AN INVESTIGATION OF THE EFFECTS OF TEMPERATURE AND SUSPENDED SEDIMENT ON THE LANDSAT MSS REFLECTANCE OF JOHN H. KERR RESERVOIR

by

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(ABSTRACT)

The report herein consisted of two objectives, the first of which was a data collection effort in John H. Kerr Reservoir. Ten field monitoring trips were performed between March 30, 1981 and March 3, 1982. The temperature, velocity, and depth data from those trips are contained in Appendix A. Plots of temperature versus depth at the stations chosen in the reservoir are contained in Appendix B.

The second objective was an application of the database to Landsat MSS data available during the same period of record. The effects of temperature and total suspended solids on Landsat MSS reflectance were investigated.

The effect of increasing temperature was a notable decrease in reflectance especially in Bands 4 and 5. This temperature effect may have been influenced by other water quality parameters that were not measured. The effect of increasing total suspended solids was a pronounced reflectance increase in Band 5.

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CHAPTER 1

INTRODUCTION

The past decade has been conducive to environmental concern. An aspect of this concern was an interest in water quality, from which evolved new methodology for the acquisition of water quality data. An effort was made to develop methods through which large amounts of data could be gathered in a short time with limited manpower. Another influencing factor was the need for repetition over time of the gathering of water quality data, which further enforced the effort to develop improved methodology. Remote sensing was decidedly the way to go to achieve the goal of data acquisition within the time constraints. For a description of NASA's Landsat system, see Chapter 3.

1.1 Multispectral Scanner

The Corps of Engineers has been using remotely sensed data since the 1930's in the form of aerial photography (Engineer Pamphlet 70-1-1, 1979), sensing electromagnetic radiation in the visible and near infrared range. With new technology, the multispectral scanner was developed, which senses and digitizes reflectance of electromagnetic radiation within specified wavelength ranges. The multispectral system is used on board aircraft as the modular multispectral scanner (MMS) and on Landsat as the multispectral scanner (MSS). The MMS splits the 0.407 to 1.060 μm range down into 10 separate channels and has additionally a thermal (emitted infrared) band detecting from 8 to 14 μm wavelengths (Table 1.1). The MSS splits the 0.5 to 1.1 μm range into four channels (Table 1.2).

The multispectral scanner was designed for land applications. When applied to water bodies, it is notable that less than 3 percent of the incident light is reflected, to be detected by the MSS sensors (Blackwell and Boland, 1979; Boland, 1979). For this reason, water can be distinguished from land (usually best for Landsat application is MSS band 7), but on the negative side, water has a limited range of expected raw reflectance values. The application of Landsat to observation of water quality parameters has nevertheless proven suitable.

From Tables 1.1 and 1.2, it can be seen that the ranges in wavelengths of the MMS channels are narrower than those of the MSS on board Landsat, and thereby have the advantage of a more precise study of landform, vegetation, or water response to the narrower wavelength bands (Johnson, 1976). Two other advantages of the MMS over MSS use also present themselves. One is that aircraft flown observation offers much better resolution of the subject area due simply to the lower altitude of flight. The other advantage is that the aircraft flight can be scheduled for a cloudless day; where, with Landsat, only what happens to be available can be considered for use. The primary advantage of use of Landsat over aircraft for remote sensing applications is that the Landsat flight need not be scheduled and the data is readily and relatively inexpensively available from the EROS Data Center in Sioux Falls, South Dakota. For the purposes of this study, use of Landsat data was chosen with John H. Kerr Reservoir as the study area.

1.2 Sources of Error

Ground information gathered by a remote sensor can be adversely altered by atmospheric conditions (Link, 1972; Link and Cress, 1974). The reflected or emitted electromagnetic energy can interact with the atmosphere and be incorrectly measured through absorption, reflection, refraction, diffraction, polarization, and emission of the electromagnetic energy (EP 70-1-1, 1979). Causes of these interactions in the atmosphere are clouds, haze, smoke, dust, and atmospheric moisture content (Blackswell and Boland, 1979). Figure 1.1 shows a pictorial representation of this interaction. Emission is caused by ambient electromagnetic energy in the air. Quantification of these influences on MSS data is not feasible at this point, especially within the limited time constraints of this project.

Another source of error is the solar elevation angle. No correction was attempted for this as it has previously been determined to have very little influence on results (LeCroy, 1982). Time constraints do not permit confirmation of this claim.

In an attempt to minimize the effects of atmospheric conditions on Landsat MSS data, the tapes which were used were coverage of relatively cloudless days. Correction for the numerous influences on MSS data is not possible at this time and should be considered in review of any MSS related study (Sheffield, et. al., 1981).

1.3. Factors Affecting Measured Irradiance from a Water Body

In order to define the irradiance values detected by the Landsat MSS correctly as a response to surface conditions and atmospheric effects, these variables would first require definition and quantification. Because these factors are so numerous, the plausability of such an all-encompassing endeavor through use of Landsat on real earth data is questionable. A more reasonable approach would be to isolate and obtain sound understanding of the major effects initially, and then build on that foundation by including additional variables while noting their influences individually. This type of approach would ideally be suited to investigation in the laboratory under controlled conditions. Fortunately, investigations of this nature have been pursued for hundreds of years, and developments since the mid-1800's are notable. In solutions of water as a solvent for various solutes, the major contributions to fluctuation in measured transmittance, absorptance, or reflectance are hydrogen ion activity, concentration, and temperature (Mellon, 1950). In this study, the irradiance response to a range of temperatures for approximately constant TSS was observed. The irradiance response to a range of TSS for approximately constant temperature was also noted.

The hydrogen-ion activity factor is the effect of acidity/basicity, or pH, of water solutions on the expected irradiance. Figure 1.2 shows the effect on transmittance of altering the pH of a solution of bromothymol blue dye in water, with concentration and temperature constant. Because all acids are electrolytes in water, the conductivity as well as the pH will be indicators of acidity. The electrical conductivity of the solution will depend on how completely the acid ionizes at a given concentration (Murphy and Rousseau, 1975). It is notable at this point that the temperature of the solution affects the balance of the reaction, or disassociation, of an acid in solution with water (Jones, 1907; Jones, 1915; Mellon, 1950). These three parameters - pH, concentration, and temperature - are closely related. The irradiance that is detected by Landsat depends primarily on various concentrations as functions of pH and temperature, and on temperature alone.

An example of the effect of concentration on transmittance is shown in Figure 1.3. The effects of concentration and temperature are similar. Increasing temperature results in the same change as increasing dilution (Mellon, 1950). The general effect is to decrease reflectance in the Landsat wavelengths. An increased concentration of a solute that is highly absorptive in the visible regions where water is transparent will further suppress reflection in that region of the spectrum. As dilution increases, the water spectrum will become predominant. Water is highly absorptive, and generally reflectance decreases with increasing dilution. Similarly, reflectance increases with increasing concentration or decreases with increasing temperature. Rise in temperature also breaks down the molecular aggregates; therefore, the absorption cannot be due to the aggregates. The solvates become simpler both by rise in temperature and by increased concentration (Jones, 1915). This change in absorption with dilution is greatest for aqueous solutions. The more dilute solution shows practically no temperature effect (Mellon, 1950). The no temperature effect is itself, however, dependent on the temperature of the source of radiation as well as the temperature of the body studied (Bramson, 1971). The effect of temperature on transmittance is depicted in Figure 1.4.

The major water quality constituents in a reservoir that affect the color and reflectance are concentrations of total suspended solids, directly; algae either directly or indirectly; and temperature. Concentration of algae is dependent on temperature and on the presence of nutrients and solar radiation. Total suspended solids generally cause a peak reflectance in the red portion of the visible spectrum, Band 5. Consequently, many investigators have found good correlation of TSS with Band 5 or with a ratio of Band 4/Band 5 (Bowker and Witte, 1975; Hergenrader, 1976; Morris and Kuo, 1982). Algae is visible as reflection in the green wavelength, or Band 4. Within a reservoir, one would expect an inverse relationship between TSS and algae. Reduction in light penetration is adverse to the development of algae.

The pH of a reservoir depends on the acidic and basic constituents present. The acidic components are comprised in part of humic and fulvic acids from soil leaching or as a result of algal productivity. These concentrations within a reservoir are additional to any acidic component produced upstream. The basic or buffering components are measured as alkalinity. Upstream conditions offer major contributions to reservoir concentration, which would be expected to peak with stormflow. This would be especially pronounced following the algal productive summer months. Thus pH, conductivity, and alkalinity would be expected to follow a similar trend.

Unfortunately, the database compiled during this project allows consideration of TSS and temperature only. The effect of temperature on reflectance as measured by the Landsat MSS was sought independently of other parameters. Evidence supporting the validity of such an effort follows.

Temperature has been found to have a marked effect on the spectral properties of a body (Alpert, Kaiser and Szymanski, 1964; Bramson, 1971; Buckingham, Lippert and Bratos, 1978; Chantry, 1971; Edisbury, 1968; Jones, 1907; Jones, 1915; Mellon, 1950). A mathematical method for describing "color temperature" at relatively low temperatures (273-300°K) has been presented (Bramson, 1971), and is stated as follows:

> For a constant temperature, every body has a perfectly definite wavelength distribution of radiance, and the shape of the spectral distribution curve can yield an accurate temperature of the body. In the case of visual photometry, radiation will have the same color at the same temperatures. As the temperature varies, the change in spectral composition will be accompanied by variations in the absolute values of the spectral radiance, at differing rates in different spectral regions. ---The procedure for color temperature determination may be applied in the infrared as well as the visible spectral region, at both high and low temperatures.

The effect of a temperature increase on an aqueous solution can visually be detected as an increase in the color of the solution, the solution becoming less transparent. The deepening of the color is usually due to a widening of the absorption bands (Jones, 1915). As the absorption bands widen, reflection will decrease, thus radiance detected by Landsat will decrease. Visually, a more peaked "reflection" spectrum appears as a bright or pronounced color at that wavelength. Decreasing the intensity of the peak decreases the brightness, while broadening the curve causes an increase in depth of color.

The temperature at which the dissolution of the solvent is affected may also have an effect on the absorption curve. Elevation of temperature beyond this level will cause an irreversible change in color (Mellon, 1950). Figure 1.5 shows the effect of heating an aqueous solution to such a level. In a reservoir, this could only be expected to take place in a very thin surface layer during periods of high solar radiation and is therefore probably not significant.

Depending on the spectral characteristics of the solute(s) present in a reservoir, the spectral response observed by Landsat will be above or below a reference curve which would be expected for perfectly clean water. For a constant concentration of TSS and other parameters, the effect of a temperature variation may be noted.

CHAPTER 2

DESCRIPTION OF THE WATERSHED*

The Roanoke River Basin is located in the southern part of Virginia and the northern part of North Carolina, including all or part of 15 counties in Virginia and 17 counties in North Carolina. The basin is roughly pear shaped, stretching a distance of approximately 220 miles in length and varying from 10 to 100 miles in width (see Figure 2.1). The basin area is 9,580 square miles above the mouth of the Roanoke River, and 7,800 square miles above John H. Kerr Reservoir. Although the upper part of the basin lies in the Blue Ridge and Allegheny Mountains, most of the area is in the Piedmont Plateau, whose main characteristic is that of rolling hills. Most of the streams in the basin are somewhat crooked and swift, traversing the area in well defined v-shaped valleys.

The Roanoke River itself rises in the Allegheny mountains to the west of Roanoke, Virginia, flows 400 miles in a southeasterly direction toward the Atlantic coast, and empties into Albemarle Sound, approximately 7 miles south of Plymouth, North Carolina.

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*Chapter 2 was written by Daniel M. Goodwin for NASA Project NAG1-123 and is included here as background material for the reader (15).

2.1 Temperature

The climate of the Roanoke River Basin is moderate, characterized by warm summers and somewhat cold and snowy winters (although these are usually not severe). The average annual temperature for the basin is about 58°F (14.4°C) and average monthly temperatures vary between 38°F (3.3°C) and 77°F (25°C).

2.2 Precipitation

The average annual precipitation over the entire Roanoke River Basin is approximately 43 inches and is well distributed throughout the year. The annual precipitation extremes for the basin are 27 and 56 inches. Precipitation varies from 50 inches near the mouth of the Ronaoke River to 35 inches at the river's headwaters. The average annual snowfall for the entire basin is about 13 inches, which does not appreciably alter flood flows (Weiss, et al., 1978).

2.3 Runoff

The annual runoff from the Roanoke River Basin averages 14 inches or approximately 32 percent of the annual precipitation. The runoff of the basin varies from an average of 1.5 cubic feet per second per square mile in the mountain tributaries of the Dan River to 1.0

cubic foot per second per square mile at the headwaters of the Roanoke River as measured near Roanoke, Virginia (Weiss, et al., 1978).

2.4 River Flow

Several flow characteristics for the Roanoke River at the location of John H. Kerr Dam are shown below:

Roanoke River Flow - cfs
for the period January 1912-February 1982

Average	7,698
Maximum (17 August 1940)	270,000
Minimum (29 September 1970)	48
Maximum Monthly Average (August 1940)	36,980
Minimum Monthly Average (September 1954)	484

2.5 Vegetation

Over 60 percent of the drainage area in the Roanoke River Basin is forested by Virginia, Loblolly, and short-leaf pines. Mixed pine/hardwood stands are scattered throughout the basin. The area surrounding Kerr Reservoir is comprised of the above mentioned pines as well as a good number of small farms mainly growing either tobacco or corn. Vegetation on the lake margins and in the lake is severely limited due to the fluctuating water level.

2.6 Regional Geology

In the area surrounding Kerr Reservoir the soil is mostly igneous rocks and interlayered sedimentary rocks of uncertain age. These rocks are very susceptible to erosion. To the northwest of Kerr are large amounts of Granite, Horneblende Greiss including interlayered Mica, Quartz, and large portions of common metamorphic rocks such as Slates and Schists. These rocks are also very susceptible to erosive action. Further to the west is the area known as the Devonion Formation, almost entirely composed of sandstone and limestone. To the west of the Devonion Formation is the Calvert Formation consisting of mostly clay with small portions of sand. The Calvert Formation covers a large portion of the western side of the Roanoke River watershed. At the headwaters of the watershed the land consists of Granite, Dolomite, and large portions of Biotite Gneiss. This Gneiss is characterized by compositional layering, and is medium to coarse grained.

2.7 John H. Kerr Reservoir

The John H. Kerr Reservoir was designed and built by the U.S. Army Corps of Engineers for the reduction of flood damage, generation of hydroelectric power, maintenance of low water control for pollution abatement, and water based recreation. The growing importance of this last use can be seen in Table 2.1.

A total of 117,000 acres was acquired for the project, with 83,000 acres lying below the full pool elevation of 320 feet at the dam site. The reservoir can store 2,324,000 acre-feet of water up to elevation 320. This is equivalent to a depth of 5.6 inches over the entire watershed area above Kerr Dam. This value does not include 484,000 acre-feet of storage below elevation 268 since the reservoir must be maintained to at least this elevation for power generation.

CHAPTER 3

LANDSAT SATELLITE CHARACTERISTICS*

The Landsat system was developed by the National Aeronautics and Space Administration (NASA) to help meet the increasing demand for man to manage the earth's limited natural resources. Data gathered by the Landsat has been applied to studies in the fields of geology, cartography, geography, land management, forestry, hydrology, and many others.

A series of satellites began with the launch of Earth Resources Technology Satellite 1 (ERTS) in July 1972. The experimental satellite proved the applicability of monitoring the earth's surface from space, and led to the launch of ERTS 2 in January 1975. It was after the successful launch of ERTS 2 that the new name Land Satellite (Landsat) was adopted. The new name distinguishes these satellites from the Seasat series of earth observation satellites.

Landsat 1 was turned off in January 1978. Landsat 2 continues to operate and Landsat 3 was launched in March of 1978. Plans are currently being developed for the

*Chapter 3 was written by Melnert, Malone, and Scarpace for the Tennessee Valley Authority and is included here as background material for the reader (27).

fourth Landsat with a scheduled 1981 launch (Landsat 4 was launched in July of 1982). Imagery used in this study was obtained by Landsat 1 or Landsat 2.

Landsat satellites are launched into sun-synchronous near-polar orbits at an altitude of approximately 900 km (540 mi) (Table 3.1). This type of orbit ensures repeatable sun-illumination conditions for any particular date from year to year.

The satellites cross the equator every 103 minutes thus completing 14 orbits in 24 hours. Therefore, the next westward track of data for any orbit is acquired at the same sun time the following day (Figure 3.1). The earth rotates 2,760 km (1,650 mi) under the satellite at the equator during each orbit. The coverage width of each orbit pass is 185 km (115 mi) and the distance between adjacent orbits at the equator is 159 km (95 mi). Complete earth coverage is, therefore, completed by each satellite every 18 days. Landsat 2 was launched so that its orbit follows Landsat 1 by 9 days. Landsat 2 and 3 also provide 9-day coverage.

The instrumentation of Landsats 1 and 2 consists of two imaging systems, the multispectral scanner (MSS) and the return beam vidicon (RBV). Also on board are the data collection system (DCS) receiver and transmitter, and two wide band video tape recorders (Figure 3.2). Only data from the MSS system was used in this study and need be considered.

The MSS is a line-scanning radiometer which collects data by creating images of the earth's surface in four spectral bands simultaneously. Radiation coming from the surface of the earth and its atmosphere is recorded as an analog signal which is converted to values of from 0 to 63. The numbers represent brightness values (BV), the amount of electromagnetic energy reflected from an area on the earth's surface in one wave length band.

The MSS scans the earth's surface from west to east (Figure 3.3). Twenty-four detectors are used to record six lines of data (Figure 3.4) in each of the four wave length bands (Table 1.2).

During a scan, the signal is sampled every 9.95 microseconds. For each band, approximately 3,300 samples are taken along a 185 km line (Figure 3.4). Thus, the instantaneous field of view (IFOV) of 79 m by 79 m moves about 56 m on the ground between each sample. The individual radiation measurements must be arranged on an image in a manner that preserves spatial relationships. Thus, the measurements are assigned dimensions of 56 m by 79 m so that geometric distortions are not introduced. The 56 m by 79 m area is called a Landsat picture element or pixel.

Landsat MSS imagery is placed in the public domain and is available as either photographic products or computer capatible magnetic tape.

For the user to locate the area of his interest, the continuous image of the MSS has been divided along the orbit path (north to south) into sections equal to the east-west width of the MSS scan, 185 km (115 mi). This division is always made as near to the same location as possible, thus creating nominal scenes of Landsat data. These scenes are assigned a unique identifying number corresponding to the orbit path and the east-to-west row of scenes (Figure 3.5).

Photographic products available include black and white prints of individual Landsat bands. These products cover one nominal scene of imagery 185 km by 185 km and are available in a variety of scales. Also available are false color infrared composites of selected scenes. These products utilize bands 4, 5, and 7 to create photographically the false color image.

Landsat computer compatible tapes (CCT) are available in one-tape, 1,600 bit-per-inch (bpi) or in two-tape 800 bpi format. (Also available at this time are geometrically corrected computer compatible tapes in two-tape, 1600 bpi format.)

CHAPTER 4

METHODOLOGY

In order to eventually utilize Landsat imagery for the extraction of water quality data, algorithms must first be developed relating water quality parameters to raw reflectance values in some form from the multispectral scanner. Successful attempts have been made at correlation of Landsat reflectance values to various water quality parameters (Bowker, et al., 1976; Colwell, 1966; Hergenrader, 1976). It is notable that most of those efforts utilized a correlation between data that were not temporally matched, some in fact with years difference were correlated. In a report by the Tennessee Valley Authority (Meinert et al, 1978), the following was recommended:

> It is anticipated that much of the variance in these models could be eliminated if ground samples are taken concurrently with Landsat overpasses.

For development of reliable Landsat algorithms, then, collection of field measurements should be coordinated with the operation of Landsat (Bowker and Witte, 1975; Price, et al., 1979). This project consisted primarily of an insitu data collection effort in conjunction with Landsat overpasses. The data was then used in three research reports. One is a sediment budget for Kerr

Reservoir (Goodwin and Kuo, 1982), another is a correlation of Landsat data to insitu surface turbidity data from Kerr Reservoir (Morris and Kuo, 1982). This report contains a correlation of Landsat data with insitu surface temperature data, with consideration of total suspended solids concentrations.

4.1 Field Measurements*

The Virginia Polytechnic Institute and State University (VPI&SU) researchers involved in this study coordinated their data collection efforts with the overhead passage of NASA Landsat II. The Landsat passes over the Kerr Reservoir area every 18 days, with the reservoir being visible for two consecutive scenes on each of these days. The VPI&SU sampling was performed on ten separate occasions between April 1981 and March 1982. Thirteen stations, located along the entire length of Kerr Reservoir, were chosen so as to suitably monitor the distributions of suspended sediments and temperature fluctuations. These stations can be seen in Figure 4.1. The stations were located near existing buoys for ease of relocation and thus for assurance that the data collected each trip would be comparable.

*Section 4.1 was written by Daniel M. Goodwin for NASA Project NAG1-123 and is included here as background material for the reader (15).

