, 00°.

0	29.14	31.66	4.67	19.54	820
10	28.80	32.77	4.70	20.48	729
20	28.40	32.88	4.64	20.69	708
30	28.38	32.98	4.47	20.78	700

STRANGER; October 28, 1959; 1413 GCT; 11°06'N, 101°01'E; sounding, 55 m; wind, 330°, force 2; weather, missing; sea, slight; wire angle, 00°.

0	28.72	32.58	4.64	20.36	740
10	28.70	32.55	4.64	20.35	741
20	28.70	32.62	4.54	20.40	736
30	28.62	32.91	4.50	20.64	713
40	28.50	32.96	4.47	20.72	706

STRANGER; October 29, 1959; 0045 GCT; 10°22'N, 99°56.5'E; sounding, 50 m; wind, 060°, force 1; weather, partly cloudy; sea, slight; wire angle, 00°.

0	27.82	31.39	4.64	19.77	797
10	28.05	32.09	4.60	20.22	754
20	28.28	32.76	4.40	20.64	713
30	28.29	32.82	4.23	20.68	709
40	28.34	32.93	4.13	20.75	703

STRANGER; October 29, 1959; 1040 GCT; 10°37'N, 99°37'E; sounding, 45 m; wind, 320°, force 1; weather, overcast; sea, slight; wire angle, 12°.

0	28.68	30.14	4.49	18.55	914
10	28.18	32.04	4.37	20.14	762
20	28.16	32.16	4.33	20.23	752
29	28.18	32.18	4.32	20.24	752

STRANGER; October 29, 1959; 2127 GCT; 11°39'N, 100°12'E; sounding, 39 m; wind, calm; weather, missing; sea, calm; wire angle, 00°.

0	28.64	32.77	4.44	20.53	724
10	28.61	32.77	4.40	20.54	723
20	28.50	32.75	4.40	20.56	721
30	28.40	32.76	4.37	20.60	717

STRANGER; October 30, 1959; 1235 GCT; 12°29'N, 101°18'E; sounding, 30 m; wind, 240°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	29.44	32.18	4.57	19.82	792
5	29.42	32.18	4.50	19.83	791
10	28.78	32.12	4.49	20.00	775
20	28.43	32.24	4.44	20.20	755

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; October 28, 1959; 0859 GCT; 11°29'N, 101°38'E; sounding, 62 m; wind, 290°, force 2; weather, cloudy; sea, slight; wire angle, 00°.

0	29.31	32.05	4.60	19.77	797
10	28.71	32.79	4.49	20.52	724
20	28.54	32.88	4.49	20.65	713
30	28.34	33.01	4.47	20.81	697
50	27.86	33.31	2.72	21.19	660

STRANGER; October 28, 1959; 1932 GCT; 10°44'N, 100°29'E; sounding, 56 m; wind, 320°, force 2; weather, missing; sea, slight; wire angle, 00°.

0	28.62	32.68	4.50	20.47	730
10	28.62	32.67	4.47	20.46	730
20	28.62	32.70	4.55	20.49	728
30	28.43	32.83	4.45	20.65	713
45	27.24	33.73	2.65	21.71	611

STRANGER; October 29, 1959; 0535 GCT; 10°00.5'N, 99°27.5'E; sounding, 27 m; wind, 120°, force 3; weather, partly cloudy; sea, slight; wire angle, 00°.

0	28.34	30.30	4.50	18.78	892
10	28.20	30.26	4.62	18.80	891
18	28.36	30.46	4.60	18.90	881

STRANGER; October 29, 1959; 1636 GCT; 11°17'N, 99°39'E; sounding, 23 m; wind, 240°, force 2; weather, missing; sea, slight; wire angle, 00°.

0	28.94	29.80	4.47	18.21	947
5	28.82	30.06	4.40	18.45	924
10	28.76	30.12	4.40	18.51	918
15	28.47	31.59	4.07	19.70	803

STRANGER; October 30, 1959; 0220 GCT; 12°01'N, 100°46'E; sounding, 32 m; wind, 050°, force 2; weather, partly cloudy; sea, calm; wire angle, 00°.

0	28.70	32.87	4.38	20.59	718
10	28.52	32.85	4.44	20.63	714
15	28.45	32.81	4.37	20.62	715
20	28.52	32.93	4.22	20.69	708

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	m/L	g/L	cl/ton

STRANGER; November 26, 1959; 0000 GCT; 12°54'N, 109°32'E; sounding, 163 m; wind, 040°, force 4; weather, cloudy; sea, very rough; wire angle, 24°.

0	26.45	33.80	4.52	22.02	581
9	26.42	33.40u	4.50	(22.04)	(579)
28	26.50	34.14a)	4.42	(22.15)	(569)
45	26.48	33.99a)	4.40	(22.26)	(558)
69	26.44	34.17	4.40	22.29	555
92	26.38	34.21	4.32	22.34	550
119	25.98	34.29	4.30	22.52	533
128	25.76	34.60r	4.25	(22.59)	(527)
137	25.45	34.28	4.19	22.68	518

STRANGER; November 26, 1959; 1819 GCT; 12°51'N, 110°24'E; sounding, 2232 m; wind, 050°, force 6; weather, missing; sea, high; wire angle, - .

0	26.66	33.63	4.34	21.81	601
10	26.68	33.72u	4.34	(21.81)	(601)
30	26.64	33.59	4.30	21.80	602
54	26.32	33.95	4.14	22.17	567
84	20.97	34.58	3.64	24.20	373
107	18.41	34.87u	2.97	(24.94)	(302)
160	15.12	34.67	2.92	25.71	229
211	13.19	34.55	2.40	26.03	199
313	11.10	34.45	2.32	26.34	169

STRANGER; November 27, 1959; 1747 GCT; 13°04'N, 111°43'E; sounding, 2200 m; wind, 040°, force 6; weather, missing; sea, high; wire angle, - .

0	26.40	33.83	4.51	22.05	578
9	26.39	33.85	4.48	22.07	576
28	26.12	34.20	4.43	22.42	543
52	20.92	34.56	3.28	24.20	373
80	18.29	34.60	2.47u	24.91	305
102	17.42	34.65	2.77	25.16	281
151	15.38	34.61	2.64	25.61	239
200	13.96	34.56	2.76	25.88	213
303	11.37	34.50	2.23	26.34	169
407	9.42	34.45	2.13	26.64	141
592	7.18	34.48	1.79	27.01	106
834	5.15	34.55	1.76	27.32	76
1050	3.93	34.59	1.93	27.49	60

a) Possible transposition.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	m/L	g/L	cl/ton

STRANGER; November 26, 1959; 0743, 0830 GCT; 12°46'N, 109°52'E; sounding, 1528 m; wind, 040°, force 5; weather, cloudy; sea, high; wire angle, - , - .

0	26.39	33.96	4.34	22.15	569
10	26.36	34.19	4.34	22.34	551
29	25.56	34.29	4.29	22.66	520
54	25.32	34.79u	4.30	(22.78)	(508)
83	24.96	34.47	4.14	22.98	489
106	22.36	34.62	3.85	23.85	406
157	17.58	-	3.10	(25.09)	(288)
208	15.16	34.58	3.00	25.64	236
315	12.36	34.47	2.55	26.12	190
356	11.02	34.42	2.22	26.33	170
500	8.89	34.40	2.12	26.69	136
712	6.80	34.43	1.72	27.02	105
919	4.94	34.53	1.77	27.33	75

STRANGER; November 27, 1959; 0919 GCT; 13°06'N, 111°02'E; sounding, 2661 m; wind, 040°, force 6; weather, cloudy; sea, high; wire angle, 30°.

8	26.64	33.59	4.46	21.79	603
26	26.60	33.61	4.40	21.82	600
48	22.52	34.51	4.18	23.73	418
73	17.96	34.62	2.60	25.01	296
95	16.70	34.50u	-	(25.31)	(267)
142	15.42	34.62	2.70	25.61	239
190	14.04	34.59	2.67	25.88	213
286	12.17	34.50	2.52	26.18	184
381	10.29	34.49	2.10	26.52	152
550	7.88	34.46	1.88	26.89	117
785	5.65	34.57	1.74	27.28	80
1000	4.26	34.58	1.86	27.45	64

STRANGER; November 30, 1959; 0725 GCT; 12°09'N; 109°24'E; sounding, 95 m; wind, 030°, force 5; weather, partly cloudy; sea, moderate; wire angle, 03°.

0	26.26	33.48	4.45	21.94	599
10	26.26	33.48	4.45	21.94	599
20	26.18	33.54	4.22	21.90	593
30	26.16	33.66	4.44	21.99	584
50	26.08	33.80	4.40	22.13	571
75	25.89	33.85	4.37	22.23	561

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INTERPOLATED				COMPUTED	
Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; November 30, 1959; 1522, 1650 GCT;  
11°52'N, 110°08'E; sounding, 2067 m; wind, 030°,  
force 5; weather, missing; sea, moderate; wire  
angle, -, -.

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0	26.66	33.48	4.37	21.70	611
10	26.66	33.48	4.42	21.70	611
20	26.68	33.49	4.44	21.70	611
30	26.68	33.49	4.44	21.70	611
55	26.28	33.84	4.42	22.09	574
84	22.10	34.52	3.88	23.84	407
108	19.24	34.61	3.14	24.68	327
161	15.56	34.58	2.87	25.54	245
213	14.08	34.55	2.74	25.84	217
320	11.10	34.49	2.02	26.38	165
430	9.90	34.45	1.78	26.56	148
535	8.71	34.44	1.71	26.75	130
643	7.56	34.45	1.68	26.92	114
539a)	8.66	34.42	1.70	26.74	131
741	6.54	34.46	1.68	27.08	99
950	4.77	34.51	1.88	27.33	75
1152	3.70	34.57	1.78	27.49	60
1374	3.12	34.60	1.92	27.58	52
1583	2.75	34.60	1.70	27.61	49

STRANGER; December 1, 1959; 1137, 1240 GCT;  
11°17'N, 111°23'E; sounding, 3180 m; wind, 040°,  
force 4; weather, missing; sea, rough; wire  
angle 05°, 04°.

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0	27.05	33.42	4.44	21.53	628
10	27.05	33.41	4.37	21.53	628
64	20.30	34.60	2.99	24.40	354
87	19.15	34.58	3.00	24.68	327
135	17.19	34.61	2.44	25.19	279
192	14.64	34.61	2.76	25.78	223
300	12.50	34.52	2.39	26.14	188
405	10.29	34.48	2.25	26.51	153
511	8.56	34.46	1.85	26.79	127
622	7.34	34.50	1.73	27.00	107
540a)	8.46	34.43	1.70	26.78	128
748	6.17	34.51	1.72	27.16	91
967	4.50	34.54	1.78	27.39	70
1171	3.60	34.56	2.09	27.50	59
1381	3.10	34.59	2.05	27.57	53

INTERPOLATED				COMPUTED	
Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; December 1, 1959; 0115, 0300, 0350  
GCT; 11°37'N, 110°46'E; sounding, 2527 m; wind,  
040°, force 5; weather, cloudy; sea, rough; wire  
angle, 12°, 20°, -.

0	27.07	33.34	4.50	21.47	634
9	27.10	33.37	4.46	21.48	633
20	27.08	33.35	4.48	21.47	634
27	27.09	33.35	4.46	21.47	634
52	27.09	33.35	4.46	21.47	634
81	20.56	34.51	3.04	24.26	367
105	18.74	34.63	2.96	24.82	314
158	15.78	34.63	2.94	25.53	246
210	13.87	34.52	2.49	25.86	215
316	11.39	34.47	2.28	26.31	172
422	9.48	34.47	2.00	26.65	140
529	8.39	34.45	1.83	26.80	126
636	7.25	34.45	1.76	26.96	110
539a)	8.46	34.45	1.79	26.80	126
745	6.16	34.50	1.71	27.16	91
969	4.58	34.54	1.89	27.39	70
1166	3.62	34.59	1.93	27.51	58
1379	3.08	34.61	1.96	27.59	51
1589	2.80	34.61	2.03	27.62	48

STRANGER; December 2, 1959; 2043, 2302 GCT;  
10°57'N, 112°02'E; sounding, 3972 m; wind, 040°,  
force 4; weather, missing; sea, missing; wire  
angle, 03°, 14°.

1	27.06	33.44	4.40	21.55	626
11	27.06	33.46	4.50	21.55	626
31	27.04	33.46	4.24	21.56	625
56	20.70	34.54	2.77	24.24	369
87	18.74	34.60	2.84	24.80	316
117	17.34	34.60	2.74	25.14	283
172	15.36	34.60	2.39	25.60	240
223	13.90	34.52	2.20	25.86	215
329	11.28	34.42	2.20	26.29	174
436	9.4 b)	34.40	1.78	26.61	144
647	7.04	34.47	1.63	27.01	106
860	5.24	34.49	1.73	27.26	82
1077	4.05	34.54	1.09u	27.43	66
1036a)	4.20	34.54	1.75	27.42	67
1331	3.26	34.56	1.93	27.54	56

a) Overlapping casts.

b) Temperature inferred from pressure thermometer and wire depth.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; December 2, 1959; 0925, 1027 GCT; 10°27'N, 112°54'E; sounding, 2533 m; wind, 050°, force 5; weather, cloudy; sea, rough; wire angle, 00°, 00°.

0	27.48	33.01	4.32	21.08	671
10	27.50	33.11	4.34	21.17	664
20	27.44	33.04	4.40	21.13	667
30	27.34	33.15	4.44	21.25	655
55	24.26	34.33	4.35	23.08	480
85	19.66	34.53	3.17	24.51	343
109	18.15	34.60	2.80	24.94	302
163	15.70	34.60	2.39	25.52	247
218	13.90	34.53	2.74	25.87	214
326	11.07	34.47	2.07	26.36	167
434	9.30	34.49	2.03	26.69	136
542	7.80	34.46	2.30	26.90	116
651	6.78	34.54u	2.07	(27.11)	(96)
753	6.16	34.52	1.93	27.18	90
972	4.54	34.54	1.87	27.39	70
1182	3.78	34.58	1.77	27.49	60
1391	3.18	34.63	1.70	27.60	50

STRANGER; December 3, 1959; 0734 GCT; 8°45'N, 111°50'E; sounding, 1398 m; wind, 040°, force 5; weather, cloudy; sea, very rough; wire angle, 05°.

0	28.20	33.01	4.29	20.86	692
10	28.21	32.98	4.24	20.83	695
29	27.34	33.21	4.24	21.29	651
53	22.94b)	34.44	4.12	23.55	435
82	20.74	34.60	3.34	24.28	365
104	19.53	34.66	3.19	24.64	331
207	15.88	34.58	2.80	25.47	252
308	11.48	34.46	2.02	26.29	174
410	9.75	34.42	1.77	26.56	148
619	7.46	34.44	1.70	26.93	113
835	5.81	34.49	1.73	27.20	88
1051	4.14	34.56	1.80	27.44	65
1267	3.50	34.59	1.90	27.54	56

- a) Overlapping casts.  
b) Alternate value, 22.21°C.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; December 2, 1959; 1911, 1936, 2052 GCT; 9°44'N, 112°26'E; sounding, 2094 m; wind, 040°, force 5; weather, missing; sea, moderate; wire angle, 18°, missing, 15°.

0	27.20	32.72	4.29	20.97	682
10	27.22	32.77	4.29	21.00	679
19	27.24	32.92	4.40	21.10	669
28	27.25	33.31	4.20	21.40	641
53	23.43	34.42	4.37	23.39	450
82	20.42	34.60	3.20	24.37	357
105	18.54	34.54	2.55	24.81	315
155	16.87	34.54	2.40	25.21	277
207	14.30	34.51	2.40	25.76	224
311	11.14	34.45	2.14	26.34	169
415	9.62	34.40	1.82	26.56	148
522	8.17	34.40	1.78	26.80	126
628	7.15	34.42	1.78	26.96	110
530a)	8.30	34.41	1.87	26.79	127
734	6.29	34.47	1.65	27.12	95
950	4.74	34.51	1.75	27.34	74
1158	3.70	34.55	1.90	27.48	61
1368	3.16	34.57	2.00	27.56	54
1587	2.88	34.61	2.10	27.61	49

STRANGER; December 3, 1959; 2022, 2049, 2207 GCT; 9°13'N, 111°14'E; sounding, 2341 m; wind, 030°, force 5; weather, missing; sea, rough; wire angle, 20°, -, 25°.

0	27.36	33.37	4.47	21.40	640
10	27.36	33.31	4.54	21.36	644
19	27.37	33.35	4.34	21.39	641
28	27.36	33.36	4.44	21.40	640
52	24.20	34.21	4.09	23.00	487
80	21.31	34.50	3.44	24.05	387
103	20.79	34.61	3.37	24.27	366
153	18.58	34.61	2.97	24.85	311
203	15.74	34.56	2.62	25.49	250
292	12.40	34.47	2.32	26.12	190
426	9.78	34.45	2.00	26.58	147
598	7.82	34.45	1.83	26.89	117
793	5.66	34.49	1.70	27.21	87
987	4.74	34.53	1.75	27.36	73
1183	3.72	34.58	1.88	27.50	59
1389	3.16	34.61	1.93	27.59	51

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; December 4, 1959; 0604, 0700 GCT;  
9°40'N, 110°38'E; sounding, 3000 m; wind, 030°,  
force 5; weather, cloudy; sea, rough; wire angle,  
25°, 25°.

15 16

0	27.77	33.19	4.19	21.14	666
9	27.79	33.18	4.17	21.13	667
18	27.77	33.26	4.39	21.19	660
27	27.77	33.28	4.34	21.21	659
50	26.90	33.66	4.42	21.77	605
76	21.70	34.56	3.72	23.99	393
98	19.59	34.67	2.99	24.64	331
149	17.12	34.61	2.87	25.21	277
201	14.60	34.54	2.70	25.72	228
309	12.06	34.46	2.62	26.18	185
415	9.92	34.42	2.10	26.53	151
524	8.42	34.42	1.85	26.78	128
632	6.94	34.45	1.77	27.02	105
524b)	8.50	34.44	1.87	26.79	127
729	6.04	34.65u	1.80	(27.16)	(92)
942	4.68	34.54	1.80	27.37	72
1146	3.68	34.57	1.88	27.49	60
1350	3.15	34.60	1.90	27.58	52
1553	2.82	34.60	2.00	27.60	50

STRANGER; December 4, 1959; 2311 GCT; 10°34'N,  
109°25'E; sounding, 256 m; wind, 020°, force 5;  
weather, partly cloudy; sea, rough; wire angle, 25°.

17 18

6	26.49	33.62	4.44	21.87	596
15	26.48	33.62	4.40	21.87	596
25	26.48	33.63	4.34	21.88	595
33	26.13	33.86	4.37	22.16	568
57	25.36	34.18	4.30	22.64	522
84	25.26	34.23	4.24	22.70	516
105	24.42	34.35	4.07	23.05	483
153	17.00	34.61	2.90	25.24	274
202	15.30	34.60	2.87	25.62	238

STRANGER; December 9, 1959; 1215, 1223 GCT;  
9°46'N, 107°03'E; sounding, 23 m; wind, 040°,  
force 5; weather, missing; sea, moderate; wire  
angle, 00°, - .

19 20

0	26.51	33.31	4.57	21.63	618
10	26.50	33.40	4.54	21.70	612
18	26.38	33.58	4.57	21.88	595

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; December 4, 1959; 1506 GCT;  
10°07'N, 110°02'E; sounding, 1353 m; wind,  
030°, force 6; weather, missing; sea, moderate;  
wire angle, 09°.

0	27.47	33.19	4.37	21.24	656
10	27.50	33.22	4.57	21.25	655
30	27.47	33.19	4.49	21.24	656
55	26.50a)	33.56	4.47	21.82	600
84	20.48	34.54	3.40	24.30	363
108	18.82	34.57	2.94	24.76	320
211	14.07	34.53	2.87	25.83	218
314	11.41	34.45	2.34	26.29	174
423	9.58	34.42	2.00	26.60	145
623	7.04	34.42	1.75	26.98	109
839	5.21	34.47	1.80	27.25	83
1059	4.10	34.53	2.00	27.43	66
1272	3.26	34.54	1.97	27.51	58

STRANGER; December 5, 1959; 0724 GCT; 11°00'N,  
108°50'E; sounding, 44 m; wind, 030°, force 6;  
weather, partly cloudy; sea, rough; wire angle, 12°.

0	26.09	33.55	4.47	21.94	589
10	26.07	33.57	4.37	21.96	587
20	26.06	33.57	4.49	21.96	587
29	25.61	33.57	4.50	22.10	574

STRANGER; December 9, 1959; 1835 GCT; 9°06'N,  
107°18'E; sounding, 32 m; wind, 070°, force 5;  
weather, missing; sea, moderate; wire angle, 00°.

0	26.28	33.78	4.49	22.05	578
10	26.28	33.89c)	4.49	(22.05)	(578)
20	26.28	33.80	4.50	22.07	576
25	26.28	33.78c)	4.45	(22.13)	(570)

- a) Alternate value, 26.85°C.  
b) Overlapping casts.  
c) Possible transposition.

INTERPOLATED				COMPUTED	
Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; December 10, 1959; 0122 GCT;  
8°28'N, 107°44'E; sounding, 55 m; wind, 070°,  
force 2; weather, overcast; sea, moderate;  
wire angle, 00°.

0	26.28	33.53	-	21.86	596
10	26.30	33.63	4.52	21.93	590
20	26.30	33.64	-	21.94	589
30	26.28	33.69	4.60	21.98	584
40	26.28	33.72	4.62	22.00	583

STRANGER; December 10, 1959; 1534 GCT;  
7°01'N, 108°24'E; sounding, 93 m; wind, 060°,  
force 3; weather, missing; sea, moderate;  
wire angle, 08°.

0	27.48	32.79	4.52	20.93	686
10	27.47	32.79	4.59	20.94	685
20	26.42	33.69	4.64	21.94	589
30	26.19	33.73	4.60	22.04	579
40	26.10	33.84	4.57	22.15	569
50	25.11	34.24	4.49	22.75	511
60	24.55	34.30	4.44	22.97	490
70	24.29	34.33	4.27	23.07	481
79	23.95	34.36	4.25	23.19	469

STRANGER; December 11, 1959; 0521 GCT;  
5°28'N, 107°49'E; sounding, 68 m; wind, 040°,  
force 2; weather, cloudy; sea, smooth; wire  
angle, 05°.

0	27.32	33.43	4.49	21.46	635
10	26.70	33.48	4.65	21.70	612
20	26.34	33.72	4.65	21.99	584
30	26.16	33.78	4.40	22.09	574
40	26.13	33.80	4.49	22.11	572
50	26.10	33.80	4.45	22.12	571

STRANGER; December 11, 1959; 1829 GCT;  
4°32'N, 106°03'E; sounding, 86 m; wind, 030°,  
force 3; weather, missing; sea, smooth; wire  
angle, 03°.

0	28.00	33.34	4.06	21.18	662
10	28.02	33.33	4.13	21.16	664
20	28.01	33.33	4.30	21.16	664
30	28.04	33.32	4.40	21.13	666
40	28.02	33.33	4.47	21.16	664
50	27.92	33.37	4.43	21.23	657
60	27.43	33.62	4.33	21.56	625
70	26.76	33.89	3.43	21.99	584

INTERPOLATED				COMPUTED	
Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; December 10, 1959; 0801 GCT;  
7°43'N, 108°05'E; sounding, 82 m; wind, 070°,  
force 3; weather, cloudy; sea, moderate;  
wire angle, 12°.

0	27.84	33.03	4.18u	20.99	680
9	27.04	33.26	4.55	21.42	639
19	26.41	33.64	4.54	21.91	592
30	26.39	33.67	4.60	21.94	589
49	26.38	33.66	4.60	21.93	590
73	25.86	33.78	4.50	22.18	566

STRANGER; December 10, 1959; 2212 GCT;  
6°08'N, 108°44'E; sounding, 110 m; wind, 030°,  
force 3; weather, missing; sea, slight; wire  
angle, 05°.

0	27.24	33.08	4.17u	21.22	657
10	27.11	33.22	4.60	21.37	643
20	26.31	33.69	4.67	21.97	586
30	26.12	33.75	4.64	22.08	575
50	26.05	33.77	4.50	22.11	573
75	22.47	34.45	3.85	23.68	422
99	20.24	34.58	3.34	24.40	354

STRANGER; December 11, 1959; 1157 GCT;  
4°56'N, 106°50'E; sounding, 62 m; wind, 020°,  
force 3; weather, missing; sea, smooth; wire  
angle, 02°.

0	27.00	33.64	4.62	21.72	610
10	26.76	33.66	-	21.80	602
20	26.66	33.71	4.57	21.87	595
30	26.65	33.71	4.60	21.89	594
40	26.66	33.73	4.47	21.90	593
50	26.64	33.71	4.37	21.89	594

STRANGER; December 12, 1959; 0042 GCT;  
5°16'N, 105°51'E; sounding, 73 m; wind, 020°,  
force 3; weather, cloudy; sea, slight; wire  
angle, 00°.

0	27.58	33.35	4.12	21.32	648
10	27.56	33.37	4.37	21.32	648
20	27.56	33.35	4.40	21.32	648
30	27.44	33.38	4.47	21.38	642
40	27.30	33.53	4.47	21.47	634
50	27.20	33.69	4.50	21.70	612
60	27.12	33.69	4.24	21.72	610

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SIO NAGA S-2		INTERPOLATED				COMPUTED	
		Z m	T °C	S ‰	O <sub>2</sub> m/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

29 30 STRANGER; December 12, 1959; 0738 GCT;  
6°06'N, 105°33'E; sounding, 51 m; wind, 030°,  
force 5; weather, partly cloudy; sea, moderate;  
wire angle, 03°.

0	27.23	33.32	4.52	21.41	640
10	27.24	33.30	4.58	21.38	642
20	27.16	33.31	4.57	21.43	638
30	27.17	33.40	4.53	21.49	632
40	27.00	33.62	4.53	21.70	612

31 32 STRANGER; December 12, 1959; 2115 GCT;  
7°32'N, 104°58'E; sounding, 38 m; wind, 040°,  
force 3; weather, missing; sea, moderate;  
wire angle, 05°.

0	27.08	33.73	4.20	21.77	606
10	27.10	33.73	4.52	21.76	607
20	27.10	33.71	4.55	21.75	608
28	27.10	33.74	4.32	21.77	606

		INTERPOLATED				COMPUTED	
		Z m	T °C	S ‰	O <sub>2</sub> m/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; December 12, 1959; 1416 GCT;  
6°50'N, 105°19'E; sounding, 49 m; wind, 030°,  
force 4; weather, missing; sea, moderate;  
wire angle, 00°.

0	27.00	33.64	4.43	21.72	610
10	26.98	33.62	4.48	21.72	610
20	26.98	33.64	4.70	21.73	609
30	27.00	33.64	4.63	21.72	610
40	26.98	33.68	4.67	21.76	606

STRANGER; December 13, 1959; 0412 GCT;  
8°20'N, 104°51'E; sounding, 29m; wind, 080°,  
force 5; weather, overcast; sea, moderate;  
wire angle, 06°.

0	27.36	31.46	4.30	19.97	778
5	27.34	31.36u	4.70	(19.98)	(777)
10	27.12	32.02	4.64	20.47	730
20	26.90	32.94	4.40	21.22	658

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 22, 1960; 0159 GCT; 6°22'N, 102°14'E; sounding, 27 m; wind, 210°, force 3; weather, overcast; sea, slight; wire angle, 04°.