Data collected at each designated station included water temperature and current velocity and direction at increments of 5 feet until a depth of 20 feet was reached. Below the 20 foot depth, each of these parameters was measured at 10 foot depth increments until the reservoir bottom was located. Also, any isothermal layers occurring between increments were traced to their existing location. Turbidity was measured at 1 meter increments, and similar to temperature, any large change between measured depths was investigated and specifically located. Air temperature, wind speed, and wind direction were also measured periodically, since a change in any of these parameters may result in an altered sediment pattern. Six Secchi depths were also obtained at each station using the following disks: 30 cm black, 30 cm white, 30 cm B/W and 20 cm B/W. Secchi depths provide a relative measure of the amount of suspended sediment in water. The deeper a Secchi disk is visible, the clearer the water must be.

In addition to this, streamflow data for the Roanoke, Dan, Hyco and Bannister Rivers, as well as the sediment load carried by the Roanoke and Dan Rivers, were obtained from the U.S. Geological Surveys, Water Resources Division. The U.S. Army Corps of Engineers Wilmington District provided Kerr Dam discharges, lake levels and morphometric information.

Current speed, current direction, water temperature, and instrument depth were measured with an ENDECO Type 110 remote reading current meter. The meter is an axial flow, ducted impeller specifically designed for continental shelf and estuarine environmental monitoring.

Current speed was measured by a neutrally balanced impeller riding on glass ball bearings in Delien races that turns a multipole, corrosion resistant ceramic magnet that is coupled to a magnetic reed switch. One rotation of the impeller provides four closures of the reed switch which are transmitted to the surface deck unit via a telemetering cable. However, current speed below 0.1 knots (as was almost always the case for Kerr Reservoir) must be monitored by visually counting the reed switch pulses for a given period of time. The conversion from pulses to knots is made as follows:

$$K = \frac{P}{S \times 3.56}$$

where K = knots

P = number of pulses

S = time period in seconds for pulse count

All field data were converted to ft/min as follows

$$\frac{ft}{min} = P(0.949)$$

where P = number of pulses over a 30 second period. A 2-inch cup mini Pygmy current meter was piggy-backed on the ENDECO meter for current speed measurements. The use of this device was later discontinued due to the insensitivity of recording small readings. Current direction was monitored using a potentiometric compass to sense magnetic north. The direction data was telemetered to the deck readout unit and was displayed by the meter.

Ambient temperature was monitored by a thermo-linear thermistor sensor in the subsurface unit. These data were also telemetered to the deck readout unit and displayed by a meter. The temperature displayed by the ENDECO 110 was checked at a depth of 3 feet in Kerr Reservoir and corresponded exactly with the readings of a standard thermometer.

Instrument depth was monitored by an oil filled pressure transducer. The transducer is a pressure operated potentiometer in which position of the potentiometer wiper provides a voltage that is telemetered to a meter in the surface deck unit.

Measurement of turbidity was made with the Monteduro-Whitney Corporations' Transmissometer. The instrument consists of two parts: (1) the deck unit (model TMU-1B) which houses the cable spool and the meter, control switches and battery and (2) the probe, which is comprised of a light source, light receiver, and prism. The instrument measures the percent difference in light received of the light transmitted, which is directly related to the level of total suspended solids (TSS). NASA Langley Research Center calibrated the instrument at three different path lengths (10 cm, 33 cm, 100 cm) in the Kerr Reservoir site and in the laboratory based primarily on results from using Kerr sediment and pure quartz deionized water. NASA results yielded a plot (of the three path lengths) from which TSS in parts per million (PPM) can be determined once the percent difference in light received is known. The NASA plot is shown in Figure 4.2.

To maintain assured accuracy of the transmissometer, two screens, one with large holes and one with smaller holes were initially held in front of the light receiving apparatus on the instrument. The percent of light received was recorded for each screen and subsequently checked before each research trip.

4.2 Data Preparation and Plots

The research trip data was subsequently coded and entered into the Virginia Tech IBM 370 computer as Statistical Analysis System (SAS) field data files (Appendix A) for later use of SAS regression analysis, and for the plotting of temperature against depth at stations within the reservoir (Barr, et al., 1979; Hales, et al. 1981). Each plot, generated by SAS, contains at most five trips for a given station, and thus each station requires two plots to accommodate the ten trips. These plots are contained in Appendix B.

4.3 Extraction of Data from CCT's

Having accomplished the year of field data acquisition, the availability of suitable Landsat computer compatible tapes (CCT's) for regression analysis against the field data was queried of the EROS Data Center. The tapes which were found suitable for purchase are listed and dated in Table 4.1 with a list of trips, also dated for which insitu data was acquired. From Table 4.1, it can be seen that only two trips involving 13 points could be matched exactly with tape data.

The CCT's were ordered in the 1600 bits per inch, band sequential form in order to utilize specific programs written by Dr. Gregory T. Koeln of the Fish and Wildlife Department at VPI&SU for extraction of data from the tapes (Hockenbrink, 1978). Upon receipt of the CCT's from EROS Data Center, a program of Dr. Koeln's was used for tape verification after cataloguing and submitting the tapes to the VPI&SU Computing Center tape library. The use of this tape print (TPPRINT) program was vital in this research effort as the EROS Data Center initially was in error with our order. The major items to verify were the scene identification and the bands contained on each tape.

Five basic steps were involved in the data extraction. First, black and white prints using Band 6 of each scene, which were also obtained from EROS Data Center, were examined to locate the approximate east-west and north-south ranges in pixel coordinates occupied on each scene by the reservoir. Each geometrically corrected scene contains 3659 pixels in the east-west direction and 2983 pixels in the approximately north-south direction.

These coordinates were used in Step 2, which was the production of computer generated maps of what part of the reservoir was covered by each scene. Kerr Reservoir requires two consecutive scenes for complete coverage by Landsat. The Roanoke branch of the reservoir is covered by Pass 17, Row 34 and is located in the southeast corner of this scene (Figure 4.3). The Nutbush branch of the reservoir is covered by Pass 17, Row 35 and is located in the northeast corner of the Landsat scene (Figure 4.4). Management of computer input and output was significantly complicated by the necessity of the two different Landsat scenes involved.

The generation of computer maps was performed using a subroutine RAW which accesses a program of Dr. Koeln's which assigns symbols for prescribed reflectance ranges or values. The program involves a density slicing technique which creates a histograph of the pixel reflectance values (greytones) and assigns symbols as defined by the user for specific ranges or values of greytones (Williamson, et al., 1974). Band 7 (near infrared) shows most clearly the delineation between land and water because water is almost totally absorbtive of near infrared radiation and land forms generally reflect most near infrared radiation. As a rule of thumb, water rarely reflects values greater than 15 reflectance units. Using the preceding as background, the symbols were user-defined to be, generally, a "0" or "1" within the 0 to 15 reflectance units range. All others were defined symbols other than "0" or "1". The RAW routine was later altered to a form referred to as RAW4 such that non-water pixels generated blank spaces on the computer maps. The result of RAW or RAW4 was thus a computer generated map of each scene, with the reservoir clearly defined, and with a grid of pixel coordinates at page boundaries (Figure 4.5).

Once the reservoir was located, step 3 was carried out, which was the locating of our sampling stations within the reservoir. This was performed by using a survey map of Kerr Reservoir (Alexandria Drafting Co.,

1981) and the output of RAW or RAW4, resulting in pixel co-ordinates for the stations covered by each scene.

The fourth step involved a subroutine (RAW3) which accessed another of Dr. Koeln's programs. Each run of RAW3 required changes consisting of (1) the tape to be used and associated dates, and (2) the east-west and north-south ranges in pixel coordinates to be extracted from the tape. The program generated an output of raw pixel reflectance values within a grid of pixel co-ordinates. The sampling station pixels (located from RAW or RAW4) were then marked on the printouts as preparation for the next step.

Step 5 in the procedure for extraction of data from the CCT's was accomplished through the use of a short Fortran program (Appendix C) written by W. Sharp. The program is interactive in nature, querying the user first of data identification information (tape, station, etc.), then accepting input of a five by five matrix of pixel reflectance values centered about the station pixel from RAW or RAW4. Only the 3x3 "smoothed" value (T) was used in this analysis. The program created two external files, one containing the five by five matrix with necessary identification(Appendix D), and the other a SAS file containing identification, the center pixel value (C) and smoothed values of reflectance, one of which was to

be used for SAS regression analysis (Appendix E).
The smoothed values of reflectance, consisted of the following:

1. T, the average of a three by three matrix surrounding the center pixel.
2. TL, the average of the top left four by four matrix within the five by five.
3. TR, the average of the top right four by four matrix within the five by five.
4. BL, the average of the bottom left four by four matrix within the five by five.
5. BR, the average of the bottom right four by four matrix within the five by five.
6. F, the average of the twenty-five reflectances contained in the five by five.

4.4 Development of Data for Regressions

At this point, two separate sets of data were available for use. The separate datasets had to first be related through a common variable and then merged for subsequent use of SAS. The logical variables to relate were the variable TRIP in the field data file and the variable TAPE in the Landsat data file. Another factor which promoted the use of these as common variables was that, as mentioned in Section 4.3, only two trips could be matched exactly with tape data in the year's study. Consequently, the trip data for which no exact match of the tape data existed was related to tape data from Landsat passes from 18 days preceding or following the trip data used. Care must be taken in matching trip data to tape data even if separated by only 18 days. A significant storm event could markedly alter water quality parameters throughout the reservoir, and thus adversely bias any regression performed with such points included (U.S. Army Corps of Engineers, 1962). For the purposes of this report all possible correlations between Landsat data and reservoir field data were used in order to test the validity of such an effort. For this purpose, it was necessary to temporally adjust the trip temperature data to the related tape (Table 4.2).

The adjusted data was then applied in RSQUARE and STEPWISE procedures for linear regression analysis using the Statistical Analysis System to determine which band or combination of bands was most suitable for more detailed study.

4.5 Landsat MSS Band Products and Ratios

In the past, various sums, differences, products and ratios of MSS band reflectances have been used in biological application of regression analysis for such purposes as relative greenness, vegetation index, and perpendicular-vegetation index (Tucker, 1979) and generally for the purpose of reduction in error due to peripheral effects (LeCroy, 1982). Ratios were used to model water quality parameters in Kansas reservoirs (Yarger and McCauley, 1975), and were found useful in mapping water quality in Saginaw Bay (Rogers, et al., 1976).

In this study, various ratios were considered in the statistical analysis. The ratios which were included in the initial analysis are contained in Table 4.3.

4.6 Regression Model Development

The dataset which was used for regression analysis (50 total observations) is contained in Tables 4.4 and 4.5. The values of T for bands 4 through 7 at various stations from particular tapes are contained in Table 4.4. The corresponding temperatures and adjusted temperatures are found in Table 4.5. Products and ratios of the four bands were created within the SAS routines to minimize the amount of tabular data presented.

The first type of analysis applied to the dataset used the RSQUARE procedure of SAS. RSQUARE is a linear model procedure which performs all possible combinations (the maximum and minimum to be included may be user specified) for one or more dependent variables and a list of independent variables (Barr, et al., 1979). A maximum of 14 independent variables is suggested in the *SAS User's Guide* ( ); however, when limiting the number of possible combinations, more independent variables may be included. The RSQUARE procedure was used to determine which variables and combinations produced the best regression results in terms of the R^2 statistic.

The STEPWISE procedure was next used to provide more detailed information of what was determined from the RSQUARE procedure. The stepwise regression attempts to determine the best models (of combinations) in a forward search (adding variables) of the independent variable list by evaluation of certain statistics (Graybill, 1976; Wonnacott and Wonnacott, 1977). These statistics include R^2, F statistic, and C_p.

4.6.1 Coefficient of Multiple Determination, R^2

The coefficient of multiple determination measures the proportionate reduction of total variation in a dependent variable (temperature) associated with the use of independent variables (Neter and Wasserman, 1974), and is defined as follows:

$$R^2 = \frac{SSR}{SSTO} = 1 - \frac{SSE}{SSTO}$$

where

SSR = regression sum of squares

SSTO = total sum of squares

SSE = error sum of squares

The range of R^2 is between zero and 1, with one being the perfect fit. When R^2 is equal to 1, all observations are on the fitted line and SSE equals zero. In using the R^2 statistic to choose a model, the highest value of R^2 is sought for a minimum number of independent variables included in the model. Other statistics are also observed as R^2 changes in order to find the optimum.

4.6.2 Error Mean Square, MSE

The error mean square is an unbiased estimator of the variance σ^2 in error, and is given by the following:

$$MSE = \frac{SSE(X_n)}{n-2}$$

where

$SSE(X_n)$ = error sum of squares (variable X_n)

n = number of observations

The error sum of squares has n-2 degrees of freedom associated with it (Neter and Wasserman, 1974), and thus accounts for the number of parameters in the model where the R^2 statistic does not. MSE is to be minimized as much as possible in the optimum model.

4.6.3 Mallows Statistic, C_p

The C_p criterion is concerned with the total squared error of the n fitted observations for any given regression model (Neter and Wasserman, 1979). The error has a bias component and a random error component, and C_p is an estimator of the total squared error. In using the C_p criterion to detect bias in a model, the value of C_p is ideally equal to the number of independent variables. The objective is to find the set of independent variables which yields the best results with respect to the C_p criterion. Since it is desirable to use a model with few independent variables, the model with the lowest value for C_p is desirable.

4.6.4 Coefficient of Partial Correlation, F Statistic

The F statistic is useful in determining the linearity of a model and is defined as follows:

$$F = \frac{MSR}{MSE}$$

where

MSR = regression mean square

MSE = error mean square

For a better fitted line, the coefficient of partial correlation will have a greater value, and thus the regression line is accounting for the variation in the dependent variable. The significance of the F-value is noted by the PROB F statistic provided in the SAS output. A small F-probability is sought for a large F-value.

CHAPTER 5

RESULTS AND DISCUSSION

The results of the RSQUARE, STEPWISE, and BACKWARD linear regression models are found in Appendix F. A discussion of the results follows.

5.1 Exact Match Dataset, 13 Points

An attempt was made to verify the acceptability of use of the adjusted temperature data that was force matched to tape data. As a starting point, the dataset containing the 13 exact match points was considered. The results of the RSQUARE procedure are found in Table 5.1. RSQUARE was performed on a list of 44 non-redundant independent variables (Table 4.3). STEPWISE was performed on those variables which were found to be significant through the RSQUARE procedure. The values of R^2 were good, and examination of more detailed statistics from the STEPWISE procedure found in Table 5.2 indicated that Band 4 was significant and was the best one variable model in the dataset. The resulting value of R^2 from Band 4 was 0.85. Addition of any one of at least eight independent variables to Band 4 in the model significantly improved the R^2 value to at least 0.92, and in most cases improved the F-value somewhat (Appendix F). The additional variable which resulted in the highest F-value and the lowest F-probability was 5X5BY6 (Table 5.2), with an R^2 of 0.93.

5.2 Entire Dataset, 50 Points

For the results of the RSQUARE procedure including all 50 points, refer to Table 5.3. The resulting values of R^2 were not as good as those for the 13 exact match points. The best one variable model for the 50 observations was 4X4BY5, yielding an R^2 of 0.60 (Table 5.5). Band 4 as the regressor yielded an R^2 of 0.41, or third in the group. It is notable that Band 4 played an important role in the two variable models, all of which produced values of R^2 greater than the best one variable model. The best two variable had an R^2 value of 0.68. Notice from Table 5.3 that addition of more independent variables did not significantly improve the value of R^2.

5.3 Exact Match and 50 Observation Datasets Statistically Compared

After noting the importance of Band 4 in regressions of both datasets, a second variable was then sought that would offer similar results when applied to either dataset. The only common second variable that offered significant and acceptable results was 5X5BY6, which provided the best value of R^2 when combined with Band 4 on the 13 observation dataset.

The resulting linear regression equations using Band 4 and 5X5BY6 as independent variables (on 13 points from Table 5.2, and on 50 points from Table 5.4) to model surface temperature in Kerr Reservoir follow.

$$TEMPC = 0.5932(Band\ 4) - 0.2058(5X5BY6) + 10.26 \quad (5.1)$$

$$ADJTEMPC = 1.038(Band\ 4) - 0.3055(5X5BY6) + 9.469 \quad (5.2)$$

Equation 5.1 resulted from the 13 observations and 5.2 from 50 observations. The two equations were very similar, which indicated that the temporal temperature adjustment may have been acceptable when applying the above equations on this particular dataset. To further investigate that question, each of the equations was applied to the 50 observation dataset and the results compared to the adjusted temperatures. These results are found in Table 4.5.

Figure 5.1(a) is a plot of the application of Equation 5.1 to the 13 exact match observations. A linear regression of actual temperatures versus the temperatures predicted by Equation 5.1 is shown with 90 percent confidence limits. The actual data points are also shown on the plot. In order to discover which tapes comprise the points used for regression, refer to Figure 5.1(b). Similarly, part (b) of all figures in Chapter 5 contain the data points indicated by tape for the regression in part (a) of each figure.

In using Equation 5.1 to predict the adjusted temperatures, good correlation was noted for temperatures in the low to upper teens. However, when temperatures were in the twenties, Equation 5.1 predicted values in the mid-teens. And for temperatures of approximately six degrees celcius, Equation 5.1 predicted values between approximately seven and nine. Thus, Equation 5.1 failed to match the extreem temperatures.

The application of Equation 5.1 to the entire 50 point dataset is shown in Figure 5.2(a). For a best fit, the regression line shown should pass through the origin and have unit slope, and the 90 percent confidence limits should be close to the fitted line with all points falling within those limits. Figure 5.1(a) demonstrates these qualities, showing that equation 5.1 is closely predicting the actual temperatures included in the 13 point dataset. The application of Equation 5.1 to the entire dataset, however, yields a non-unit slope and wider confidence limits. Thus, Figure 5.2(a) depicts the limitations of application of Equation 5.1 to the larger dataset.

The extent that each equation is limited in a particular application would be quantifiable by calculation of error, were the database more substantial. Only 13 points, however, are actual known values (ground truth data). This limits the reliability of such a rigorous approach, but error analysis will nevertheless be investigated to some degree later in this report. A visual approach was first used to determine which model appeared to be depicting the temperature conditions "best". For a specific model to be labelled "best", it must predict acceptably or at least better than the other models in application to both datasets.

Equation 5.2, as expected, proved to be the better general predictor of temperature for the entire 50 observations, although Equation 5.1 yielded excellent results when applied to that part of the dataset from which it was derived (tapes 1 and 9). The application of either equation to a contour plot on any day other than Equation 5.1 applied on November 15, 1981 Landsat data would not be recommended as the accuracy would be questionable. For a general idea of temperatures, Equation 5.2 would be useful. The application of Equation 5.2 to the 13 points can be seen in Figure 5.3(a) and applied to the 50 points in Figure 5.4(a).

5.4 Further Investigation for a Better Model

In examination of the plots of the application of Equations 5.1 and 5.2 to the 50 point dataset, it was noted that some outliers existed in the data. Also, some concern arose from the regression shown in Figure 5.3(a). Regression equation 5.2 is seen applied to 13 points in that figure. The confidence limits were close, but the origin-intercept and unit-slope conditions were not met. From these two equations and four applications, it was suspected that some adjustment of the coefficients and of the constant in the basic form of the equation might offer better overall results.

To investigate the possibility of a better equation, the outliers were first identified. Those points falling near and outside the confidence limits were data from tapes 3 and 1 (Figure 5.2(b) and Figure 5.4(b)). Deletion of the four points from tape 3 decreased the number of observations to 46 and increased the value of R^2 from 0.63 to 0.75 (Table 5.6). The F-value also increased significantly from 40 to 64 and the MSE was reduced from 18 to 10. The Cp and PROB>F (significance) values remained the same and were good in both cases. The regression of temperature with Band 4 and 5X5BY6 as independent variables on the new 46 point dataset resulted in the following equation:

$$ADJTEMPC = 0.9554(Band\ 4) - 0.3145(5X5BY6) + 10.21 \quad (5.3)$$

The application of Model 3 (Equation 5.3) to Landsat data for the 13 point dataset is shown in Figure 5.5(a). Some improvement was noted here over the application of Model 2. The slope and intercept were both closer to optimum. Figure 5.6(a) shows the application of Model 3 to the database from which it was derived; and, as expected, the slope and intercept were good. Also note that the confidence limits were much narrower than those for Model 2 on 50 points (Figure 5.4(a)). When Model 3 was applied on the entire 50 points, the regression remained of nearly unit slope (Figure 5.7(a)) and passed very close to the origin.

To further investigate the possibility of a better model equation, tape 1 data was also deleted from the database. Removal of the three points formerly contributing from tape 1 decreased the number of observations to 43 and further increased the R^2 value to 0.82 (Table 5.7). The F-value also further increased to 88 and the MSE was reduced somewhat to eight. Again, the Cp and PROB>F values remained the same. The following equation resulted.

$$ADJTEMPC = 1.157(Band\ 4) - 0.3328(5X5BY6) + 8.161 \quad (5.4)$$

The application of Model 4 (Equation 5.4) to the 13 point dataset is shown in Figure 5.8(a). Clearly, this was the worst model when applied to the exact match points. The probable reason for the evident poor behavior is that Equation 5.4 was being forced to model an excessive number of points from which it was not developed.