0	26.95	30.96	4.42	19.72	802
5	27.62	30.96	4.34	19.51	822
10	27.82	31.70	4.29	20.00	775
15	27.80	31.78	4.09	20.06	769

STRANGER; January 22, 1960; 1304 GCT; 7°12.5'N, 103°01'E; sounding, 53 m; wind, 090°, force 4; weather, missing; sea, moderate; wire angle, 00°.

0	26.76	33.37a)	4.40	(20.06)	(769)
10	26.78	32.35a)	4.36	(20.58)	(719)
20	26.76	31.64a)	4.12	(21.59)	(622)
30	26.36b)	33.45	3.97	-	-
42	26.86	33.59	4.07	21.72	610

STRANGER; January 23, 1960; 0036 GCT; 7°57'N, 103°57'E; sounding, 31 m; wind, 070°, force 4; weather, cloudy; sea, moderate; wire angle, 00°.

0	26.26	33.74	4.36	22.02	581
10	26.26	33.94a)	4.46	(22.03)	(580)
15	26.26	33.77	4.44	22.05	578
20	26.28	33.76a)	4.41	(22.17)	(567)

STRANGER; January 23, 1960; 1401 GCT; 9°06'N, 104°14'E; sounding, 18 m; wind, 090°, force 4; weather, missing; sea, slight; wire angle, 00°.

0	27.54	31.57	4.27	19.99	776
5	27.52	31.60	4.27	20.02	773
10	27.53	31.67	4.21	20.07	768

STRANGER; January 24, 1960; 0118 GCT; 9°25'N, 103°22'E; sounding, 44 m; wind, 090°, force 4; weather, partly cloudy; sea, moderate; wire angle, 00°.

0	28.16	32.36	4.13	20.38	738
10	28.17	32.31	3.91	20.34	742
20	28.16	32.34	4.11	20.37	740
30	28.16	32.33	3.93	20.36	740
35	28.18	32.40	3.99	20.41	736

STRANGER; January 24, 1960; 1121 GCT; 8°37'N, 102°21.5'E; sounding, 73 m; wind, 100°, force 4; weather, cloudy; sea, moderate; wire angle, 00°.

0	27.96	31.53	4.59	19.83	792
10	27.99	31.56	4.60	19.84	790
20	27.96	31.64	4.60	19.91	784
30	28.34	32.35	4.57	20.32	744
40	28.19	32.44	4.44	20.43	733
49	28.29	32.91a)	3.19	(20.66)	(712)
63	27.34	32.79a)	1.94	(21.05)	(674)

a) Possible transposition.

b) Bathy thermograph trace is isothermal to 32 meters.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 22, 1960; 0825 GCT; 6°49'N, 102°41.5'E; sounding, 44 m; wind, 070°, force 4; weather, cloudy; sea, moderate; wire angle, 03°.

0	27.52	32.44	4.38	20.65	712
10	27.50	32.42	4.47	20.64	713
20	27.02	33.30	4.47	21.46	635
30	27.04	33.45	4.42	21.56	625
35	27.06	33.46	4.38	21.56	625

STRANGER; January 22, 1960; 1938 GCT; 7°34.5'N, 103°32'E; sounding, 50 m; wind, 070°, force 5; weather, missing; sea, missing; wire angle, 05°.

0	26.44	33.79a)	4.42	(21.98)	(585)
10	26.44	33.98a)	4.37	(22.00)	(583)
20	26.44	33.95a)	4.50	(22.01)	(582)
30	26.44	33.78a)	4.45	(22.13)	(571)
39	26.44	33.75a)	4.42	(22.15)	(569)

STRANGER; January 23, 1960; 0620 GCT; 8°20'N, 104°24.5'E; sounding, 30 m; wind, 070°, force 5; weather, partly cloudy; sea, rough; wire angle, 03°.

0	26.31	33.57	4.57	21.88	594
5	26.32	33.57	4.57	21.88	595
10	26.27	33.60	4.57	21.92	591

STRANGER; January 23, 1960; 2012 GCT; 9°52'N, 103°50.5'E; sounding, 22 m; wind, 120°, force 4; weather, missing; sea, slight; wire angle, 03°.

0	28.28	32.58u)	4.34	-	-
5	28.30	32.38	4.34	20.35	741
10	28.26	32.41	4.31	20.39	738
15	28.30	32.43	4.29	20.39	738

STRANGER; January 24, 1960; 0627 GCT; 9°02'N, 102°51'E; sounding, 58 m; wind, 090°, force 4; weather, partly cloudy; sea, slight; wire angle, 09°.

0	27.98	31.53	4.67	19.82	792
10	27.98	31.51	4.67	19.80	794
20	27.94	31.55	4.65	19.85	790
30	28.45	32.35	4.57	20.28	748
39	28.22	-	-	-	-
46	28.04	32.98	4.31	20.89	690

STRANGER; January 24, 1960; 1915, 1932 GCT; 8°16'N, 101°46'E; sounding, 59 m; wind, 090°, force 1; weather, missing; sea, missing; wire angle, 03°, missing.

0	27.92	31.47	4.51	19.79	795
10	27.92	31.47	4.53	19.79	795
20	27.94	31.54	4.51	19.84	790
30	27.88	31.77	4.45	20.03	772
39	27.82	31.90	4.45	20.15	761
49	27.74	32.12	4.19	20.34	742

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

13 14 STRANGER; January 25, 1960; 0045 GCT; 7°54'N, 101°11.5'E; sounding, 44 m; wind, 120°, force 3; weather, partly cloudy; sea, slight; wire angle, 00°.

0	27.65	32.08	4.30	20.34	742
10	27.65	32.22a)	4.28	(20.39)	(737)
20	27.64	32.34a)	4.25	(20.45)	(732)
27	27.64b)	32.66	4.25	20.48	729
34	27.63	32.15a)	4.23	(20.54)	(723)

15 16 STRANGER; January 26, 1960; 0752 GCT; 8°38'N, 100°17'E; sounding, 20 m; wind, 120°, force 4; weather, cloudy; sea, moderate; wire angle, 20°.

0	28.22	31.45	4.54	19.68	806
5	28.19	31.40	4.51	19.65	808
10	28.08	31.39	4.48	19.68	805
15	27.97	31.41	4.41	19.73	801

17 18 STRANGER; January 26, 1960; 1953 GCT; 9°35'N, 101°20'E; sounding, 66 m; wind, 120°, force 3; weather, missing; sea, missing; wire angle, 00°.

0	27.96	31.47	4.46	19.78	796
10	27.97	31.47	4.51	19.78	796
20	27.96	31.53	4.54	19.83	792
30	27.99	31.60	4.51	19.87	788
40	28.04	31.57	4.46	19.83	791
49	28.04	31.64	4.27	19.88	786
55	27.94	31.73	4.12	19.98	777

19 20 STRANGER; January 27, 1960; 0730 GCT; 10°23'N, 102°30'E; sounding, 59 m; wind, 080°, force 3; weather, cloudy; sea, slight; wire angle, 01°.

0	28.12	31.36	4.69	19.65	809
10	28.12	31.36	4.72	19.65	809
20	28.08	31.46	4.56	19.74	800
30	28.10	31.49	4.63	19.75	799
39	28.23	31.73	4.08	19.89	786
49	28.48	32.23	4.34	20.18	758

21 22 STRANGER; January 27, 1960; 1838 GCT; 11°16'N, 102°36'E; sounding, 31 m; wind, 160°, force 1; weather, missing; sea, missing; wire angle, 01°.

0	28.24	31.86a)	4.66	(19.90)	(784)
5	28.26	31.80a)	4.61	(19.91)	(784)
10	28.24	31.75a)	4.64	(19.93)	(782)
20	28.24	31.76a)	4.63	(19.98)	(727)

- a) Possible transposition.  
b) Alternate value, 27.77 °C.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 25, 1960; 0359 GCT; 7°40'N, 100°47.5'E; sounding, 24 m; wind, 090°, force 3; weather, partly cloudy; sea, slight; wire angle, 00°.

0	27.78	31.62	4.46	19.95	780
5	27.82	31.63	4.48	19.95	780
10	27.72	31.62	4.46	19.97	778
15	27.70	31.74	4.43	20.07	768

STRANGER; January 26, 1960; 1309 GCT; 9°07'N, 100°48'E; sounding, 33 m; wind, 120°, force 3; weather, missing; sea, moderate; wire angle, 00°.

0	28.10	31.86u	4.43	-	-
10	28.10	31.78	4.43	19.97	778
15	28.08	31.82	4.40	20.00	774
23	28.01	31.80	4.38	20.01	774

STRANGER; January 27, 1960; 0139, 0149 GCT; 10°03'N, 101°51.5'E; sounding, 70 fm; wind, 110°, force 1; weather, partly cloudy; sea, slight; wire angle, 00°, 00°.

0	28.12	31.73	4.54	19.92	782
10	28.11	31.85a)	4.47	(19.94)	(780)
20	28.10	31.75a)	4.43	(19.98)	(776)
30	28.10	31.80a)	4.39	(20.02)	(773)
40	28.32	32.27a)	4.25	(20.20)	(756)
49	28.24	32.16a)	4.34	(20.29)	(747)
59	28.32	32.38	3.76	20.35	742

STRANGER; January 27, 1960; 1212 GCT; 10°41'N, 103°03'E; sounding, 26 m; wind, 130°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	28.28	32.42a)	4.51	(20.28)	(748)
5	28.28	32.28a)	4.41	(20.33)	(743)
10	28.30	32.34a)	4.31	(20.38)	(738)
15	28.35	32.49	3.84	20.42	735

STRANGER; January 28, 1960; 0535 GCT; 11°52.5'N, 102°11'E; sounding, 33 m; wind, 180°, force 1; weather, partly cloudy; sea, slight; wire angle, 00°.

0	28.20	31.76	4.66	19.92	783
10	28.13	31.75	4.62	19.94	781
20	28.56	32.39	4.09	20.27	748

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 28, 1960; 1014 GCT; 11°31'N, 101°38'E; sounding, 57 m; wind, 110°, force 1; weather, partly cloudy; sea, slight; wire angle, 05°.

0	28.38	32.49	4.44	20.41	736
10	28.21	32.50	4.44	20.47	730
20	28.18	32.52	4.43	20.50	727
30	28.26	33.35	2.88	21.09	670
39	27.81	33.48	1.24	21.34	647
46	27.79	33.53	1.19	21.38	642

STRANGER; January 28, 1960; 2029 GCT; 10°50'N, 100°31'E; sounding, 55 m; wind, 110°, force 1; weather, missing; sea, missing; wire angle, 04°.

0	28.05	30.06	4.57	18.70	900
10	28.06	30.09	4.56	18.72	898
20	28.11	30.26	4.51	18.83	888
30	28.22	31.75	4.54	19.91	784
39	28.25	32.65	3.94	20.57	720

STRANGER; January 29, 1960; 0547 GCT; 10°06'N, 99°23'E; sounding, 24 m; wind, 050°, force 3; weather, partly cloudy; sea, slight; wire angle, 03°.

0	28.30	30.94	4.43	19.27	845
5	28.28	30.86	4.44	19.22	850
10	28.00	30.89	4.41	19.33	839
15	27.96	31.06	4.36	19.47	826

STRANGER; January 29, 1960; 1441 GCT; 11°17'N, 99°39'E; sounding, 22 m; wind, 060°, force 2; weather, missing; sea, missing; wire angle, 05°.

0	27.84	30.24	5.01	18.90	881
5	27.84	30.23	4.98	18.89	882
9	27.64	31.07	4.62	19.58	815
12	27.90	31.96	4.48	20.17	759

STRANGER; January 30, 1960; 0145 GCT; 12°07.5'N, 100°46'E; sounding, 29 m; wind, 300°, force 2; weather, partly cloudy; sea, smooth; wire angle, 01°.

0	28.24	32.61	4.43	20.54	723
10	28.24	32.59	4.35	20.53	724
15	28.24	32.58	4.43	20.52	725
20	28.24	32.64	4.35	20.57	720

a) Possible transposition.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 28, 1960; 1316 GCT; 11°11.5'N, 101°03.5'E; sounding, 53 m; wind, calm; weather, missing; sea, slight; wire angle, 00°.

0	27.92	31.87	4.58	20.09	766
10	28.10	32.20	4.52	20.28	748
20	28.26	32.60	4.52	20.53	724
30	28.32	32.63	4.47	20.53	724
40	28.04	32.69	4.13	20.67	711

STRANGER; January 29, 1960; 0115 GCT; 10°28'N, 99°56.5'E; sounding, 49 m; wind, 040°, force 2; weather, partly cloudy; sea, calm; wire angle, 00°.

0	28.12	31.24a)	4.36	(19.48)	(825)
10	28.12	31.13a)	4.35	(19.56)	(818)
20	28.08	31.24	4.30	19.57	816
30	28.48	32.22	3.47	20.17	758
40	28.40	32.73	3.02	20.58	719

STRANGER; January 29, 1960; 0955 GCT; 10°40'N, 99°35.5'E; sounding, 35 m; wind, 030°, force 4; weather, partly cloudy; sea, slight; wire angle, 00°.

0	28.11	30.45	4.51	18.97	874
10	28.10	30.71	4.49	19.17	855
17	27.97	31.53	4.44	19.82	792
25	27.62	32.29	3.81	20.50	726

STRANGER; January 29, 1960; 2027 GCT; 11°42'N, 100°12'E; sounding, 36 m; wind, 070°, force 1; weather, missing; sea, slight; wire angle, 00°.

0	27.72	31.60	4.55	19.96	779
10	27.93	31.77	4.57	20.02	773
16	28.08	32.65	4.33	20.63	715
26	27.96	32.67	4.24	20.68	710

STRANGER; January 30, 1960; 0038 GCT; 12°24'N, 101°19'E; sounding, 27 m; wind, 210°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	28.50	32.75	4.55	20.56	721
10	28.24	32.63	4.55	20.56	721
17	28.18	32.66	4.52	20.60	717

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δT
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; February 27, 1960; 0512 GCT;  
15°40'N, 108°41'E; sounding, 37 m; wind, 280°,  
force 2; weather, cloudy; sea, smooth; wire  
angle, 00°.

0	22.94	31.79	5.06	21.54	627
10	22.22	32.36	5.06	22.18	566
20	22.29	32.67	4.87	22.40	545
29	23.62	33.92	4.69	22.96	491

STRANGER; February 28, 1960; 0625 GCT;  
15°36'N, 110°42'E; sounding, 732 m; wind 070°,  
force 3; weather, cloudy; sea, smooth; wire  
angle, 24°.

0	25.37	33.49	4.77	22.12	572
27	24.09	34.16	4.86	23.00	487
49	23.31	34.44	4.86	23.44	445
77	22.34	-	4.22	(23.82)	(409)
98	20.60	34.64	3.69	24.35	359
148	17.54	34.62	3.54	25.11	286

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δT
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; February 27, 1960; 1506 GCT; 15°38'N,  
109°40'E; sounding, 476 m; wind, 040°, force 1;  
weather, missing; sea, smooth; wire angle, 06°.

0	24.18	33.65	4.79	22.59	527
10	23.14	34.47	4.99	23.52	438
29	22.88	34.45	4.99	23.57	433
48	22.80	34.46	5.20	23.60	430
74	22.71	34.55	-	23.70	421
98	21.30	34.76	3.96	24.25	368
148	18.14	34.72	3.76	25.04	293
245	13.71	34.53	3.50	25.90	211
343	10.28	34.42	2.54	26.47	157
440	8.72	34.42	2.26	26.73	132

STRANGER; February 28, 1960; 1514, 1327,  
1617 GCT; 15°41'N, 111°48'E; sounding, 1244 m;  
wind, 100°, force 2; weather, missing; sea,  
smooth; wire angle, 03°, 02°, 02°.

0	24.86	33.77	-	22.48	537
10	24.80	33.80	4.66	22.51	534
29	24.70	33.82	4.71	22.56	529
49	24.56	34.07	4.66	22.78	508
73	23.42	34.44	4.42	23.41	448
0	24.86	33.81	4.72	22.51	534
98	21.21	34.63	3.61	24.18	375
118	19.65	34.66	3.51	24.61	334
143	17.42	34.66	3.51	25.18	280
172	16.16	34.60	3.51	25.42	257
199	14.60	34.60	3.11	25.76	224
252	12.66	34.49	2.90	26.09	193
356	10.21	34.47	2.41	26.52	152
472	8.60	34.46	2.13	26.78	128
630	6.96	34.42	1.89	26.99	108
798	5.40	34.46	1.90	27.23	85
957	4.37	34.52	1.87	27.39	70
1174	3.42	34.59	1.98	27.54	55

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

5 6 STRANGER; February 29, 1960; 0425, 0457, 0527, 0612 GCT; 15°44'N, 112°50'E; sounding, 2360 m; wind, 070°, force 3; weather, partly cloudy; sea, smooth; wire angle, 09°, 14°, 12°, 09°.

0	25.42	33.92	4.72	22.42	543
10	25.14	33.78	4.69	22.40	545
29	24.90	33.82	4.75	22.50	535
53	24.82	33.83	4.75	22.53	532
81	23.06	34.43	4.19	23.51	439
106	19.78	34.72	3.50	24.63	332
159	15.78	34.59	3.12	25.50	249
256	12.34	34.48	2.88	26.13	189
372	9.60	34.44	2.32	26.61	144
530	7.74	34.45	2.00	26.90	116
695	6.23	34.47	1.90	27.12	95
852	5.10	34.52	1.86	27.30	78
1070	3.95	34.57	1.89	27.47	62

7 8 STRANGER; March 1, 1960, 0115, 0255 GCT; 14°18'N, 113°12'E; sounding, 2650 m; wind, 080°, force 4; weather, partly cloudy; sea, slight; wire angle, 14°, 16°.

0	25.62	33.84	4.72	22.30	554
9	25.60	33.81	4.70	22.28	556
28	24.74	33.91	4.79	22.62	524
53	24.57	33.93	4.78	22.68	518
81	23.16	34.48	4.30	23.52	438
105	20.34	34.73	3.65	24.48	346
158	16.10	34.61	3.25	25.45	254
259	11.87	34.46	2.91	26.22	181
373	10.14	34.46	2.09	26.52	152
527	8.16	34.44	2.07	26.83	123
695	6.20	34.48	1.92	27.13	94
851	4.94	34.51	1.89	27.31	77
1069	3.89	34.54	1.98	27.45	64

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; February 29, 1960; 1308, 1336, 1505 GCT; 14°56'N, 113°00'E; sounding, 2880 m; wind, 090°; force 3; weather, missing; sea, smooth; wire angle, 12°, -, 10°.

0	25.87	33.80	4.57	22.20	564
10	25.83	33.78	4.62	22.19	565
29	25.06	33.88u	4.60	(22.46)	(539)
54	25.00	33.83	4.65	22.48	537
83	24.40	34.16	3.44	22.91	496
106	20.74	34.62	4.59	24.29	364
162	16.60	34.66	3.11	25.36	262
263	12.36	34.48	2.79	26.13	189
378	9.61	34.39	2.26	26.56	148
542	7.66	34.40	1.95	26.87	119
708	6.38	34.44	1.90	27.08	99
863	5.02	34.50	1.86	27.29	79
1077	3.92	34.51	1.92	27.43	66
810a)	5.26	34.48	1.87	27.25	83
1016	4.13	34.54	1.86	27.43	66
1223	3.40	34.57	1.98	27.52	57
1436	2.92	34.58	2.06	27.58	52

STRANGER; March 1, 1960; 1113, 1135 GCT; 13°30'N, 113°36'E, sounding, 4316 m; wind, 070°, force 3; weather, partly cloudy; sea, slight; wire angle, 08°, -.

0	26.52	33.50	4.60	21.76	606
10	26.52	33.52	4.60	21.78	604
29	25.82	33.54	4.65	22.01	582
54	25.68	33.59	4.66	22.10	574
85	20.92	34.58	2.82u	24.22	371
109	18.70	34.60	3.55	24.81	315
163	16.11	34.59	2.65	25.43	256
265	12.94	34.50	2.47	26.04	198
383	10.64	34.45	2.25	26.43	161
539	8.31	34.57u	1.89	(26.80)	(126)
706	6.45	34.45	1.83	27.08	99
865	5.18	34.51	1.80	27.29	79
1082	3.96	34.56	1.89	27.46	63

a) Overlapping casts.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; March 1, 1960; 2055, 2200 GCT;  
13°28'N, 112°38'E; sounding, 2100 m; wind, 070°,  
force 3; weather, missing; sea, slight; wire  
angle, 03°, 06°.

0	26.02	33.62	4.64	22.01	582
10	26.00	33.63	4.68	22.02	581
29	25.41	33.69	4.68	22.25	559
54	24.39	34.27	4.67	22.99	488
83	22.10	34.65	3.99	23.95	397
107	19.02	34.76	3.59	24.85	311
161	15.34	34.57	2.70	25.58	241
99b)	19.82	34.70	3.59	24.60	335
216	13.64	34.54	2.69	25.92	209
372	10.68	34.48	2.38	26.45	159
537	8.44	34.44	1.95	26.79	127
693	7.08	34.45	1.80	27.00	107
909	5.00	34.51	1.87	27.31	77

STRANGER; March 2, 1960; 1625, 1720 GCT;  
13°27'N, 110°49'E; sounding, 2834 m; wind, 060°,  
force 3; weather, missing; sea, smooth; wire  
angle, 00°, 06°.

0	26.22	33.53	4.64	21.88	595
10	26.24	33.54	4.62	21.88	595
29	25.86	33.54	4.64	22.00	583
55	24.62	33.95	4.48	22.69	517
84	21.62	34.50	3.55	23.96	396
108	19.34	34.58	2.83	24.63	332
162	16.52	34.57	2.43	25.31	267
266	12.83	34.52	2.67	26.08	194
381	10.22	34.45	2.07	26.50	154
537	8.24	34.44	1.81	26.82	124
704	6.40	34.47	1.75	27.10	97
862	5.22	34.51	1.74	27.28	80
1079	4.10	34.55	1.84	27.44	65

STRANGER; March 3, 1960; 0650 GCT; 13°27'N,  
109°23'E; sounding, 44 m; wind, 020°, force 3;  
weather, cloudy; sea, smooth; wire angle, 00°.

0	25.25	33.03	4.89	21.80	602
10	24.30	33.31	4.89	22.30	554
20	23.81	34.07	4.86	23.01	486
34	23.63	34.31	4.83	23.24	464

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; March 2, 1960; 0806 GCT; 13°27'N,  
111°40'E; sounding, 2715 m; wind, 060°, force 3;  
weather, partly cloudy; sea, slight; wire angle,  
12°.

0	26.10	33.67	4.62	22.02	581
10	26.00	33.66	4.62	22.05	578
28	25.40	33.68	4.57	22.24	560
51	25.32	33.67	4.59	22.27	557
78	23.38	34.24	3.02a)	23.27	462
98	19.24	34.60	4.18a)	24.67	328
144	16.68	34.59	2.50	25.29	269
232	13.56	34.54	2.59	25.94	207
332	11.36	34.45	2.27	26.30	173
468	9.28	34.43	1.84	26.65	140
620	7.96	34.47	1.78	26.89	117
760	6.52	34.47	1.77	27.09	98
972	4.77	34.51	1.83	27.33	75

STRANGER; March 2, 1960; 2345 GCT; 13°28'N,  
110°02'E; sounding, 2050 m; wind, 050°, force 3;  
weather, cloudy; sea, smooth; wire angle, 34°.

0	25.20	34.11	4.68	22.63	523
8	24.08	34.41	4.80	23.19	469
24	23.41	34.49	4.86	23.45	444
44	23.16	34.64	4.87	23.63	427
66	22.19	34.55	4.74	23.84	407
83	21.21	34.49	4.51	24.07	385
122	20.74	34.60	4.51	24.28	365
194	16.22	34.60	3.12	25.41	258
270	12.24	34.47	2.82	26.15	187
372	9.96	34.43	2.04a)	26.53	151
480	8.70	34.44	2.33a)	26.75	130
580	7.61	34.44	1.92	26.91	115
755	5.90	34.48	1.81	27.18	90

STRANGER; March 4, 1960; 1142 GCT; 12°09'N,  
109°24'E; sounding, 93 m; wind, 060°, force 4;  
weather, missing; sea, smooth; wire angle, 05°.

0	24.92	33.54	4.90	22.29	555
10	24.92	33.55	4.92	22.30	554
29	24.47	33.72	4.86	22.55	530
49	22.78	34.42	4.64	23.58	432
63	22.40	34.43	4.63	23.70	421
78	21.89	34.44	4.55	23.85	406

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- a) Possible transposition.  
b) Overlapping casts.

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

15 16 STRANGER; March 4, 1960; 2045 GCT; 11°51'N, 110°07'E; sounding, 2158 m; wind, 030°, force 4; weather, missing; sea, slight; wire angle, 05°.

0	26.34	33.63	4.50	21.92	591
10	26.34	33.60	4.52	21.90	593
34	23.34	34.44	4.80	23.43	446
60	22.78	34.52	4.79	23.65	425
93	22.00	34.58	4.37	23.92	400
118	20.66	34.68	3.57	24.36	358
176	16.00	34.61	3.06	25.47	252
294	11.30	34.44	2.51	26.30	173
412	10.02	34.43	2.18	26.52	152
588	7.82	34.45	1.73	26.89	117
765	5.92	34.48	1.67	27.18	90
933	4.79	34.54	1.74	27.36	73
1155	3.69	34.56	1.79	27.48	61

17 18 STRANGER; March 5, 1960; 1205 GCT; 11°11'N, 111°32'E; sounding, 3292 m; wind, 070°, force 3; weather, partly cloudy; sea, slight; wire angle, 07°.

0	26.78	33.50	4.50	21.69	613
10	26.77	33.52	4.50	21.71	611
29	26.12	33.58	4.53	21.95	588
53	25.90	33.60	4.53	22.03	580
84	21.69	34.45	2.78a)	23.90	401
108	18.88	34.57	3.35a)	24.74	321
162	16.32	34.59	2.49	25.38	260
265	12.56	34.49	2.16	26.10	192
380	10.11	34.46	1.89	26.53	151
537	7.80	34.46	1.65	26.90	116
703	6.50	34.47	1.62	27.09	98
860	5.27	34.49	1.68	27.26	82
1077	4.06	34.59	1.80	27.47	62

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; March 5, 1960; 0340, 0403 GCT; 11°32'N, 110°49'E; sounding, 2560 m; wind, 050°, force 3; weather, cloudy; sea, slight; wire angle, 00°, 06°.

0	26.62	33.48	4.61	21.72	611
10	26.50	33.51	4.58	21.78	604
29	26.44	33.53	4.57	21.81	601
54	25.88	33.65	4.64	22.07	576
84	23.70	34.45	4.63	23.34	455
108	21.42	34.61	3.65	24.10	382
162	15.46	34.59	2.93	25.58	242
266	11.96	34.48	2.39	26.22	181
380	9.85	34.43	2.04	26.55	149
536	7.98	34.44	1.79	26.86	120
702	6.56	34.47	1.79	27.08	99
859	5.41	34.51	1.77	27.26	82
1076	4.26	34.55	1.79	27.42	67

STRANGER; March 5-6, 1960; 1959, 2057, 0103 GCT; 10°52'N, 112°08'E; sounding, 4087 m; wind, 070°, force 3; weather, partly cloudy; sea, smooth; wire angle, 00°, 04°, 05°.

0	26.96	33.53	4.60	21.66	616
10	26.97	33.55	4.52	21.67	615
29	26.94	33.55	4.51	21.68	614
55	26.32	33.58	4.51	21.90	593
84	21.43	34.48	3.43	24.00	392
107	19.39	34.62	3.04	24.65	330
162	15.98	34.59	2.54	25.46	253
269	12.32	34.49	2.53	26.15	187
385	9.93	34.46	2.24	26.56	148
541	7.94	34.43	1.72	26.86	120
708	6.28	34.49	1.65	27.13	94
864	5.28	34.49	1.66	27.26	82
1083	4.04	34.58	1.82	27.47	62
1220	3.44	34.59	2.03	27.54	56
1522	2.86	34.62	2.03	27.62	48
1828	2.59	34.60	2.21	27.62	48
2137	2.48	34.63	2.30	27.66	44
2449	2.41	34.62	2.39	27.66	44
2765	2.38	34.62	2.39	27.66	44
3177	2.37	34.63	2.44	27.67	43
3590	2.43	34.66	2.50	27.68	42
3895	2.46	34.62u	2.50	-	-

a) Possible transposition.



INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; March 6, 1960; 1215 GCT; 10°28'N, 112°55'E; sounding, 2167 m; wind, 070°, force 4, weather, cloudy; sea, slight; wire angle, 04°.

0	27.08	33.53	4.47	21.62	621
10	27.08	33.52	4.47	21.61	622
29	26.42	33.56	4.53	21.83	599
53	24.74	34.25	4.61	22.87	500
84	21.40	34.55	2.79a)	24.06	386
107	17.79	34.52	3.57a)	24.98	299
161	15.32	34.47	2.76	25.52	247
263	12.42	34.43	2.63	26.08	194
379	10.12	34.41	2.54	26.49	155
534	8.10	34.46u	1.92	-	-
701	6.42	34.58u	1.68	-	-
857	5.20	34.60u	1.73	-	-
1074	3.96	34.61	1.77	27.50	59

STRANGER; March 7, 1960; 0300, 0329 GCT; 9°20'N, 112°12'E; sounding, 1792 m; wind, 070°, force 2; weather, cloudy; sea, smooth; wire angle, 09°, 10°.

0	27.00	33.57	4.55	21.67	615
10	26.93	33.59	4.53	21.71	611
29	26.58	33.63	4.52	21.84	598
54	24.10	34.41	4.59	23.19	469
82	20.24	34.59	3.18	24.41	353
106	18.98	34.61	2.72	24.74	321
160	17.10	34.60	2.72	25.21	277
262	13.32	34.52	2.61	25.98	204
382	11.41	34.47	2.37	26.31	172
537	8.49	34.44	1.68	26.79	127
704	6.50	34.45	1.56	27.08	99
861	5.38	34.49	1.62	27.25	83
1076	3.94	34.55	1.76	27.46	63

- a) Possible transposition.  
b) Overlapping casts.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; March 6, 1960; 2024 GCT, 9°45'N, 112°34'E; sounding, 1746 m; wind, 090°, force 3; weather, missing; sea, slight; wire angle, 02°.

7	26.73	33.65	4.59	21.81	601
17	26.73	33.67	4.59	21.82	600
36	26.32	33.65	4.59	21.95	588
61	24.45	34.40	4.59	23.08	480
91	22.56	34.62	4.10	23.79	412
114	18.84	34.63	3.80	24.80	316
168	15.68	34.58	4.08	25.52	247
270	12.58	34.49	2.42	26.10	192
387	10.16	34.43	2.10	26.50	154
543	8.08	34.42	1.97	26.83	123
709	6.37	34.46	1.64	27.10	97
868	5.26	34.49	1.67	27.26	82
1084	4.02	34.55	1.77	27.44	65

STRANGER; March 7, 1960; 1202, 1253, 1333 GCT; 8°36'N, 111°48'E; sounding, 1280 m; wind, 060°, force 3; weather, missing; sea, slight; wire angle, 00°, 00°, 02°.

0	27.20	33.60	4.74	21.62	619
10	27.14	33.61	4.65	21.66	616
30	26.76	33.62	4.59	21.78	604
55	24.32	34.16	4.58	22.94	493
84	20.74	34.56	3.32	24.25	368
109	19.68	34.56	2.97	24.53	341
266	13.82	34.52	2.15	25.87	214
381	10.86	34.48	1.97	26.41	163
537	8.46	34.44	1.73	26.79	127
704	6.46	34.48	1.61	27.10	97
162b)	18.60	34.60	2.91	24.84	312
862	5.22	34.50	1.70	27.27	81
1080	3.90	34.56	1.82	27.47	62

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

23 24 STRANGER, March 7, 1960; 2211, 2246 GCT; 7°58'N, 111°24'E; sounding, 1939 m; wind, 050°, force 3; weather, missing; sea, slight; wire angle, 12°, - .

0	27.11	33.63	4.46	21.68	614
10	27.11	33.63	4.40	21.68	614
29	27.10	33.63	4.40	21.69	613
53	24.72	34.19	4.55	22.84	503
81	23.28	34.45	4.28	23.45	444
105	22.23	34.52	3.79	23.81	410
161	17.96	34.64	3.00	25.03	294
259	14.28	34.54	2.39	25.80	221
370	11.16	34.46	2.00	26.34	169
518	9.12	34.46	1.64	26.70	135
681	7.14	34.45	1.58	26.99	108
836	5.78	34.49	1.64	27.21	87
1052	4.08	34.54	1.71	27.43	66

25 26 STRANGER; March 8, 1960; 1510, 1604 GCT; 9°18'N, 110°22'E; sounding, 2651 m; wind, 060°, force 2; weather, missing; sea, smooth; wire angle, 09°, 10°.

0	27.13	33.57	4.37	21.63	619
10	27.14	33.58	4.68	21.64	618
29	26.92	33.58	4.33	21.70	612
53	25.36	33.94	4.35	22.46	539
83	23.18	34.45	4.47	23.49	441
106	21.74	34.52	4.30	23.95	397
159	17.66	34.65	3.60	25.10	287
260	12.48	34.52	3.06	26.14	188
376	10.00	34.47	2.26	26.55	149
535	8.22	34.45	1.86	26.83	123
699	6.68	34.49	1.68	27.08	99
855	5.34	34.65u	1.70	(27.28)	(80)
1072	3.98	34.56	1.76	27.46	63

27 28 STRANGER; March 9, 1960; 0617 GCT; 10°32'N, 109°25'E; sounding, 183 m; wind, 080°, force 2; weather, partly cloudy; sea, calm; wire angle, 01°.

0	27.22	33.67	4.43	21.68	614
11	26.56	33.72	4.53	21.92	591
30	23.62	34.39	4.74	23.32	457
54	23.36	34.49	4.78	23.31	443
83	22.94	34.49	4.55	23.59	431
108	22.28	34.43	4.37	23.73	418
163	19.18	34.64	3.42	24.72	323

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; March 8, 1960; 0540, 0603 GCT; 8°38'N, 110°55'E; sounding, 1536 m; wind, 070°, force 3; weather, partly cloudy; sea, smooth; wire angle, 06°, 08°.

0	27.26	33.63	4.50	21.64	618
10	26.99	3.59	4.50	21.67	615
29	26.54	33.57	4.53	21.81	601
54	24.09	34.38	4.65	23.17	471
83	21.49	34.50	3.70	24.00	392
10a)	27.04	33.60	4.50	21.69	613
64	22.88	34.44	4.40	23.57	433
166	18.30	34.61	3.00	24.92	304
282	13.30	34.51	2.49	25.98	204
437	9.71	34.45	1.83	26.60	145
602	7.55	34.45	1.65	26.93	113
759	6.16	34.50	1.63	27.16	91
977	4.40	34.53	1.73	27.40	69

STRANGER; March 8-9, 1960; 2328, 0108 GCT; 10°00'N, 109°40'E; sounding, 1006 m; wind, 060°, force 1; weather, partly cloudy; sea, calm; wire angle, 12°, 08°.

0	27.01	33.78	4.65	21.82	600
10	27.03	33.78	4.63	21.81	601
29	26.68	33.81	4.61	21.95	588
53	24.28	34.21	4.87	22.98	489
81	22.44	34.45	4.71	23.70	421
105	21.60	34.52	4.46	23.99	393
158	16.68	34.78u	3.09	(25.32)	(266)
205	14.28	34.58	2.94	25.83	218
319	10.72	34.50	2.39	26.46	158
423	9.30	34.68u	2.10	-	-
422a)	9.44	34.46	2.10	26.64	141
529	8.21	34.46	1.75	26.84	122
773	6.10	34.51	1.69	27.18	90
993	4.60	34.56	1.77	27.40	69

STRANGER; March 9, 1960; 1248 GCT; 11°02'N, 108°59'E; sounding, 58 m; wind, 060°, force 2; weather, missing; sea, smooth; wire angle, 00°.

0	26.67	33.74	4.62	21.90	592
10	26.38	33.71	4.64	21.97	586
20	25.78	33.84	4.68	22.25	559
30	24.49	33.91	4.78	22.69	517
44	23.92	34.25	4.80	23.12	476

a) Overlapping casts.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; March 15, 1960; 1620 GCT; 9°43'N, 107°04'E; sounding, 24 m; wind, 100°, force 3; weather, missing; sea, smooth; wire angle, 00°.

0	26.64	34.06	4.58	22.15	569
8	26.65	34.07	4.61	22.15	569
16	26.64	34.06	4.61	22.15	569

STRANGER; March 16, 1960; 0414 GCT; 8°19'N, 107°50'E; sounding, 58 m; wind, 100°, force 2; weather, partly cloudy; sea, smooth; wire angle, 03°.

0	27.04	33.80	4.46	21.82	600
15	26.87	33.82	4.50	21.90	593
25	26.78	33.80	4.60	21.92	591
34	25.88	33.79	4.65	22.19	565
44	25.24	33.90	4.48	22.46	539

STRANGER; March 16, 1960; 1809 GCT; 6°55'N, 108°31'E; sounding, 104 m; wind, 070°, force 2; weather, missing; sea, smooth; wire angle, 03°.

0	27.60	33.86	4.42	21.69	613
10	27.48	33.88	4.45	21.75	607
19	25.09	34.06	4.72	22.63	523
30	24.40	34.15	4.73	22.90	497
54	23.52	34.38	4.65	23.34	455
74	23.24	34.45	4.75	23.46	443
93	21.93	34.48	3.89	23.87	404

STRANGER; March 17, 1960; 0825 GCT; 5°41'N, 107°53'E; sounding, 71 m; wind, calm; weather, partly cloudy; sea, calm; wire angle, 00°.

0	29.12	33.82	4.46	21.17	663
15	26.85	33.82	4.59	21.91	592
25	25.48	33.87	4.62	22.37	548
34	25.32	33.87	4.62	22.42	543
59	25.03	33.89	4.64	22.52	533

STRANGER; March 17, 1960; 2356 GCT; 4°37'N, 105°56'E; sounding, 80 m; wind, 040°, force 2; weather, partly cloudy; sea, calm; wire angle, 02°.

0	27.99	33.79	4.46	21.53	628
10	27.99	33.79	4.49	21.53	628
19	27.90	33.77	4.49	21.53	628
29	27.10	33.74	4.54	21.76	606
48	26.18	33.78	4.57	22.08	575
69	25.94	33.72	4.38	22.12	572

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; March 15, 1960; 2156 GCT; 9°01'N, 107°24'E; sounding, 38 m; wind, 100°, force 3; weather, missing; sea, calm; wire angle, 02°.

0	27.02	33.87	4.50	21.89	594
10	27.00	33.88	4.48	21.90	593
20	26.00	33.91	4.63	22.23	561
29	25.70	33.92	4.65	22.33	551

STRANGER; March 16, 1960; 1055 GCT; 7°37'N, 108°10'E; sounding, 80 m; wind, 070°, force 2; weather, partly cloudy; sea, smooth; wire angle, 03°.

0	28.02	33.80	4.42	21.51	630
15	26.82	33.75	4.48	21.86	596
25	25.66	33.91	4.62	22.34	550
50	23.74	34.44	4.77	23.32	457
69	23.24	34.44	4.69	23.46	443

STRANGER; March 17, 1960; 0007, 0021 GCT; 6°14'N, 108°52'E; sounding, 112 m; wind, 070°, force 1; weather, cloudy; sea, slight; wire angle, 01°, 01°.

0	27.62	33.74	4.44	21.60	622
11	27.62	33.74	4.46	21.60	622
21	24.54	34.05	4.72	22.78	508
31	24.00	34.29	4.73	23.13	475
55	23.40	34.45	4.62	23.42	447
74	22.90	34.43	4.73	23.55	435
94	21.70	34.46	4.00	23.92	400

STRANGER; March 17, 1960; 1641 GCT; 5°08'N, 106°54'E; sounding, 59 m; wind, 320°, force 1; weather, missing; sea, calm; wire angle, 03°.

0	28.24	33.89	4.45	21.50	631
10	27.66	33.83	4.39	21.65	616
20	26.81	33.75	4.54	21.86	596
29	26.12	33.79	4.59	22.11	572
49	25.58	33.86	4.52	22.32	552

STRANGER; March 18, 1960; 0557 GCT; 5°25'N, 105°42'E; sounding, 73 m; wind, 080°, force 1; weather, partly cloudy; sea, smooth; wire angle, 02°.

0	28.65	33.81	4.44	21.31	649
10	27.70	33.78	4.46	21.60	622
20	27.05	33.66	4.57	21.72	610
39	26.76	33.67	4.59	21.82	600
58	26.08	33.68	4.47	22.04	579

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SIO NAGA S-2		INTERPOLATED				COMPUTED	
		Z m	T °C	S ‰	O <sub>2</sub> m/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

29 30 STRANGER; December 12, 1959; 0738 GCT;  
6°06'N, 105°33'E; sounding, 51 m; wind, 030°,  
force 5; weather, partly cloudy; sea, moderate;  
wire angle, 03°.

0	27.23	33.32	4.52	21.41	640
10	27.24	33.30	4.58	21.38	642
20	27.16	33.31	4.57	21.43	638
30	27.17	33.40	4.53	21.49	632
40	27.00	33.62	4.53	21.70	612

31 32 STRANGER; December 12, 1959; 2115 GCT;  
7°32'N, 104°58'E; sounding, 38 m; wind, 040°,  
force 3; weather, missing; sea, moderate;  
wire angle, 05°.

0	27.08	33.73	4.20	21.77	606
10	27.10	33.73	4.52	21.76	607
20	27.10	33.71	4.55	21.75	608
28	27.10	33.74	4.32	21.77	606

SIO NAGA S-2		INTERPOLATED				COMPUTED	
		Z m	T °C	S ‰	O <sub>2</sub> m/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; December 12, 1959; 1416 GCT;  
6°50'N, 105°19'E; sounding, 49 m; wind, 030°,  
force 4; weather, missing; sea, moderate;  
wire angle, 00°.

0	27.00	33.64	4.43	21.72	610
10	26.98	33.62	4.48	21.72	610
20	26.98	33.64	4.70	21.73	609
30	27.00	33.64	4.63	21.72	610
40	26.98	33.68	4.67	21.76	606

STRANGER; December 13, 1959; 0412 GCT;  
8°20'N, 104°51'E; sounding, 29m; wind, 080°,  
force 5; weather, overcast; sea, moderate;  
wire angle, 06°.

0	27.36	31.46	4.30	19.97	778
5	27.34	31.36u	4.70	(19.98)	(777)
10	27.12	32.02	4.64	20.47	730
20	26.90	32.94	4.40	21.22	658

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; April 23, 1960; 1713 GCT; 6°23'N, 102°12'E; sounding, 24 m; wind, 190°, force 1; weather, missing; sea, calm; wire angle, 00°.

0	30.23	31.61	4.17	19.13	858
5	30.16	32.08	4.23	19.51	822
10	29.33	32.39	4.24	20.02	773
15	29.34	32.53	4.17	20.12	763

STRANGER; April 24, 1960; 0454 GCT; 7°10'N, 103°10.5'E; sounding, 51 m; wind, 250°, force 1; weather, cloudy; sea, calm; wire angle, 00°.

0	30.52	32.52	4.19	19.71	803
10	29.96	33.62	4.38	20.73	705
20	29.06	33.89	4.48	21.23	657
30	28.72	33.88	4.53	21.34	646
39	27.06	33.95	4.48	21.93	590

STRANGER; April 24, 1960; 1508 GCT; 7°55'N, 104°14'E; sounding, 31 m; wind, 220°, force 2; weather, missing; sea, calm; wire angle, 04°.

0	29.94	34.10	4.33	21.09	670
5	29.96	34.09	4.30	21.08	671
10	29.52	34.08	4.38	21.22	658
15	29.26	34.13	4.42	21.34	646
20	29.24	34.17	4.36	21.38	642

STRANGER; April 25, 1960; 0216, 0226 GCT; 9°01.5'N, 104°14.5'E; sounding, 22 m; wind, 220°, force 2; weather, partly cloudy; sea, slight; wire angle, 00°, 01°.

0	29.97	33.74	4.36	20.81	697
5	29.98	33.77	4.38	20.83	695
10	29.93	33.76	4.24	20.84	694
15	29.91	33.77	4.22	20.86	693

STRANGER; April 25, 1960; 1000 GCT; 9°50'N, 103°53.5'E; sounding, 27 m; wind, 260°, force 4; weather, partly cloudy; sea, slight; wire angle, 02°.

0	30.92	31.83	4.09	19.06	866
10	30.88	31.81	4.10	19.06	866
15	29.89	32.52	3.82	19.93	782
20	28.68	33.29	3.34	20.91	688

STRANGER; April 25, 1960; 2051 GCT; 8°57'N, 102°49'E; sounding, 31 m; wind, 220°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	30.66	32.02a)	4.27	(19.25)	(848)
5	30.66	31.96a)	4.31	(19.29)	(843)
10	30.61	32.69	4.31	19.81	793
20	28.89	33.63	4.64	21.09	670

a) Possible transposition.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; April 23, 1960; 2323 GCT; 6°45.5'N, 102°41'E; sounding, 46 m; wind, calm; weather, partly cloudy; sea, calm; wire angle, 00°.

0	30.36	32.31	4.28	19.61	812
10	30.26	32.49	4.37	19.78	796
20	29.06	32.72	4.65	20.36	741
30	27.06	33.67	3.76	21.72	610
34	26.93	33.74	3.65	21.81	601

STRANGER; April 24, 1960; 0942 GCT; 7°32'N, 103°41.5'E; sounding, 44 m; wind, 240°, force 2; weather, partly cloudy; sea, calm; wire angle, 00°.

0	30.92	34.03	4.31	20.70	707
10	29.79	34.03	4.34	21.09	670
20	29.19	34.25a)	4.42	(21.32)	(648)
30	28.95	34.16	4.40	21.47	634
36	28.92	34.07a)	4.40	(21.55)	(626)

STRANGER; April 24, 1960; 1932 GCT; 8°16'N, 104°43.5'E; sounding, 24 m; wind, 200°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	29.48	34.24	4.26	21.35	645
5	29.48	34.22	4.31	21.34	646
10	29.42	34.36	4.32	21.46	634
15	29.34	34.37	4.35	21.50	631

STRANGER; April 25, 1960; 0615 GCT; 9°26.5'N, 104°05'E; sounding, 26 m; wind, 260°, force 3; weather, partly cloudy; sea, slight; wire angle, 00°.

0	30.96	32.10	4.43	19.25	847
5	30.90	32.09	4.46	19.26	846
10	29.91	33.38	4.43	20.56	721
15	29.92	33.56	4.37	20.70	708

STRANGER; April 25, 1960; 1546 GCT; 9°24.5'N, 103°21'E; sounding, 40 m; wind, 280°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	30.66	31.84	4.28	19.16	856
10	30.67	31.84	4.34	19.15	856
20	30.02	33.89	4.28	20.91	688
30	29.62	33.98	4.25	21.11	668

STRANGER; April 26, 1960; 0201, 0212 GCT; 8°29.5'N, 102°17.5'E; sounding, 70 m; wind, 230°, force 3; weather, cloudy; sea, slight; wire angle, 00°, 00°.

0	30.76	32.08	4.36	19.30	842
10	30.76	32.16	4.37	19.36	836
20	30.21	32.94	4.42	20.13	762
30	28.80	33.74	4.63	21.21	659
39	27.80	33.89	4.71	21.65	617
49	26.17	33.91	4.10	22.18	566
58	26.16	33.99	4.04	22.24	560

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

13 14 STRANGER; April 26, 1960; 0655 GCT; 8°05.5'N, 101°50.5'E; sounding, 75 m; wind, calm; weather, overcast; sea, slight; wire angle, 00°.

0	30.78	32.12	4.28	19.32	840
10	30.46	32.11	4.35	19.43	830
20	30.20	32.14	4.50	19.54	819
30	29.24	32.54	4.38	20.16	759
39	27.47	33.68	4.62	21.60	622
49	26.42	33.77	3.76	22.00	583
59	26.19	33.87	3.43	22.14	569

15 16 STRANGER; April 26, 1960; 1730 GCT; 7°20.5'N, 100°54.5'E; sounding, 18 m; wind, 230°, force 3; weather, missing; sea, slight; wire angle, 02°.

0	30.69	32.39	4.28	19.56	818
5	30.68	32.37	4.22	19.54	819
10	30.66	32.38	4.31	19.56	817

17 18 STRANGER; April 27, 1960; 0459 GCT; 8°40'N, 100°15'E; sounding, 17 m; wind, 330°, force 2; weather, partly cloudy; sea, calm; wire angle, 01°.

0	31.29	32.34	4.20	19.31	841
5	31.05	32.35	4.20	19.40	832
9	31.08	32.36	4.28	19.40	833

19 20 STRANGER; April 27, 1960; 1751 GCT; 9°30'N, 101°20.5'E; sounding, 64 m; wind, 160°, force 3; weather, missing; sea, slight; wire angle, 01°.

0	30.54	31.97	4.32	19.29	843
10	30.54	31.96	4.35	19.29	844
20	30.11	32.02	4.37	19.48	825
30	30.10	32.29	4.73	19.68	805
39	29.03	32.21	4.69	19.98	776
49	28.81	32.28	4.60	20.11	764

21 22 STRANGER; April 28, 1960; 0444 GCT; 10°19'N, 102°25.5'E; sounding, 62 m; wind, 210°, force 2; weather, partly cloudy; sea, slight; wire angle, 01°.

0	30.69	32.03	4.32	19.29	843
10	30.34	32.11	4.35	19.47	826
20	30.30	32.07	4.24	19.45	828
30	29.77	32.41	4.04	19.89	786
39	28.60	32.58	4.01	20.40	736
49	28.09	32.97	1.35	20.86	692

23 24 STRANGER; April 28, 1960; 2237 GCT; 11°27'N, 102°45.5'E; sounding, 24 m; wind, 210°, force 2; weather, missing; sea, slight; wire angle, 00°.

0	31.54	31.74	4.20	18.78	893
5	31.56	31.75	4.20	18.78	893
10	30.88	32.56a)	4.31	(19.43)	(830)
15	30.34	32.30a)	4.20	(19.81)	(793)

- a) Possible transposition.  
b) Alternate value, 31.52°C.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; April 26, 1960; 1157 GCT; 7°44'N, 101°19'E; sounding, 46 m; wind, 100°, force 2; weather, missing; sea, calm; wire angle, 00°.

0	30.75	31.80	4.37	19.10	862
10	30.52	31.74	4.43	19.13	859
20	30.46	31.81	4.48	19.20	852
30	28.92	32.57a)	4.04	(20.24)	(752)
36	28.50	32.50a)	3.90	(20.41)	(736)

STRANGER; April 26, 1960; 2248 GCT; 8°03.5'N, 100°42.5'E; sounding, 26 m; wind, 280°, force 4; weather, partly cloudy; sea, slight; wire angle, 00°.

0	30.50	-	4.36	-	-
5	30.49	32.23	4.41	19.51	822
10	30.46	32.18	4.41	19.48	825
15	30.47	32.36	4.41	19.61	812

STRANGER; April 27, 1960; 1220 GCT; 9°05.5'N, 100°48'E; sounding, 37 m; wind, 310°, force 1; weather, missing; sea, calm; wire angle, 00°.

0	30.82	32.00a)	4.32	(19.21)	(851)
10	30.54	32.07a)	4.32	(19.32)	(840)
20	30.48	31.98a)	4.33	(19.39)	(834)
28	30.14	32.11	4.45	19.54	820

STRANGER; April 27, 1960; 2313, 2325 GCT; 9°55.5'N, 101°54'E; sounding, 69 m; wind, 200°, force 3; weather, partly cloudy; sea, slight; wire angle, 00°, 00°.

0	30.12	32.11u	4.41	-	-
10	30.13	32.03	4.43	19.48	825
20	30.12	32.02	4.40	19.48	825
30	30.00	32.07	4.44	19.55	818
39	29.14	32.06	4.52	19.84	791
49	28.36	32.42	4.06	20.36	740
58	27.16	33.50	2.50	21.56	625

STRANGER; April 28, 1960; 1000 GCT; 10°43'N, 102°59'E; sounding, 31 m; wind, 220°, force 3; weather, partly cloudy; sea, slight; wire angle, 00°.

0	31.48	32.01	4.34	19.00	871
10	31.39b)	32.01	4.37	19.03	868
15	31.06	32.00	4.42	19.14	858
20	29.40	32.59	3.37	20.14	761

STRANGER; April 29, 1960; 1241 GCT; 11°53'N, 102°10'E; sounding, 37 m; wind, 120°, force 4; weather, missing; sea, calm; wire angle, 00°.

0	30.35	32.17	4.40	19.51	822
10	30.36	32.16	4.37	19.50	823
20	30.25	32.21	4.37	19.57	816
28	30.22	32.22	4.34	19.59	814

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; April 29, 1960; 1832 GCT; 11°27.5'N, 101°38'E; sounding, 57 m; wind, 160°, force 3; weather, missing; sea, calm; wire angle, 00°.

0	30.28	32.18a)	4.44	(19.53)	(820)
10	30.30	32.35a)	4.40	(19.54)	(819)
20	30.28	32.26a)	4.41	(19.58)	(815)
30	30.10	32.16a)	4.49	(19.66)	(808)
39	29.18	32.23a)	4.20	(20.07)	(768)
46	28.56	32.65	2.28	20.47	730

STRANGER; April 30, 1960; 0542 GCT; 10°39'N, 100°33'E; sounding, 55 m; wind, 170°, force 3; weather, cloudy; sea, slight; wire angle, 00°.

0	30.38	32.15	3.94	19.48	825
10	30.21	32.26a)	4.51	(19.60)	(813)
20	30.18	32.39a)	4.51	(19.64)	(810)
30	30.15	32.27	4.49	19.65	808
44	28.52	32.22a)	4.16	(20.28)	(748)

STRANGER; April 30, 1960; 1729 GCT; 10°03'N, 99°27'E; sounding, 29 m; wind, 280°, force 3; weather, missing; sea, calm; wire angle, 00°.

0	30.74	32.55	4.15	19.66	808
5	30.72	32.55	4.34	19.67	807
10	30.54	32.61	4.32	19.77	797
20	30.37	32.76	4.32	19.94	780

STRANGER; May 1, 1960; 0907 GCT; 11°18'N, 99°39.5'E; sounding, 20 m; wind, 120°, force 2; weather, partly cloudy; sea, slight; wire angle, 00°.

0	30.82	32.46	4.44	19.56	817
5	30.66	32.45	4.42	19.61	812
10	30.32	32.45	4.41	19.73	801

STRANGER; May 1, 1960; 1916 GCT; 12°09'N, 100°50'E; sounding, 27 m; wind, 190°, force 4; weather, missing; sea, slight; wire angle, 00°.