From the preceding, it can be deduced that Model 1 is of course the best predictor of temperature for May 1 and November 15, 1981. When temperatures predicted by Model 1 are compared to a larger database consisting of temporally adjusted temperatures from field data, the correlation is not as easily acceptable. Any predicted temperature could be incorrect by plus or minus seven degrees celcius within the 90 percent confidence limits. Model 3 offers the best general application results of the four models studied, though bettering the confidence interval to only plus or minus five degrees celcius.

5.5 Evaluation of Error

In the evaluation of error, each tape was first considered separately, and the combinations of tapes that were observed in plot form were then developed. Table 5.8 contains the absolute error and percent error for each observation and model. The error was calculated in the following manner:

$$(T_{model} - T_A) / T_A = \Delta T / T_A$$

Where T_A = actual temperature for tapes 1 and 9, and adjusted temperature for tapes 3, 5, 7, and 12.

Multiplication by 100 yeilded percent error. A negative error or percent error indicated that the model predicted low for that observation. These results were then averaged for each tape (Table 5.9). The values in the columns with the heading "average group error" were calculated in the following manner:

$$\text{Average Group Error} = (1/n) \sum_{i=1}^{n} (100 \ \Delta T \ / T_A)_i$$

and contain the averages, in percent, of the sums of the individual percent errors for each model. This quantity represented how high or low the model predicted temperatures on the average. A value close to zero indicated that the model passed through the center of the group of data points.

The values in the columns with the heading "average total error" were calculated in the following manner:

$$\text{Average Total Error} = (1/n) \sum_{i=1}^{n} (100 \ |\Delta T| \ / T_A)_i$$

and contain the averages, in percent, of the sums of the absolute values of the percent errors for each model. This quantity represented the average amount of error for the group of points (each tape).

From Table 5.9, the accuracy with which each model predicted temperatures for each of the six tapes can be seen. Only tapes 1 and 9 contained exact match data points. The application of error calculation to the other tapes showed only how well each model predicted the adjusted temperatures and should not be interpreted as actual "error".

The error was then calculated for various combinations of tapes and summarized in Tables 5.10 and 5.11. Table 5.10 contains values representing the closeness of fit in percent, and Table 5.11 contains the average error in percent of each model for the various combinations of tapes. The optimum value for each of these parameters is zero. The starred values are the data for the tapes from which the models were developed. From these two tables it is evident, once again, that Model 1 was best for the exact match points with less than five percent error. Model 3 was the best of the remaining models, predicting high by almost 18 percent.

For modelling the entire dataset, Model 3 was the best with the closest fit, but with an average error of 21 percent. Model 1 was second best with an average error of 25 percent, predicting high by approximately eight percent. Because Model 1 was significantly better than any model when applied to the exact match ground truth data, and since this model was not significantly inferior to the best predictor (Model 3) of the dataset containing adjusted temperatures as well, Model 1 can be chosen as the best overall regression of temperature in this study.

CHAPTER 6

SUMMARY AND CONCLUSIONS

This report has presented a description of the extraction of data from Landsat computer compatable tapes and of the subsequent development of linear regression equations designed to predict surface temperature in the Kerr Reservoir from Landsat MSS data. Using only Landsat data that matched exactly with field data, good correlation was found through use of MSS Band 4. Use of $(\text{Band } 5)^2/\text{Band } 6$ and Band 4 as independent variables improved the correlation considerably in comparison with Band 4 alone. Application of these same variables to a dataset including exact match and temporally adjusted temperature data yielded fair results and a very similar regression equation to that of the matched-only data.

6.1 Effects of Temperature and Total Suspended Solids

The evidence of importance of Band 4 in the regressions is supportive of earlier findings by other researchers that a correlation of Landsat MSS values and temperature should exist. The intensity of green light should change more rapidly than red light but more slowly than blue light (Bramson, 1971). The field and Landsat data verify this claim. Blue light however is not detected by Landsat, but the curve is increasing toward the blue wavelengths from the near infrared. Good correlation of temperature with Band 5 has been found (Rogers, 1976), in which case the TSS effect (or lack thereof) may have been influencing the use of Band 5. The model used in this study included a negative 5X5BY6 term which would cancel the TSS peak effect in Band 5. Because the TSS effect was an evident peak in Band 5, either slope approaching the peak (4BY5 or 5BY6) would describe the TSS effect. The variable 5X5BY6 represents the slope 5BY6 multiplied by Band 5. The order of the effect of TSS on any of the Landsat bands is uncertain; and, the order of the TSS cancellation (5X5BY6) is probably a major factor in the increased error of any model when applied to more adjusted data points because the TSS effect does not appear to be linear (Table 6.1, Figure 6.1).

Other Landsat users neglect consideration of temperature entirely. From the evidence presented in the introduction, the Landsat detection curve should be dependent on reflection enhancing and inhibiting concentrations and on color temperature. Total suspended solids concentration enhances reflection. Any other concentrations may be temperature dependent during periods of algal production within the reservoir. Nevertheless, Landsat may have been detecting the organic compounds rather than the temperature. Because the best model was developed from periods when algal productivity would be severely limited, the levels of organics within the reservoir would not be due to production within the reservoir. Thus, no temperature dependency would exist other than the change of the dissociation constant of the organics with temperature. If the preceding assumptions are true, then the regression has shown that there was a temperature effect on the Landsat remotely sensed data, either direct or indirect (Figure 6.2). The effect of increased temperature appeared to be a suppression of the reflectance detected by Landsat. This effect was evident over Bands 4 and 5 especially, as expected.

Unfortunately, a firm conclusion to that effect cannot be made on the basis of the field data because organics were not measured. Correlation of spectral reflectance with dissolved organic carbon has been found (Witte et al, 1982). In that study the effect of increased humic acid concentration was noted for approximately constant turbidity, though no consideration was mentioned of either the temperature or the pH. Considerable heat could have been added to the water by the solar simulator and the pH was altered by adding increments of acid to the solution.

6.2 Limitations and Recommendations

The results and conclusions presented herein should be considered cautiously for the following reasons:

1. The multispectral scanner on board Landsat is a low resolution device with even more limitation when applied to a water body. The range in pixel reflectances is small compared with the range in temperatures.
2. Landsat MSS data is subject to influence by conditions of the atmosphere, for correction of which very little is known at this time. Clear cloudless days were chosen for this study and a ratio was used to limit atmospheric and other effects.
3. The regression equations are based on a small database, though larger than average when compared with the databases of many other similar studies. Only thirteen points were of matched data, and the remainder of the 50 total observations were temporally adjusted to match available tape data.
4. Additional information is needed in a study of this nature. Laboratory measurement of transmittance and reflectance concurrently of a solution with known humic or other concentration should be made. Monitored or controlled turbidity, temperature, and pH could be expected to reduce errors considerably.

5. The lack of water quality data for the period of this study must be considered in the evaluation of the results presented.

The availability of Landsat MSS data is severely limited due to poor atmospheric conditions. The increasing cost of CCT's and of computer time are adverse to the application of Landsat to the water quality problems in which good quantification is sought. Because of the limited range in reflectances of Landsat when applied to water bodies, this application is not strongly recommended. Thirteen-channel MMS on board an aircraft could be considered as a viable solution to this shortcoming following a more thorough effort at quantification of water response in the lab. Alternatively, the addition of an operative emitted I.R. band would make Landsat more suitable for applications involving temperature, and would lessen the problems related to such factors as haze and smoke encountered in the visible and near-visible wavelengths. Within Bands 4 through 7, however, at least the major effects still need to be accounted for to insure the development of useful algorithms.

Until such time as atmospheric problems can be readily dealt with, the use of Landsat will be hampered by the limited availability of cloud-free imagery. Improvement of the resolution of the sensing device is also desirable. In addition, it would be more conclusive to extend studies of this nature for several years in order to solidify the database. Perhaps in that instance many of the preceding problems would become either more or less significant and thereby become less prominent concerns.

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TABLES

TABLE 1.1

Aircraft MMS Channels and Wavelengths
(adapted from Blackwell and Boland, 1979)

Channel Number	Center Wavelength λ_c , μm	Spectral Bandwidth Δ , μm
1	0.410	0.06
2	0.465	0.05
3	0.515	0.05
4	0.560	0.04
5	0.600	0.04
6	0.640	0.04
7	0.680	0.04
8	0.720	0.04
9	0.910	0.10
10	1.015	0.09
11	- -	8 - 14 (emitted IR)

TABLE 1.2

Landsat MSS Channels and Wavelengths
(NASA, 1972)

Band 4	Visible green	0.5 - 0.6	µm
Band 5	Visible red	0.6 - 0.7	µm
Band 6	Invisible reflected IR	0.7 - 0.8	µm
Band 7	Invisible reflected IR	0.8 - 1.1	µm

TABLE 2.1

Kerr Reservoir Attendance Figures
(Weiss, 1978)

Year	Attendence at John H. Kerr Dam and Reservoir
1967	2,685,423
1968	2,737,400
1969	2,666,700
1970	3,007,100
1971	3,275,600
1972	3,008,000
1973	3,195,700
1974	3,276,700
1975	3,721,900

TABLE 3.1

Characteristics of the Landsat Orbit
(Nasa, 1972)

Orbital Parameter	Actual Orbit
Semi-major axis	7285.82 km
Inclination	99.114 deg
Period	103.267 min
Eccentricity	.0006
Time of equatorial crossing	9:42 a.m.
Coverage cycle	18 days
Duration of cycle	251 revs
Distance between adjacent tracks at the equator	159.38 km
Distance between successive tracks at the equator	2,760 km
Altitude	880 - 940 km

TABLE 4.1
Landsat Tape and Field Trip Information

Row[1]	Scene ID	Cloud Cover /Quality[2]	Tape Date	Tape No.	Trip No.	Trip Date	No. of Points
35	8222 911 5120	20/5888	5/1/81	1	1	5/1/81	3
					2	5/18/81	
35	8223 451 5111	30/5555	6/24/81	2[3]	3	6/24/81	
34	8223 811 5095	10/5555	7/30/81	3			4[4]
					4	8/16/81	
34	8223 911 5095	30/5555	8/17/81	4[3]			
					5	9/3/81	
34	8224 351 5092	10/5555	9/22/81	5			12[4]
35	8224 351 5095	10/5555	9/22/81	6			
					6	10/8/81	
34	8224 711 5100	00/5888	10/28/81	7			
35	8224 811 5102	00/5858	10/28/81	8			
34	8224 891 5104	20/5555	11/15/81	9	7	11/15/81	10
35	8224 891 5111	10/8888	11/15/81	10			
35	8225 071 5114	00/8855	12/03/81	11	8[5]	12/3/81	
34	8225 611 5124	10/8888	1/26/82	12			9[4]
35	8225 611 5130	30/8888	1/26/83	13			
					9	2/12/82	
					10	3/2/82	

1. Pass 17.
2. Cloud cover in %/quality scaled 1(min) to 8(max) for Bands 4, 5, 6, and 7.
3. Excessive atmospheric moisture, tapes not usable.
4. Trip data adjusted to match tape date, see Table 4.2.
5. No data gathered on Nutbush branch this trip.

TABLE 4.2
Temporal Temperature Adjustment (Linear)

TAPE 3

Station	Trip 3	Adjusted Temperature	Trip 4	Temperature (3-4)
1	28.8	28.4	28.2	0.6
2	28.4	28.3	28.2	0.2
3	28.4	28.3	28.2	0.2
4	28.8	28.6	28.5	0.3
Date	6/24/81	7/30/81	8/16/81	
	36 days	18 days		

TAPE 5

Station	Trip 5	Adjusted Temperature	Trip 6	Temperature (5-6)
1	26.8	21.4	15.9	10.9
2	26.8	22.3	17.8	9.0
3	26.9	23.9	20.8	6.1
4	26.9	22.8	18.7	8.2
5	26.8	23.2	19.5	7.3
6	27.0	23.6	20.1	6.9
7	27.1	23.6	20.1	7.0
8	27.0	23.7	20.3	6.7
9	26.9	23.6	20.2	6.7
10	26.7	23.3	20.3	6.0
11	26.7	23.4	20.1	6.6
12	26.1	23.1	20.1	6.0
Date	9/3/81	9/22/81	10/8/81	
	18 days	18 days		

TABLE 4.2 (continued)

TAPE 7

Station	Trip 6	Adjusted Temperature	Trip 7	Temperature (6-7)
1	15.9	13.0	10.1	5.8
2	17.8	13.9	10.0	7.8
3	20.8	16.4	12.0	8.8
4	18.7	15.1	11.5	7.2
5	19.5	16.0	12.5	7.0
6	20.1	16.7	13.2	6.9
7	20.1	16.8	13.5	6.6
8	20.3	17.1	13.8	6.6
9	20.2	17.1	14.0	6.2
10	20.3	17.2	14.0	6.3
11	20.1	16.8	13.4	6.7
12	20.1	16.6	13.0	7.1
Date	10/8/81	10/28/81	11/15/81	
	18 days	18 days		

TAPE 12

Station	Trip 8	Adjusted Temperature	Trip 9	Temperature (8-9)
1	7.0	5.9	5.5	1.5
2	7.0	5.7	5.3	1.7
3	7.2	5.8	5.3	1.9
4	7.8	5.7	5.0	2.8
5	9.0	5.9	4.9	4.1
6	9.8	5.9	4.6	5.2
7	10.2	6.2	4.9	5.3
8	11.0	5.9	4.2	6.8
9	11.3	5.7	3.8	7.5
10	--	--	3.8	--
Date	12/3/81	1/26/82	2/12/82	
	54 days	18 days		

TABLE 4.3

Landsat Band Products and Ratios
Included in the SAS Analysis

4X4	Band 4	X	Band 4		
4X5	Band 4	X	Band 5		
4X6	Band 4	X	Band 6		
4X7	Band 4	X	Band 7		
5X5	Band 5	X	Band 5		
5X6	Band 5	X	Band 6		
5X7	Band 5	X	Band 7		
6X6	Band 6	X	Band 6		
6X7	Band 6	X	Band 7		
7X7	Band 7	X	Band 7		
4BY5	Band 4	/	Band 5		
4BY6	Band 4	/	Band 6		
4BY7	Band 4	/	Band 7		
5BY6	Band 5	/	Band 6		
5BY7	Band 5	/	Band 7		
6BY7	Band 6	/	Band 7		
4X4BY5	Band 4	X	Band 4	/	Band 5
4X4BY6	Band 4	X	Band 4	/	Band 6
5X5BY4	Band 5	X	Band 5	/	Band 4
5X5BY6	Band 5	X	Band 5	/	Band 6
5X5BY7	Band 5	X	Band 5	/	Band 7
6X6BY4	Band 6	X	Band 6	/	Band 4
6X6BY5	Band 6	X	Band 6	/	Band 5
6X6BY7	Band 6	X	Band 6	/	Band 7
7X7BY4	Band 7	X	Band 7	/	Band 4
7X7BY5	Band 7	X	Band 7	/	Band 5
7X7BY6	Band 7	X	Band 7	/	Band 6
4X5BY6	Band 4	X	Band 5	/	Band 6
4X5BY7	Band 4	X	Band 5	/	Band 7
4X6BY5	Band 4	X	Band 6	/	Band 5
4X6BY7	Band 4	X	Band 6	/	Band 7
4X7BY5	Band 4	X	Band 7	/	Band 5
4X7BY6	Band 4	X	Band 7	/	Band 6
5X6BY4	Band 5	X	Band 6	/	Band 4
5X6BY7	Band 5	X	Band 6	/	Band 7
5X7BY4	Band 5	X	Band 7	/	Band 4
5X7BY6	Band 5	X	Band 7	/	Band 6
6X7BY4	Band 6	X	Band 7	/	Band 4
6X7BY5	Band 6	X	Band 7	/	Band 5

TABLE 4.4

Landsat Band Data
(T Values Matched with Trip Data)

TAPE	STATION	BAND_4	BAND_5	BAND_6	BAND_7
1	11	23.56	15.56	9.44	2.67
1	12	23.22	16.11	8.89	2.22
1	13	23.00	20.22	15.00	7.22
3	1	22.44	22.22	12.56	1.78
3	2	15.11	21.22	11.78	2.44
3	3	21.00	18.78	13.89	5.44
3	4	15.22	12.00	6.89	1.56
5	1	27.22	36.11	21.44	6.11
5	2	22.11	20.56	12.11	3.44
5	3	20.67	19.11	11.67	3.44
5	4	19.67	16.22	9.78	2.44
5	5	18.33	13.89	8.78	2.33
5	6	19.11	14.67	9.44	3.78
5	7	18.00	14.56	9.22	3.00
5	8	17.67	13.89	8.67	2.33
5	9	17.78	13.67	8.89	3.00
5	10	18.56	14.22	9.89	2.56
5	11	20.33	15.33	10.22	3.11
5	12	19.44	15.78	10.56	4.56
7	1	17.78	28.56	22.89	6.78
7	2	20.22	34.00	26.44	9.78
7	3	19.67	29.67	22.44	4.56
7	4	12.44	12.00	4.44	0.22
7	5	11.78	9.33	2.56	0.11
7	6	11.67	9.33	3.11	0.0
7	7	11.22	9.22	2.67	0.11
7	8	12.33	9.56	2.67	0.11
7	9	11.67	8.89	2.89	0.0
7	10	11.67	8.33	8.33	2.56
7	11	11.33	7.22	7.22	2.67
7	12	11.44	7.78	7.78	1.11
9	1	12.89	13.78	5.56	0.11
9	2	13.00	13.33	5.00	0.33
9	3	13.11	13.67	6.67	0.67
9	4	12.67	14.44	7.00	1.00
9	5	13.22	14.11	7.00	1.00
9	6	13.22	12.89	5.89	1.00
9	7	13.11	12.00	5.89	0.89
9	9	13.67	13.56	6.78	2.00
9	10	13.67	11.67	5.67	2.22
9	12	14.11	12.11	7.56	2.22
12	1	12.22	21.78	12.22	0.89
12	2	10.22	20.56	10.22	1.78
12	3	11.11	21.89	11.11	2.56
12	4	9.44	19.44	9.44	1.56
12	5	9.33	19.67	9.33	1.33
12	6	9.67	20.78	9.67	1.89
12	7	13.89	25.33	13.89	2.33
12	8	14.22	26.33	14.22	2.44
12	9	14.22	25.78	14.22	2.56

TABLE 4.5

Adjusted Field Data and Model Results

TAPE	STATION	TEMP_C	ADJTEMPC	EQ.5.1	EQ.5.2	EQ.5.3	EQ.5.4
1	11	18.7	18.7	19.0	26.1	24.7	26.9
1	12	18.2	18.2	18.0	24.7	23.2	25.3
1	13	18.4	18.4	18.3	25.0	23.6	25.7
3	1	28.2	28.4	15.5	20.8	19.3	21.0
3	2	28.2	28.3	11.4	13.5	12.6	12.9
3	3	28.2	28.3	17.5	23.5	22.3	24.0
3	4	28.5	28.6	15.0	18.9	18.2	18.8
5	1	26.8	21.4	13.9	19.2	17.1	19.4
5	2	26.8	22.3	16.2	21.8	20.4	22.1
5	3	26.9	23.9	16.1	21.4	20.1	21.7
5	4	26.9	22.8	16.4	21.7	20.5	22.0
5	5	26.8	23.2	16.6	21.8	20.8	22.1
5	6	27.0	23.6	16.9	22.4	21.3	22.7
5	7	27.1	23.6	16.2	21.1	20.2	21.3
5	8	27.0	23.7	16.2	21.0	20.1	21.2
5	9	26.9	23.6	16.5	21.5	20.6	21.7
5	10	26.3	23.3	17.1	22.5	21.5	22.8
5	11	26.7	23.4	17.6	23.6	22.4	24.0
5	12	26.1	23.1	16.9	22.5	21.4	22.8
7	1	15.9	13.0	13.5	17.1	16.0	16.9
7	2	17.8	13.9	13.3	17.1	15.8	17.0
7	3	20.8	16.4	13.9	17.9	16.7	17.9
7	4	18.7	15.1	11.0	12.5	11.9	11.8
7	5	19.5	16.0	10.2	11.3	10.8	10.5
7	6	20.1	16.7	11.4	13.1	12.6	12.3
7	7	20.1	16.8	10.4	11.4	10.9	10.5
7	8	20.3	17.1	10.5	11.8	11.2	11.0
7	9	20.2	17.1	11.6	13.3	12.8	12.6
7	10	20.3	17.2	15.5	19.0	18.7	18.9
7	11	20.1	16.8	15.5	19.0	18.8	18.9
7	12	20.1	16.6	15.4	19.0	18.7	18.8
9	1	10.1	10.1	10.9	12.4	11.8	11.7
9	2	10.0	10.0	10.7	12.1	11.5	11.4
9	3	12.0	12.0	12.3	14.5	13.9	14.0
9	4	11.5	11.5	11.6	13.5	13.0	12.9
9	5	12.5	12.5	12.2	14.5	13.9	14.0
9	6	13.2	13.2	12.3	14.6	14.0	14.1
9	7	13.5	13.5	13.0	15.6	15.1	15.2
9	9	14.0	14.0	12.8	15.4	14.7	15.0
9	10	14.0	14.0	13.4	16.3	15.7	16.0
9	12	13.0	13.0	14.6	18.2	17.6	18.0
12	1	5.5	5.9	9.5	10.3	9.7	9.4
12	2	5.3	5.7	7.8	7.5	7.0	6.2
12	3	5.3	5.8	8.0	7.9	7.3	6.7
12	4	5.0	5.7	7.6	7.1	6.6	5.8
12	5	.	5.9	7.3	6.5	6.1	5.2
12	6	4.6	5.9	6.8	5.9	5.4	4.5
12	7	4.9	6.2	9.0	9.8	9.0	8.9
12	8	4.2	5.9	8.7	9.4	8.5	8.4
12	9	3.8	5.7	9.1	10.0	9.1	9.1