0	30.44	32.68	4.26	19.86	788
5	30.44	32.69	4.30	19.87	788
10	30.44	32.68	4.30	19.86	788
18	30.45	32.72	4.29	19.89	786

a) Possible transposition.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; April 29, 1960; 2344, 2357 GCT; 11°03.5'N, 101°05.5'E; sounding, 53 m; wind, 170°, force 4; weather, cloudy; sea, slight; wire angle, 00°, 03°.

0	30.16	32.06	-	19.49	824
11	30.16	32.09	4.49	19.51	822
21	30.14	32.07	4.49	19.51	822
31	29.82	32.04	4.34	19.59	814
44	29.00	32.21	4.05	19.99	776
49	28.28	-	2.78	-	-

STRANGER; April 30, 1960; 1108 GCT; 10°19'N, 100°03'E; sounding, 51 m; wind, calm; weather, partly cloudy; sea, calm; wire angle, 00°.

0	31.05	32.13	4.39	19.24	848
10	30.40	32.11	4.36	19.45	828
20	30.33	32.09	4.42	19.46	827
30	28.72	32.28	4.04	20.14	762
39	28.24	32.31	3.26	20.32	744

STRANGER; May 1, 1960; 0404 GCT; 10°37'N, 99°39'E; sounding, 40 m; wind, 360°, force 2; weather, cloudy; sea, calm; wire angle, 00°.

0	30.94	32.48	4.30	19.54	819
10	30.56	32.44	4.30	19.64	810
20	30.36	32.45	4.24	19.72	802
30	28.54	32.32	3.70	20.23	753

STRANGER; May 1, 1960; 1409 GCT; 11°41.5'N, 100°12'E; sounding, 34 m; wind, 180°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	30.24	32.41	4.11	19.73	801
5	30.24	32.43	4.19	19.74	800
10	30.04	32.42	4.15	19.80	794
20	29.72	32.38	3.92	19.88	786
26	29.60	32.35	3.67	19.90	785

STRANGER; May 1, 1960; 2340 GCT; 12°24'N, 101°24'E; sounding, 26 m; wind, 220°, force 3; weather, partly cloudy; sea, slight; wire angle, 02°.

0	30.78	32.36	4.02	19.50	823
5	30.78	32.40	4.15	19.53	820
10	30.77	32.39	4.15	19.53	820
19	30.25	32.37	4.16	19.69	804

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; May 29, 1960; 0315 GCT; 15°40'N,  
108°42'E; sounding, 42 m; wind, 290°, force 1;  
weather, cloudy; sea, smooth; wire angle, 00°.

0	27.76	33.26	4.52	21.20	666
10	26.62	33.54	4.58	21.76	606
20	25.47	33.44	4.63	22.04	579
30	24.78	33.69	4.61	22.44	541

STRANGER; May 29, 1960; 1753 GCT; 15°42'N,  
110°20'E; sounding, 466 m; wind, 170°, force 3;  
weather, missing; sea, slight; wire angle, 15°.

0	29.52	33.95	4.43	21.13	666
9	28.42	34.15	4.69	21.65	617
28	23.54	34.44	4.87	23.37	452
53	20.72	34.58	4.42	24.27	366
80	19.94	34.73	3.87	24.59	336
104	19.20	34.73	3.72	24.79	317
156	16.60	34.62	3.63	25.33	265
256	12.12	34.41	2.96	26.13	189
368	9.69	34.39	2.35	26.55	149

STRANGER; May 30, 1960; 0915, 1000, 1028 GCT;  
15°38'N, 112°01'E; sounding, 1573 m; wind, 230°,  
force 3; weather, cloudy; sea, slight; wire angle,  
05°, 03°, 08°.

0	30.52	34.03	4.34	20.86	692
10	30.46	34.04	4.34	20.90	689
29	27.36	34.19	4.80	22.01	582
53	23.54	34.53	5.01	23.44	445
83	20.51	34.65	3.86	24.38	356
106	18.90	34.69	3.58	24.83	313
161	15.52	34.58	3.22	25.55	244
263	11.70	34.43	2.79	26.23	180
381	9.48	34.39	2.25	26.58	146
537	7.51	34.41	1.97	26.90	116
709	6.16	34.44	1.96	27.11	96
866	5.15	34.49	1.96	27.39	70
1083	3.90	34.54	1.97	27.45	64

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; May 29, 1960; 1014 GCT; 15°40'N,  
109°31'E; sounding, 384 m; wind, 320°, force 3;  
weather, cloudy; sea, smooth; wire angle, 03°.

0	28.44	33.65	4.58	21.26	654
10	27.00	33.68	4.70	21.75	607
29	23.13	34.54	4.90	23.57	433
48	22.18	34.64	4.56	23.92	400
74	21.25	34.64	4.40	24.17	376
98	19.53	34.69	3.73	24.67	328
147	17.02	34.67	3.44	25.28	270
244	13.62	-	-	-	-

STRANGER; May 30, 1960; 0230 GCT; 15°42'N,  
111°12'E; sounding, 933 m; wind, 200°, force 3;  
weather, cloudy; sea, slight; wire angle, 05°.

0	30.35	34.09	4.29	20.97	682
10	30.27	34.09	4.32	20.99	680
29	28.02	34.02	4.65	21.68	614
48	25.44	34.32	5.00	22.71	515
74	22.88	34.46	4.33	23.58	432
97	19.02	34.63	3.24	24.76	320

STRANGER; May 30, 1960; 1838, 1905, 2005 GCT;  
15°45'N, 112°50'E; sounding, 2468 m; wind, 220°,  
force 4; weather, missing; sea, moderate; wire  
angle, 06°, 19°, 24°.

0	30.15	33.83	4.23	20.83	695
10	30.16	33.82	4.26	20.82	696
29	29.48	33.95	4.41	21.14	665
54	25.63	34.35	4.96	22.68	518
82	22.58	34.58	4.59	23.75	416
105	20.59	34.65	3.63	24.36	358
156	17.02	34.63	3.59	25.25	273
254	12.58	34.41	2.96	26.04	198
373	9.78	34.41	2.54	26.54	150
525	7.79	34.42	1.96	26.87	119
688	6.30	34.42	1.78	27.08	99
844	5.29	34.50	1.85	27.26	82
1061	4.07	34.41u	1.92	-	-

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	m/L	g/L	cl/ton

STRANGER; May 31, 1960; 0418 GCT; 15°06'N,  
113°02'E; sounding, 4353 m; wind, 230°, force 5;  
weather, partly cloudy; sea, rough; wire angle,  
11°.

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0	29.87	34.08	4.36	21.12	668
10	29.88	33.99	4.36	21.04	675
33	26.70	34.30	4.95	22.31	553
57	23.48	34.51	5.01	22.40	445
91	20.85	34.69	4.16	24.31	362
114	19.00	34.70	3.52	24.81	315
173	15.82	34.62	3.31	25.51	248
288	11.62	34.44	2.73	26.25	178
403	9.51	34.41	2.47	26.60	145
577	7.40	34.46	1.78	26.95	111
751	5.58	34.50	1.75	27.24	84
916	4.74	34.52	1.79	27.34	74
1138	3.88	34.55	1.94	27.46	63

STRANGER; June 1, 1960; 0015, 0215 GCT;  
13°55'N, 112°46'E; sounding, 1829 m; wind, 220°,  
force 7; weather, partly cloudy; sea, very rough;  
wire angle, 30°, 40°.

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2	29.43	33.99	4.28	21.19	661
10	29.45	33.98	4.43	21.18	662
26	27.08	34.17	4.82	22.10	574
47	23.60	34.49	4.99	23.39	450
72	21.90	34.58	4.41	23.95	397
92	20.31	34.67	3.67	24.45	349
138	17.00	34.64	3.34	25.26	272
210	13.70	34.50	2.68	25.88	213
297	11.42	34.43	2.30	26.27	176
417	9.66	34.37	2.08	26.53	151
545	8.06	34.39	1.83	26.81	125
673	6.86	34.43	1.79	27.01	106
859	5.32	34.48	1.79	27.25	83

STRANGER; June 2, 1960; 0255, 0340 GCT;  
13°35'N, 111°21'E; sounding, 1554 m; wind, 250°,  
force 5; weather, partly cloudy; sea, rough; wire  
angle, 16°, 20°.

11 12

0	29.22	34.04	4.44	21.29	651
9	29.22	33.98	4.43	21.25	655
33	28.76	34.01	4.58	21.43	638
56	24.90	34.24	4.90	22.83	504
90	21.54	34.57	4.21	24.04	388
113	19.46	34.67	3.43	24.67	328
169	16.04	34.63	3.12	25.47	252
283	12.14	34.40	2.99	26.12	190
396	10.93	34.65u	2.36	(26.34)	(169)
566	8.56	34.41	1.97	26.75	130
736	6.82	34.43	1.76	27.02	105
900	5.34	34.51	1.82	27.27	81
1120	4.04	-	1.99	-	-

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	m/L	g/L	cl/ton

STRANGER; May 31, 1960; 1330 GCT; 14°12'N,  
113°17'E; sounding, 3566 m; wind, 220°, force 5;  
weather, missing; sea, very rough; wire angle,  
20°.

0	29.84	33.78	4.38	20.88	690
10	29.86	33.79	4.40	20.90	689
28	28.84	34.00	4.40	21.40	641
52	24.49	34.37	5.04	23.05	483
80	22.38	34.57	4.61	23.80	411
104	19.83	34.67	3.91	24.58	337
155	16.70	34.52u	3.17	(25.33)	(265)
253	12.54	34.48	3.01	26.10	192
364	10.16	34.43	2.63	26.50	154
514	8.22	34.43	2.07	26.82	124
678	6.61	34.44	1.90	27.05	102
832	5.33	34.50	1.87	27.26	82
1050	4.16	34.51	1.89	27.41	68

STRANGER; June 1, 1960; 1520 GCT; 13°44'N,  
112°05'E; sounding, 2268 m; wind, 220°, force 5;  
weather, missing; sea, rough; wire angle, 26°.

0	29.06	33.94	4.31	21.27	653
8	29.06	33.92	4.29	21.26	654
25	25.91	34.09	4.95	22.40	545
45	23.75	34.39	4.78	23.28	461
68	22.06	34.13u	4.41	(23.85)	(406)
87	20.82	34.59	3.68	24.25	368
128	18.06	34.60	2.98	24.96	300
206	13.98	34.51	2.94	25.83	218
294	11.78	34.50	2.31	26.27	176
414	10.03	34.45	2.04	26.53	151
544	8.46	34.43	1.89	26.78	128
673	7.32	34.74r	1.84	(26.95)	(111)
865	5.45	34.48	1.81	27.24	84

STRANGER; June 2, 1960; 1311 GCT; 13°34'N,  
110°37'E; sounding, 2752 m; wind, 220°, force 2;  
weather, missing; sea, smooth; wire angle, 10°.

0	29.18		4.38		
10	28.99		4.51		
28	26.08		4.96		
52	23.24		4.95		
82	20.72		3.99		
105	18.69		3.47		
159	15.24		2.72		
260	12.44		2.63		
376	10.45		2.13		
533	8.44		1.95		
698	6.81		1.80		
854	5.58		1.70		
1069	4.35		1.80		

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; June 2, 1960; 2110 GCT; 13°32'N,  
109°53'E; sounding, 823 m; wind, 210°, force 2;  
weather, missing; sea, smooth; wire angle, 00°.

0	27.49	33.61	4.62	21.53	628
10	27.52	33.59	4.63	21.52	629
29	24.36	34.42	5.00	23.12	476
54	22.95	34.59	4.80	23.66	424
84	21.04	34.58	4.36	24.18	375
107	19.89	34.73	3.95	24.61	334
161	16.64	34.80u	3.81	-	-
264	13.15	34.74u	3.06	-	-
383	10.70	34.48	2.29	26.43	161
539	8.76	34.44	2.07	26.74	131
705	7.06	34.49	1.74	27.03	104

STRANGER; June 10, 1960; 1241 GCT; 12°09'N,  
109°25'E; sounding, 95 m; wind, 160°, force 2;  
weather, missing; sea, moderate; wire angle, 00°.

0	27.39	33.74	4.56	21.68	614
10	27.39	33.76	4.61	21.69	613
20	26.40	33.85	4.65	22.07	576
29	26.30	33.75u	4.67	(22.10)	(573)
53	23.60	34.09	4.55	23.10	478
73	22.56	34.49	4.56	23.70	421

STRANGER; June 11, 1960; 0526, 0610 GCT;  
11°34'N, 110°52'E; sounding, 2560 m; wind, 220°,  
force 5; weather, cloudy; sea, rough; wire angle,  
05°, 05°.

0	28.18	34.00	4.49	21.61	620
10	28.16	33.95	4.46	21.58	623
29	28.06	33.95	4.46	21.61	620
53	24.08	34.71u	4.94	(23.22)	(466)
83	21.31	34.62	3.94	24.15	378
107	19.37	34.62	3.32	24.66	329
161	16.88	35.88r	2.71	(25.25)	(273)
262	12.73	34.46	2.58	26.05	197
377	10.38	34.42	2.06	26.46	158
533	8.24	36.02r	1.90	(26.80)	(126)
700	6.56	34.45	1.83	27.07	100
861	4.96	34.49	1.83	27.30	78
1079	3.82	34.58	1.96	27.49	60

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; June 3, 1960; 0701 GCT; 13°26'N,  
109°25'E; sounding, 100 m; wind, 240°, force 4;  
weather, overcast; sea, smooth; wire angle, 08°.

0	26.80	33.79	4.69	21.90	593
10	26.78	33.64	4.69	21.79	603
29	24.36	33.99	4.76	22.80	507
53	22.92	34.70	4.82	23.75	416
81	21.10	35.02r	4.31	(24.21)	(372)
86	20.92	34.62	4.28	24.25	368

STRANGER; June 10, 1960; 2015, 2115 GCT;  
11°52'N, 110°08'E; sounding, 2140 m; wind, 210°,  
force 5; weather, missing; sea, rough; wire angle,  
12°, 15°.

0	26.72	33.90	4.61	22.01	582
9	26.74	33.81	4.46	21.93	590
33	25.22	34.09	4.72	22.61	525
58	21.10	34.55	3.65	24.15	378
91	19.06	34.65	3.39	24.76	320
109	18.28	34.62	2.92	24.93	303
164	15.63	34.58	2.72	25.53	246
276	12.12	34.44	2.28	26.15	187
386	10.24	34.43	2.04	26.48	156
553	8.16	34.43	1.78	26.83	123
722	6.54	34.46	1.70	27.08	99
885	4.84	34.51	1.81	27.32	76
1106	3.70	34.57	1.86	27.49	60

STRANGER; June 11, 1960; 1420 GCT; 11°18'N,  
111°34'E; sounding, 2743 m; wind, 220°, force 5,  
weather, missing; sea, rough; wire angle, 11°.

0	28.14	33.92	4.52	21.56	625
10	28.16	33.92	4.49	21.56	625
33	28.14	33.92	4.47	21.56	625
57	28.02	33.94	4.52	21.60	621
91	23.08	34.44	4.31	23.51	439
115	21.57	34.54	3.87	24.01	391
173	17.26	34.62	2.98	25.00	279
286	12.43	34.44	2.63	26.09	193
401	10.07	34.40	2.45	26.49	155
572	7.90	34.41	2.02	26.85	121
744	6.12	34.58u	1.77	(27.11)	(96)
911	4.56	34.50	1.77	27.36	73
1134	3.54	34.55	1.95	27.49	60

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; June 12, 1960; 0030, 0059, 0136 GCT;  
10°56'N, 112°13'E; sounding, 4114 m; wind, 230°,  
force 5; weather, cloudy; sea, rough; wire angle,  
14°, 12°, 12°.

19 20

0	28.36	34.34u	4.44	-	-
10	28.38	33.97	4.43	21.53	628
28	28.37	33.98	4.41	21.54	627
53	28.37	33.97	4.43	21.54	627
81	23.64	34.38	4.55	23.30	459
103	22.28	34.50	4.12	23.79	412
156	18.47	34.66	3.32	24.92	304
257	13.64	34.51	2.59	25.90	211
378	10.74	34.41	2.38	26.38	165
533	8.52	34.45	1.76	26.79	127
695	6.67	34.45	1.71	27.05	102
853	5.26	34.66u	1.73	(27.26)	(82)
1071	3.96	34.57	1.91	27.47	62

STRANGER; June 12, 1960; 2124, 2210, 2245 GCT,  
9°58'N, 112°30'E; sounding, 2113 m; wind, 220°,  
force 4; weather, missing; sea, moderate; wire  
angle, 15°, 10°, 10°.

21 22

0	28.70	34.08	4.46	21.50	631
10	28.71	34.01	4.46	21.46	635
28	28.70	34.03	4.43	21.45	636
53	28.72	33.99	4.53	21.42	639
81	23.95	34.42	4.53	23.24	464
103	22.78	34.51	4.43	23.65	425
156	18.17	34.60	2.91	24.94	302
256	13.65	34.51	2.53	25.90	211
371	11.31	34.48	2.08	26.33	170
532	8.56	34.56u	1.88	(26.79)	(128)
699	6.64	34.45	1.77	27.05	102
856	5.28	34.50	1.70	27.27	81
1072	4.02	34.59	1.80	27.47	62

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; June 12, 1960; 0923, 1015 GCT;  
10°35'N, 112°51'E; sounding, 2651 m; wind, 220°,  
force 5; weather, overcast; sea, rough; wire  
angle, 15°, 18°.

0	28.68	33.94	4.46	21.41	640
9	28.66	33.96	4.46	21.43	638
33	28.64	33.95	4.46	21.43	638
56	28.42	33.98	4.49	21.51	630
89	23.42	34.44	4.67	23.41	448
113	21.72	34.54	3.77	23.97	395
170	17.18	34.61	2.93	25.20	278
281	12.44	34.56	2.17	26.18	184
394	10.38	34.45	2.02	26.48	156
565	7.93	34.45	1.77	26.87	119
739	6.14	34.49	1.71	27.16	92
905	4.86	34.52	1.76	27.33	75
1125	3.78	34.54	1.82	27.47	62

STRANGER; June 13, 1960; 0620 GCT; 9°22'N,  
112°09' E; sounding, 1829 m; wind, 220°, force 4,  
weather, cloudy; sea, moderate; wire angle, 10°.

0	29.02	33.94	4.36	21.28	652
10	28.82	33.95	4.41	21.36	644
33	28.74	33.95	4.36	21.40	641
58	28.30	33.98	4.44	21.55	626
92	23.32	34.47	4.80	23.45	444
115	20.19	34.64	3.56	24.46	348
173	17.07	34.57	2.57	25.20	278
287	12.82	34.50	2.47	26.06	196
403	10.57	34.45	2.00	26.45	159
579	8.08	34.43	1.76	26.84	122
757	6.22	34.48	1.65	27.13	94
925	4.84	34.80r	1.76	(27.33)	(75)
1149	3.70	34.56	1.83	27.49	60

INTERPOLATED				COMPUTED	
Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; June 13, 1960; 1256 GCT; 8°51'N,  
111°50'E; sounding, 1737 m; wind, 220°, force 3;  
weather, missing; sea, slight; wire angle, 15°.

0	28.70	33.73	4.42	21.24	656
9	28.72	33.73	4.44	21.22	658
28	28.56	33.75	4.48	21.30	650
51	24.91	34.24	4.63	22.83	504
80	21.85	34.55	3.74	23.94	398
103	20.54	34.60	3.39	24.34	360
156	17.60	34.60	2.79	25.09	288
252	13.30	34.51	2.42	25.98	204
362	10.98	34.45	2.12	26.38	166
510	8.60	34.45	1.70	26.78	128
669	6.98	34.46	1.65	27.02	105
819	5.65	34.50	1.71	27.22	86
1031	4.32	34.51	1.79	27.39	70

STRANGER; June 14, 1960; 0446 GCT; 9°44'N,  
110°42'E; sounding, 3109 m; wind, 220°, force 4;  
weather, cloudy; sea, moderate; wire angle, 08°.

0	28.38	34.14u	4.45	-	-
10	28.26	33.71	4.48	21.36	644
29	26.12	34.08	4.86	22.32	552
54	23.56	34.45	4.83	23.38	451
82	21.86	34.51	4.04	23.90	401
105	20.81	34.59	3.71	24.25	368
157	16.76	34.59	2.94	25.28	270
255	13.58	34.50	2.53	25.91	210
367	11.03	34.45	2.13	26.25	168
514	8.40	34.45	1.70	26.80	126
672	6.95	34.45	1.68	27.02	105
825	5.67	34.49	1.67	27.22	86
1043	4.17	34.55	1.79	27.44	65

STRANGER; June 15, 1960; 0013 GCT; 10°31'N,  
109°36'E; sounding, 284 m; wind, 220°, force 4;  
weather, partly cloudy; sea, slight; wire angle,  
22°.

0	26.44	33.85	4.59	22.05	578
9	26.44	33.90	4.62	22.10	574
27	24.72	34.28	4.76	22.91	496
50	21.52	34.62	4.36	24.08	384
77	19.38	34.67	3.68	24.70	326
99	18.84	34.70	3.58	24.85	311
150	16.22	34.59	2.78	25.40	259
227	13.26	34.50	2.67	25.98	204

a) Overlapping casts.

INTERPOLATED				COMPUTED	
Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; June 13, 1960; 2157, 2113 GCT;  
9°18'N, 111°14'E; sounding, 2377 m; wind, 210°,  
force 4; weather, missing; sea, slight; wire angle,  
10°, 29°.

0	28.36	33.78	4.45	21.40	641
10	28.37	33.80	4.45	21.41	640
33	27.82	33.87	4.54	21.61	620
73	22.28	34.46	3.98	23.75	416
96	21.07	34.56	3.82	24.17	376
183	16.51	34.59	2.76	25.33	265
289	12.26	34.45	2.33	26.13	189
262a)	12.82	34.47	2.45	26.04	198
364	10.96	34.44	2.09	26.38	166
519	8.48	34.42	2.03	26.78	128
676	6.68	34.43	1.68	27.04	103
829	5.67	34.48	1.73	27.20	88
1038	4.22	34.51	1.86	27.40	69

STRANGER; June 14, 1960; 1704, 1747 GCT;  
10°12'N, 110°08'E, sounding, 1737 m; wind, 240°,  
force 4; weather, missing; sea, slight; wire angle,  
13°, 09°.

0	27.40	34.08	4.80	21.93	590
10	27.42	34.08	4.60	21.92	591
33	24.54	34.28	4.80	22.96	491
57	22.13	34.60	4.54	23.90	402
91	18.72	34.60	2.96	24.81	315
114	17.06	34.59	2.77	25.21	277
172	14.92	34.55	2.79	25.66	234
287	12.66	34.48	2.64	26.08	194
401	9.82	34.43	2.04	26.55	149
574	7.48	34.43	1.78	26.92	114
759	5.99	34.50	1.76	27.19	89
926	4.92	34.52	1.79	27.32	76
1145	3.68	34.55	1.93	27.48	61

STRANGER; June 15, 1960; 0729, 0737 GCT;  
10°56'N, 108°56'E; sounding, 46 m; wind, 220°,  
force 5; weather, partly cloudy; sea, moderate;  
wire angle, 09°, 11°.

0	26.60	34.13	4.55	22.21	563
10	26.42	34.13	4.61	22.27	557
19	25.62	34.16	4.69	22.54	531
28	23.82	34.22	4.64	23.12	476

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

29 30 STRANGER; June 19, 1960; 1143 GCT; 9°45'N, 107°04'E; sounding, 22 m; wind, 220°, force 5; weather, cloudy; sea, moderate; wire angle, 10°.

0	29.09	34.13u	4.50	-	-
5	29.09	32.98	4.53	20.54	723
10	28.72	33.29	4.46	20.90	688
14	28.00	33.98	4.28	21.66	616

31 32 STRANGER; June 20, 1960; 0114 GCT; 8°18'N, 107°48'E; sounding, 58 m; wind, 330°, force 5; weather, overcast; sea, moderate; wire angle, 00°.

0	28.99	33.34	4.53	20.85	693
10	29.04	33.38	4.52	20.85	693
29	28.95	33.50	4.58	20.98	681
48	22.73	34.50	4.13	23.65	425

33 34 STRANGER; June 20, 1960; 1537 GCT; 6°54'N, 108°31'E; sounding, 113 m; wind, 230°, force 6; weather, missing; sea, rough; wire angle, 18°.

0	29.24	33.29	4.35	20.72	706
9	29.24	33.33	4.38	20.74	704
18	29.26	33.34	4.38	20.74	704
28	29.28	33.35	4.38	20.75	703
51	27.15	33.99	4.77	21.94	589
69	24.10	-	4.75	(23.14)	(474)
88	21.78	34.51	3.54	23.94	398

35 36 STRANGER; June 21, 1960; 1040 GCT; 5°37'N, 107°22'E; sounding, 60 m; wind, 230°, force 5; weather, overcast; sea, moderate; wire angle, 00°.

0	28.34	33.85u	4.45	-	-
10	28.37	33.61	4.48	21.26	654
20	28.38	33.62	4.56	21.26	654
30	28.38	33.64	4.46	21.28	652
54	25.14	34.43	4.35	22.89	498

37 38 STRANGER; June 22, 1960; 0524 GCT; 4°45'N, 106°08'E; sounding, 82 m; wind, 210°, force 4; weather, overcast; sea, moderate; wire angle, 05°.

0	28.80	33.25	4.49	20.84	694
10	28.85	33.26	4.45	20.83	695
21	28.91	33.33	4.43	20.86	692
30	28.97	33.35	4.42	20.86	692
54	28.86	33.42	4.36	20.94	685
73	23.34	34.45	4.13	23.43	446

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; June 19, 1960; 1845 GCT; 9°02'N, 107°25'E; sounding, 38 m; wind, 190°, force 4; weather, missing; sea, moderate; wire angle, 02°.

0	28.49	33.95	4.40	21.47	634
10	28.50	33.97	4.43	21.48	633
21	28.40	33.97	4.43	21.52	629
23	26.84	34.08	4.52	22.10	574
27	25.08	34.33	4.61	22.83	504
32	25.08	34.34	4.61	22.84	503

STRANGER; June 20, 1960; 0749 GCT; 7°34'N, 108°10'E; sounding, 84 m; wind, 230°, force 4; weather, overcast; sea, rough; wire angle, 14°.

0	28.84	32.38	4.34	20.17	759
10	29.20	33.09	4.32	20.58	719
19	29.23	33.13	4.41	20.60	717
28	29.26	33.21	4.43	20.66	712
55	25.98	34.02	4.90	22.32	552
75	23.58	34.41	4.61	23.35	454

STRANGER; June 21, 1960; 0157 GCT; 6°16'N, 108°06'E; sounding, 82 m; wind, 240°, force 4; weather, cloudy; sea, rough; wire angle, 10°.

0	29.39	33.46	4.31	20.80	698
10	29.38	33.44	4.37	20.79	699
19	29.37	33.45	4.35	20.80	698
28	29.39	33.44	4.35	20.79	699
52	26.56	33.88	4.56	22.04	579
71	23.04	34.42	4.10	23.50	440

STRANGER; June 21, 1960; 1952, 2003 GCT; 5°08'N, 106°42'E; sounding, 55 m; wind, 210°, force 4; weather, missing; sea, moderate; wire angle, 03°, 03°.

0	29.06	33.43	4.49	20.88	690
10	29.06	33.43	4.50	20.88	690
19	29.06	33.42	4.50	20.85	691
29	29.06	33.43	4.53	20.88	690
38	29.04	33.44	4.49	20.90	689
48	28.88	33.48	4.44	20.99	680

STRANGER; June 22, 1960; 1221 GCT; 5°20'N, 105°45'E; sounding, 70 m; wind, 210°, force 3; weather, missing; sea, slight; wire angle, 03°.