TABLE 5.1

RSQUARE Results, 13 Exact Match Points

RSQUARE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 BAND_5 BAND_6 BAND_7
_4X4_ _5X5_ _6X6_ _7X7_
_4X5_ _4X6_ _4X7_ _5X6_ _5X7_ _6X7_
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_ _6BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _5X5BY6_ _5X5BY7_
_6X6BY4_ _6X6BY5_ _6X6BY7_ _7X7BY4_ _7X7BY5_ _7X7BY6_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _4X7BY5_ _4X7BY6_
_5X6BY4_ _5X6BY7_ _5X7BY4_ _5X7BY6_ _6X7BY4_ _6X7BY5_
USING TAPES 1 & 9

N= 13 REGRESSION MODELS FOR DEPENDENT VARIABLE ADJTEMPC

NUMBER IN MODEL	R-SQUARE	VARIABLES IN MODEL
1	0.56513249	BAND_7
1	0.58944561	BAND_6
1	0.60098913	_4X7_
1	0.62826938	_5X7BY6_
1	0.64423745	_5BY6_
1	0.69145503	_4X7BY5_
1	0.70520200	_4BY5_
1	0.72906116	_4X6_
1	0.74494309	_4X5_
1	0.77942371	_4X7BY6_
1	0.83382715	_4X4BY5_
1	0.84159061	_4X4_
1	0.84432107	_4X6BY5_
1	0.85072024	BAND_4
2	0.92604868	BAND_4 _6BY7_
2	0.92630257	BAND_4 _4X6BY7_
2	0.92675535	BAND_4 _5X6BY7_
2	0.92837838	BAND_4 _4BY7_
2	0.92849112	_4X4BY5_ _4X7BY6_
2	0.92852513	BAND_4 _4X4BY7_
2	0.92880523	BAND_4 _5BY7_
2	0.92904277	BAND_4 _4X5BY7_
2	0.92919357	BAND_4 _5X5BY7_
2	0.93230232	_4X4BY5_ _5X7BY6_
2	0.93348715	_4X7_ _6X7_
2	0.93389050	_5X5BY6_ _4X4_
2	0.93420418	BAND_4 _5X5BY6_
2	0.94344450	_7X7_ _4X7_
3	0.96194652	BAND_7 _4X6BY5_ _5X7BY6_
3	0.96236513	_7X7BY5_ _4X5_ _4X7_
3	0.96315720	BAND_5 _7X7BY4_ _5X7_
3	0.96342452	_7X7BY5_ _5X5_ _4X7_
3	0.96378062	_5X5BY6_ _6X6BY4_ _5X5_
3	0.96400872	_7X7BY5_ _4X6_ _4X7_
3	0.96467335	BAND_5 _7X7BY5_ _4X7_
3	0.96570519	_4BY5_ _7X7BY5_ _5X7_
3	0.96628477	_7X7BY5_ _4X7BY6_ _7X7_
3	0.96929121	_7X7BY6_ _4X7BY6_ _7X7_
3	0.97038549	_5X5BY6_ _6X7BY4_ _5X7_
3	0.97251960	_5X5BY6_ _6X7BY5_ _4X7_
3	0.97348948	_5X5BY4_ _7X7BY5_ _5X7_
3	0.97488593	_5X5BY4_ _7X7BY4_ _5X7_

TABLE 5.2

STEPWISE Results for 13 Exact Match Point Dataset of Band 4 and 5X5BY6 as Independent Variables Modelling Temperature

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5X5BY6_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 13.68833685

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _5X5BY6_ ENTERED R SQUARE = 0.93420418
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	97.19747780	48.59873890	70.99	0.0001
ERROR	10	6.84559913	0.68455991		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	10.25855233				
BAND_4	0.59315942	0.05471129	80.46377654	117.54	0.0001
_5X5BY6_	-0.20581488	0.05777958	8.68592676	12.69	0.0052

TABLE 5.3

RSQUARE Results, 50 Point Dataset

```
                 RSQUARE  PROCEDURE USING THE FOLLOWING
                      BAND_4 BAND_5 BAND_6 BAND_7
                       _4X4_   _5X5_    _6X6_   _7X7_
             _4X5_   _4X6_    _4X7_    _5X6_   _5X7_   _6X7_
            _4BY5_   _4BY6_   _4BY7_   _5BY6_  _5BY7_  _6BY7_
     _4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _5X5BY6_ _5X5BY7_
     _6X6BY4_ _6X6BY5_ _6X6BY7_ _7X7BY4_ _7X7BY5_ _7X7BY6_
     _4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _4X7BY5_ _4X7BY6_
     _5X6BY4_ _5X6BY7_ _5X7BY4_ _5X7BY6_ _6X7BY4_ _6X7BY5_
                      AS INDEPENDENT VARIABLES

N=      50      REGRESSION MODELS FOR DEPENDENT VARIABLE ADJTEMPC
```

NUMBER IN MODEL	R-SQUARE	VARIABLES IN MODEL
1	0.08710159	_7X7BY6_
1	0.11345258	_4X7_
1	0.12665166	_5X6BY4_
1	0.12914230	_4X5BY6_
1	0.18838671	_5X5BY6_
1	0.26148196	_5X5BY4_
1	0.27041450	_4X7BY5_
1	0.28914447	_4X7BY6_
1	0.33142114	_4X6BY5_
1	0.33421045	_4X4BY6_
1	0.36500733	_4X4_
1	0.41178345	BAND_4
1	0.41680165	_4BY5_
1	0.60066607	_4X4BY5_
2	0.63551239	BAND_4 _5X6BY4_
2	0.63778052	_4X6_ _5X6_
2	0.63834652	_4BY5_ _4X4_
2	0.63881903	BAND_4 _5X5_
2	0.64735725	_5X5_ _4X5_
2	0.65433351	_5X5BY4_ _4X4_
2	0.66061532	BAND_4 _4BY5_
2	0.66103889	_5X5BY4_ _4X5_
2	0.66383671	_5X6BY4_ _4X6_
2	0.66433750	BAND_4 BAND_5
2	0.66704741	_5X5BY4_ _4X6_
2	0.67422091	BAND_5 _5X5BY4_
2	0.67925564	BAND_4 _5X5BY4_
2	0.68277743	BAND_6 _5X6BY4_
3	0.69325905	BAND_6 _4X6BY7_ _5X6BY4_
3	0.69333624	BAND_4 _5X5BY4_ _4X4_
3	0.69340146	BAND_6 _5BY7_ _5X6BY4_
3	0.69340478	BAND_6 _4X5BY7_ _5X6BY4_
3	0.69351892	BAND_6 _4BY7_ _5X6BY4_
3	0.69352279	BAND_6 _4X4BY7_ _5X6BY4_
3	0.69406398	BAND_4 BAND_6 _5X6BY4_
3	0.69443829	BAND_4 BAND_6 _5X5BY4_
3	0.69752551	BAND_5 _5X5BY4_ _4X6BY5_
3	0.69793744	BAND_6 _5X5BY4_ _6X6BY5_
3	0.70397300	BAND_6 _4X5BY6_ _5X6BY4_
3	0.70542524	BAND_6 _4X4BY6_ _5X6BY4_
3	0.70783888	BAND_6 _5BY6_ _5X6BY4_
3	0.71100037	BAND_6 _4BY6_ _5X6BY4_

TABLE 5.3 (continued)

RSQUARE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6 BAND_7
_4X4_ _5X5_ _6X6_ _7X7_
_4X5_ _4X6_ _4X7_ _5X6_ _5X7_ _6X7_
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_ _6BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _5X5BY6_ _5X5BY7_
_6X6BY4_ _6X6BY5_ _6X6BY7_ _7X7BY4_ _7X7BY5_ _7X7BY6_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _4X7BY5_ _4X7BY6_
_5X6BY4_ _5X6BY7_ _5X7BY4_ _5X7BY6_ _6X7BY4_ _6X7BY5_
AS INDEPENDENT VARIABLES

N= 50 REGRESSION MODELS FOR DEPENDENT VARIABLE ADJTEMPC

NUMBER IN MODEL	R-SQUARE	VARIABLES IN MODEL
4	0.71798028	BAND_4 BAND_5 _4BY6_ _4X4BY6_
4	0.71842458	BAND_4 _4BY5_ _4X4BY5_ _4X5_
4	0.71862639	BAND_5 _4BY6_ _5X5BY6_ _5X6BY4_
4	0.71895162	BAND_4 _5X6BY4_ _4X4_ _4X6_
4	0.71906879	BAND_6 _4BY6_ _5X6BY4_ _7X7_
4	0.71950345	BAND_6 _4BY6_ _5X5BY4_ _6X6BY4_
4	0.71962225	BAND_6 _4BY6_ _7X7BY5_ _5X6BY4_
4	0.72070609	BAND_7 _5X6BY4_ _4X6_ _4X7_
4	0.72078948	BAND_4 _4BY5_ _4X4BY5_ _5X5_
4	0.72099343	_4X4BY5_ _4X4_ _5X5_ _4X5_
4	0.72100899	BAND_6 _4BY6_ _5X6BY4_ _6X6_
4	0.72250366	BAND_6 _4BY6_ _5X5BY6_ _6X6BY4_
4	0.72274674	BAND_6 _5BY6_ _5X5BY6_ _6X6BY4_
4	0.72740702	BAND_4 _4BY6_ _4X4BY6_ _5X5_

TABLE 5.4

STEPWISE Results for 50 Point Dataset of Band 4 and 5X5BY6 as Independent Variables Modelling Temperature

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5X5BY6_
USING TAPES 1,3,5,7,9 & 12

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.41178345
C(P) = 29.00451805

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	965.79690646	965.79690646	33.60	0.0001
ERROR	48	1379.60309354	28.74173112		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	0.67887249				
BAND_4	0.99924152	0.17237887	965.79690646	33.60	0.0001

STEP 2 VARIABLE _5X5BY6_ ENTERED R SQUARE = 0.63140650
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	1480.90080611	740.45040305	40.26	0.0001
ERROR	47	864.49919389	18.39359987		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	9.46921907				
BAND_4	1.03790159	0.13809232	1039.0586211	56.49	0.0001
_5X5BY6_	-0.30545756	0.05772140	515.1038997	28.00	0.0001

TABLE 5.5

Regression of Independent Variable 4X4BY5 on 50 Point Dataset, Best Single Regressor

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE _4X4BY5_ ENTERED R SQUARE = 0.60066607
C(P) = 67.22915314

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	1408.80219065	1408.80219065	72.20	0.0001
ERROR	48	936.59780935	19.51245436		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.53825957				
_4X4BY5_	0.72053328	0.08479788	1408.80219065	72.20	0.0001

TABLE 5.6

Regression of Independent Variables
Band 4 and 5X5BY6 on Dataset
Containing Tapes 1,5,7,9, and 12
(Tape 3 Deleted, 46 Observations Included)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5X5BY6_
USING TAPES 1,5,7,9 & 12

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.44251057
C(P) = 52.82539138

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	757.08132609	757.08132609	34.93	0.0001
ERROR	44	953.79606522	21.67718330		
TOTAL	45	1710.87739130			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	1.05176290				
BAND_4	0.92260877	0.15611612	757.08132609	34.93	0.0001

STEP 2 VARIABLE _5X5BY6_ ENTERED R SQUARE = 0.74719803
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	1278.36421936	639.18210968	63.55	0.0001
ERROR	43	432.51317194	10.05844586		
TOTAL	45	1710.87739130			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	10.21376132				
BAND_4	0.95537567	0.10644106	810.32804126	80.56	0.0001
_5X5BY6_	-0.31445870	0.04368098	521.28289328	51.83	0.0001

TABLE 5.7

Regression of Independent Variables Band 4 and 5X5BY6 on Dataset Containing Tapes 5,7,9, and 12 (Tapes 1 & 3 Deleted, 43 Observations Included)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5X5BY6_
USING TAPES 5,7,9 & 12

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.47274954
C(P) = 75.20985155

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	793.57034835	793.57034835	36.76	0.0001
ERROR	41	885.05709351	21.58675838		
TOTAL	42	1678.62744186			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-0.87292698				
BAND_4	1.07124998	0.17668180	793.57034835	36.76	0.0001

STEP 2 VARIABLE _5X5BY6_ ENTERED R SQUARE = 0.81533976
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	1368.65169755	684.32584877	88.31	0.0001
ERROR	40	309.97574431	7.74939361		
TOTAL	42	1678.62744186			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	8.16094380				
BAND_4	1.15704561	0.10632748	917.65111601	118.42	0.0001
_5X5BY6_	-0.33279568	0.03863197	575.08134920	74.21	0.0001

TABLE 5.8

Absolute and Percent Errors for Each Model on the 50 Point Dataset

TAPE	STATION	T_A	Model 1 ΔT	Model 1 $100\Delta T/T_A$	Model 2 ΔT	Model 2 $100\Delta T/T_A$	Model 3 ΔT	Model 3 $100\Delta T/T_A$	Model 4 ΔT	Model 4 $100\Delta T/T_A$
1	11	18.7	0.3	1.60	7.4	39.57	6.0	32.09	8.2	43.85
1	12	18.2	- 0.2	- 1.10	6.5	35.71	5.0	27.47	7.1	39.01
1	13	18.4	- 0.1	- 0.54	6.6	35.87	5.2	28.26	7.3	39.67
3	1	28.4	-12.9	-45.42	- 7.6	-26.76	- 9.1	-32.04	- 8.4	-29.58
3	2	28.3	-16.9	-59.72	-14.8	-52.30	-15.7	-55.48	-15.4	-54.42
3	3	28.3	-10.8	-38.16	- 4.8	-16.96	- 6.0	-21.20	- 4.3	-15.19
3	4	28.6	-13.6	-47.55	- 9.7	-33.92	-10.4	-36.36	- 9.8	-34.27
5	1	21.4	- 7.5	-35.05	- 2.2	-10.28	- 4.3	-20.09	- 2.0	- 9.35
5	2	22.3	- 6.1	-27.35	- 0.5	- 2.24	- 1.9	- 8.52	- 0.2	- 0.90
5	3	23.9	- 7.8	-32.64	- 2.5	-10.46	- 3.8	-15.90	- 2.2	- 9.21
5	4	22.8	- 6.4	-28.07	- 1.1	- 4.82	- 2.3	-10.09	- 0.8	- 3.51
5	5	23.2	- 6.6	-28.45	- 1.4	- 6.03	- 2.4	-10.34	- 1.1	- 4.74
5	6	23.6	- 6.7	-28.39	- 1.2	- 5.08	- 2.3	- 9.75	- 0.9	- 3.81
5	7	23.6	- 7.4	-31.36	- 2.5	-10.59	- 3.4	-14.41	- 2.3	- 9.75
5	8	23.7	- 7.5	-31.65	- 2.7	-11.39	- 3.6	-15.19	- 2.5	-10.55
5	9	23.6	- 7.1	-30.08	- 2.1	- 8.90	- 3.0	-12.71	- 1.9	- 8.05
5	10	23.3	- 6.2	-26.61	- 0.8	- 3.43	- 1.8	- 7.73	- 0.5	- 2.15
5	11	23.4	- 5.8	-24.79	0.2	0.85	- 1.0	- 4.27	0.6	2.56
5	12	23.1	- 6.2	-26.84	- 0.6	- 2.60	- 1.7	- 7.36	- 0.3	- 1.30
7	1	13.0	0.5	3.85	4.1	31.54	3.0	23.08	3.9	30.00
7	2	13.9	- 0.6	- 4.32	3.2	23.02	1.9	13.67	3.1	22.30
7	3	16.4	- 2.5	-15.24	1.5	9.15	0.3	1.83	1.5	9.15
7	4	15.1	- 4.1	-27.15	- 2.6	-17.22	- 3.2	-21.19	- 3.3	-21.85
7	5	16.0	- 5.8	-36.25	- 4.7	-29.38	- 5.2	-32.50	- 5.5	-34.38
7	6	16.7	- 5.3	-31.74	- 3.6	-21.56	- 4.1	-24.55	- 4.4	-26.35
7	7	16.8	- 6.4	-38.10	- 5.4	-32.14	- 5.9	-35.12	- 6.3	-37.50
7	8	17.1	- 6.6	-38.60	- 5.3	-30.99	- 5.9	-34.50	- 6.1	-35.67
7	9	17.1	- 5.5	-32.16	- 3.8	-22.22	- 4.3	-25.15	- 4.5	-26.32
7	10	17.2	- 1.7	- 9.88	1.8	10.47	1.5	8.72	1.7	9.88
7	11	16.8	- 1.3	- 7.74	2.2	13.10	2.0	11.90	2.1	12.50
7	12	16.6	- 1.2	- 7.23	2.4	14.46	2.1	12.65	2.2	13.25
9	1	10.1	0.8	7.92	2.3	22.77	1.7	16.83	1.6	15.84
9	2	10.0	0.7	7.00	2.1	21.00	1.5	15.00	1.4	14.00
9	3	12.0	0.3	2.50	2.5	20.83	1.9	15.83	2.0	16.67
9	4	11.5	0.1	0.87	2.0	17.39	1.5	13.04	1.4	12.17
9	5	12.5	- 0.3	- 2.40	2.0	16.00	1.4	11.20	1.5	12.00
9	6	13.2	- 0.9	- 6.82	1.4	10.61	0.8	6.06	0.9	6.82
9	7	13.5	- 0.5	- 3.70	2.1	15.56	1.6	11.85	1.7	12.59
9	9	14.0	- 1.2	- 8.57	1.4	10.00	0.7	5.00	1.0	7.14
9	10	14.0	- 0.6	- 4.29	2.3	16.43	1.7	12.14	2.0	14.29
9	12	13.0	1.6	12.31	5.2	40.00	4.6	35.38	5.0	38.46
12	1	5.9	3.6	61.02	4.4	74.58	3.8	64.41	3.5	59.32
12	2	5.7	2.1	36.84	1.8	31.58	1.3	22.81	0.5	8.77
12	3	5.8	2.2	37.93	2.1	36.21	1.5	25.86	0.9	15.52
12	4	5.7	1.9	33.33	1.4	24.56	0.9	15.79	0.1	1.75
12	5	5.9	1.4	23.73	0.6	10.17	0.2	3.39	- 0.7	-11.86
12	6	5.9	0.9	15.25	0.0	0.00	- 0.5	- 8.47	- 1.4	-23.73
12	7	6.2	2.8	45.16	3.6	58.06	2.8	45.16	2.7	43.55
12	8	5.9	2.8	47.46	3.5	59.32	2.6	44.07	2.5	42.37

TABLE 5.9

Sums and Averages of Errors for Each Tape and Model

(a) Tape 1 (n=3 observations)

Model	sum group error	average group error	sum total error	average total error
1	- 0.04	- 0.01	3.24	1.08
2	111.15	37.05	111.15	37.05
3	87.82	29.27	87.82	29.27
4	122.53	40.84	122.53	40.84

(b) Tape 3 (n=4 observations)

Model	sum group error	average group error	sum total error	average total error
1	-190.85	-47.71	190.85	47.71
2	-129.94	-32.49	129.94	32.49
3	-145.08	-36.27	145.08	36.27
4	-133.46	-33.37	133.46	33.37

(c) Tape 5 (n=12 observations)

Model	sum group error	average group error	sum total error	average total error
1	-354.28	-29.52	354.28	29.52
2	- 74.97	- 6.25	76.67	6.39
3	-136.36	-11.36	136.36	11.36
4	- 60.76	- 5.06	65.88	5.49

TABLE 5.9 (continued)

(d) Tape 7 (n=12 observations)

Model	sum group error	average group error	sum total error	average total error
1	-244.56	-20.38	252.26	21.02
2	- 51.77	- 4.31	255.25	21.27
3	-101.16	- 8.43	244.86	20.41
4	- 84.99	- 7.08	279.15	23.26

(e) Tape 9 (n=10 observations)

Model	sum group error	average group error	sum total error	average total error
1	4.82	0.48	56.38	5.64
2	190.59	19.06	190.59	19.06
3	142.33	14.23	142.33	14.23
4	149.98	15.00	149.88	15.00

(f) Tape 12 (n=9 observations)

Model	sum group error	average group error	sum total error	average total error
1	360.37	40.04	360.37	40.04
2	369.92	41.10	369.92	41.10
3	272.67	30.30	289.61	32.18
4	230.93	25.66	266.52	29.61

TABLE 5.10

Closeness of Fit in Percent [$(1/n) \sum_{i=1}^{n} (100\, \Delta T/T_A)_i$] of Each Model for Various Combinations of Tapes

Tapes Included	n	Model 1	Model 2	Model 3	Model 4
1,3,5,7,9,12	50	- 8.49	8.30*	2.40	4.48
1, 5,7,9,12	46	- 5.08	11.85	5.77*	7.78
5,7,9,12	43	- 5.53	10.09	4.13	5.47*
3,5,7, 12	37	-11.60	3.06	- 2.97	- 1.30
1, 9	13	0.37*	23.21	17.70	20.96

* indicates particular model was derived from corresponding tapes

TABLE 5.11

Average Error in Percent $\left[(1/n) \sum_{i=1}^{n} (100 \, |\Delta T| / T_A)_i \right]$
of Each Model for Various Combinations of Tapes

Tapes Included	n	Model 1	Model 2	Model 3	Model 4
1,3,5,7,9,12	50	24.35	22.67*	20.92	20.35
1, 5,7,9,12	46	22.32	21.82	19.59*	19.22
5,7,9,12	43	23.80	20.75	18.91	17.71*
3,5,7, 12	37	31.29	22.48	22.05	20.14
1, 9	13	4.59*	23.21	17.70	20.96

* indicates particular model was derived from corresponding tapes

TABLE 6.1

TSS, Temperature, and Landsat Data

OBS	TRIP	STATION	S_TEMP_C	ADJTEMPC	TSS_PPM	W_SECCHI	TAPE	BAND_4	BAND_5	BAND_6	BAND_7
1	1	11	18.7	18.7	4.3	175	1	23.56	15.56	9.44	2.67
2	1	12	18.2	18.2	4.4	145	1	23.22	16.11	8.89	2.22
3	1	13	18.4	18.4	5.6	138	1	23.00	20.22	15.00	7.22
4	3	1	28.2	28.4	12.2	71	3	22.44	22.22	12.56	1.78
5	3	2	28.2	28.3	12.8	85	3	15.11	21.22	11.78	2.44
6	3	3	28.2	28.3	8.7	105	3	21.00	18.78	13.89	5.44
7	3	4	28.5	28.6	3.6	160	3	15.22	12.00	6.89	1.56
8	5	1	26.8	21.4	19.2	60	5	27.22	36.11	21.44	6.11
9	5	2	26.8	22.3	18.0	61	5	22.11	20.56	12.11	3.44
10	5	3	26.9	23.9	16.8	72	5	20.67	19.11	11.67	3.44
11	5	4	26.9	22.8	8.6	145	5	19.67	16.22	9.78	2.44
12	5	5	26.8	23.2	7.5	150	5	18.33	13.89	8.78	2.33
13	5	6	27.0	23.6	5.8	185	5	19.11	14.67	9.44	3.78
14	5	7	27.1	23.6	4.6	220	5	18.00	14.56	9.22	3.00
15	5	8	27.0	23.7	4.5	235	5	17.67	13.89	8.67	2.33
16	5	9	26.9	23.6	4.0	261	5	17.78	13.67	8.89	3.00
17	5	10	26.3	23.3	3.8	280	5	18.56	14.22	9.89	2.56
18	5	11	26.7	23.4	4.1	270	5	20.33	15.33	10.22	3.11
19	5	12	26.1	23.1	4.0	250	5	19.44	15.78	10.56	4.56
20	7	1	10.1	10.1	18.0	68	9	12.89	13.78	5.56	0.11
21	7	2	10.0	10.0	18.0	80	9	13.00	13.33	5.00	0.33
22	7	3	12.0	12.0	18.3	62	9	13.11	13.67	6.67	0.67
23	7	4	11.5	11.5	17.2	66	9	12.67	14.44	7.00	1.00
24	7	5	12.5	12.5	15.5	68	9	13.22	14.11	7.00	1.00
25	7	6	13.2	13.2	13.8	80	9	13.22	12.89	5.89	1.00
26	7	7	13.5	13.5	12.3	110	9	13.11	12.00	5.89	0.89
27	7	9	14.0	14.0	.	100	9	13.67	13.56	6.78	2.00
28	7	10	14.0	14.0	.	135	9	13.67	11.67	5.67	2.22
29	7	12	13.0	13.0	.	180	9	14.11	12.11	7.56	2.22

FIGURES

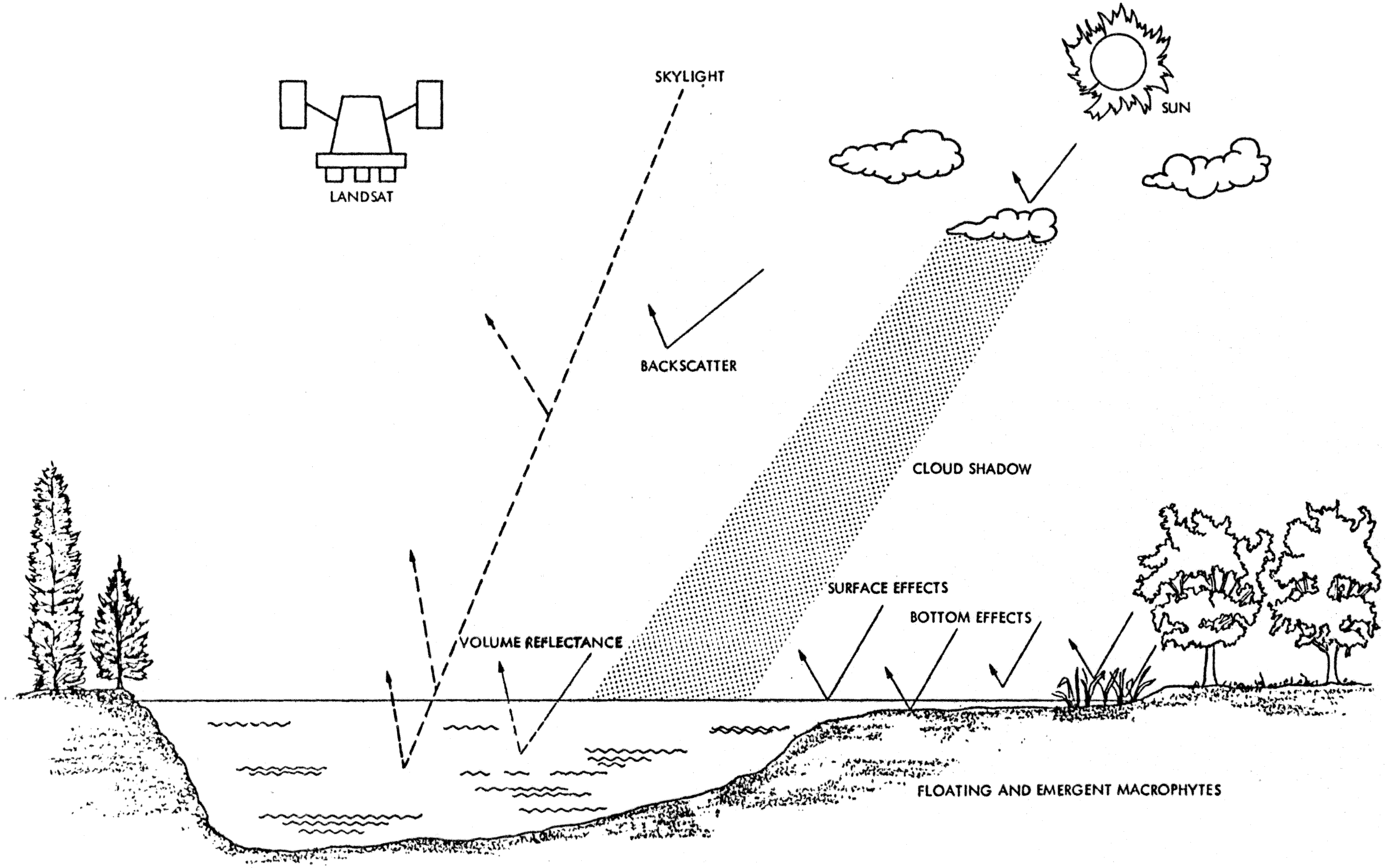
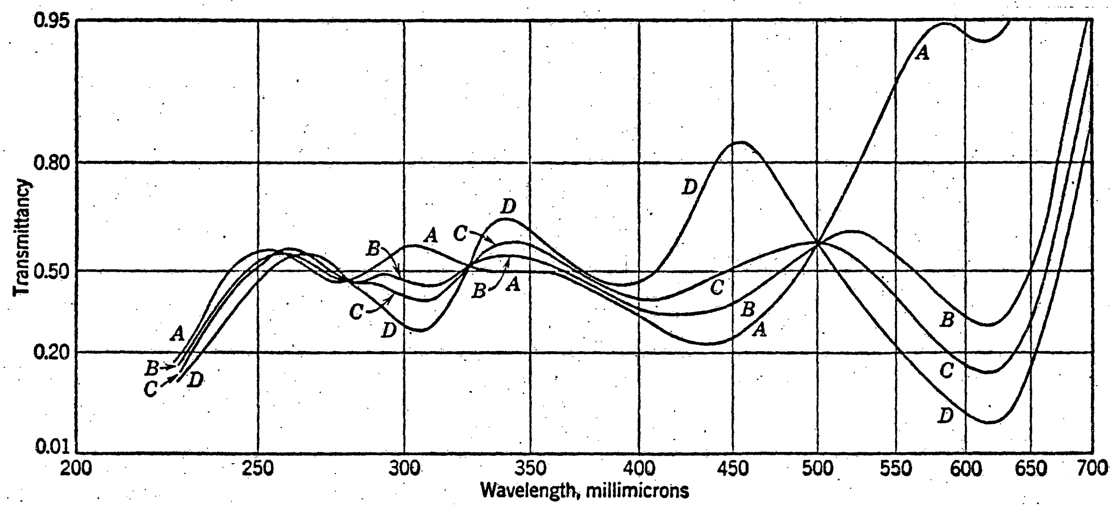


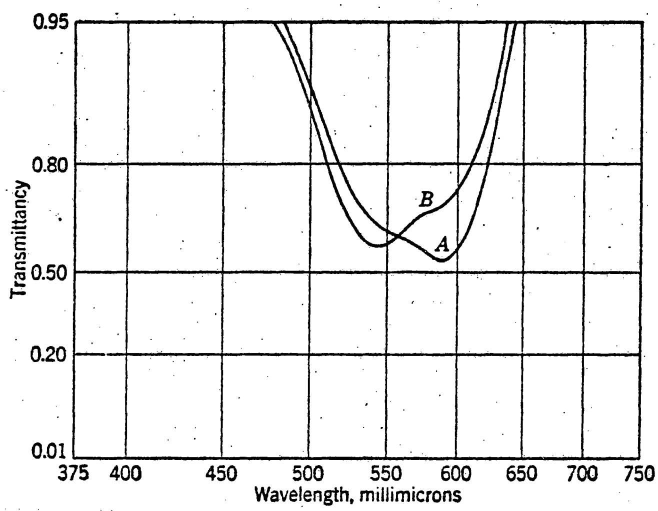
Figure 1.1 Some Components and Interactions of Light with Hypothetical Lake and Atmosphere (Blackwell and Boland, 1979)



Solvent = Water

A = pH 5.45 ;
B = pH 6.95 ;
C = pH 7.50 ;
D = pH 11.60 .

Figure 1.2 Absorbtion Spectra of Bromothymol Blue at Various Hydrogen-ion Activities (Mellon, 1950)

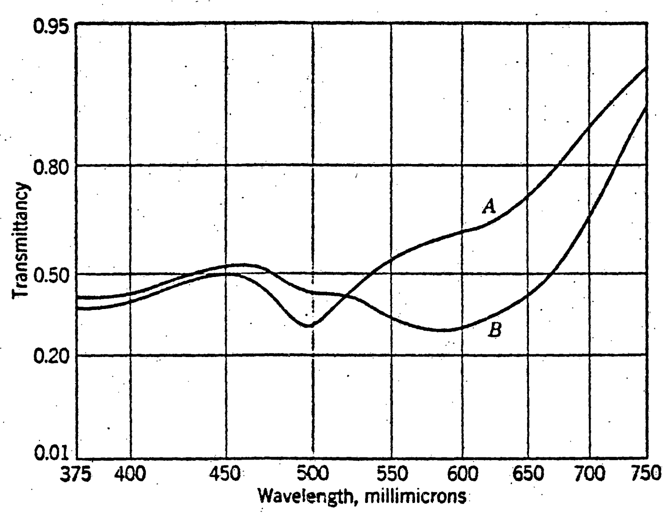


Solvent = Water

A = 0.4 mg/l in a 10-cm cell

B = 20.0 mg/l in a 0.2-cm cell

Figure 1.3 Effect of Concentration on Absorption Spectrum of Formyl Violet S4B (Mellon, 1950)

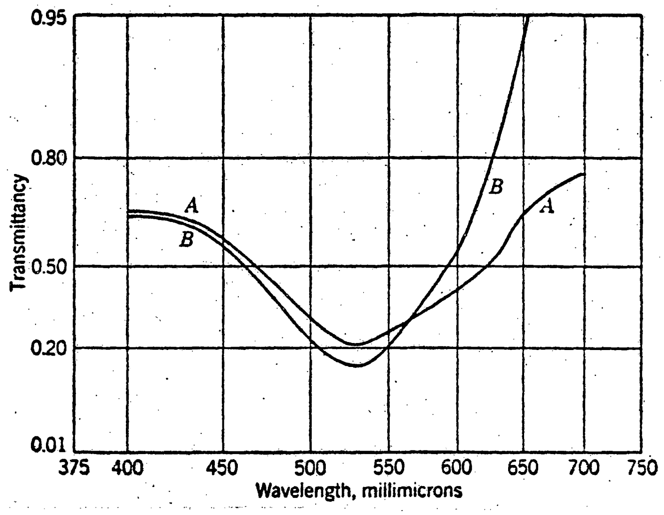


Solvent = Water

A = 25 degrees celcius

B = 50 degrees celcius

Figure 1.4 Effect of Temperature on Absorption Spectrum of Eriochrome Verdon A (Mellon, 1950)



Solvent = Water

A = dye dissolved at 25 degrees celcius

B = dye dissolved at 85 degrees celcius

Figure 1.5 Effect of Solution Heating on Absorbtion Spectrum of Diamine Violet N (Mellon, 1950)

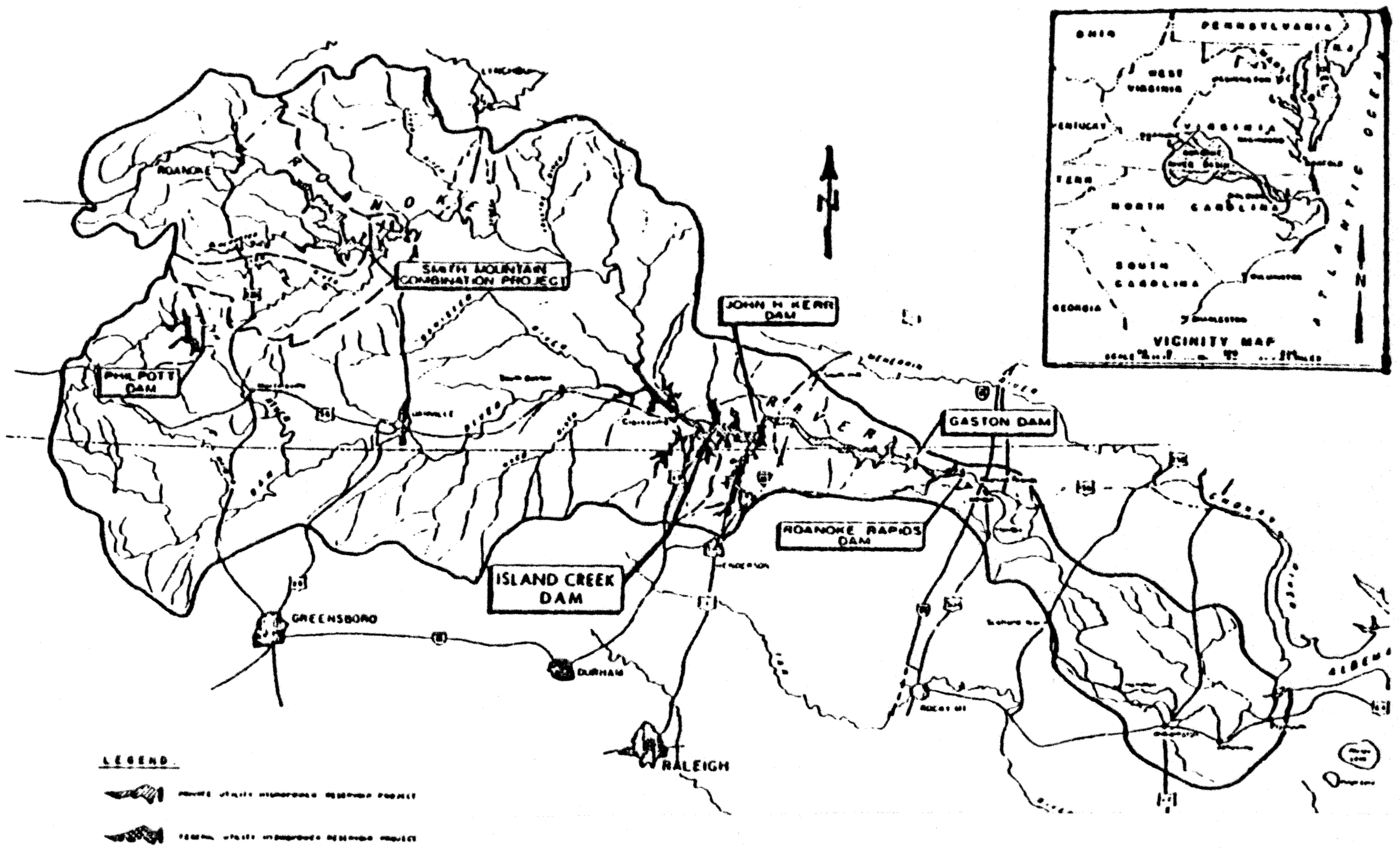


Figure 2.1 Roanoke River Basin
(U.S. Army Corps of Engineers, 1962)

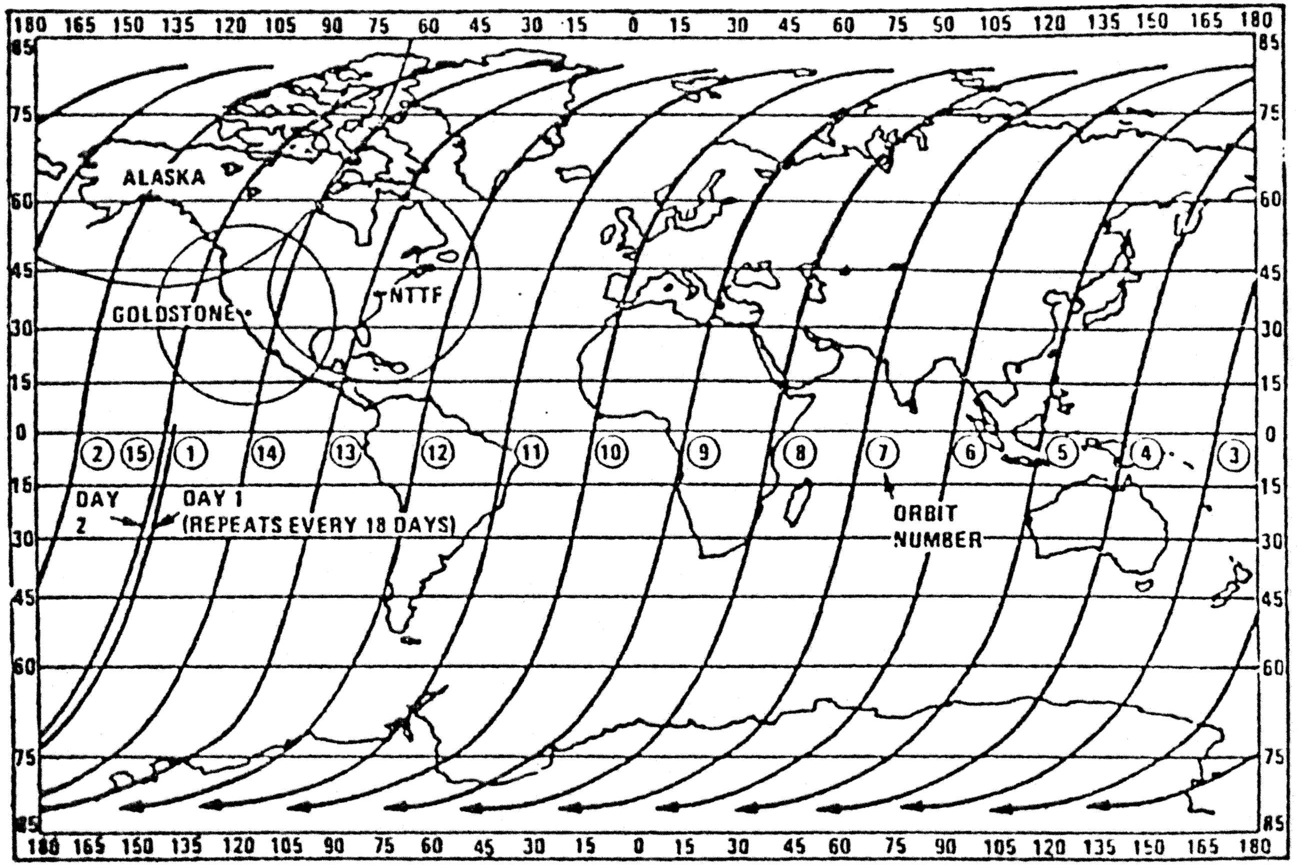


Figure 3.1 Landsat Orbital Tracks for One Day of Coverage (NASA, 1972)