0	29.00	33.33	4.44	20.82	696
10	29.00	33.33	4.51	20.82	696
24	29.01	33.33	4.51	20.82	696
34	29.00	33.34	4.48	20.84	694
58	28.99	33.44	4.47	20.94	685
63	28.42	33.67	4.50	21.28	652

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; June 22, 1960; 1820 GCT; 5°59'N,  
105°23'E; sounding, 53 m; wind, 190°, force 3;  
weather, missing; sea, slight; wire angle, 00°.

0	29.14	33.42	4.49	20.85	693
10	29.16	33.44	4.52	20.86	692
21	29.14	33.44	4.52	20.86	692
30	29.14	33.51	4.50	20.92	687
45	29.13	33.44	4.50	20.85	691

STRANGER; June 23, 1960; 0920, 0929 GCT;  
7°32'N, 105°10'E; sounding, 35 m; wind, 280°,  
force 4; weather, overcast; sea, rough; wire  
angle, 08°, 10°.

0	28.58	33.05	4.56	20.77	701
10	28.59	33.64u	4.53	(20.77)	(701)
19	28.16	33.41	4.49	21.17	663
27	27.84	33.73	4.43	21.51	630

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; June 22, 1960; 2345 GCT; 6°44'N,  
105°14'E; sounding, 51 m; wind, 300°, force 7;  
weather, overcast; sea, slight; wire angle, 08°.

0	29.18	33.41	4.54	20.84	694
10	29.19	33.42	4.63	20.84	694
19	29.20	33.44	4.69	20.85	693
33	29.02	33.48	4.50	20.93	686
43	28.34	33.55	4.42	21.22	658

STRANGER; June 24, 1960; 0019 GCT; 8°19'N,  
104°48'E; sounding, 26 m; wind, 280°, force 4;  
weather, overcast; sea, rough; wire angle, 05°.

0	28.85	32.94u	4.25	-	-
5	28.84	32.25	4.30	20.07	768
10	28.88	32.28	4.33	20.08	767
15	28.89	32.34	4.29	20.12	763

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; August 2, 1960; 1015 GCT; 12°59.5'N, 100°35'E; sounding, 24 m; wind, 260°, force 4; weather, overcast; sea, moderate; wire angle, 00°.

0	29.62	33.17	4.34	20.50	726
5	29.62	33.19	4.32	20.52	725
10	29.65	33.22	4.29	20.53	724
18	29.64	33.24	4.28	20.55	722

STRANGER; August 2, 1960; 1539 GCT; 12°40'N, 100°15'E; sounding, 20 m; wind, 190°, force 3; weather, missing; sea, slight; wire angle, 01°.

0	29.50	33.00	4.36	20.42	735
5	29.51	33.03	4.39	20.44	733
10	29.54	33.03	4.40	20.43	734
15	29.59	33.08	4.43	20.45	732

STRANGER; August 2, 1960; 2146 GCT; 12°20'N, 100°35'E; sounding, 27 m; wind, 200°, force 4; weather, missing; sea, slight; wire angle, 00°.

0	29.08	32.65	4.26	20.30	746
7	29.08	32.66	4.25	20.30	746
14	29.09	32.65	4.26	20.29	747
21	29.08	32.69	4.32	20.33	744

STRANGER; August 3, 1960; 0525 GCT; 11°48.5'N, 99°57.5'E; sounding, 24 m; wind, 190°, force 3; weather, overcast; sea, slight; wire angle, 02°.

0	28.52	33.21	4.30	20.90	688
9	28.48	33.20	4.30	20.91	688
14	28.46	33.45	4.26	21.10	669
19	28.41	33.66	2.97	21.28	652

STRANGER; August 3, 1960; 1548 GCT; 11°39'N, 100°13'E; sounding, 35 m; wind, 290°, force 3; weather, missing; sea, slight; wire angle, 03°.

0	28.53	33.08	3.72	20.80	698
10	28.56	33.12	4.21	20.82	696
22	28.64	33.25	3.94	20.89	689
27	28.62	33.27	3.88	20.91	687
29	28.60	33.30	3.80	20.94	684

STRANGER; August 4, 1960; 0109 GCT; 12°22'N, 101°25'E; sounding, 27 m; wind, 210°, force 4; weather, overcast; sea, slight; wire angle, 03°.

0	29.10	32.65	4.20	20.29	747
5	29.10	32.66	4.25	20.30	746
15	29.12	32.69	4.25	20.31	745
18	29.09	32.65	4.29	20.29	747
22	29.11	32.69	4.28	20.32	744

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; August 2, 1960; 1258 GCT; 12°59'N, 100°15'E; sounding, 20 m; wind, 190°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	29.65	33.29	4.22	20.58	719
5	29.64	33.30	4.32	20.60	718
10	29.66	33.31	4.26	20.60	718
15	29.61	33.31	4.21	20.61	716

STRANGER; August 2, 1960; 1840, 1851 GCT; 12°40'N, 100°35.5'E; sounding, 22 m; wind, 200°, force 4; weather, missing; sea, missing; wire angle, 02°, 01°.

0	29.45	33.05	4.15	20.47	730
5	29.46	33.03	4.23	20.45	731
10	29.47	33.07	4.20	20.48	729
13	29.44	-	4.23	-	-
17	29.46	33.07	4.23	20.48	728

STRANGER; August 3, 1960; 0040, 0047 GCT; 12°20'N, 100°15'E; sounding, 26 m; wind, 200°, force 3; weather, cloudy; sea, slight; wire angle, 00°, 00°.

0	29.19	32.96	4.32	20.49	728
6	29.18	32.94	4.30	20.48	729
13	29.20	32.97	4.30	20.50	727
20	29.36	33.03	4.26	20.49	728

STRANGER; August 3, 1960; 1020 GCT; 11°17'N, 99°40'E; sounding, 24 m; wind, 240°, force 4; weather, cloudy; sea, slight; wire angle, 00°.

0	28.25	33.70	4.46	21.36	644
6	28.26	33.71	4.46	21.36	644
12	28.22	33.75	4.41	21.40	640
18	28.00	33.79	3.09	21.51	630

STRANGER; August 4, 1960; 2058 GCT; 12°01.5'N, 100°47'E; sounding, 37 m; wind, 230°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	28.91	33.23a)	4.04	(20.76)	(702)
10	28.90	33.19a)	4.00	(20.79)	(699)
20	28.92	33.41a)	4.02	(20.88)	(691)
30	28.94	33.36a)	3.51	(20.91)	(688)

STRANGER; August 4, 1960; 0520, 0530 GCT; 12°07'N, 101°48'E; sounding, 31 m; wind, 230°, force 4; weather, cloudy; sea, slight; wire angle, 00°, 00°.

0	28.82	32.36	4.30	20.17	759
8	28.81	32.68	4.28	20.41	736
16	28.80	32.68	4.30	20.41	735
26	28.79	32.66	4.26	20.40	736

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a) Possible transposition.

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

13 14 STRANGER; August 4, 1960; 0830, 0838 GCT; 11°54'N, 102°12'E; sounding, 31 m; wind, 240°, force 4; weather, overcast; sea, slight; wire angle, 02°, 03°.

0	28.54	30.52	4.52	18.88	882
10	28.73	31.93	4.46	19.87	787
15	29.06	32.34	4.28	20.07	768
19	29.13	32.53	4.17	20.19	757
22	28.95	32.67	5.03u	20.36	741

15 16 STRANGER; August 4, 1960; 2025 GCT; 11°11'N, 101°10'E; sounding, 55 m; wind, 250°, force 5; weather, missing; sea, slight; wire angle, 04°.

0	28.54	32.65	4.38	20.48	729
10	28.57	32.68	4.37	20.49	728
20	28.56	32.69	4.41	20.50	727
30	28.55	32.71	4.44	20.52	725
40	28.56	32.69	4.41	20.50	727
47	28.58	32.71	4.37	20.51	726

17 18 STRANGER; August 5, 1960; 0756 GCT; 10°29.5'N, 100°12'E; sounding, 53 m; wind, 240°, force 4; weather, cloudy; sea, slight; wire angle, 02°.

0	29.00	32.82	4.41	20.45	732
10	28.94	32.82	4.36	20.47	730
20	28.76	32.82	4.34	20.53	724
29	28.82	32.87	4.30	20.55	722
39	28.71	32.94	4.21	20.64	714
44	27.99	33.49	3.17	21.29	652

19 20 STRANGER; August 6, 1960; 0601 GCT; 9°17.5'N, 100°06'E; sounding, 17 m; wind, 310°, force 4; weather, cloudy; sea, slight; wire angle, 00°.

0	29.22	32.80	4.20	20.36	740
4	29.22	32.80	4.20	20.36	740
8	29.16	32.80	4.20	20.38	738
12	28.95	32.80	4.11	20.45	731

21 22 STRANGER; August 6, 1960; 1814 GCT; 9°06.5'N, 100°47'E; sounding, 37 m; wind, 290°, force 4; weather, missing; sea, missing; wire angle, 00°.

0	28.73	32.62	3.88	20.39	737
10	28.76	32.61	4.37	20.37	739
20	28.04	33.72	3.81	21.44	636
26	27.49	33.87	3.83	21.73	609
30	27.49	33.89	3.85	21.75	607

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; August 4, 1960; 1352, 1400 GCT; 11°32'N, 101°38'E; sounding, 57 m; wind, 230°, force 4; weather, missing; sea, slight; wire angle, 00°, 00°.

0	28.64	32.81	4.36	20.56	721
10	28.67	32.83	4.46	20.57	720
20	28.69	32.85	4.46	20.58	720
30	28.72	32.87	4.42	20.58	719
39	28.72	32.92	4.34	20.62	716
49	28.27	33.66	3.06	21.32	648

STRANGER; August 5, 1960; 0241 GCT; 10°50'N, 100°44.5'E; sounding, 54 m; wind, 240°, force 4; weather, cloudy; sea, slight; wire angle, 06°.

0	28.82	32.55	4.34	20.31	745
10	28.82	32.61a)	4.38	(20.33)	(743)
20	28.80	32.57	4.38	20.33	743
29	28.78	32.58a)	4.38	(20.36)	(740)
39	28.83	32.84a)	4.33	(20.45)	(732)
47	28.92	32.73a)	4.28	(20.49)	(728)

STRANGER; August 5, 1960; 1450 GCT; 10°13'N, 99°36'E; sounding, 37 m; wind, 240°, force 3; weather, missing; sea, slight; wire angle, 00°.

0	28.70	32.76	4.29	20.50	726
10	28.70	32.74	4.42	20.49	728
20	28.70	32.76	4.42	20.50	726
26	27.60	33.66	3.11	21.54	627
31	27.56	33.64	2.82	21.54	627

STRANGER; August 6, 1960; 1226 GCT; 8°39'N, 100°15'E; sounding, 17 m; wind, 250°, force 4; weather, missing; sea, slight; wire angle, 02°.

0	29.02	32.93a)	4.37	(20.50)	(727)
5	29.01	32.90	4.38	20.51	726
9	28.97	32.87a)	4.36	(20.53)	(724)

STRANGER; August 6, 1960; 2337 GCT; 9°28'N, 101°21'E; sounding, 68 m; wind, 300°, force 3; weather, cloudy; sea, slight; wire angle, 00°.

0	28.71	32.60	4.35	20.38	738
10	28.72	32.61	4.34	20.39	738
20	28.72	32.62	4.35	20.39	737
30	28.87	33.05	4.38	20.67	711
39	28.84	33.10	4.27	20.71	706
49	27.04	33.91	4.07	21.91	592
58	26.14	34.02	3.93	22.27	557

a) Possible transposition.



INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; August 7, 1960; 0450, 0459 GCT;  
9°59'N, 101°53'E; sounding, 70 m; wind, 270°,  
force 4; weather, cloudy; sea, moderate; wire  
angle, 04°, 00°.

0	29.00	32.55u	4.35	-	-
10	28.98	32.45	4.31	20.18	758
20	28.98	32.45	4.31	20.18	758
30	28.95	32.43	4.32	20.18	758
40	28.95	32.44	4.32	20.18	757
49	28.98	32.45	4.31	20.18	758
59	28.98	32.44	4.31	20.17	758
64	-	33.49	3.57	-	-

STRANGER; August 7, 1960; 1623 GCT; 10°41.5'N,  
103°03.5'E; sounding, 27 m; wind, 260°, force 4;  
weather, missing; sea, slight; wire angle, 00°.

0	28.56	30.71	4.35	19.02	870
7	28.57	30.74	4.38	19.04	868
14	28.55	32.39	4.32	20.28	748
21	28.50	32.39	4.15	20.29	747

STRANGER; August 8, 1960; 0050 GCT; 9°49'N,  
103°54'E; sounding, 31 m; wind, 260°, force 6;  
weather, overcast; sea, moderate; wire angle, 00°.

0	28.08	30.38	4.38	18.93	878
9	28.12	30.37	4.39	18.91	880
18	28.43	30.30u	3.89	-	-
25	28.42	32.15	3.81	20.14	761

STRANGER; August 8, 1960; 1200 GCT; 9°00'N,  
102°53'E; sounding, 59 m; wind, 260°, force 4;  
weather, cloudy; sea, moderate; wire angle, 03°.

0	28.70	32.65	4.64	20.42	734
10	28.71	32.63	4.47	20.40	736
20	28.72	32.65	4.40	20.42	735
29	28.52	32.99	4.06	20.74	704
39	27.30	33.75	4.13	21.70	611
46	27.06	33.84	3.97	21.85	598
51	27.05	33.92	3.93	21.91	592

STRANGER; August 9, 1960; 0047, 0100 GCT;  
8°06'N, 101°52'E; sounding, 68 m; wind, 260°,  
force 3; weather, cloudy; sea, moderate; wire  
angle, 05°, 06°.

0	28.98	32.69	4.42	20.36	740
10	28.98	32.69	4.45	20.36	740
20	28.99	32.68	4.45	20.35	741
29	28.96	32.69	4.35	20.37	740
39	28.74	32.86	4.36	20.57	720
48	26.49	33.95	3.85	22.11	572
54	25.95	34.01	3.56	22.32	552
60	25.95	34.02	3.53	22.33	551

a) Possible transposition.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; August 7, 1960; 1008 GCT; 10°20'N,  
102°26'E; sounding, 60 m; wind, 260°, force 4;  
weather, cloudy; sea, moderate; wire angle, 05°.

0	28.86	32.67a)	4.43	(20.34)	(743)
10	28.83	32.59a)	4.42	(20.38)	(738)
20	28.75	32.62	4.40	20.38	738
29	28.72	32.62	4.35	20.39	737
45	28.69	32.62	4.31	20.40	736
48	28.72	32.77	3.98	20.51	726
53	28.68	33.00	3.68	20.69	708

STRANGER; August 7, 1960; 2100 GCT; 10°12'N,  
103°32.5'E; sounding, 22 m; wind, 270°, force 3;  
weather, missing; sea, slight; wire angle, 03°.

0	28.47	31.67	4.31	19.76	798
5	28.46	31.69	4.27	19.78	796
10	28.54	31.83	4.22	19.86	788
16	28.48	32.29	4.01	20.23	753

STRANGER; August 8, 1960; 0612 GCT; 9°23.5'N,  
103°24'E; sounding, 38 m; wind, 250°, force 3;  
weather, overcast; sea, moderate; wire angle, 01°.

0	28.08	30.80	4.16	19.76	848
10	28.19	31.22	4.19	19.52	821
20	28.42	32.48	4.32	20.39	738
29	28.21	32.86	3.90	20.74	704
32	27.96	33.62	3.16	21.39	641

STRANGER; August 8, 1960; 1810 GCT; 8°31.5'N,  
102°22.5'E; sounding, 73 m; wind, 260°, force 5;  
weather, missing; sea, moderate; wire angle, 07°.

0	28.70	32.63	4.40	20.41	736
15	28.70	32.61	4.30	20.39	737
25	28.72	32.60	4.38	20.38	738
34	28.68	32.62	4.36	20.41	736
43	26.44	33.89	3.61	22.08	575
58	26.00	34.03	3.72	22.32	552
66	26.06	34.04	3.73	22.31	553

STRANGER; August 9, 1960; 0615 GCT; 7°40'N,  
101°22'E; sounding, 46 m; wind, 240°, force 3;  
weather, cloudy; sea, slight; wire angle, 01°.

0	29.30	32.68	4.38	20.25	751
10	29.03	32.69	4.38	20.34	742
20	29.00	32.72	4.36	20.38	739
29	28.97	32.72	4.34	20.39	738
35	28.98	32.72	4.36	20.38	738
40	28.71	32.88	4.18	20.59	718

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

33 34 STRANGER; August 9, 1960; 1126 GCT; 7°22'N, 100°43.5'E; sounding, 18 m; wind, 280°, force 4; weather, cloudy; sea, moderate; wire angle, 00°.

0	29.08	33.10	4.28	20.63	714
6	29.08	33.12	3.74	20.65	713
12	29.06	33.12	4.30	20.66	712

35 36 STRANGER; August 11, 1960; 0322 GCT; 6°21'N, 102°12'E; sounding, 26 m; wind, 230°, force 2; weather, cloudy; sea, smooth; wire angle, 01°.

0	29.42	32.32	4.34	19.94	781
10	29.24	32.47	4.31	20.11	764
15	29.24	32.81	4.35	20.36	740
18	29.08	33.22	4.31	20.72	705
21	28.69a)	33.22	4.21	20.85	693

37 38 STRANGER; August 11, 1960; 1440, 1450 GCT; 7°15'N, 103°06'E; sounding, 51 m; wind, 280°, force 4; weather, missing; sea, moderate; wire angle, 05°, 05°.

0	28.51	33.37	4.30	21.02	676
10	28.52	33.34	4.28	21.00	679
20	28.52	33.36	4.30	21.01	678
29	28.38	33.40	4.24	21.09	670
39	27.62	33.57	3.71	21.47	634
45	27.61	33.58	3.84	21.48	633

39 40 STRANGER; August 12, 1960; 0248, 0256 GCT; 8°11'N, 104°07'E; sounding, 20 m; wind, 270°, force 4; weather, overcast; sea, moderate; wire angle, 05°, 05°.

0	28.26	32.76	4.30	20.65	712
5	28.26	32.77	4.30	20.66	712
10	28.26	32.77	4.25	20.66	712
15	28.26	32.76	4.29	20.65	712

41 42 STRANGER; August 12, 1960; 1434 GCT; 9°05'N, 104°13'E; sounding, 22 m; wind, 260°, force 4; weather, missing; sea, moderate; wire angle, 05°.

0	28.12	31.42	4.37	19.69	804
5	28.12	31.42	4.34	19.69	804
10	28.10	31.42	4.34	19.70	804
17	28.10	31.43	4.33	19.71	803

a) Alternate value, 27.69°C.

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; August 10, 1960; 2312 GCT; 6°44'N, 101°51'E; sounding, 35 m; wind, 270°, force 4; weather, partly cloudy; sea, slight; wire angle, 00°.

0	29.12	32.68	4.47	20.31	746
10	29.12	32.69	4.45	20.31	745
20	29.10	32.68	4.45	20.31	745
29	29.12	32.88	4.49	20.46	731

STRANGER; August 11, 1960; 0914 GCT; 6°48'N, 102°39.5'E; sounding, 46 m; wind, 220°, force 3; weather, overcast; sea, moderate; wire angle, 14°.

0	28.76	32.90	4.18	20.59	718
10	28.77	32.91	4.36	20.60	718
19	28.61	33.22	4.31	20.88	690
29	27.22	33.73	3.94	21.71	610
38	26.00	34.03	3.46	22.32	552

STRANGER; August 11, 1960; 2055 GCT; 7°43'N, 103°37'E; sounding, 45 m; wind, 220°, force 5; weather, missing; sea, rough; wire angle, 12°.

0	28.38	32.91	4.43	20.72	705
10	28.40	32.91	4.41	20.72	706
20	28.41	32.91	4.41	20.71	706
29	28.52	33.18	4.39	20.88	690
37	27.86	33.54	4.00	21.36	644

STRANGER; August 11, 1960; 1947 GCT; 8°24'N, 104°37'E; sounding, 26 m; wind, 240°, force 5; weather, cloudy; sea, moderate; wire angle, 00°.

0	28.30	30.97	4.54	19.30	843
10	28.25	30.97	4.54	19.31	841
20	28.32	32.05	4.34	20.10	765

STRANGER; August 13, 1960; 1341 GCT; 11°13'N, 102°32.5'E; sounding, 42 m; wind, 250°, force 4; weather, missing; sea, moderate; wire angle, 00°.

0	28.62	32.77	4.58	20.54	723
10	28.64	32.78	4.49	20.54	723
20	28.64	32.79	4.52	20.55	722
30	28.60	32.80	4.43	20.57	720
35	28.50	32.98	3.66	20.74	704

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 12, 1960; 0151 GCT;  
15°40'N, 108°41'E; sounding, 41 m; wind, calm;  
weather, partly cloudy; sea, smooth; wire angle,  
00°.

0	29.69	29.93	4.20	18.07	962
10	29.90	32.27	4.24	19.74	800
19	29.07	33.62	4.22	21.03	676
29	25.84	33.63	4.17	22.07	576

STRANGER; September 12, 1960; 1820 GCT;  
15°46'N, 110°29'E; sounding, 439 m; wind, 190°,  
force 4; weather, missing; sea, smooth; wire  
angle, 08°.

0	29.10	33.91	4.24	21.24	656
10	29.08	34.01	4.26	21.31	649
29	28.36	34.43	4.46	21.87	595
53	21.66	35.05u	4.13	(24.05)	(387)
82	18.78	34.64	3.04	24.82	314
105	16.51	34.64	2.95	25.38	261
159	14.72	34.54	3.12	25.70	230
260	11.76	34.43	2.74	26.22	181
377	9.52	34.43	2.37	26.61	144

STRANGER; September 13, 1960; 0757, 1534 GCT;  
15°42'N, 112°01'E; sounding, 1273 m; wind, 230°,  
force 1; weather, partly cloudy; sea, calm; wire  
angle, 05°, 08°.

0	29.38	34.04	4.31	21.24	656
10	28.62	34.01	4.32	21.48	633
29	26.16	34.29	4.62	22.47	538
53	22.44	34.59	4.39	23.80	411
83	20.16	34.67	3.34	24.51	345
106	18.25	34.66	2.86	24.97	300
160	16.34	34.67	2.72	25.43	255
262	12.76	34.55	2.76	26.11	191
377	9.89	34.46	2.26	26.57	148
530	7.86	34.43	1.86	26.87	119
694	6.43	34.45	1.86	27.08	99
854	5.18	34.50	1.90	27.28	80
1070	4.12	34.55	1.91	27.44	65

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 12, 1960; 1022 GCT;  
15°42'N, 109°34'E; sounding, 430 m; wind, 140°,  
force 3; weather, partly cloudy; sea, smooth; wire  
angle, 13°.

0	30.14	31.65	4.17	19.19	853
9	29.15	33.30	4.35	20.76	702
28	22.24	34.84	4.41	24.24	387
53	19.42	34.90	3.33	24.86	310
81	17.82	34.85	3.13	25.22	276
105	16.42	35.75r	3.05	-	-
157	14.65	34.76u	2.94	-	-
258	12.60	35.07r	2.86	-	-
373	9.85	34.58u	2.30	-	-

STRANGER; September 13, 1960; 0106, 0125 GCT;  
15°40'N, 111°10'E; sounding, 925 m; wind, 190°,  
force 2; weather, partly cloudy; sea, smooth; wire  
angle, 29°, 26°.

0	28.53	34.02	4.17	21.51	630
8	28.46	34.02	4.27	21.53	628
27	24.70	34.44	4.44	23.02	485
49	21.32	34.58	3.85	24.11	382
77	19.10	34.74	3.04	24.82	314
100	17.45	34.79u	2.80	-	-
146	15.50	34.70u	2.98	-	-
237	13.32	34.57	2.84	26.02	200
339	11.22	34.54u	2.47	-	-
478	9.04	34.66u	2.07	-	-
633	7.74	34.87r	1.79	-	-

STRANGER; September 13, 1960; 2000 GCT;  
15°42'N, 112°48'E; sounding, 2505 m; wind, 190°,  
force 3; weather, missing; sea, smooth; wire  
angle, 01°.

0	28.57	33.73	4.24	21.28	652
10	28.64	33.83	4.24	21.33	647
29	26.10	34.19	4.45	22.42	543
54	20.90	34.61	3.85	24.24	369
84	19.16	34.66	3.05	24.75	321
107	17.89	34.66	2.84	25.06	291
161	15.70	34.80u	2.88	-	-
262	12.13	34.66u	2.66	-	-
378	9.96	34.44	2.22	26.55	150
532	8.21	34.44	1.97	26.82	124
696	6.57	34.63u	1.86	-	-
851	5.08	34.56u	1.87	-	-
1066	3.85	34.98r	1.88	-	-

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 14, 1960; 0213, 0300 GCT;  
14°59'N, 113°04'E; sounding, 3493 m; wind, calm;  
weather, partly cloudy; sea, calm; wire angle,  
05°, 03°.

7 8

0	29.30	34.13	4.32	21.34	646
10	29.08	34.27	4.31	21.51	630
30	28.73	34.27	4.32	21.64	618
54	22.72	34.53	4.68	23.68	422
83	19.12	34.62	2.97	24.72	323
108	17.86	34.63	2.80	25.04	293
162	15.46	34.58	2.99	25.56	243
264	11.86	34.47	2.69	26.22	180
380	9.75	34.49u	2.27	(26.57)	(147)
533	8.01	34.43	2.02	26.85	121
696	6.44	34.47	1.84	27.09	98
851	5.58	34.42u	2.49u	(27.22)	(86)
1067	4.22	34.51	1.94	27.40	69

STRANGER; September 15, 1960; 0101, 0157,  
0242 GCT; 13°25'N, 113°24'E; sounding, 4169 m;  
wind, 360°, force 3; weather, partly cloudy; sea,  
smooth; wire angle, 12°, 19°, 22°.

9 10

0	29.96	33.99	4.78	21.01	678
10	29.31	34.03	4.75	21.26	654
29	27.18	33.88	4.16	21.84	598
53	21.77	32.92r	4.07	(23.97)	(395)
82	18.87	34.63	2.78	24.79	316
105	18.25	34.63	2.72	24.95	302
156	15.95	34.62	2.71	25.49	250
256	13.00	34.54	2.47	26.06	196
366	11.15	34.89r	2.06	(26.37)	(167)
516	8.97	34.53u	2.01	(26.74)	(132)
674	7.22	34.48	1.76	27.00	107
825	5.88	34.52	1.69	27.20	87
1039	4.34	34.57	1.81	27.43	66

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 14, 1960; 0919, 1000 GCT;  
14°14'N, 113°19'E; sounding, 2906 m; wind, 320°,  
force 1; weather, cloudy; sea, calm; wire angle,  
00°, 02°.

0	30.68	33.71	4.56	20.55	722
10	28.90	33.90	4.31	21.30	650
29	26.92	33.75	4.12	21.83	599
54	24.20	34.48	4.23	23.21	467
83	19.30	34.68	2.91	24.72	323
108	17.98	34.70	2.72	25.07	290
165	15.74	34.86u	2.73	(25.55)	(244)
265	12.52	34.52	2.47	26.14	188
381	10.42	35.10r	1.92	(26.49)	(155)
536	8.54	34.72r	1.96	(26.80)	(126)
702	6.86	34.49	1.65	27.06	101
857	5.58	34.49	1.76	27.23	85
1072	4.18	35.06r	1.81	-	-

STRANGER; September 15, 1960; 1453, 1603,  
1710 GCT; 13°26'N, 112°38'E; sounding, 2377 m;  
wind, 020°, force 4; weather, missing; sea,  
missing; wire angle, 03°, 12°, 12°.

0	29.91	34.61u	4.42	(21.09)	(670)
10	29.89	34.08	4.45	21.10	669
29	26.66	34.84u	4.44	(22.43)	(543)
53	21.10	34.71	3.85	24.27	366
82	18.21	34.66	2.80	24.98	298
106	17.06	34.66	2.78	25.26	272
159	15.10	34.57	2.58	25.64	236
258	12.38	34.47	2.64	26.12	190
371	10.54	34.46	2.06	26.46	158
684	6.84	34.46	1.73	26.71	134
839	5.43	34.48	1.76	27.24	84
1054	4.23	34.52	1.79	27.40	68

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 15, 1960; 2348 GCT;  
13°26'N, 111°50'E; sounding, 2195 m; wind, 340°,  
force 3; weather, cloudy; sea, rough; wire angle,  
08°.

0	29.73	33.54	4.67	20.75	703
10	29.73	33.56	4.67	20.76	702
30	27.49	32.79u	4.16	(21.93)	(589)
54	20.00	34.66	3.52	24.52	342
83	17.92	34.66	3.15	25.05	292
108	16.16	34.63	2.97	25.45	254
162	14.18	34.54	2.80	25.81	219
264	11.54	34.47	2.20	26.29	174
379	9.81	34.41	2.14	26.54	150
532	8.29	34.41	1.80	26.79	127
695	6.68	34.48	1.69	27.07	100
849	5.37	34.49	1.77	27.26	83
1066	4.20	34.52	1.85	27.41	68

STRANGER; September 16-17, 1960; 0013,  
2332 GCT; 13°13'N, 110°10'E; sounding, 2195 m;  
wind, 330°, force 5; weather, overcast; sea,  
very rough; wire angle, 00°, 46°.

0	28.84	33.59	4.37	21.08	671
10	28.84	33.53	4.40	21.03	676
30	26.00	34.41	4.53	22.61	525
44	22.45	34.65	4.41	23.84	407
68	19.40	34.93u	3.06	(24.71)	(324)
86	17.92	34.70	2.87	25.09	288
125	15.76	-	-	(25.59)	(241)
200	13.64	34.61	2.90	25.99	203
271	12.04	34.54	2.50	26.24	178
377	9.96	34.50	2.13	26.59	146
485	8.60	34.50	2.10	26.82	124
590	7.50	34.50	1.85	26.97	109
758	6.09	34.53	1.69	27.19	89

STRANGER; September 20, 1960; 0314 GCT;  
12°10'N, 109°24'E; sounding, 93 m; wind, calm;  
weather, partly cloudy; sea, calm; wire angle,  
00°.

0	28.78	32.43a)	4.12	20.24	752
10	28.66	32.55u	4.12	(20.30)	(746)
19	28.62	32.47	4.09	20.32	744
29	28.35	32.54	4.08	20.46	731
53	28.08	32.87	4.05	20.80	698
72	26.40	33.92a)	3.96	22.12	572

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 16, 1960; 0803, 0713 GCT,  
13°24'N, 111°02'E; sounding, 2926 m; wind, 340°,  
force 5; weather, overcast; sea, very rough; wire  
angle, 28°, 30°.

0	29.76	33.60	4.65	20.78	700
9	29.76	33.58	4.61	20.77	701
27	25.32	34.41	4.42	22.82	504
50	20.06	34.67	3.50	24.51	343
76	18.20	35.21r	3.11	(24.98)	(298)
98	16.86	34.63	2.99	25.28	270
146	14.72	34.56	2.88	25.71	229
235	11.62	34.47	2.43	26.27	176
331	10.50	34.44	2.18	26.45	159
472	8.67	34.43	1.73	26.75	131
630	7.08	34.47	1.59	27.02	105
784	5.96	34.48	1.48	27.17	90
999	4.42	34.55	1.81	27.40	68

STRANGER; September 17, 1960; 0901, 0927 GCT;  
13°04'N, 109°33'E; sounding, 143 m; wind, 340°,  
force 6; weather, overcast; sea, moderate, wire  
angle, 37°, 40°.

0	28.50	32.57	4.31	20.43	734
8	28.52	32.71	4.31	20.53	724
23	28.55	32.79	-	20.58	719
43	28.12	33.09	4.27	20.95	684
65	25.33	34.20	3.94	22.64	520
85	20.00	34.56	3.42	24.44	350

STRANGER; September 20, 1960; 1312, 1346 GCT;  
11°51'N, 110°08'E; sounding, 2286 m; wind, 200°,  
force 4; weather, missing; sea, smooth; wire  
angle, 17°, 17°.

0	29.00	32.58	4.10	20.27	749
10	28.91	33.32	4.14	20.85	693
33	28.65	33.60	4.08	21.16	664
57	27.12	33.91	4.00	21.88	594
90	22.39	34.57	3.70	23.80	411
113	20.62	34.74	3.11	24.42	352
168	17.25	34.70	2.60	25.27	273
279	13.46	34.50	2.40	25.93	208

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a) Salinity bottle numbers were not recorded on the data sheet. Since standard handling procedures were used, these salinity values are assumed to be in the order listed.

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δT
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 20, 1960; 2315 GCT;  
11°38'N, 110°56'E; sounding, 2926 m; wind, 240°,  
force 4; weather, cloudy; sea, rough; wire angle,  
35°.

17 18

0	28.80	33.13	4.13	20.75	703
8	28.80	33.14	4.15	20.76	702
29	28.82	33.14	4.13	20.76	702
50	28.71	33.27	4.10	20.88	690
78	27.42	33.75	3.94	21.67	615
97	24.07	34.34	3.94	23.14	474
145	20.96	34.55	3.10	24.18	374
235	15.18	34.54	2.37	25.60	240
322	12.44	34.48	2.59	26.12	190
457	9.98	34.41	2.13	26.52	152
598	7.90	34.43	1.77	26.86	120
741	6.33	34.45	1.71	27.10	97
947	4.71	34.50	1.74	27.34	75

STRANGER; September 21, 1960; 2031, 2050 GCT;  
10°30'N, 111°50'E; sounding, 4114 m; wind, 250°,  
force 4; weather, missing; sea, moderate; wire  
angle, 05°, 08°.

19 20

0	28.66	33.14	4.16	20.80	698
10	28.68	33.18	4.12	20.83	695
35	28.73	33.23	4.12	20.85	693
59	28.18	33.46	4.01	21.21	659
93	25.34	34.16	3.92	22.63	523
118	21.56	34.55	3.40	24.02	390
176	19.42	34.60	2.94	24.63	332
292	13.88	34.53	2.33	25.87	214
406	10.62	34.46	1.99	26.44	160
576	7.98	34.44	1.69	26.86	120
747	6.34	34.46	1.60	27.11	97
911	5.10	34.53	1.63	27.33	77
1131	3.88	34.53	1.69	27.45	64

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δT
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 21, 1960; 0914, 0919,  
1018, 1052 GCT; 11°11'N, 111°36'E; sounding,  
3987 m; wind, 260°, force 5; weather, overcast;  
sea, rough; wire angle, 18°, -, 14°, 25°.

0	28.84	33.11	4.11	20.73	705
9	28.86	33.11	4.13	20.72	706
33	28.82	33.19	4.17	20.79	699
57	28.32	33.66	4.14	21.31	649
90	25.89	33.73	3.95	22.13	570
113	22.14	34.54	3.53	23.85	406
169	20.12	34.65	3.01	24.48	346
280	14.33	34.60	2.74	25.82	218
401	10.96	34.49	2.08	26.41	163
561	8.30	34.74r	1.69	-	-
727	6.51	34.58u	1.59	-	-
885	5.25	34.62u	1.68	-	-

STRANGER; September 22, 1960; 0704, 0735 GCT;  
9°59'N, 112°21'E; sounding, 2341 m; wind, 240°,  
force 4; weather, overcast; sea, moderate; wire  
angle, 12°, 15°.

0	28.70	33.64u	4.16	(20.83)	(695)
9	28.71	33.20	4.19	20.83	695
33	28.64	33.31	4.17	20.94	685
58	28.30	33.55	4.16	21.24	656
91	24.20	34.41	3.96	23.16	472
114	21.72	34.49	3.40	23.93	398
172	18.58	34.64	2.77	24.87	309
280	13.58	34.43u	2.18	-	-
385	10.86	34.55u	1.97	-	-
543	8.24	34.43	1.64	26.81	125
706	6.43	34.44	1.58	27.08	99
865	5.26	34.62u	1.64	-	-
1083	3.92	34.62u	1.71	-	-

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 22, 1960; 1622 GCT;  
9°27'N; 112°04'E; sounding, 2012 m; wind, 250°,  
force 4; weather, missing; sea, slight; wire  
angle, 04°.

0	28.43	33.14	4.18	20.88	690
10	28.46	33.16	4.21	20.88	690
30	28.44	33.17	4.21	20.89	689
55	27.90	33.60	4.15	21.41	640
84	25.18	34.20	3.98	22.70	516
109	20.04	34.55	2.76	24.43	351
162	17.06	34.55	2.33	25.18	280
262	13.21	34.52	2.11	26.00	210
375	10.55	34.46	1.95	26.46	158
526	8.52	34.46	1.60	26.80	126
689	6.59	34.49	1.60	27.09	98
850	5.30	34.53	1.60	27.29	79

STRANGER; September 23, 1960; 0819 GCT;  
8°24'N, 111°40'E; sounding, 1500 m; wind, 240°,  
force 4; weather, overcast; sea, moderate; wire  
angle, 15°.

0	28.19	33.13	4.29	20.95	684
10	28.20	33.15	4.29	20.96	683
29	28.23	33.19	4.24	20.98	681
52	27.86	33.76	4.21	21.53	628
81	22.73	34.46	3.81	23.62	428
104	20.84	34.55	3.22	24.21	372
157	16.81	34.57	2.44	25.25	273
256	13.56	34.50	2.25	25.91	210
366	10.84	34.46	1.94	26.41	163
513	8.54	34.45	1.61	26.79	127
672	6.80	34.45	1.57	27.04	103
824	5.59	34.50	1.66	27.23	85
1039	4.15	34.55	1.71	27.44	65

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 22-23, 1960; 0053,  
2339 GCT; 8°56'N, 111°45'E; sounding, 1188 m;  
wind, 240°, force 4; weather, overcast; sea,  
moderate; wire angle, 11°, 26°.

0	28.10	33.46u	4.22	-	-
48	27.42	34.03	4.16	21.87	595
86	21.98	34.88	3.57	23.90	402
124	18.94	34.92	2.90	24.74	322
0a)	28.06	33.17	4.22	21.03	676
23	28.13	33.25	4.21	21.07	672
77	24.48	34.40	4.10	23.06	481
179	15.98	34.59	2.67	25.46	253
273	12.82	34.59	2.08	26.13	189
418	9.79	34.50	1.87	26.62	143
566	7.86	34.62u	1.60	-	-
715	6.39	34.50	1.58	27.13	94
929	4.82	34.71r	1.63	-	-

STRANGER; September 23, 1960; 1704 GCT;  
8°56'N, 111°08'E; sounding, 1829 m; wind, 250°,  
force 4; weather, missing; sea, moderate; wire  
angle, 06°.

0	28.03	33.22	3.89	21.07	672
10	28.05	33.24	4.28	21.08	671
34	27.14	34.13	4.35	22.04	579
59	24.32	34.44	4.34	23.15	473
92	21.58	34.57	3.73	24.03	389
117	19.34	34.57	2.92	24.63	332
175	15.67	34.62	2.58	25.55	244
290	11.84	34.69u	1.98	-	-
413	9.94	34.63u	1.78	-	-
574	7.72	34.63u	1.67	-	-
746	6.28	34.57u	1.69	-	-
909	5.07	34.79r	1.72	-	-
1129	3.85	34.58	1.81	27.49	60

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21 22

23 24

a) Overlapping casts.

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

25 26 STRANGER; September 24, 1960; 0032 GCT;  
9°26'N, 110°34'E; sounding, 2926 m; wind, 250°,  
force 4; weather, partly cloudy; sea, moderate;  
wire angle, 05°.

0	28.18	33.10	4.30	20.93	686
10	28.16	33.10	4.31	20.94	685
30	28.03	33.56	4.28	21.33	647
54	26.96	34.18	4.28	22.14	570
83	22.60	34.50	3.97	23.69	422
109	20.24	34.56	3.06	24.38	356
162	16.14	34.53	2.44	25.38	261
263	12.57	34.49	2.18	26.10	192
378	10.70	34.44	1.88	26.42	162
531	8.36	34.42	1.81	26.79	127
694	6.68	34.48	1.65	27.07	100
849	5.53	34.50	1.66	27.24	84
1064	4.17	34.57	1.80	27.45	64

27 28 STRANGER; September 24, 1960; 2325 GCT;  
10°18'N, 109°27'E; sounding, 274 m; wind, 280°,  
force 4; weather, overcast; sea, slight; wire  
angle, 08°.

0	28.55	33.05	4.28	20.78	700
10	28.57	33.05	4.30	20.77	701
30	28.58	33.05	4.27	20.77	701
55	28.32	33.56	4.20	21.24	656
84	23.00	34.42	3.89	23.52	438
108	20.67	34.56	3.13	24.27	366
162	17.38	34.58	2.72	25.14	285
244	13.78	34.57	2.44	25.92	209

29 30 STRANGER; September 30, 1960; 1159 GCT;  
9°44'N, 107°04'E; sounding, 23 m; wind, 280°,  
force 5; weather, missing; sea, slight; wire  
angle, 00°.

0	28.44	30.66	4.57	19.03	964
8	28.46	31.28	4.41	19.48	825
16	28.26	32.93	3.74	20.78	700

31 32 STRANGER; October 1, 1960; 0203 GCT; 8°15'N,  
107°44'E; sounding, 57 m; wind, 280°, force 5;  
weather, overcast; sea, very rough; wire angle,  
08°.

0	28.54	33.02	4.32	20.76	702
10	28.56	33.03	4.26	20.76	702
19	28.56	33.04	4.26	20.76	702
29	28.54	33.04	4.29	20.77	701
48	28.56	33.08	4.28	20.80	698

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; September 24, 1960; 0855, 0946 GCT;  
9°52'N, 110°02'E; sounding, 1554 m; wind, 260°,  
force 4; weather, cloudy; sea, moderate; wire  
angle, 20°, 15°.

0	28.68	33.24	4.26	20.87	691
10	28.66	33.24	4.26	20.88	690
33	28.22	33.47	4.29	21.20	660
57	26.39	34.00	4.18	22.18	565
89	22.36	34.53	3.83	23.78	413
111	20.54	34.64	3.27	24.36	357
167	17.16	34.59	2.52	25.18	279
275	12.78	34.51	2.26	26.08	194
380	10.52	34.44	1.82	26.45	159
570	8.04	34.64u	1.67	(26.85)	(121)
741	6.36	34.47	1.70	27.11	96
905	4.90	34.55	1.73	27.36	73
1124	3.62	34.69u	1.82	-	-

STRANGER; September 25, 1960; 0737 GCT;  
10°59'N, 108°52'E; sounding, 46 m; wind, 210°,  
force 5; weather, cloudy; sea, moderate; wire  
angle, 05°.

0	28.99	33.13u	4.22	(20.58)	(719)
10	28.95	32.99	4.33	20.59	718
19	28.75	33.08	4.04	20.73	705
29	28.75	33.22	3.97	20.84	694
38	28.62	33.38	3.86	21.00	679

STRANGER; September 30, 1960; 1850 GCT;  
8°59'N, 107°25'E; sounding, 37 m; wind, 280°,  
force 6; weather, missing; sea, moderate; wire  
angle, 13°.

0	28.18	31.09	4.38	19.43	830
9	28.18	31.10	4.38	19.44	829
19	28.42	32.56	4.28	20.45	732
28	28.33	33.06	4.10	20.85	693

STRANGER; October 1, 1960; 1211 GCT; 7°56'N;  
107°42'E; sounding, 55 m; wind, 270°, force 7;  
weather, missing; sea, rough; wire angle, 13°.

0	28.54	33.11a)	4.31	(20.77)	(701)
10	28.57	33.09a)	4.29	(20.80)	(698)
19	28.56	33.08a)	4.32	(20.80)	(698)
28	28.55	33.05a)	4.32	(20.82)	(696)
37	28.56	33.26	4.32	20.93	686

a) Possible transposition.



INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; October 2, 1960; 0124 GCT;  
7°27'N, 107°24'E; sounding, 55 m; wind, 270°,  
force 4; weather, overcast; sea, very rough; wire  
angle, 05°.

0	28.42	32.76	4.19	20.59	718
10	28.43	32.77	4.19	20.59	718
19	28.44	32.77	4.20	20.59	718
29	28.44	32.79	4.20	20.61	716
48	27.91	33.76	3.88	20.76	702

STRANGER; October 2, 1960; 2143 GCT; 7°04'N,  
108°26'E; sounding, 91 m; wind, 280°, force 5;  
weather, overcast; sea, rough; wire angle, 08°.

0	28.48	33.18	4.34	20.90	689
10	28.50	33.38u	4.37	(20.90)	(689)
19	28.53	33.24	4.34	20.93	686
28	28.54	33.34	4.34	21.00	679
53	28.54	33.35	4.32	21.01	678
72	26.43	34.19	4.18	22.32	553

STRANGER; October 3, 1960; 2115 GCT; 6°09'N,  
107°18'E; sounding, 58 m; wind, 220°, force 5;  
weather, missing; sea, moderate; wire angle, 00°.

0	28.51	33.11	4.29	20.83	695
10	28.51	33.09	4.32	20.82	696
20	28.52	33.09	4.28	20.82	696
29	28.52	33.09	4.35	20.82	696
43	28.54	33.11	4.32	20.82	696

STRANGER; October 4, 1960; 2020 GCT; 5°23'N,  
105°50'E; sounding, 75 m; wind, 210°, force 5;  
weather, missing; sea, moderate; wire angle, 00°.

0	28.62	33.15	4.33	20.82	696
10	28.66	33.13	4.30	20.80	698
20	28.64	33.13	4.26	20.81	697
29	28.64	33.13	4.27	20.81	697
53	28.26	33.68	4.22	21.34	646

STRANGER; October 5, 1960; 1201 GCT; 6°56'N,  
105°28'E; sounding, 39 m; wind, 200°, force 5;  
weather, missing; sea, moderate; wire angle, 00°.

0	28.83	33.16	4.30	20.76	702
10	28.86	33.15	4.30	20.75	703
20	28.85	33.15	4.29	20.75	703
29	28.84	33.15	4.26	20.76	702

STRANGER; October 6, 1960; 0156 GCT; 8°20'N,  
104°51'E; sounding, 26 m; wind, 210°, force 3;  
weather, cloudy; sea, moderate; wire angle, 00°.

0	27.95	31.59	4.17	19.87	787
9	28.06	32.03	4.13	20.17	759
17	28.08	32.33	4.16	20.38	738

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; October 2, 1960; 0812, 0821 GCT;  
7°40'N, 108°06'E; sounding, 77 m; wind, 200°,  
force 6; weather, overcast; sea, rough; wire  
angle, 05°, 05°.

0	28.48	33.20	4.22	20.90	688
10	28.51	33.22	4.29	20.91	687
19	28.52	33.36u	4.34	(20.91)	(687)
29	28.51	33.24	4.19	20.93	686
48	28.64u	34.11r	4.16	-	-
64	28.23	33.76	4.25	21.41	640

STRANGER; October 3, 1960; 0715 GCT; 6°37'N,  
107°50'E; sounding, 73 m; wind, 210°, force 6;  
weather, cloudy; sea, rough; wire angle, 07°.

0	28.46	32.99u	4.23	(20.62)	(715)
10	28.46	32.81	4.37	20.62	715
19	28.44	32.97	4.33	20.75	703
28	28.44	33.12	4.32	20.86	692
54	28.52	33.36	4.21	21.02	677
65	27.32	34.01	4.29	21.89	593

STRANGER; October 4, 1960; 1100 GCT; 5°29'N,  
106°38'E; sounding, 57 m; wind, 200°, force 5;  
weather, cloudy; sea, moderate; wire angle, 06°.

0	28.60	33.16	4.21	20.84	694
9	28.62	33.22	4.18	20.88	690
19	28.62	33.39u	4.28	-	-
28	28.60	33.15u	4.27	-	-
53	28.45	34.03	3.89	21.54	627

STRANGER; October 5, 1960; 0317 GCT; 6°15'N,  
105°47'E; sounding, 49 m; wind, 190°, force 5;  
weather, cloudy; sea, moderate; wire angle, 06°.

0	28.83	33.34u	4.26	(20.76)	(702)
9	28.82	33.16	4.27	20.76	702
19	28.82	33.14	4.24	20.75	703
28	28.79	33.15	4.24	20.76	702
42	28.71	33.18	4.10	20.82	696

STRANGER; October 5, 1960; 2000 GCT; 7°42'N,  
104°58'E; sounding, 35 m; wind, 200°, force 3;  
weather, missing; sea, moderate; wire angle, 05°.

0	28.28	33.61u	4.17	(20.83)	(695)
10	28.29	33.01	4.21	20.83	695
19	28.30	33.06	4.27	20.86	692
27	28.28	33.08	4.18	20.88	690

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## INTERPOLATED

## COMPUTED

Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton
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STRANGER; November 9, 1960; 1959 GCT;  
11°36.5'N, 100°16'E; sounding, 42 m; wind, 330°,  
force 4; weather, missing; sea, slight; wire angle,  
00°.

0	28.19	32.51	3.07	20.49	728
10	28.50	32.87	4.20	20.65	712
20	28.48	32.89	4.18	20.68	710
29	28.50	32.90	4.16	20.68	710
38	28.49	32.88	4.18	20.66	711

STRANGER; November 10, 1960; 1030 GCT; 9°50'N,  
100°26'E; sounding, 55 m; wind, 260°, force 1;  
weather, cloudy; sea, calm; wire angle, 00°.

0	28.34	31.78	4.28	19.89	786
10	28.16	32.26	4.28	20.31	745
20	28.43	32.58	4.20	20.46	731
29	28.67	32.84	4.04	20.58	720
38	28.38	33.13	3.48	20.89	690
48	28.16	33.28	2.69	21.07	672

STRANGER; November 10, 1960; 2353 GCT; 9°08'N,  
100°49'E; sounding, 36 m; wind, 350°, force 2;  
weather, partly cloudy; sea, slight; wire angle, 00°.

0	28.02	32.07	4.22	20.21	755
10	28.41	32.35	4.14	20.29	747
20	28.84	32.81	3.78	20.50	727
29	28.95	32.90	3.59	20.53	724

STRANGER; November 11, 1960; 1257, 1310 GCT;  
9°54'N, 101°50'E; sounding, 72 m; wind, 040°,  
force 1; weather, missing; sea, calm; wire angle,  
00°, 00°.

0	28.80	33.00	4.22	20.65	712
10	28.80	33.00	4.28	20.65	712
20	28.65	32.97	4.26	20.68	710
29	28.66	32.98	4.24	20.68	709
38	28.66	32.98	4.24	20.68	709
48	28.68	33.07	4.15	20.74	703
58	28.03	33.56	2.78	21.33	648
66	26.93	33.86	2.29	21.90	592

STRANGER; November 11, 1960; 2034 GCT;  
10°21'N, 102°19'E; sounding, 72 m; wind, calm;  
weather, missing; sea, calm; wire angle, 01°.

0	28.84	32.30	4.23	20.12	764
10	28.85	32.31	4.22	20.12	764
20	28.92	32.52	4.31	20.25	751
29	29.11	33.15	4.30	20.66	711
38	28.32	32.94	4.24	20.77	701
48	28.36	33.14	4.11	20.90	688
58	27.40	33.71	2.38	21.64	617
66	27.37	33.72	2.35	21.66	616

## INTERPOLATED

## COMPUTED

Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton
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STRANGER; November 10, 1960; 0326, 0336 GCT;  
10°33'N, 100°08.5'E; sounding, 57 m; wind, 090°,  
force 2; weather, cloudy; sea, calm; wire angle,  
00°, 00°.

0	28.58	32.84	4.18	20.61	717
10	28.38	32.81	4.20	20.65	713
20	28.36	32.79	4.20	20.64	713
29	28.38	32.82	4.23	20.66	712
38	28.38	32.79	4.18	20.63	714
48	27.79	33.55	2.30	21.40	641
52	27.78	33.55	2.05	21.40	641

STRANGER; November 10, 1960; 1814, 1823 GCT;  
8°34'N, 100°23'E; sounding, 25 m; wind, 300°,  
force 2; weather, missing; sea, calm; wire angle,  
03°, 03°.

0	27.90	30.44	4.18	19.03	868
5	28.62	31.22	3.91	19.38	835
10	28.74	31.43	3.83	19.50	823
15	28.76	31.52	3.79	19.56	818
20	28.75	31.55	3.76	19.58	815

STRANGER; November 11, 1960; 0544 GCT; 9°24'N,  
101°15'E; sounding, 67 m; wind, 040°, force 2;  
weather, cloudy; sea, slight; wire angle, 02°.

0	28.49	32.49	4.19	20.37	739
10	28.36	32.57	4.23	20.48	729
20	28.80	32.97	4.23	20.63	714
29	28.82	33.02	4.15	20.66	712
38	28.77	33.03	4.12	20.69	709
48	28.59	33.08	4.12	20.78	700
58	27.74	33.58	3.75	21.43	637

STRANGER; November 11, 1960; 1935, 1949 GCT;  
10°21'N, 102°19'E; sounding, 72 m; wind, calm;  
weather, missing; sea, calm; wire angle, 01°,  
missing.

0	28.84	32.30	4.19	20.12	764
10	28.86	32.30	4.22	20.11	765
20	28.94	32.52	4.26	20.25	751
29	29.16	33.16	4.27	20.65	712
38	28.28	32.95	4.14	20.79	699
48	28.42	33.17	4.07	20.91	688
58	27.38	33.70	2.41	21.64	618
66	27.38	33.71	2.37	21.65	617

STRANGER; November 11, 1960; 2141 GCT;  
10°21'N, 102°19'E; sounding, 72 m; wind, 280°,  
force 1; weather, missing; sea, calm; wire angle,  
00°.

0	28.84	32.35	4.24	20.15	760
10	28.86	32.35	4.24	20.15	761
20	28.92	32.59	4.24	20.31	746
29	29.14	33.16	4.28	20.66	712

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

8-4 8-5 STRANGER; November 12, 1960; 2234, 2254 GCT;  
10°21'N, 102°19'E; sounding, 72 m; wind, calm;  
weather, overcast; sea, calm; wire angle, 01°, 01°.

0	28.82	32.35	4.23	20.16	760
10	28.84	32.34	4.23	20.15	761
20	28.92	32.58	4.28	20.30	746
29	29.15	33.17	4.35	20.66	711
38	28.14	32.90	4.23	20.79	699
48	28.06	32.92	4.10	20.84	695
58	27.37	33.70	2.41	21.64	617
66	27.37	33.75	2.38	21.68	614

8-6 8-7 STRANGER; November 12, 1960; 0035, 0043 GCT;  
10°21'N, 102°19'E; sounding, 71 m; wind, calm;  
weather, overcast; sea, calm; wire angle, 00°,  
missing.