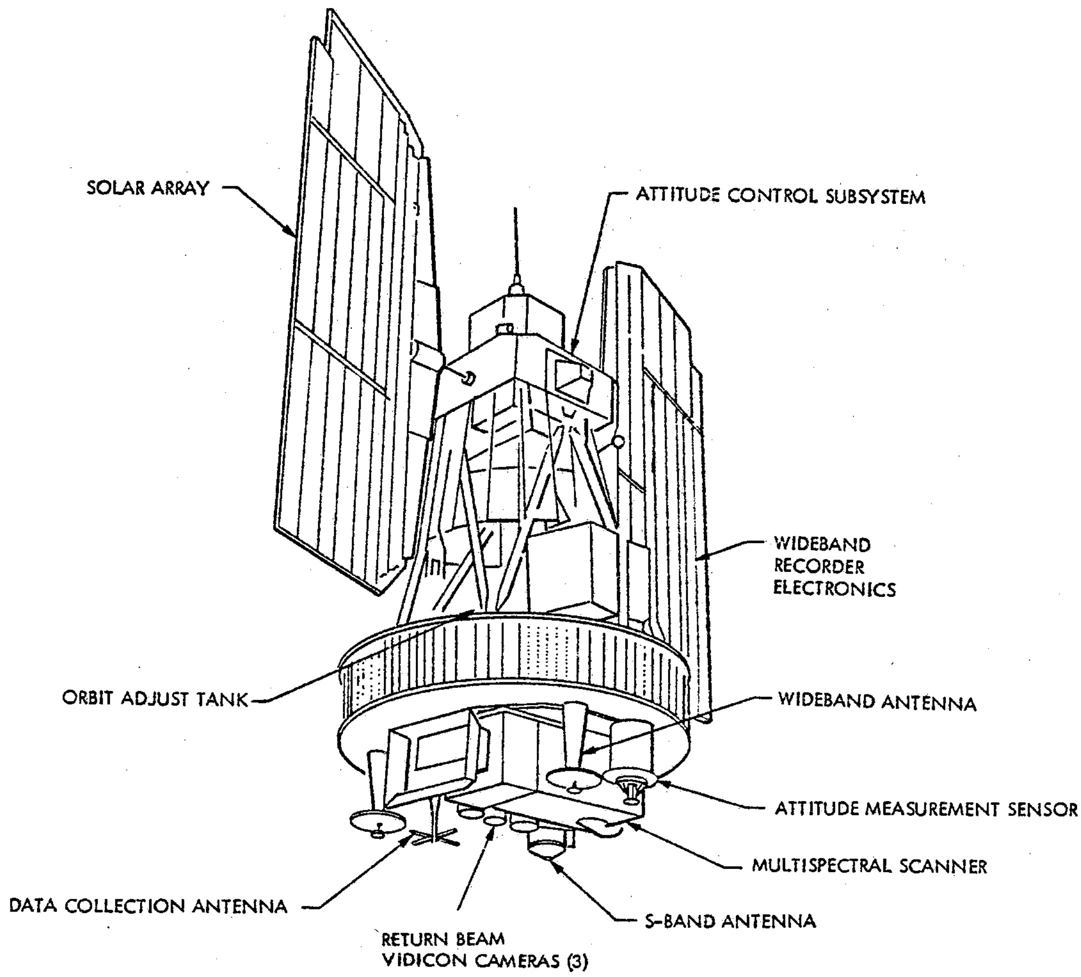


Figure 3.2 Landsat Configuration (NASA, 1972)

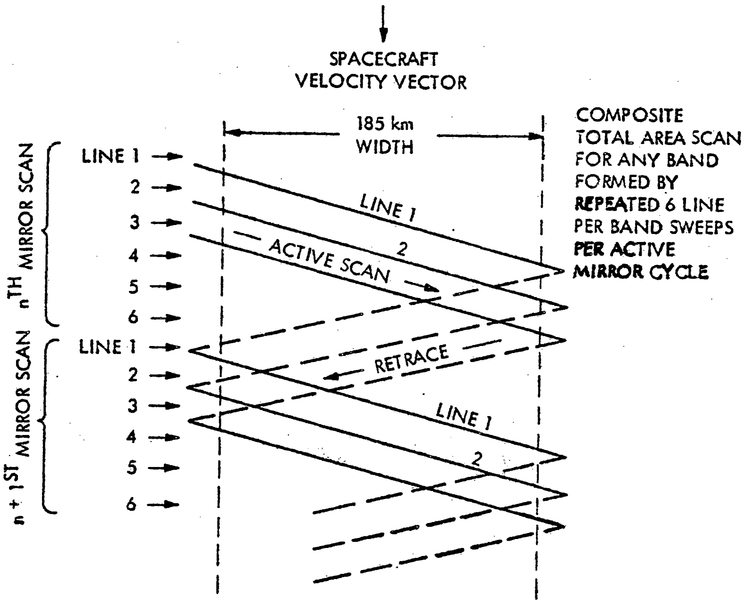


Figure 3.3 Scanning Arrangement of MSS (NASA, 1972)

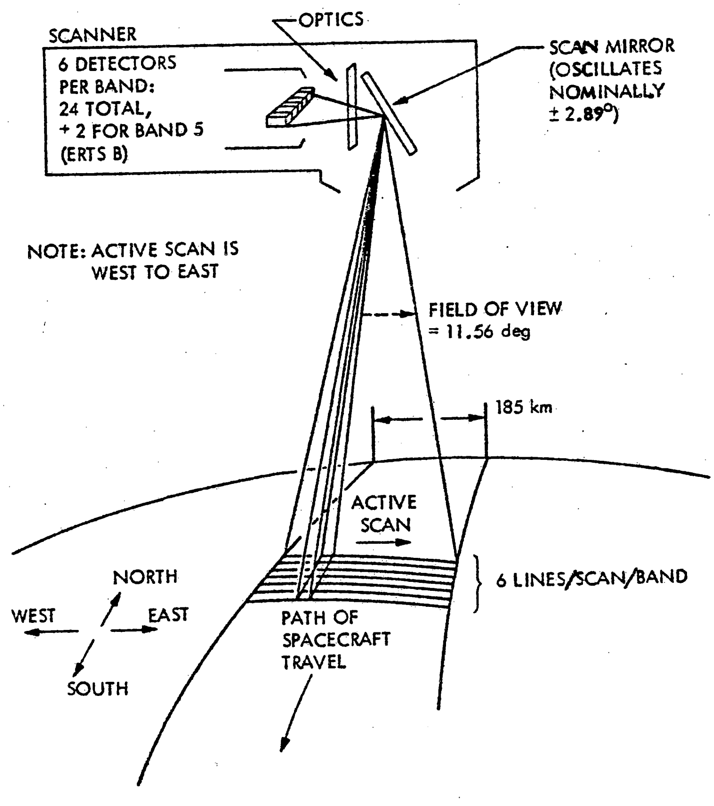


Figure 3.4 Scanning Pattern of MSS on the Earth's Surface (NASA, 1972)

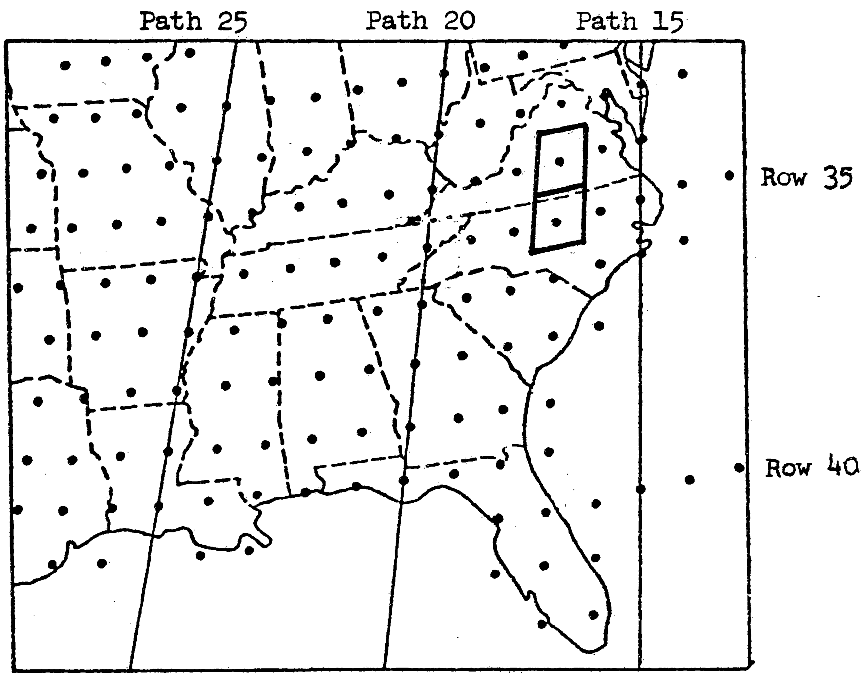


Figure 3.5 Nominal Scenes for Landsat Imagery
(Adapted from Meinert, et al, 1978)

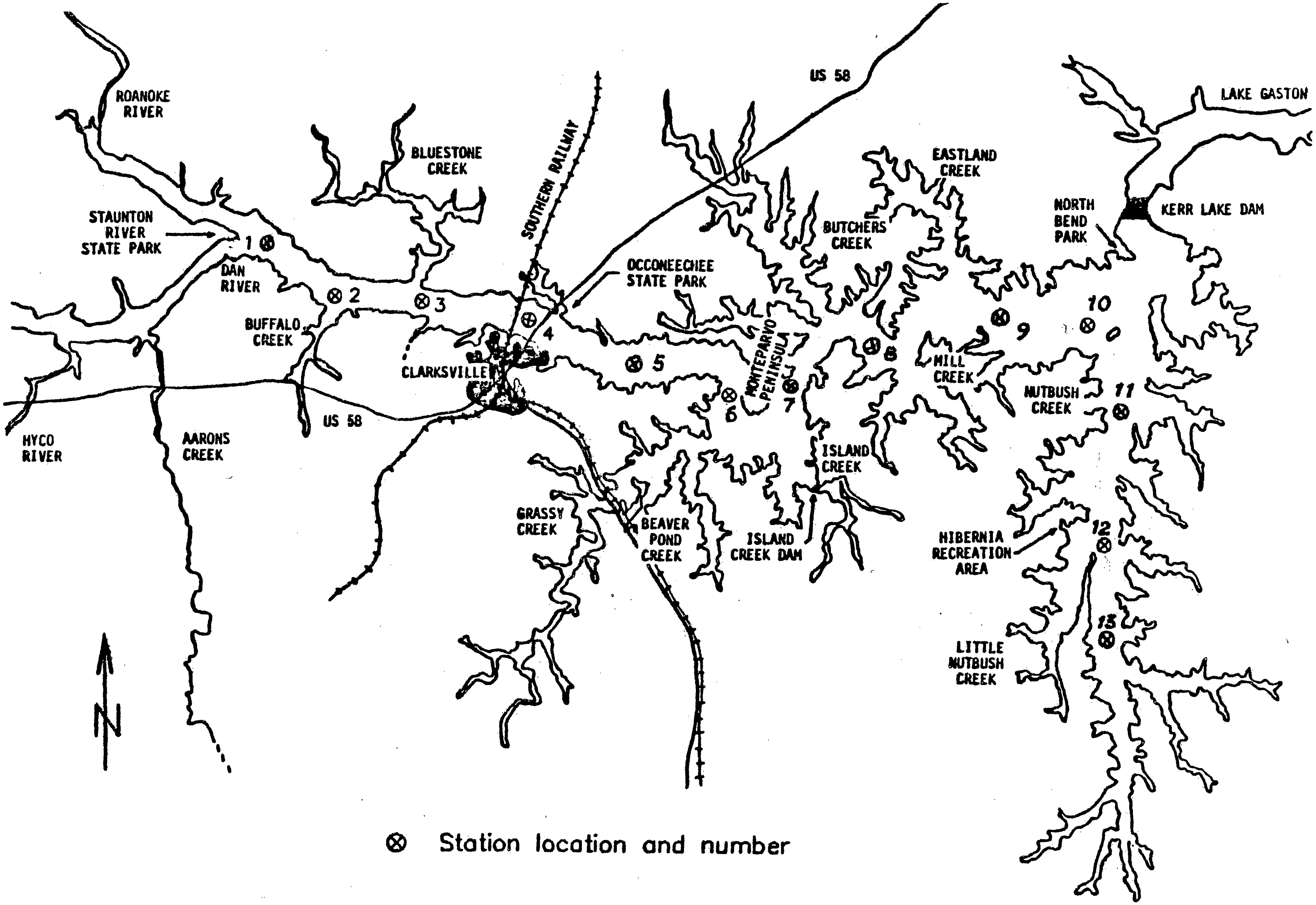


Figure 4.1 Location of V.P.I. & S.U. Sampling Stations
(Adapted from LeCroy, 1982)

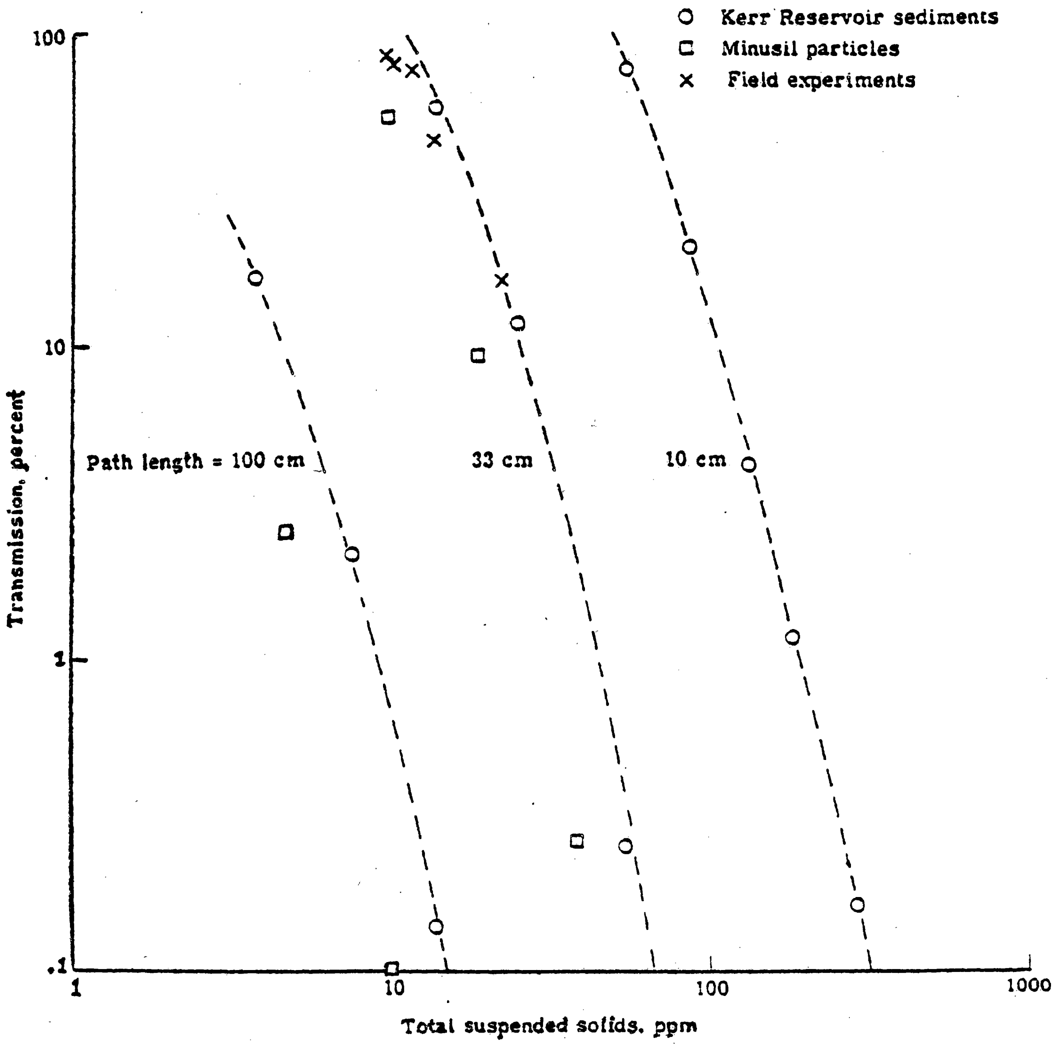


Figure 4.2 Total Suspended Solids Versus Beam Transmission (Usry and Whitlock, 1981)