0	28.81	32.32	4.26	20.14	762
10	28.82	32.30	4.26	20.12	763
20	28.92	32.55	4.30	20.28	748
29	29.16	33.12	4.30	20.62	715
38	28.23	32.91	4.32	20.77	701
48	28.02	32.88	4.10	20.82	696
58	27.38	33.68	2.43	21.63	619
65	27.37	33.69	2.33	21.64	618

8-8 8-9 STRANGER; November 12, 1960; 0235 GCT;  
10°21'N, 102°19'E; sounding, 71 m; wind, calm;  
weather, cloudy; sea, calm; wire angle, 00°.

0	28.84	32.36	4.26	20.16	760
10	28.83	32.33	4.26	20.14	761
20	28.94	32.64	4.31	20.34	743
29	29.07	33.12	4.31	20.65	712
38	28.22	32.87	4.28	20.75	703
48	28.05	32.91	4.18	20.83	695
58	27.38	33.74	2.38	21.67	615
65	27.37	33.74	2.33	21.67	614

8-10 8-11 STRANGER; November 12, 1960; 1435 GCT;  
10°21'N, 102°19'E; sounding, 71 m; wind, 260°,  
force 3; weather, cloudy; sea, calm; wire angle,  
00°.

0	28.90	32.34	4.26	20.13	763
10	28.86	32.32	4.27	20.12	763
20	28.91	32.47	4.34	20.22	754
29	28.54	32.85	4.30	20.63	715
38	28.44	32.91	4.31	20.70	707
48	28.26	33.00	4.10	20.83	695
58	27.38	33.66	2.51	21.61	620
65	27.38	33.72	2.35	21.66	616

8-12 8-13 STRANGER; November 12, 1960; 0854 GCT;  
10°21'N, 102°19'E; sounding, 70 m; wind, calm;  
weather, overcast; sea, calm; wire angle, 00°.

0	28.90	32.32	4.30	20.11	764
10	28.87	32.32	4.32	20.12	763
20	28.90	32.42	4.31	20.19	757
29	28.60	32.77	4.40	20.55	723
38	28.27	32.80	4.36	20.68	710
48	28.26	33.03	3.98	20.85	693
58	27.39	33.68	2.40	21.62	619
64	27.38	33.69	2.41	21.63	618

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 11, 1960; 2337 GCT;  
10°21'N, 102°19'E; sounding, 72 m; wind, calm;  
weather, overcast; sea, calm; wire angle, 00°.

0	28.82	32.31	4.24	20.13	763
10	28.82	32.29	4.24	20.11	764
20	28.92	32.46	4.27	20.21	755
29	29.17	33.10	4.31	20.60	717
38	28.15	32.83	4.28	20.74	704
48	28.15	32.99	4.07	20.86	693
58	27.38	33.68	2.39	21.63	619
66	27.38	33.68	2.34	21.63	619

STRANGER; November 12, 1960; 0140 GCT;  
10°21'N, 102°19'E; sounding, 71 m; wind, calm;  
weather, cloudy; sea, calm; wire angle, 00°.

0	28.82	32.29	4.26	20.11	764
10	28.83	32.30	4.26	20.12	764
20	28.91	32.53	4.28	20.26	750
29	29.12	33.10	4.28	20.62	715
38	28.23	32.86	4.28	20.74	704
48	28.02	32.86	4.14	20.80	698
58	27.37	33.68	2.42	21.63	619
65	27.37	33.69	2.35	21.64	618

STRANGER; November 12, 1960; 0335 GCT;  
10°21'N, 102°19'E; sounding, 71 m; wind, calm;  
weather, cloudy; sea, calm; wire angle, 00°.

0	29.10	32.34	4.26	20.06	769
10	28.85	32.32	4.27	20.13	763
20	28.87	32.41	4.27	20.19	757
29	28.78	32.95	4.34	20.62	715
38	28.22	32.86	4.31	20.74	704
48	28.08	32.93	4.07	20.84	695
58	27.38	33.69	2.46	21.63	618
65	27.38	33.72	2.34	21.66	616

STRANGER; November 12, 1960; 0639 GCT;  
10°21'N, 102°19'E; sounding, 70 m; wind, 220°,  
force 3; weather, overcast; sea, calm; wire angle,  
00°.

0	28.88	32.31	4.35	20.11	764
10	28.86	32.32	4.35	20.12	763
20	28.91	32.42	4.39	20.18	758
29	28.64	32.78	4.49	20.54	723
38	28.46	32.87	4.40	20.67	711
48	28.26	32.95	4.19	20.79	699
58	27.38	33.66	2.45	21.61	620
65	27.39	33.67	2.41	21.62	620

STRANGER; November 12, 1960; 1038 GCT;  
10°21'N, 102°19'E; sounding, 70 m; wind, 300°,  
force 3; weather, cloudy; sea, calm; wire angle,  
00°.

0	28.89	32.32	4.32	20.11	764
10	28.86	32.35	4.36	20.15	761
20	28.91	32.43	4.36	20.19	757
29	28.63	32.79	4.40	20.55	722
38	28.30	32.85	4.38	20.70	707
48	28.22	33.03	4.05	20.87	692
58	27.39	33.66	2.46	21.61	621
64	27.38	33.71	2.41	21.65	617

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 12, 1960; 1235 GCT;  
10°21'N, 102°19'E; sounding, 70 m; wind, 270°,  
force 2; weather, missing; sea, calm; wire angle,  
00°.

0	28.84	32.32	4.30	20.13	762
10	28.86	32.31	4.35	20.12	764
20	28.86	32.36	4.35	20.15	760
29	28.84	32.82	4.40	20.50	727
38	28.72	32.96	4.39	20.65	713
48	28.24	32.95	4.19	20.80	698
58	27.38	33.67	2.48	21.62	620
64	27.39	33.70	2.41	21.64	618

STRANGER; November 12, 1960; 1637 GCT;  
10°21'N, 102°19'E; sounding, 70 m; wind, 260°,  
force 1; weather, missing; sea, calm; wire angle,  
00°.

0	28.83	32.33	4.34	20.14	761
10	28.84	32.33	4.34	20.14	762
20	28.84	32.35	4.35	20.15	760
29	29.04	32.76	4.41	20.39	737
38	28.89	33.03	4.40	20.65	713
48	28.50	32.98	4.35	20.74	704
58	27.38	33.64	2.59	21.60	622
64	27.40	33.68	2.46	21.62	620

STRANGER; November 12, 1960; 2038 GCT;  
10°21'N, 102°19'E; sounding, 70 m; wind, 300°,  
force 1; weather, missing; sea, calm; wire angle,  
00°.

0	28.80	32.37	4.38	20.18	758
10	28.82	32.36	4.35	20.17	759
20	28.87	32.41	4.36	20.19	757
29	28.95	32.77	4.51	20.43	734
38	28.89	33.03	4.45	20.65	713
48	28.59	33.04	4.43	20.75	703
58	27.40	33.67	2.62	21.61	620
64	27.40	33.70	2.52	21.63	618

STRANGER; November 13, 1960; 0739 GCT;  
10°13'N, 103°32.5'E; sounding, 28 m; wind, calm;  
weather, partly cloudy; sea, calm; wire angle, 00°.

0	28.74	31.78	4.28	19.76	798
5	28.77	31.89	4.24	19.83	791
10	28.88	32.11	4.21	19.96	779
20	28.96	32.41	3.98	20.16	760
23	28.98	32.44	3.98	20.17	758

STRANGER; November 13, 1960; 1728 GCT; 9°36'N,  
102°40'E; sounding, 62 m; wind, 220°, force 2;  
weather, missing; sea, calm; wire angle, 00°.

0	28.66	31.52	4.30	19.59	814
10	28.51	32.10	4.28	20.07	768
20	28.72	32.51	4.30	20.31	745
29	28.74	32.53	4.30	20.32	744
38	28.66	32.61	4.20	20.41	736
48	27.99	33.17	3.07	21.05	675
53	27.81	33.38	2.91	21.26	654

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 12, 1960; 1430 GCT;  
10°21'N, 102°19'E; sounding, 70 m; wind, 240°,  
force 2; weather, missing; sea, calm; wire angle,  
00°.

0	28.86	32.33	4.35	20.13	762
10	28.84	32.32	4.36	20.13	762
20	28.87	32.38	4.36	20.17	759
29	29.04	32.88	4.41	20.48	729
38	28.73	33.02	4.41	20.69	709
48	28.12	32.91	4.27	20.81	697
58	27.38	33.65	2.49	21.60	621
64	27.40	33.69	2.46	21.63	619

STRANGER; November 12, 1960; 1843 GCT;  
10°21'N, 102°19'E; sounding, 70 m; wind, 350°,  
force 2; weather, missing; sea, calm; wire angle,  
00°.

0	28.82	32.36	4.34	20.17	759
10	28.84	32.36	4.34	20.16	760
20	28.86	32.44	4.43	20.21	754
29	28.98	32.91	4.41	20.53	725
38	28.86	33.08	4.48	20.69	708
48	28.56	33.03	4.38	20.75	703
58	27.40	33.39 <sup>u</sup>	2.50	21.40	640
64	27.39	33.69	2.49	21.63	619

STRANGER; November 13, 1960; 0232 GCT;  
10°42'N, 103°03'E; sounding, 34 m; wind, 080°,  
force 1; weather, cloudy; sea, calm; wire angle,  
00°.

0	28.81	32.51	4.13	20.28	748
10	28.62	32.52	4.12	20.35	741
20	28.63	32.59	4.04	20.40	736
29	28.61	32.73	3.77	20.51	726

STRANGER; November 13, 1960; 1118 GCT;  
9°56.5'N, 103°17'E; sounding, 31 m; wind, calm;  
weather, cloudy; sea, calm; wire angle, 00°.

0	28.40	29.61	4.27	18.25	944
10	28.32	30.68	4.09	19.07	864
20	28.74	31.75	3.96	19.74	800
27	28.78	32.28	4.24	20.12	763

STRANGER; November 14, 1960; 0216 GCT; 9°48'N,  
103°54'E; sounding, 37 m; wind, 090°, force 3;  
weather, partly cloudy; sea, calm; wire angle, 00°.

0	28.44	30.29	4.41	18.74	896
10	28.83	31.57	4.17	19.57	816
20	28.74	31.67	4.08	19.68	806
27	28.76	31.76	3.92	19.74	800
32	28.74	31.78	3.87	19.76	798

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8-16 8-17

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S-9

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	m/L	g/L	cl/ton

14 15-1 STRANGER; November 14, 1960; 0720 GCT; 9°18'N, 103°24'E; sounding, 47 m; wind, 110°, force 2; weather, cloudy; sea, calm; wire angle, 01°.

0	28.84	29.60	4.46	18.10	958
10	28.70	30.53	4.43	18.84	887
20	28.60	31.33	4.20	19.47	826
29	28.54	31.44	3.99	19.57	816
40	28.62	32.19	3.53	20.11	765

15-2 15-3 STRANGER; November 14, 1960; 1515 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 080°, force 2; weather, missing; sea, calm; wire angle, 00°.

0	28.98	29.44	4.58	17.93	974
10	28.36	29.46	4.62	18.15	953
20	28.57	30.38	4.35	18.77	894
29	28.62	31.18	4.30	19.35	838
38	28.58	32.48	3.88	20.34	743
48	27.60	33.46	2.38	21.39	642
58	27.60	33.46	2.36	21.39	642

15-4 15-5 STRANGER; November 14, 1960; 2120 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 180°, force 2; weather, missing; sea, calm; wire angle, 01°.

0	28.82	29.43	4.51	17.98	970
10	28.32	29.57	4.54	18.24	944
20	28.62	30.53	4.30	18.86	884
29	28.64	31.26	4.28	19.40	832
38	28.54	32.59	3.73	20.43	734
48	27.62	33.40	2.35	21.34	647
58	27.60	33.48	2.32	21.40	640

15-6 15-7 STRANGER; November 15, 1960; 0315 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 010°, force 3; weather, overcast; sea, calm; wire angle, 00°.

0	28.52	29.00	4.55	17.75	992
10	28.26	29.70	4.53	18.36	933
20	28.63	30.65	4.35	18.95	876
29	28.69	31.62	4.26	19.66	808
38	28.57	32.54	3.90	20.38	738
48	27.62	33.49	2.40	21.41	640
58	27.60	33.49	2.38	21.41	639

15-8 15-9 STRANGER; November 15, 1960; 0916 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 050°, force 4; weather, overcast; sea, slight; wire angle, 01°.

0	28.70	29.15	4.51	17.81	986
10	28.31	29.65	4.53	18.31	938
20	28.61	30.50	4.34	18.84	886
29	28.69	31.60	4.20	19.64	810
38	28.58	32.53	3.96	20.37	739
48	27.62	33.46	2.36	21.38	642
58	27.60	33.49	2.31	21.41	639

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	m/L	g/L	cl/ton

STRANGER; November 14, 1960; 1215 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 110°, force 2; weather, missing; sea, calm; wire angle, 00°.

0	29.01	29.47	4.61	17.94	973
10	28.33	29.52	4.64	18.20	948
20	28.56	30.35	4.32	18.75	895
29	28.66	31.17	4.26	19.33	840
38	28.54	32.52	3.81	20.38	739
48	27.62	33.47	2.38	21.39	641
58	27.60	33.51	2.33	21.43	638

STRANGER; November 14, 1960; 1819 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 150°, force 3; weather, missing; sea, calm; wire angle, 02°.

0	28.85	29.44	4.57	17.97	970
10	28.30	29.53	4.57	18.22	946
20	28.56	30.35	4.57	18.75	895
29	28.64	31.21	4.28	19.37	836
38	28.54	32.55	3.74	20.40	736
48	27.61	33.44	2.34	21.37	643
58	27.59	33.46	2.31	21.39	641

STRANGER; November 15, 1960; 0015 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 340°, force 3; weather, overcast; sea, calm; wire angle, 00°.

0	28.72	29.25	4.51	17.87	980
10	28.33	29.57	4.49	18.24	944
20	28.62	30.58	4.31	18.90	881
29	28.70	31.51	4.22	19.57	816
38	28.58	32.51	3.84	20.36	741
48	27.63	33.46	2.42	21.38	643
58	27.61	33.47	2.34	-	-

STRANGER; November 15, 1960; 0615 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 050°, force 4; weather, overcast; sea, calm; wire angle, 02°.

0	28.58	29.10	4.51	17.81	986
10	28.28	29.68	4.49	18.34	935
20	28.60	30.62	4.26	18.94	877
29	28.68	31.51	4.19	19.58	816
38	28.56	32.58	3.83	20.42	735
48	27.62	33.49	2.34	21.41	640
58	27.60	33.49	2.34	21.41	639

STRANGER; November 15, 1960; 1215 GCT; 8°57'N, 102°53.5'E; sounding, 65 m; wind, 130°, force 3; weather, missing; sea, calm; wire angle, 00°.

0	28.64	29.20	4.51	17.86	981
10	28.32	29.67	4.51	18.32	937
20	28.62	30.55	4.35	18.88	883
29	28.70	31.67	4.22	19.69	805
38	28.67	32.49	4.09	20.31	745
48	27.62	33.46	2.40	21.38	642
58	27.60	33.51	2.33	21.43	638

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 15, 1960; 1745 GCT;  
8°34.5'N, 102°20'E; sounding, 77 m; wind, 140°,  
force 2; weather, missing; sea, calm; wire angle,  
11°.

0	28.54	29.62	4.46	18.21	947
10	28.70	31.73	4.36	19.73	801
20	28.44	32.47	4.36	20.37	739
28	28.57	32.62	4.33	20.44	732
38	28.72	32.87	4.34	20.58	719
48	28.54	33.06	4.05	20.78	700
57	27.28	33.71	2.62	21.68	614
68	27.16	33.74	2.48	21.74	608

STRANGER; November 16, 1960; 0403 GCT;  
7°38.5'N, 101°19.5'E; sounding, 52 m; wind, 160°,  
force 3; weather, cloudy; sea, slight; wire angle,  
04°.

0	28.76	32.82	4.29	20.53	724
10	28.64	32.84	4.34	20.58	719
20	28.40	32.92	4.22	20.72	705
29	28.34	32.96	4.22	20.77	701
38	28.16	32.92	3.90	20.80	698
49	28.43	33.19	3.12	20.92	687

STRANGER; November 16, 1960; 1003 GCT;  
7°38.5'N, 101°19.5'E; sounding, 52 m; wind, 090°,  
force 3; weather, partly cloudy; sea, slight; wire  
angle, 00°.

0	29.00	32.83	4.37	20.46	731
10	28.64	32.85	4.38	20.59	718
20	28.44	32.89	4.36	20.69	709
29	28.38	32.90	4.24	20.72	706
38	28.24	32.98	3.99	20.82	696
45	28.43	33.20	3.28	20.92	686

STRANGER; November 16, 1960; 1604 GCT;  
7°38.5'N, 101°19.5'E; sounding, 51 m; wind, 100°,  
force 3; weather, missing; sea, slight; wire angle,  
00°.

0	28.82	32.85	4.36	20.53	724
10	28.82	32.85	4.36	20.53	724
20	28.39	32.87	4.32	20.69	709
29	28.39	32.92	4.22	20.73	705
38	28.28	32.96	3.93	20.79	699
45	28.40	33.19	3.26	20.93	686

STRANGER; November 16, 1960; 2200 GCT;  
7°38.5'N, 101°19.5'E; sounding, 51 m; wind, 100°,  
force 2; weather, missing; sea, slight; wire angle,  
00°.

0		32.84	4.36		
10		32.83	4.36		
20		32.88	4.34		
29		32.92	4.24		
38		32.97	3.92		
45		33.17	3.92u		

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 15, 1960; 2254, 2310 GCT;  
8°09.5'N, 101°44'E; sounding, 68 m; wind, 090°,  
force 2; weather, partly cloudy; sea, slight; wire  
angle, 00°, 00°.

0	28.34	32.24	4.35	20.23	752
10	28.34	32.29	4.34	20.27	749
20	28.84	32.80	4.35	20.49	728
29	28.91	33.01	4.30	20.62	715
38	28.86	33.05	4.26	20.67	711
48	28.78	33.05	4.19	20.70	708
58	28.37	33.30	3.35	21.02	677
62	28.35	33.26	3.28	21.00	679

STRANGER; November 16, 1960; 0703 GCT;  
7°38.5'N, 101°19.5'E; sounding, 52 m; wind, 160°,  
force 2; weather, partly cloudy; sea, slight; wire  
angle, 02°.

0	29.16	32.85	4.30	20.42	735
10	28.66	32.85	4.37	20.59	719
20	28.38	32.87	4.17	20.69	708
29	28.35	32.90	4.20	20.73	705
38	28.18	32.92	3.91	20.80	698
49	28.42	33.24	3.09	20.96	683

STRANGER; November 16, 1960; 1305 GCT;  
7°38.5'N, 101°19.5'E; sounding, 52 m; wind, 100°,  
force 3; weather, missing; sea, slight; wire angle,  
00°.

0	28.80	32.85	4.37	20.54	723
10	28.78	32.85	4.37	20.55	722
20	28.40	32.89	4.33	20.70	708
29	28.38	32.92	4.21	20.73	705
38	28.27	32.96	3.97	20.80	698
45	28.41	33.17	3.32	20.91	688

STRANGER; November 16, 1960; 1904 GCT;  
7°38.5'N, 101°19.5'E; sounding, 51 m; wind, 100°,  
force 2; weather, missing; sea, slight; wire angle,  
00°.

0	28.72	32.84	4.34	20.56	721
10	28.74	32.85	4.37	20.56	721
20	28.39	32.90	4.32	20.71	706
29	28.38	32.92	4.18	20.73	705
38	28.24	32.94	3.90	20.79	699
45	28.40	33.18	3.21	20.92	687

STRANGER; November 17, 1960; 0101 GCT;  
7°38.5'N, 101°19.5'E; sounding, 51 m; wind, 160°,  
force 2; weather, partly cloudy; sea, slight; wire  
angle, 00°.

0	28.62	32.83	4.36	20.58	719
10	28.64	32.83	4.36	20.58	719
20	28.34	32.88	4.33	20.71	706
29	28.37	32.92	4.22	20.73	704
38	28.32	32.96	3.97	20.78	700
45	28.52	32.83u	4.37u	-	-

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

18-9 19 STRANGER; November 17, 1960; 0404 GCT;  
7°38.5'N, 101°19.5'E; sounding, 51 m; wind, 160°,  
force 2; weather, overcast; sea, calm; wire angle,  
00°.

0	29.10	32.68	4.36	20.31	745
10	28.67	32.83	4.33	20.57	720
20	28.36	32.88	4.32	20.71	707
29	28.36	32.94	4.36	20.75	703
38	28.32	32.94	3.93	20.77	701
45	28.32	33.05	3.51	20.85	694

20 21 STRANGER; November 19, 1960; 0428, 0514 GCT;  
9°17.5'N, 100°06.5'E; sounding, 23 m; wind, 090°,  
force 4; weather, overcast; sea, slight; wire angle,  
15°, 02°.

0	28.56	29.81	4.31	18.34	934
9	28.58	29.81	4.31	18.34	935
16	28.78	31.90	3.13	19.84	791
22	28.82	32.01	3.01	19.90	784

22 23 STRANGER; November 20, 1960; 0026 GCT;  
10°58.5'N, 100°41.5'E; sounding, 60 m; wind,  
calm; weather, partly cloudy; sea, slight; wire  
angle, 00°.

0	28.78	33.04	4.29	20.69	709
10	28.78	33.04	4.29	20.69	709
20	28.78	33.04	4.28	20.69	709
29	28.80	33.03	4.27	20.68	710
38	28.28	33.16	3.32	20.94	684
48	27.62	33.55	2.49	20.45	636
56	27.08	33.80	2.13	21.81	601

24 25 STRANGER; November 20, 1960; 0848, 0906 GCT;  
11°32'N, 101°37.5'E; sounding, 63 m; wind, 350°,  
force 3; weather, cloudy; sea, slight; wire angle,  
10°, 01°.

0	29.01	32.68	4.33	20.34	742
10	28.98	32.79	4.35	20.44	733
20	28.96	32.99	4.37	20.59	718
29	28.81	32.99	4.35	20.64	713
38	28.60	33.04	4.29	20.75	703
48	27.28	33.76	2.71	21.72	610
59	27.23	33.76	2.41	21.73	609

26 27 STRANGER; November 20, 1960; 1505 GCT;  
11°54.5'N, 102°13.5'E; sounding, 33 m; wind,  
060°, force 2; weather, missing; sea, calm; wire  
angle, 00°.

0	29.35	32.09	4.20	19.79	795
10	29.26	32.59	4.28	20.19	757
20	29.24	32.94	4.33	20.46	731
27	29.14	33.15	4.30	20.65	712

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 18, 1960; 1544 GCT;  
7°21.5'N, 100°42'E; sounding, 22 m; wind, 320°,  
force 4; weather, missing; sea, slight; wire angle,  
01°.

0	28.95	31.01	4.26	19.11	860
10	28.88	31.36	4.23	19.40	833
20	28.76	31.60	4.02	19.61	812

STRANGER; November 19, 1960; 1540 GCT;  
10°13.5'N, 99°36'E; sounding, 43 m; wind, 040°,  
force 1; weather, missing; sea, slight; wire angle,  
04°.

0	28.43	32.35	4.23	20.29	747
10	28.44	32.39	4.26	20.31	745
20	28.56	32.72	4.22	20.52	725
32	28.42	32.78	3.72	20.61	716
40	28.42	32.83	3.69	20.65	713

STRANGER; November 20, 1960; 0519 GCT;  
11°20'N, 101°14.5'E; sounding, 64 m; wind, 320°,  
force 2; weather, cloudy; sea, slight; wire angle,  
00°.

0	29.60	33.02	4.23	20.40	737
10	28.77	32.98	4.12	20.65	713
20	28.74	32.97	4.31	20.65	713
29	28.80	32.99	4.36	20.65	713
38	28.79	33.13	4.19	20.75	703
50	27.14	33.83	2.27	21.82	601
60	27.12	33.79	2.19	21.79	603

STRANGER; November 20, 1960; 1117 GCT;  
11°39.5'N, 101°47'E; sounding, 59 m; wind, 340°,  
force 2; weather, missing; sea, calm; wire angle,  
01°.

0	29.06	33.84u	4.32	-	-
10	29.06	32.86	4.32	20.46	731
20	28.98	32.95	4.35	20.56	722
29	28.90	32.93	4.36	20.57	721
38	28.36	33.16	4.16	20.92	687
48	27.46	33.71	2.68	21.62	619
55	27.41	33.68	2.58	21.62	620

STRANGER; November 20, 1960; 1956 GCT;  
11°23'N, 102°37'E; sounding, 36 m; wind, 080°,  
force 1; weather, missing; sea, calm; wire angle,  
00°.

0	29.27	31.89	4.30	19.67	807
10	29.28	31.85	4.30	19.63	810
20	29.06	32.72	3.96	20.36	741
28	28.98	32.89	3.43	20.51	726
33	28.96	32.89	3.32	20.52	725

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 21, 1960; 0027 GCT;  
11°03.5'N, 102°10'E; sounding, 63 m; wind, 180°,  
force 2; weather, overcast; sea, calm; wire angle,  
00°.

0	28.85	31.79	4.26	19.73	801
10	28.85	31.94	4.31	19.84	790
20	29.04	32.61	4.29	20.28	748
29	29.44	32.83	4.36	20.31	745
38	28.78	33.46u	4.41	-	-
48	28.60	33.16	4.23	20.84	694
59	27.61	33.56	2.75	21.46	635

STRANGER; November 21, 1960; 1228 GCT;  
11°36'N, 101°12.5'E; sounding, 57 m; wind, 300°,  
force 3; weather, missing; sea, calm; wire angle,  
01°.

0	28.78	32.26	4.33	20.11	765
10	28.78	32.32	4.34	20.15	761
20	28.82	32.70	4.34	20.42	735
29	28.10	33.31	3.73	21.12	668
38	27.92	33.41	2.52	21.25	655
48	27.73	33.46	2.28	21.35	646
53	27.60	33.52	2.10	21.43	637

STRANGER; November 22, 1960; 1955 GCT;  
12°17.5'N, 101°43.5'E; sounding, 31 m; wind,  
010°, force 3; weather, missing; sea, calm; wire  
angle, 01°.

0	29.10	32.10	4.19	19.88	787
10	29.10	32.10	4.15	19.88	787
20	28.67	32.58	3.35	20.38	738
29	28.60	32.72	2.61	20.51	726

STRANGER; November 22, 1960; 0435 GCT;  
11°37'N, 101°43.5'E; sounding, 62 m; wind, 360°,  
force 3; weather, cloudy; sea, smooth; wire angle,  
00°.

0	29.01	32.93	4.30	20.53	724
10	28.97	32.90	4.36	20.52	725
20	28.99	33.03	4.36	20.61	716
29	28.96	33.09	4.36	20.67	711
38	28.82	33.12	4.34	20.74	704
48	27.50	33.76	2.75	21.65	617
58	27.44	33.69	2.63	21.61	620

STRANGER; November 22, 1960; 1044 GCT;  
11°37'N, 101°43.5'E; sounding, 62 m; wind, 330°,  
force 3; weather, partly cloudy; sea, calm; wire  
angle, 01°.

0	29.00	32.88	4.30	20.50	727
10	29.00	32.88	4.38	20.50	727
20	28.92	32.99	4.33	20.61	717
29	28.75	32.99	4.19	20.66	711
38	28.68	33.13	3.94	20.79	699
48	27.48	33.59	2.83	21.53	629
59	27.44	33.66	2.65	21.59	622

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 21, 1960; 0456 GCT;  
10°42.5'N, 101°43.5'E; sounding, 73 m; wind,  
040°, force 2; weather, cloudy; sea, smooth; wire  
angle, 01°.

0	28.72	32.69	4.33	20.45	732
10	28.62	32.69	4.31	20.48	729
20	28.75	32.82	4.29	20.53	724
29	28.92	33.11	4.31	20.70	708
38	28.81	33.20	4.17	20.80	698
48	28.42	33.35	4.19	21.04	675
58	27.28	33.75	2.50	21.71	611
69	27.26	33.77	2.37	21.73	609

STRANGER; November 21, 1960; 1619 GCT;  
11°59.5'N, 101°26.5'E; sounding, 44 m; wind,  
030°, force 3; weather, missing; sea, slight; wire  
angle, 00°.

0	28.94	32.45	4.27	20.19	756
10	28.96	32.48	4.30	20.21	755
20	28.86	32.82	4.38	20.50	727
29	28.60	32.90	4.13	20.64	713
34	28.47	32.94	3.50	20.72	706
40	28.38	33.08	2.85	20.85	693

STRANGER; November 22, 1960; 0130, 0250 GCT;  
11°37'N, 101°43.5'E; sounding, 62 m; wind, 040°,  
force 3; weather, partly cloudy; sea, smooth; wire  
angle, 01°, 00°.

0	28.94	32.90	4.30	20.53	724
10	28.94	32.88	4.30	20.52	725
20	28.96	32.94	4.34	20.55	722
29	28.95	33.20	4.34	20.75	703
38	28.77	33.09	4.30	20.73	705
48	27.46	33.64	2.64	21.57	624
59	27.44	33.69	2.60	21.61	620

STRANGER; November 22, 1960; 0730 GCT;  
11°37'N, 101°43.5'E; sounding, 62 m; wind, 350°,  
force 2; weather, cloudy; sea, smooth; wire angle,  
00°.

0	29.09	32.89	4.31	20.47	729
10	28.96	32.91	4.34	20.53	724
20	28.98	32.97	4.27	20.57	720
29	28.90	33.07	3.86	20.67	710
38	28.80	33.13	3.85	20.75	703
48	27.47	33.69	2.69	21.60	621
58	27.44	33.68	2.61	21.61	621

STRANGER; November 22, 1960; 1331, 1355 GCT;  
11°37'N, 101°43.5'E; sounding, 60 m; wind, 300°,  
force 1; weather, missing; sea, calm; wire angle,  
02°, 00°.

0	28.96	32.89	4.37	20.52	725
10	28.98	32.93	4.38	20.54	723
20	28.94	32.95	4.38	20.57	720
29	28.76	32.95	4.38	20.63	715
38	28.55	33.01	4.27	20.74	704
48	27.46	33.66	2.83	21.59	623
59	27.44	33.68	2.67	21.61	621

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

33-6 33-7 STRANGER; November 22, 1960; 1633 GCT;  
11°37'N, 101°43.5'E; sounding, 60 m; wind, 300°,  
force 2; weather, missing; sea, calm; wire angle,  
01°.

0	28.94	32.88	4.36	20.52	725
10	28.95	32.88	4.37	20.51	726
20	28.88	32.95	4.38	20.59	718
29	28.70	32.94	4.41	20.64	713
38	28.42	33.08	4.18	20.84	695
48	27.46	33.69	2.77	21.61	621
57	27.44	33.68	2.68	21.61	621

33-8 33-9 STRANGER; November 22, 1960; 2230 GCT;  
11°37'N, 101°43.5'E; sounding, 61 m; wind, 320°,  
force 3; weather, missing; sea, slight; wire angle,  
02°.

0	28.85	32.88	4.31	20.55	723
10	28.88	32.90	4.33	20.55	722
20	28.95	33.03	4.34	20.63	715
29	28.83	33.01	4.36	20.65	713
38	28.60	33.06	4.22	20.76	702
48	27.47	33.66	2.71	21.58	623
57	27.44	33.67	2.63	21.60	622

34 35 STRANGER; November 23, 1960; 0709 GCT;  
12°22'N, 101°25'E; sounding, 33 m; wind, 320°,  
force 1; weather, cloudy; sea, smooth; wire angle,  
00°.

0	29.16	32.14	4.29	19.89	786
10	29.04	32.12	4.27	19.91	783
20	29.04	32.14	4.26	19.93	782
30	28.90	32.51	4.01	20.25	751

36 37 STRANGER; November 23, 1960; 1645 GCT;  
11°39.5'N, 100°16'E; sounding, 47 m; wind, 100°,  
force 2; weather, missing; sea, calm; wire angle,  
00°.

0	28.48	32.77	4.27	20.59	719
10	28.57	32.81	4.27	20.59	719
20	28.59	32.81	4.16	20.58	719
29	28.73	33.03	3.67	20.70	708
38	28.72	33.07	3.51	20.73	705
43	28.73	33.07	3.52	20.73	705

38 39 STRANGER; November 24, 1960; 0648 GCT;  
12°19.5'N, 100°20.5'E; sounding, 29 m; wind,  
270°, force 1; weather, overcast; sea, smooth;  
wire angle, 02°.

0	28.82	32.51	4.22	20.28	748
10	28.76	32.44	4.21	20.25	751
20	28.74	32.44	4.18	20.25	751
28	28.76	32.44	4.15	20.25	751

40 41 STRANGER; November 24, 1960; 1114 GCT;  
12°39'N, 100°36'E; sounding, 30 m; wind, 170°,  
force 3; weather, partly cloudy; sea, slight; wire  
angle, 01°.

0	29.00	32.28	4.28	20.05	770
10	29.01	32.28	4.28	20.04	771
20	29.00	32.28	4.24	20.05	770
25	29.02	32.28	4.24	20.04	771

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; November 22, 1960; 1930 GCT;  
11°37'N, 101°43.5'E; sounding, 61 m; wind, 340°,  
force 2; weather, missing; sea, calm; wire angle,  
00°.

0	28.88	32.91	4.29	20.56	721
10	28.90	32.86	4.34	20.51	726
20	28.93	32.94	4.36	20.56	721
29	28.84	33.02	4.37	20.65	712
38	28.52	33.06	4.19	20.79	699
48	27.45	33.69	2.67	21.61	620
57	27.44	33.68	2.73	21.61	621

STRANGER; November 23, 1960; 0130 GCT;  
11°37'N, 101°43.5'E; sounding, 62 m; wind, calm;  
weather, overcast; sea, calm; wire angle, 00°.

0	28.74	32.57	4.31	20.35	741
10	28.85	32.88	4.30	20.55	723
20	28.90	32.93	4.33	20.57	721
29	28.96	33.04	4.34	20.63	715
38	28.78	33.04	4.34	20.69	709
48	27.48	33.64	2.72	21.56	625
57	27.46	33.64	2.63	21.57	624

STRANGER; November 23, 1960; 1151 GCT;  
12°01'N, 100°50.5'E; sounding, 35 m; wind, calm;  
weather, missing; sea, calm; wire angle, 00°.

0	28.82	32.51	4.32	20.28	748
10	28.82	32.64	4.32	20.38	739
20	28.76	32.76	4.24	20.49	728
28	28.78	32.76	4.21	20.48	729
33	28.76	32.78	4.14	20.50	727

STRANGER; November 23, 1960; 2129 GCT;  
11°18'N, 99°42'E; sounding, 41 m; wind, calm;  
weather, missing; sea, calm; wire angle, 07°.

0	28.21	30.47	4.36	18.95	876
10	28.68	32.20	4.30	20.09	766
20	28.54	32.72	4.29	20.53	724
29	28.42	32.80	3.70	20.63	715
39	28.42	32.80	3.67	20.63	715

STRANGER; November 24, 1960; 0853 GCT;  
12°21.5'N, 100°36'E; sounding, 27 m; wind, 140°,  
force 3; weather, cloudy; sea, slight; wire angle,  
00°.

0	28.84	32.39	4.17	20.18	757
5	28.84	32.39	4.21	20.18	757
10	28.83	32.39	4.21	20.19	757
20	28.86	32.39	4.17	20.18	758

STRANGER; November 24, 1960; 1408 GCT;  
12°59'N, 100°36'E; sounding, 30 m; wind, 220°,  
force 2; weather, missing; sea, calm; wire angle,  
01°.

0	29.04	32.21	4.25	19.98	777
10	29.04	32.21	4.25	19.98	777
20	29.04	32.22	4.20	19.99	776
25	29.06	32.22	4.17	19.98	777

INTERPOLATED				COMPUTED	
Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; January 24, 1961; 1130 GCT; 15°40'N, 108°43'E; sounding, 43 m; wind, 090°, force 2; weather, missing; sea, slight; wire angle, 00°.

0	21.57	32.01	5.01	22.10	574
10	21.02	32.29	5.15	22.45	540
19	21.09	32.46	4.92	22.56	529
29	21.92	32.92	4.74	22.68	518
34	21.98	32.87u	4.74	-	-
39	22.02	32.86u	4.70	-	-

STRANGER; January 24-25, 1961; 2353, 0014 GCT; 15°33'N, 109°47'E; sounding, 518 m; wind, 040°, force 4; weather, cloudy; sea, slight; wire angle, 14°, 16°.

0	23.62	33.95	4.64	22.98	489
10	23.64	33.95	4.74	22.97	490
28	23.59	33.97	4.66	23.00	487
52	23.84	34.21	4.59	23.11	477
80	23.42	34.38	4.03	23.36	453
104	21.72	34.60	3.70	24.01	391
156	16.82	34.60	2.94	25.27	271
254	13.38	34.48	2.90	25.93	208
366	10.51	34.42	2.41	26.43	161
481	9.02	34.41	2.13	26.67	138

STRANGER; January 25, 1961; 1120, 1217 GCT; 15°43'N, 111°02'E; sounding, 905 m; wind, 030°, force 5; weather, cloudy; sea, moderate; wire angle, 23°, 19°.

0	25.12	33.54	4.65	22.23	561
9	25.13	33.55	4.66	22.23	561
27	25.14	33.56	4.64	22.23	561
49	25.14	33.55	4.65	22.23	561
77	25.12	33.55	4.64	22.23	561
98	19.42	34.62	3.01	24.64	331
149	16.58	34.62	3.07	25.34	264
244	13.07	34.46	2.79	25.98	203
352	10.20	34.37	2.40	26.45	159
501	8.52	34.39	2.04	26.73	132
661	6.86	34.41	1.87	27.00	107
832	5.40	34.45	1.85	27.22	86

INTERPOLATED				COMPUTED	
Z m	T °C	S ‰	O <sub>2</sub> ml/L	σ <sub>t</sub> g/L	δ <sub>T</sub> cl/ton

STRANGER; January 24, 1961; 1743 GCT; 15°37'N, 109°15'E; sounding, 128 m; wind, 040°, force 3; weather, missing; sea, calm; wire angle, 09°.

0	23.39	34.00	4.78	23.08	479
9	23.42	34.00	4.75	23.07	481
29	23.30	34.00	4.80	23.11	477
52	23.18	34.09	4.82	23.21	467
81	23.06	34.09	4.75	23.24	464
105	22.82	34.11	4.74	23.33	456
117	22.22	34.13	4.70	23.52	438

STRANGER; January 25, 1961; 0542 GCT; 15°43'N, 110°30'E; sounding, 448 m; wind, 040°, force 5; weather, partly cloudy; sea, moderate; wire angle, 07°.

0	25.29	33.53	4.35	22.17	567
10	25.29	33.57	4.62	22.20	564
35	25.26	33.56	4.61	22.20	564
57	24.72	33.67	4.48	22.44	541
91	19.15	34.63	3.16	24.72	323
114	17.79	34.62	2.99	25.05	292
181	14.86	34.55	3.00	25.67	233
285	11.54	34.44	2.60	26.26	177
418	9.48	34.41	2.22	26.60	145

STRANGER; January 25, 1961; 2134, 2241 GCT; 15°37'N, 111°48'E; sounding, 1335 m; wind, 060°, force 4; weather, missing; sea, slight; wire angle, 10°, 10°.

0	24.96	33.56	4.16	22.29	555
10	24.98	33.56	4.61	22.28	556
29	24.97	33.56	4.64	22.28	556
52	25.00	33.56	4.64	22.27	557
82	22.00	34.48	3.96	23.84	407
103	18.68	34.62	3.09	24.83	313
157	15.78	34.56	2.92	25.48	251
257	12.39	34.43	2.76	26.09	193
371	10.68	34.42	2.51	26.41	163
524	8.17	34.42	2.01	26.82	124
686	6.57	34.44	1.91	27.06	101
840	5.40	34.49	1.85	27.25	83
1051	4.22	34.52	1.93	27.40	69

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NAGA  
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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 26, 1961; 0315, 0359 GCT;  
15°06'N, 111°46'E; sounding, 1426 m; wind, 050°,  
force 5; weather, cloudy; sea, rough; wire angle,  
16°, 14°.

7 8

0	25.47	33.58	3.77	22.15	569
10	25.42	33.58	4.43	22.16	568
33	25.30	33.58	4.38	22.20	564
56	25.33	33.59	4.15	22.20	564
87	21.88	34.46	3.76	23.86	405
110	18.50	34.64	3.09	24.89	307
166	15.42	34.60	3.09	25.58	241
275	11.98	34.42	2.60	26.16	186
384	10.13	34.42	2.20	26.50	154
547	8.28	34.44	1.89	26.82	124
730	6.44	34.47	1.74	27.09	98
890	5.20	34.51	1.75	27.28	80
1103	3.96	34.55	1.88	27.46	63

STRANGER; January 26, 1961; 1737 GCT; 14°34'N,  
111°13'E; sounding, 1664 m; wind, 060°, force 4;  
weather, missing; sea, moderate; wire angle,  
12°.

9 10

0	25.41	33.55	4.60	22.14	570
10	25.42	33.55	4.46	22.14	570
33	25.42	33.55	4.58	22.14	570
57	25.34	33.67	4.55	22.25	559
87	22.27	34.40	3.84	23.71	420
113	19.02	34.65	3.14	24.76	319
169	15.31	34.57	2.76	25.60	240
283	12.24	34.47	2.41	26.15	187
396	10.18	34.44	2.15	26.51	153
568	7.67	34.43	1.80	26.89	117
739	6.02	34.49	1.75	27.16	91
903	5.18	34.50	1.74	27.28	80
1118	4.14	34.53	1.90	27.42	67

STRANGER; January 27, 1961; 0335 GCT; 14°33'N,  
110°16'E; sounding, 448 m; wind, 040°, force 3;  
weather, cloudy; sea, moderate; wire angle, 06°.

11 12

0	24.70	33.66	4.62	22.44	541
10	24.64	33.66	4.62	22.46	539
29	24.62	33.65	3.89u	22.46	539
53	24.21	33.77	4.65	22.67	519
82	21.11	34.47	3.54	24.08	384
105	18.78	34.64	3.03	24.82	314
159	16.12	34.60	2.99	25.44	255
258	12.80	34.48	2.81	26.05	197
372	10.12	34.43	2.23	26.51	153

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 26, 1961; 0944, 1049 GCT;  
14°33'N, 111°43'E; sounding, 1920 m; wind, 040°,  
force 5; weather, cloudy; sea, rough; wire angle,  
34°, 34°.

0	25.33	33.57	4.80	22.19	565
8	25.35	33.57	3.86u	22.18	566
24	25.36	33.57	4.60	22.18	566
44	25.34	33.59	4.64	22.20	564
68	25.36	33.67	4.64	22.25	559
88	23.20	34.14	4.19	23.24	464
133	17.06	34.38	3.17	25.05	292
221	13.24	34.50	3.07	25.98	204
327	10.92	34.44	2.40	26.38	166
460	9.02	34.46	2.04	26.71	134
612	7.42	34.44	1.83	26.93	113
758	6.54	34.45	1.74	27.07	100
961	4.96	34.51	1.82	27.31	77

STRANGER; January 26, 1961; 2327 GCT; 14°34'N,  
110°37'E; sounding, 1189 m; wind, 040°, force 2;  
weather, missing; sea, moderate; wire angle,  
09°.

0	24.36	33.73	4.06	22.60	526
10	24.36	33.76	4.60	22.62	524
29	24.40	33.74	4.61	22.60	526
52	24.28	33.75	4.62	22.64	522
81	20.74	34.58	3.38	24.25	368
104	19.30	34.64	3.00	24.69	326
156	16.57	34.64	2.96	25.36	262
255	13.29	34.51	2.84	25.98	204
368	10.67	34.43	2.23	26.41	163
519	8.27	34.41	1.85	26.79	127
679	6.44	34.46	1.70	27.09	98
831	5.36	34.47	1.83	27.24	84
1041	4.18	34.55	1.89	27.43	66

STRANGER; January 27, 1961; 0804 GCT; 14°31'N,  
109°42'E; sounding, 311 m; wind, 330°, force 5;  
weather, cloudy; sea, rough; wire angle, 12°.

0	24.54	33.69	4.58	22.51	534
10	24.54	33.67	4.66	22.50	535
28	23.52	34.03	4.74	23.08	481
51	23.53	34.25	4.70	23.24	465
81	23.48	34.29	4.53	23.28	461
104	23.00	34.40	4.28	23.50	440
155	17.09	34.62	2.92	25.22	276
207	14.54	34.55	2.87	25.74	226
272	12.60	34.46	2.84	26.07	195

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	m/L	g/L	cl/ton

STRANGER; January 27, 1961; 1415 GCT; 14°25'N,  
109°10'E; sounding, 55 m; wind, 350°, force 4;  
weather, missing; sea, moderate; wire angle, 12°.

0	22.54	32.03	4.61	21.84	598
10	22.56	32.24	4.93	21.99	584
19	22.67	32.31	4.87	22.01	582
24	22.72	32.97	4.47	22.50	535
28	23.28	33.59	4.41	22.80	506
37	23.24	33.87	4.52	23.02	485
46	23.21	33.94	4.27	23.09	479

STRANGER; January 27, 1961; 2345 GCT; 13°27'N,  
109°44'E; sounding, 274 m; wind, 340°, force 4;  
weather, overcast; sea, rough; wire angle, 07°.

0	24.36	33.73	4.66	22.60	526
10	24.36	33.73	4.60	22.60	526
29	24.37	33.73	4.64	22.60	526
54	23.46	34.06	4.69	23.11	477
82	23.47	34.35	4.41	23.33	456
106	21.44	34.53	3.87	24.03	389
159	17.92	34.64	2.92	25.04	293
201	15.60	34.60	2.91	25.55	244
260	13.92	34.51	2.91	25.85	216

STRANGER; January 28, 1961; 0653 GCT; 13°27'N,  
110°25'E; sounding, 2706 m; wind, 010°, force 4;  
weather, overcast; sea, moderate; wire angle, 03°.

0	25.40	33.52	4.58	22.13	571
10	25.38	33.52	4.61	22.14	570
34	25.24	33.52	4.62	22.17	567
58	24.50	33.68	4.67	22.52	533
90	21.83	34.51	3.66	23.90	401
114	18.76	34.59	2.99	24.79	317
171	15.72	34.57	2.98	25.50	249
287	11.88	34.43	2.71	26.20	183
403	9.20	34.39	2.18	26.63	142
576	7.76	34.39	1.86	26.85	121
750	6.30	34.43	1.72	27.08	99
915	4.96	34.46	1.76	27.27	81
1132	3.84	34.53	1.86	27.45	64

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	m/L	g/L	cl/ton

STRANGER; January 27, 1961; 2028 GCT; 13°27'N,  
109°24'E; sounding, 64 m; wind, 360°, force 5;  
weather, missing; sea, slight; wire angle, 18°.

0	22.86	32.99	4.85	22.47	538
10	22.84	32.96	4.84	22.45	540
18	22.86	32.96	4.85	22.45	540
27	22.88	32.99	4.84	22.47	538
47	22.97	33.14	4.80	22.55	530
55	23.03	33.32	4.70	22.67	519

STRANGER; January 28, 1961; 0306 GCT; 13°27'N,  
110°04'E; sounding, 2286 m; wind, 040°, force 3;  
weather, cloudy; sea, moderate; wire angle, 16°.

0	24.50	33.74	4.61	22.56	529
9	24.50	33.73	4.42	22.55	530
32	24.44	33.73	4.60	22.58	528
56	24.46	33.73	4.57	22.56	529
86	22.24	34.43	3.79	23.74	417
110	18.70	34.64	2.98	24.84	312
164	15.87	34.60	2.81	25.49	250
272	12.46	34.49	2.71	26.12	190
376	10.06	34.41	2.36	26.50	154
537	8.14	34.46	1.86	26.85	121
694	6.74	34.46	1.71	27.06	102
848	5.58	34.50	1.70	27.24	84
1054	4.38	34.55	1.76	27.41	68

STRANGER; January 28, 1961; 1833 GCT; 12°21'N,  
110°15'E; sounding, 2560 m; wind, 040°, force 6;  
weather, missing; sea, moderate; wire angle, 08°.

0	25.50	33.52	4.52	22.10	574
10	25.52	33.52	4.57	22.10	574
29	25.54	33.54	4.57	22.10	574
53	24.80	33.63	4.66	22.39	546
82	24.16	33.95	4.66	22.83	504
106	20.14	34.60	3.29	24.44	350
158	17.02	34.60	2.99	25.22	276
258	13.02	34.48	2.82	26.01	201
373	10.89	34.43	2.27	26.38	166
526	8.74	34.41	1.90	26.72	133
687	6.88	34.43	1.79	27.01	106
839	5.67	34.46	1.76	27.19	89
1050	4.33	34.52	1.85	27.39	70

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INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

19 20 STRANGER; January 28, 1961; 2327 GCT;  
12°21'N, 109°54'E; sounding, 1554 m; wind, 350°,  
force 4; weather, missing; sea, missing; wire  
angle, 18°.

0	25.15	33.54	4.53	22.22	562
9	25.16	33.57	4.56	22.24	560
32	24.24	33.74	4.51	22.64	522
55	23.60	33.97	4.71	23.00	487
86	23.08	34.30	4.39	23.40	449
108	21.58	34.53	3.57	24.00	392
159	17.92	34.60	2.92	25.01	296
258	13.79	34.55	2.89	25.90	211
352	11.42	34.41	2.61	26.26	177
494	9.16	34.43	2.09	26.67	138
637	7.20	34.44	1.71	26.98	109
775	6.28	34.46	1.70	27.11	96
969	4.58	34.50	1.73	27.36	73

21 SH-1 STRANGER; January 29, 1961; 0504 GCT;  
12°22'N, 109°24'E; sounding, 48 m; wind, 040°,  
force 4; weather, partly cloudy; sea, moderate;  
wire angle, 01°.

0	23.88	33.33	4.71	22.44	541
10	23.41	33.28	4.82	22.53	532
19	23.34	33.32	4.76	22.59	527
29	23.26	33.40	4.72	22.67	519
39	23.30	33.47	4.70	22.71	515

SH-2 SH-3 STRANGER; January 31, 1961; 0112 GCT;  
12°18'N, 109°24'E; sounding, 73 m; wind, 360°,  
force 4; weather, cloudy; sea, slight; wire angle,  
02°.

0	23.38	33.37	-	22.62	524
10	23.38	33.42	4.72	22.65	521
19	23.39	33.72	4.61	22.88	499
29	23.36	33.85	4.66	22.98	489
39	23.36	33.93	4.66	23.04	484
48	23.18	34.08	4.58	23.20	468
58	23.18	34.08	4.54	23.20	468

SH-4 SH-5 STRANGER; January 31, 1961; 0502 GCT;  
12°18'N, 109°24'E; sounding, 71 m; wind, 020°,  
force 4; weather, cloudy; sea, slight; wire angle,  
03°.

0	23.60	33.41	4.74	22.59	527
10	23.50	33.41	4.64	22.61	525
19	23.39	33.74	4.74	22.89	498
29	23.32	33.83	4.54	22.98	489
39	23.32	33.97	4.69	23.09	479
48	23.23	34.48	4.63	23.50	440
58	23.20	34.50	4.56	23.52	438

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	σ <sub>t</sub>	δ <sub>T</sub>
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 29, 1961; 0257 GCT;  
12°22'N, 109°34'E; sounding, 137 m; wind, 340°,  
force 3; weather, partly cloudy; sea, slight; wire  
angle, 30°.

0	23.26	33.27	4.76	22.58	528
21	23.61	33.60	4.71	22.72	514
42	23.55	34.00	4.68	23.04	484
71	23.44	34.04	4.66	23.10	478
92	22.56	34.11	4.37	23.40	449
100	22.32	34.17	4.33	23.52	438

STRANGER; January 30, 1961; 2310 GCT;  
12°18'N, 109°24'E; sounding, 66 m; wind, 020°,  
force 3; weather, cloudy; sea, slight; wire angle,  
00°.

0	23.37	33.41	4.69	22.65	521
10	23.38	33.41	4.74	22.65	521
19	23.39	33.66	4.66	22.83	504
29	23.38	33.74	4.66	22.89	498
39	23.40	33.81	4.65	22.94	493
48	23.23	34.03	4.60	23.15	473
58	23.24	34.06	4.68	23.17	471

STRANGER; January 31, 1961; 0303 GCT;  
12°18'N, 109°25'E; sounding, 75 m; wind, 360°,  
force 3; weather, partly cloudy; sea, slight; wire  
angle, 02°.

0	23.49	33.41	4.46	22.61	525
10	23.41	33.44	4.84	22.65	521
19	23.37	33.74	4.64	22.90	497
29	23.34	33.82	4.72	22.96	491
39	23.38	33.94	4.54	23.05	483
48	23.25	34.04	4.60	23.15	473
58	23.19	34.06	4.59	23.19	469

STRANGER; January 31, 1961; 0707 GCT;  
12°18'N, 109°24'E; sounding, 73 m; wind, 360°,  
force 4; weather, cloudy; sea, slight; wire angle,  
03°.

0	23.60	33.43	4.72	22.60	526
10	23.59	33.44	4.69	22.61	525
19	23.39	33.81	4.69	22.94	493
29	23.36	33.88	4.68	23.00	487
39	23.38	33.93	4.69	23.04	484
48	23.32	34.08	4.66	23.16	472
58	23.24	34.10	4.59	23.20	468

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 31, 1961; 0900 GCT;  
 12°18'N, 109°24'E; sounding, 71 m; wind, 030°,  
 force 5; weather, partly cloudy; sea, moderate;  
 wire angle, 02°.

0	23.61	33.43	4.73	22.59	527
10	23.61	33.44	4.75	22.60	526
19	23.40	33.80	4.70	22.93	494
29	23.36	33.87	4.70	22.99	488
39	23.38	33.92	4.69	23.02	485
48	23.20	34.07	4.61	23.19	469
58	23.19	34.07	4.60	23.19	469

INTERPOLATED				COMPUTED	
Z	T	S	O <sub>2</sub>	$\sigma_t$	$\delta_T$
m	°C	‰	ml/L	g/L	cl/ton

STRANGER; January 31, 1961; 1101 GCT;  
 12°18'N, 109°24'E; sounding, 71 m; wind, 040°,  
 force 5; weather, partly cloudy; sea, slight; wire  
 angle, 00°.

0	23.58	33.48	4.58	22.64	522
10	23.59	33.48	4.63	22.64	522
19	23.38	33.85	4.74	22.97	490
29	23.35	33.89	4.69	23.02	486
39	23.33	33.96	4.72	23.07	481
48	23.26	34.08	4.68	23.18	470
58	23.19	34.07	4.63	23.19	469

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SH-6 SH-7