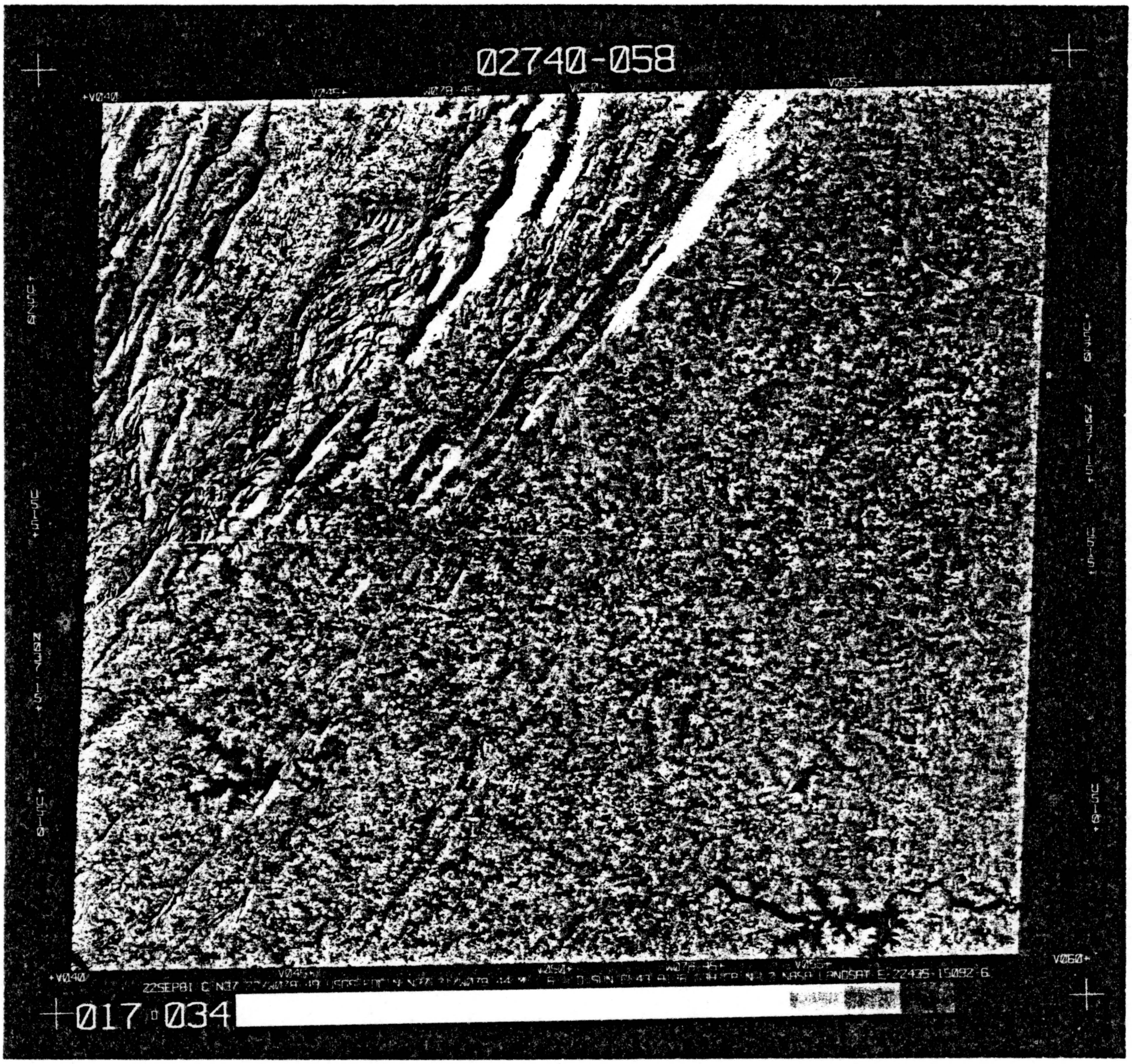


Figure 4.3 Band 6 Image of Pass 17, Row 34 on September 22, 1981

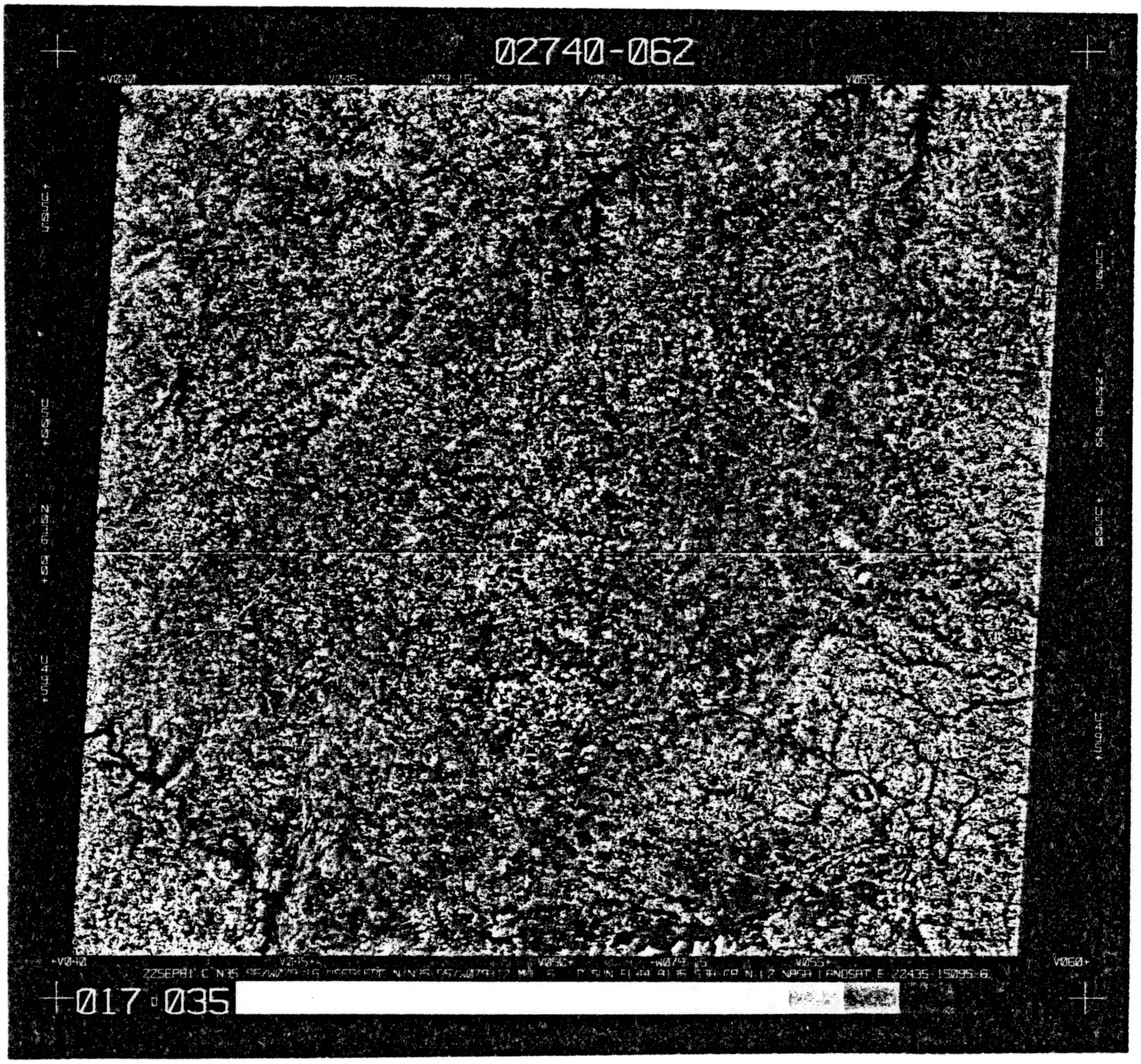


Figure 4.4 Band 6 Image of Pass 17, Row 35 on September 22, 1981

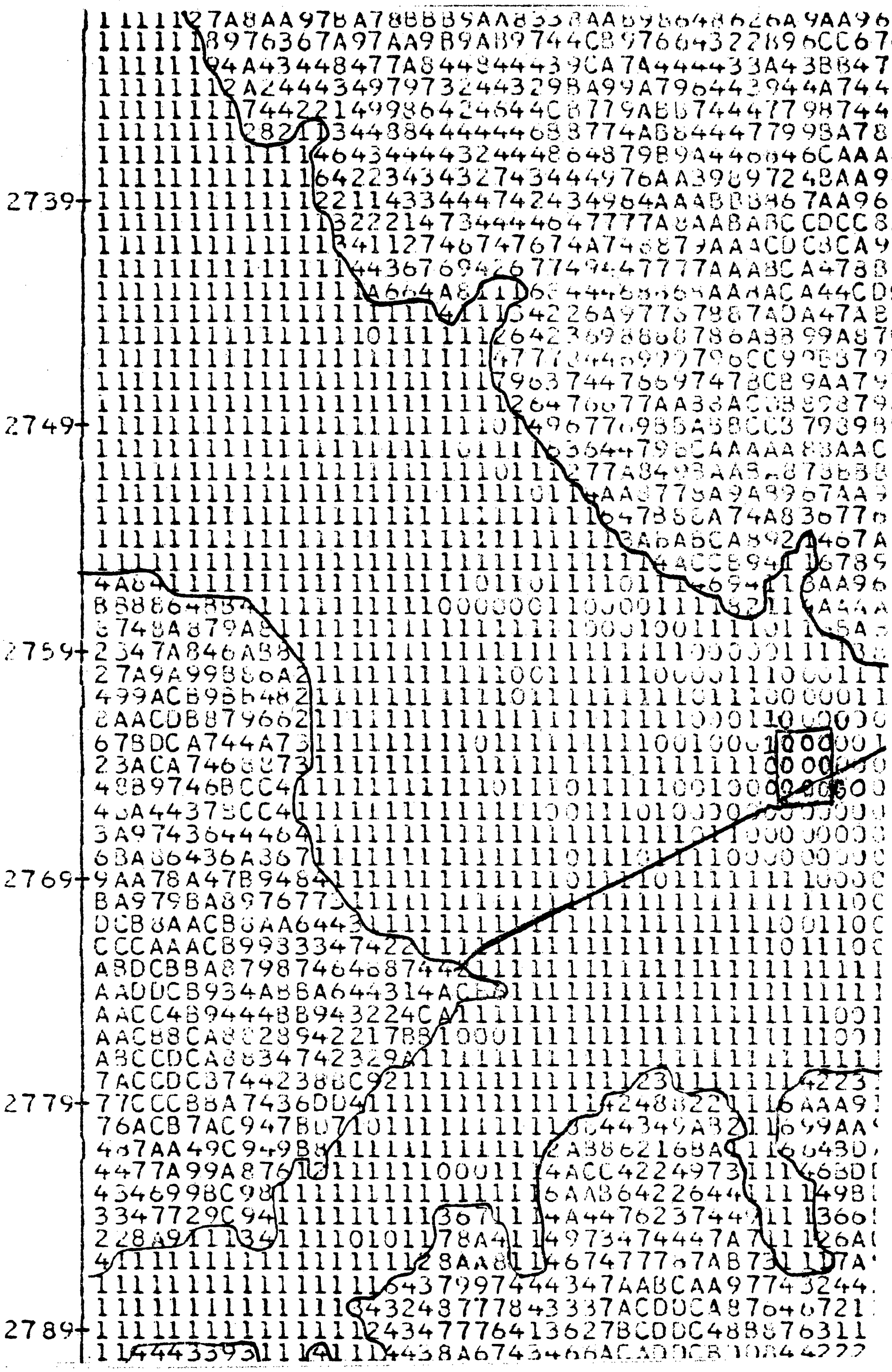


Figure 4.5 Output of RAW Subroutine, Buoy 24 Area Showing Location of Land and Water Pixels

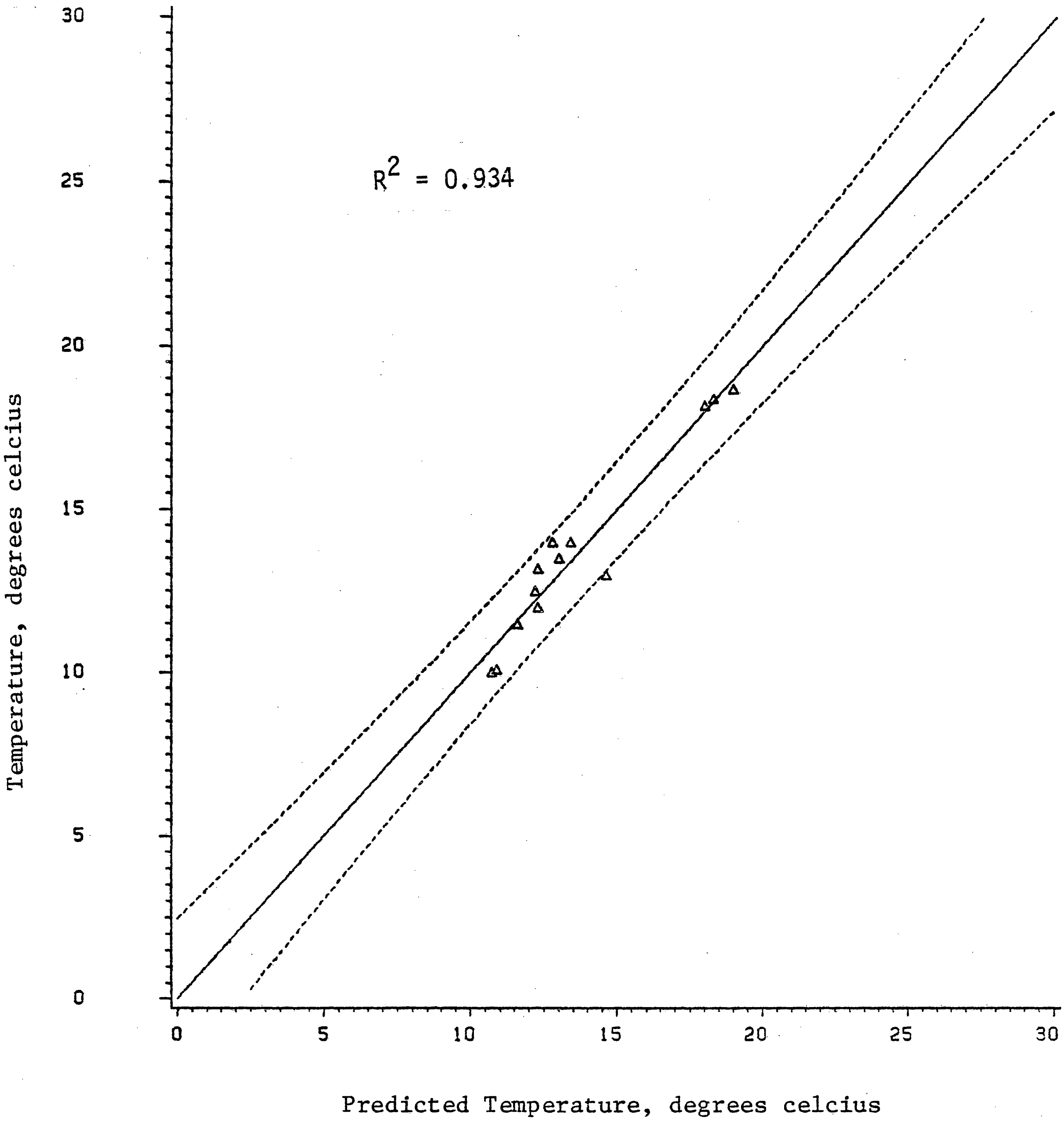


Figure 5.1 Application of Equation 5.1 to 13 Exact Match Points

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 1 with 90 Percent Confidence Limits

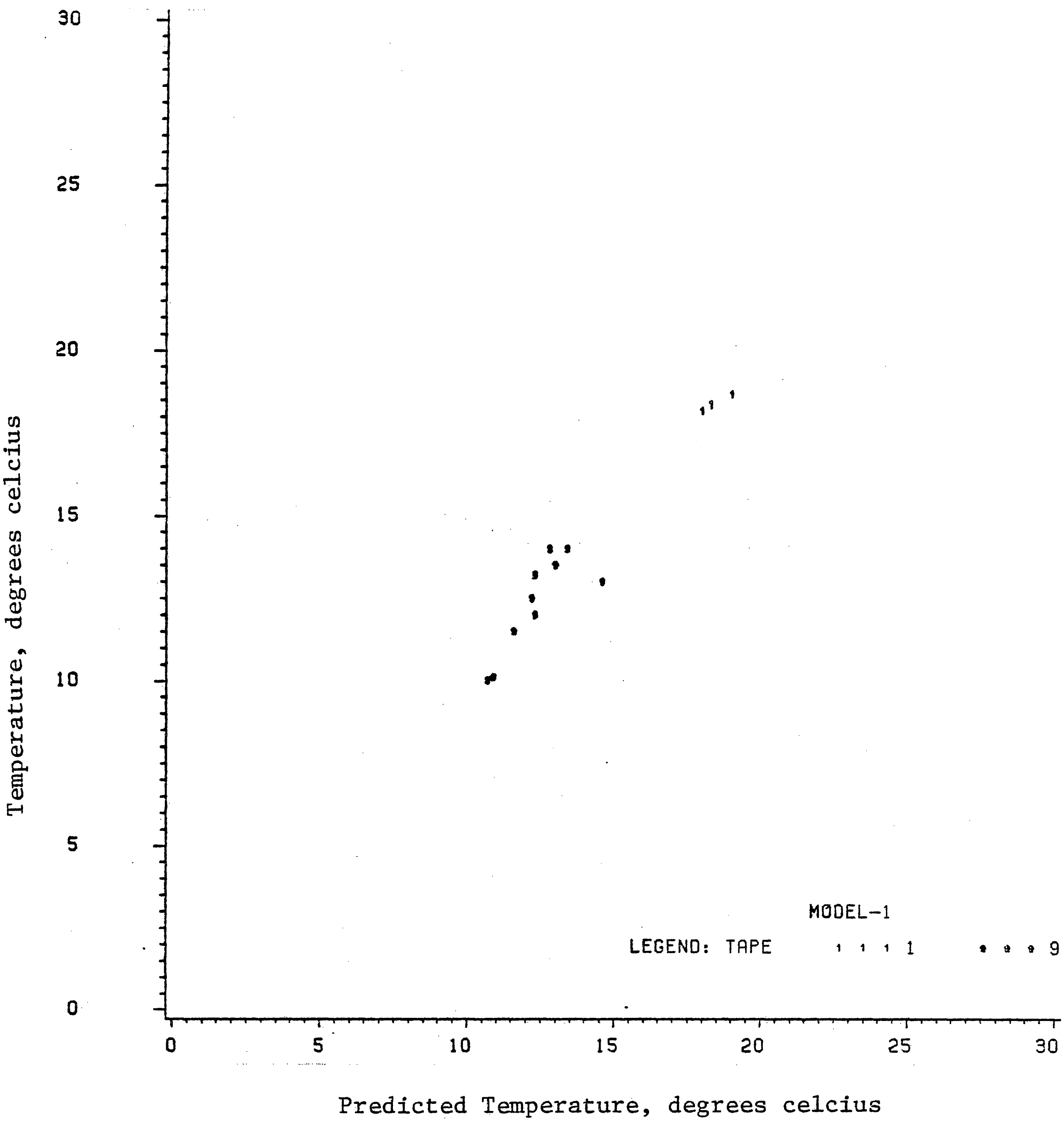


Figure 5.1 Application of Equation 5.1 to 13 Exact Match Points

(b) Data Points for Regression

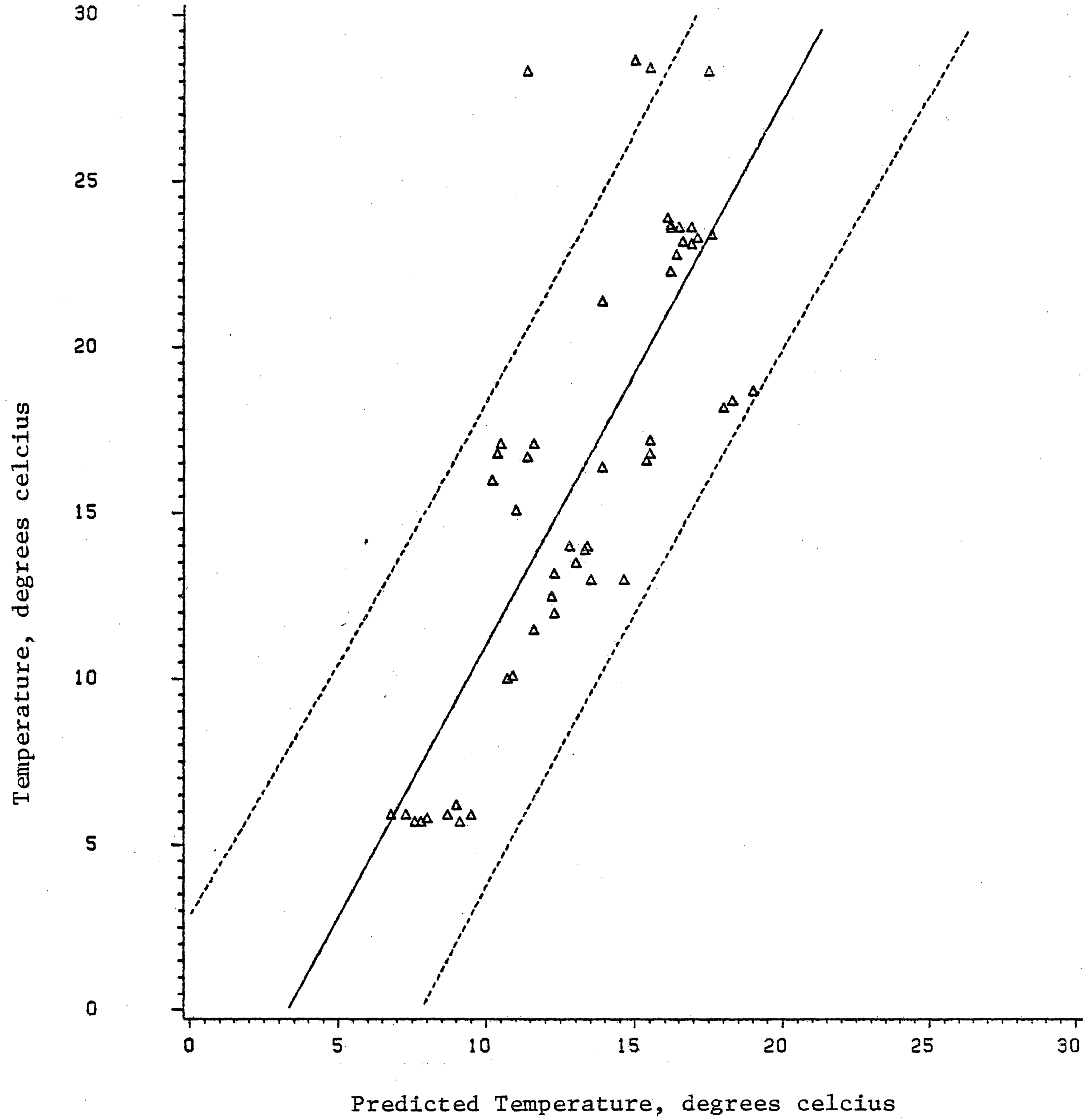


Figure 5.2 Application of Equation 5.1 to 50 Point Dataset

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 1 with 90 Percent Confidence Limits

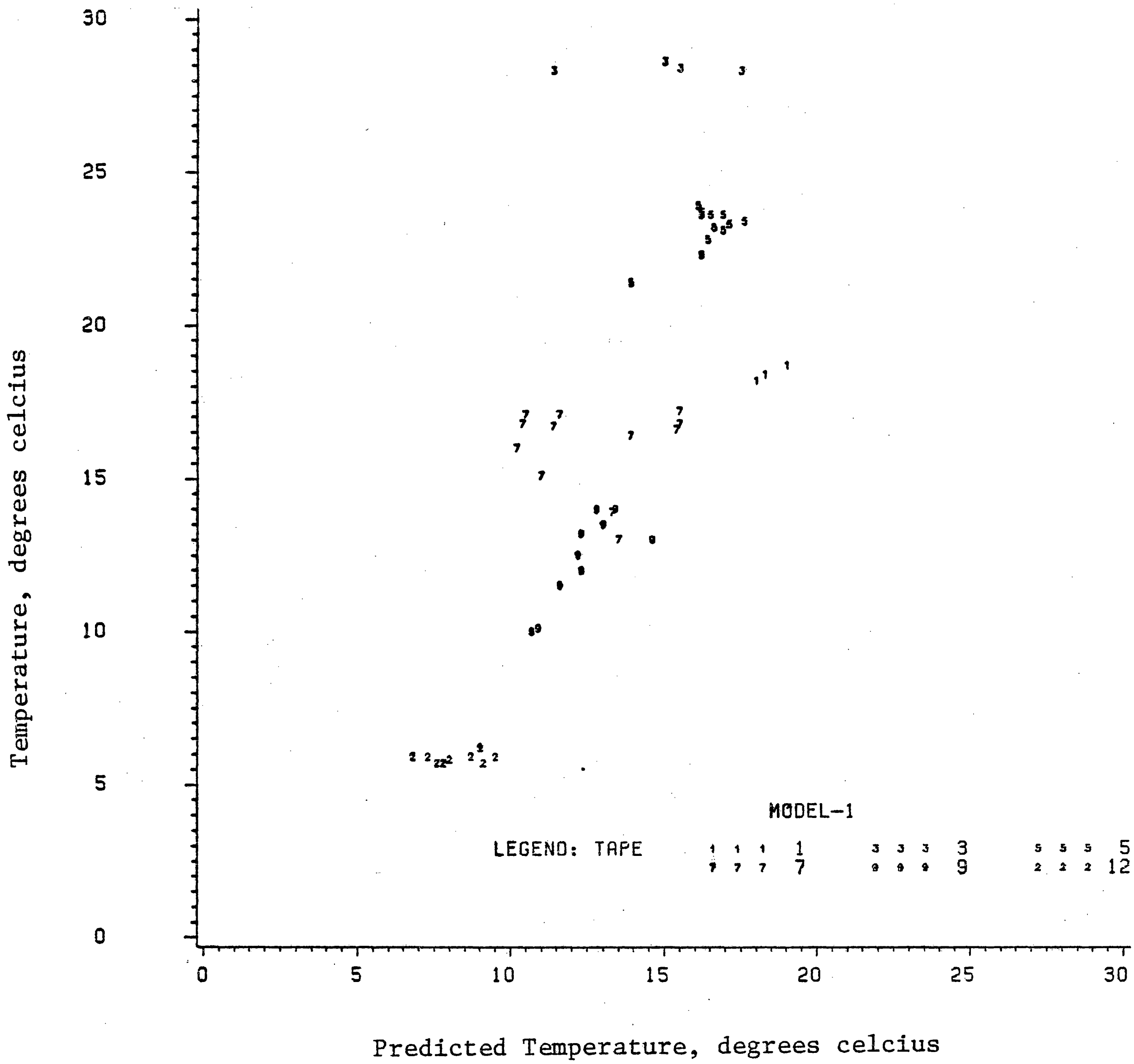


Figure 5.2 Application of Equation 5.1 to 50 Point Dataset

(b) Data Points for Regression

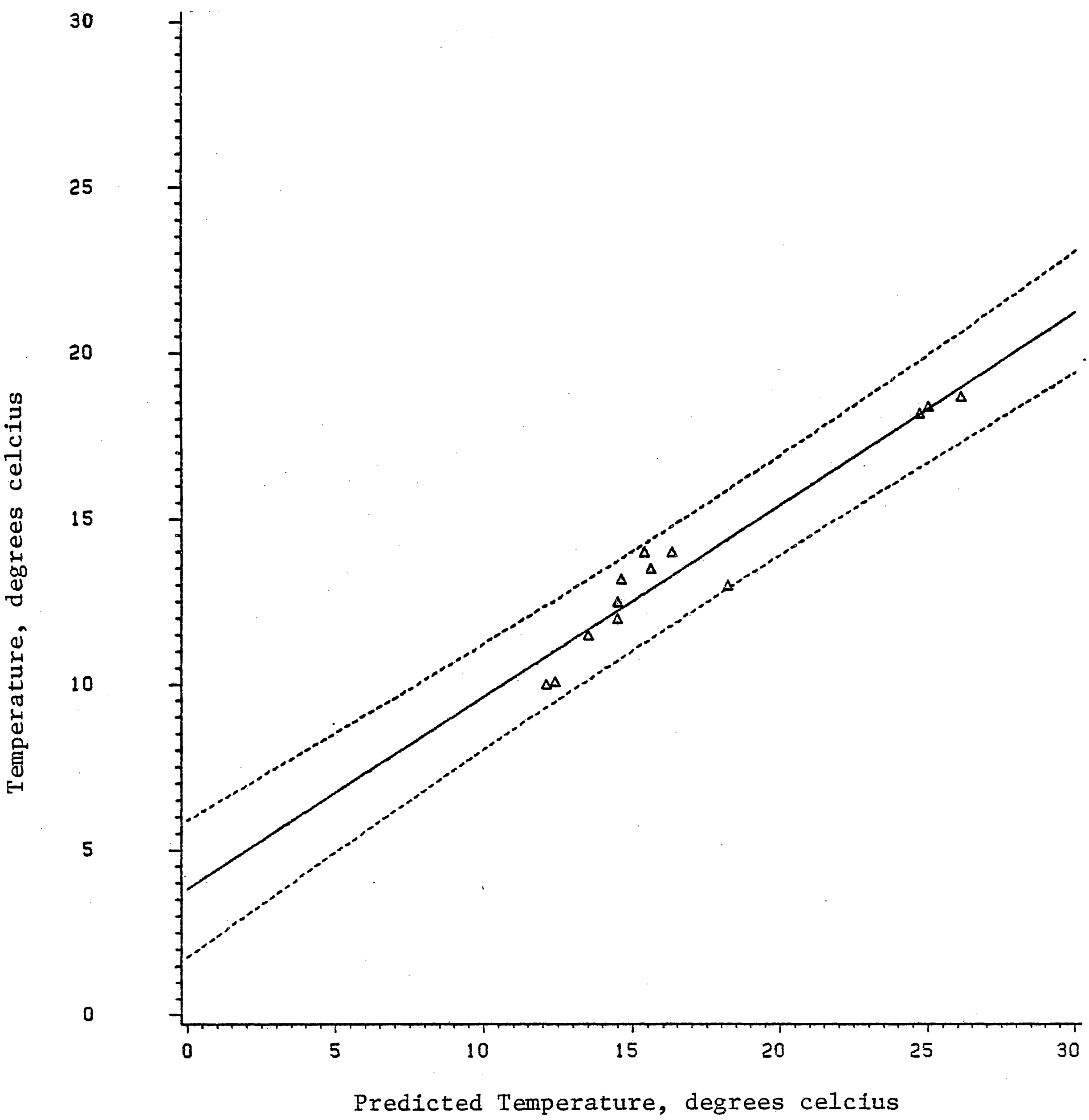


Figure 5.3 Application of Equation 5.2 to 13 Exact Match Points

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 2 with 90 Percent Confidence Limits

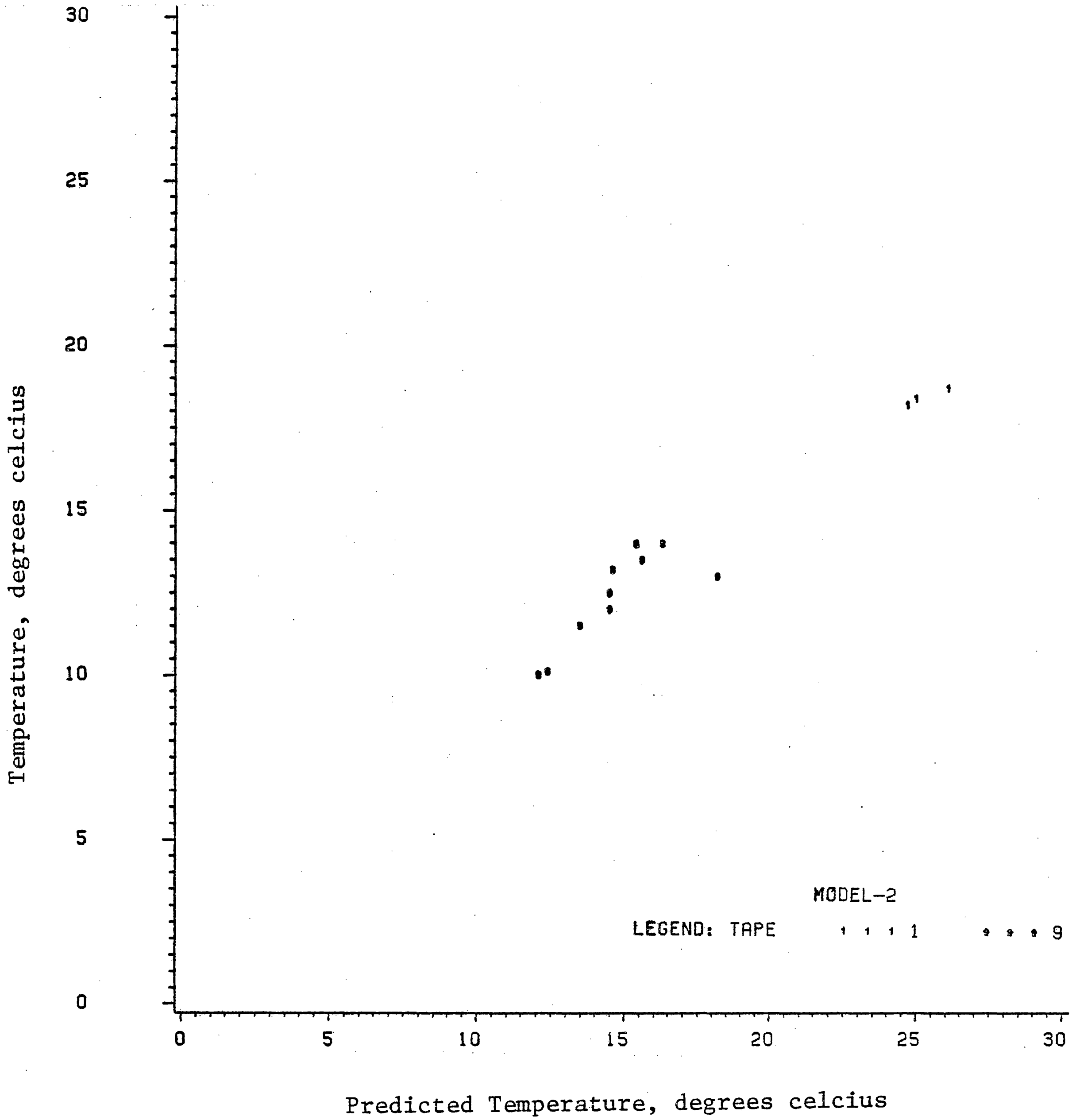


Figure 5.3 Application of Equation 5.2 to 13 Exact Match Points

(b) Data Points for Regression

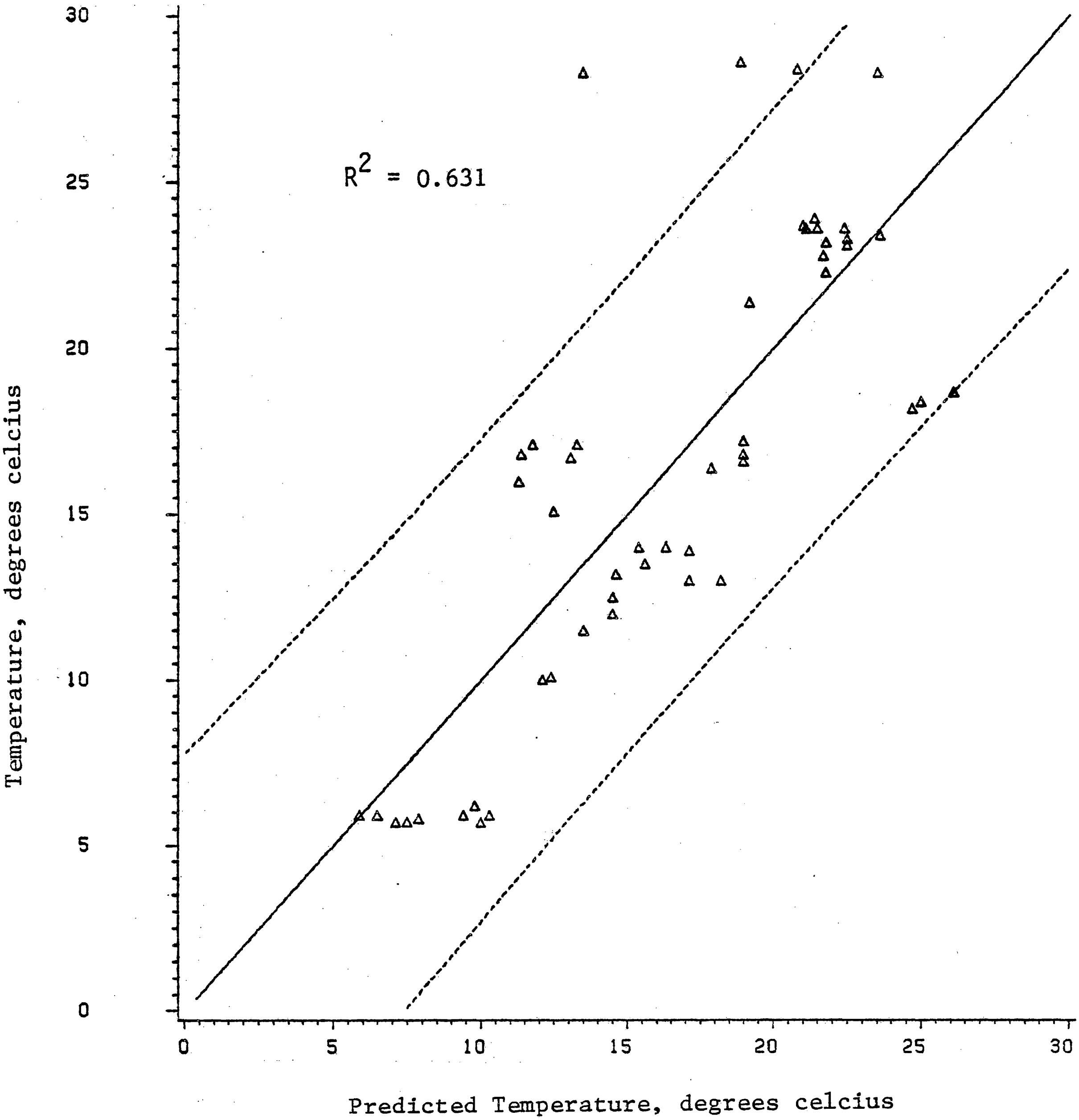


Figure 5.4 Application of Equation 5.2 to 50 Point Dataset

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 2 with 90 Percent Confidence Limits

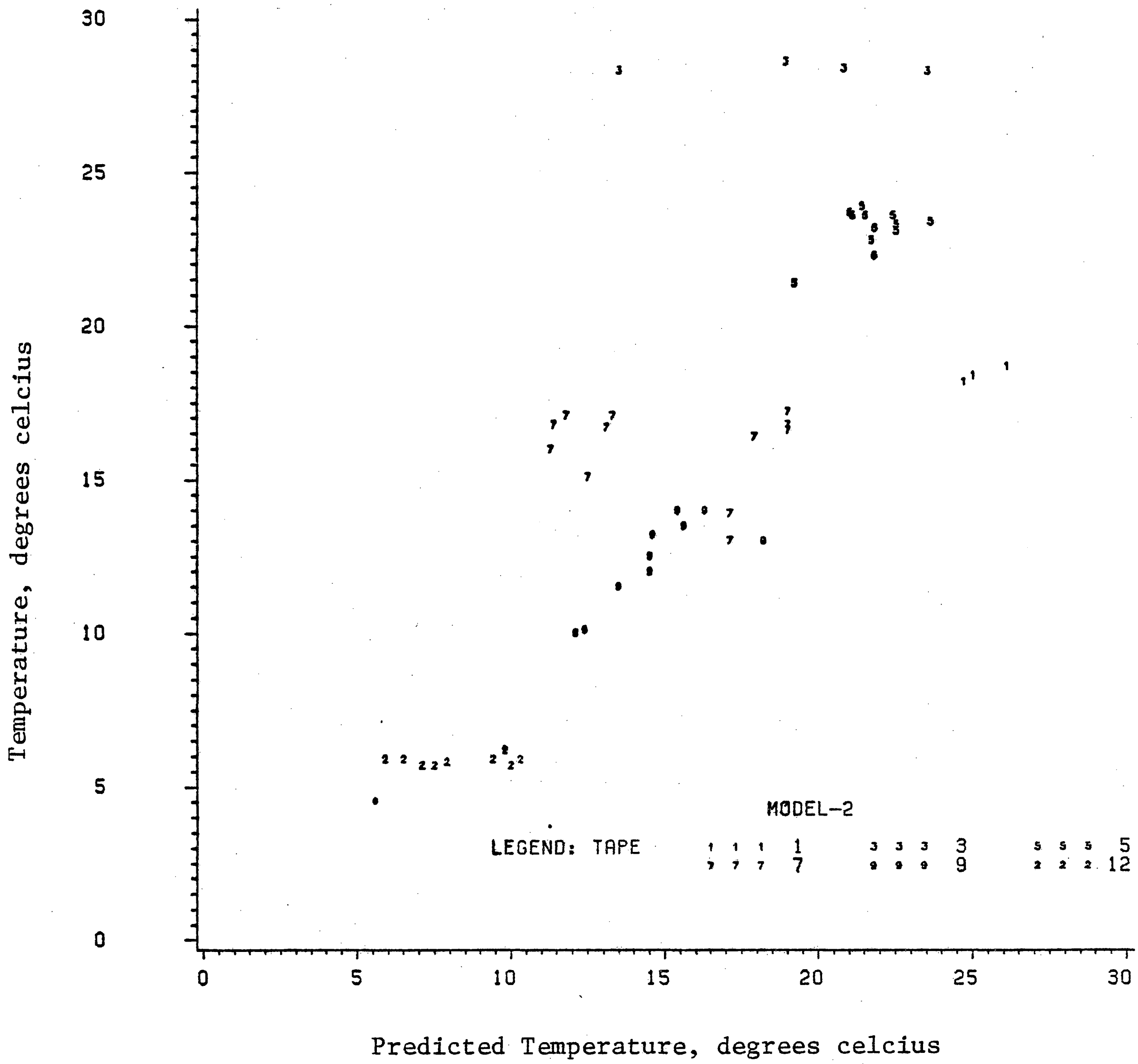


Figure 5.4 Application of Equation 5.2 to 50 Point Dataset

(b) Data Points for Regression

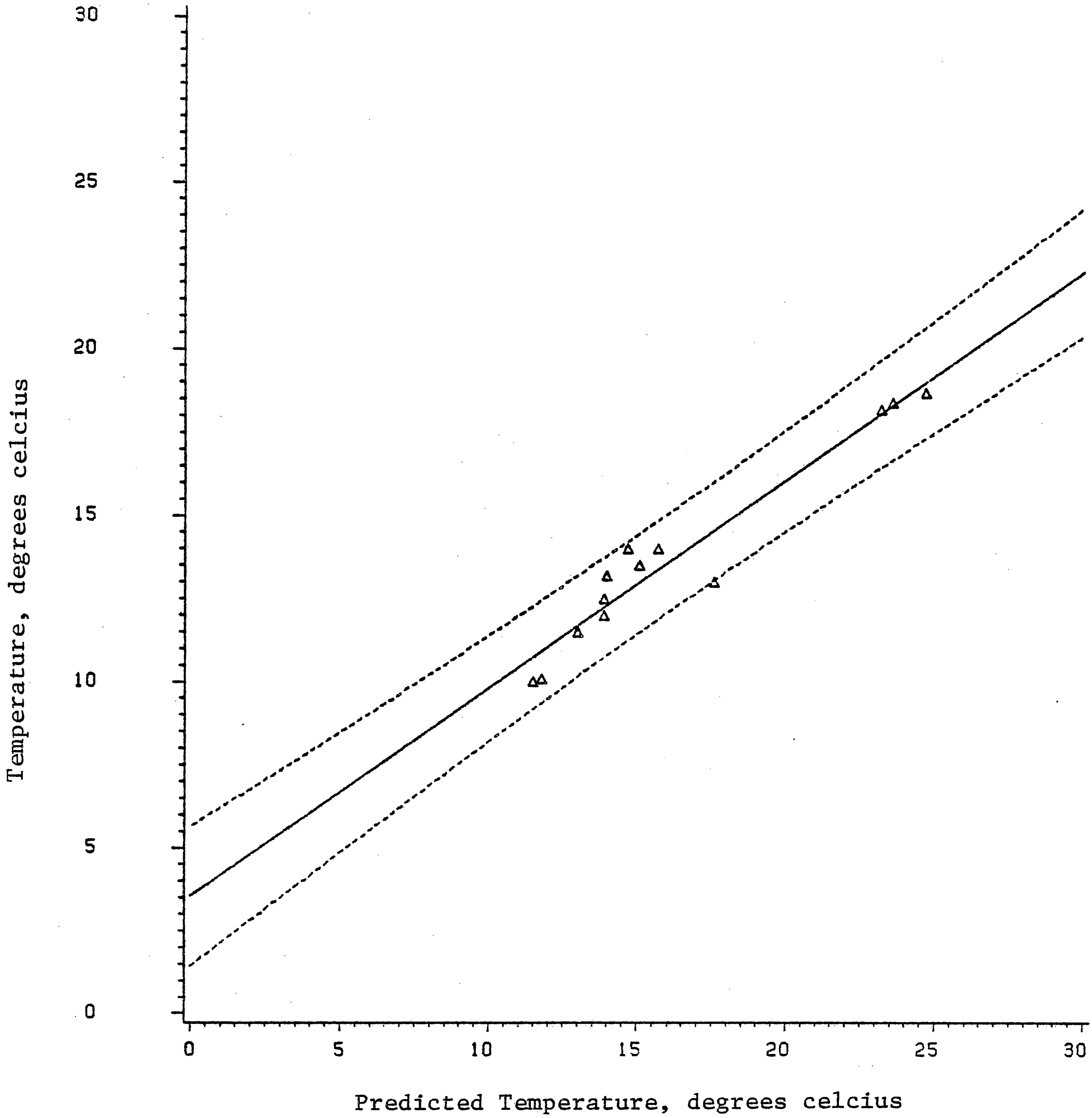


Figure 5.5 Application of Equation 5.3 to 13 Exact Match Points

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 3 with 90 Percent Confidence Limits

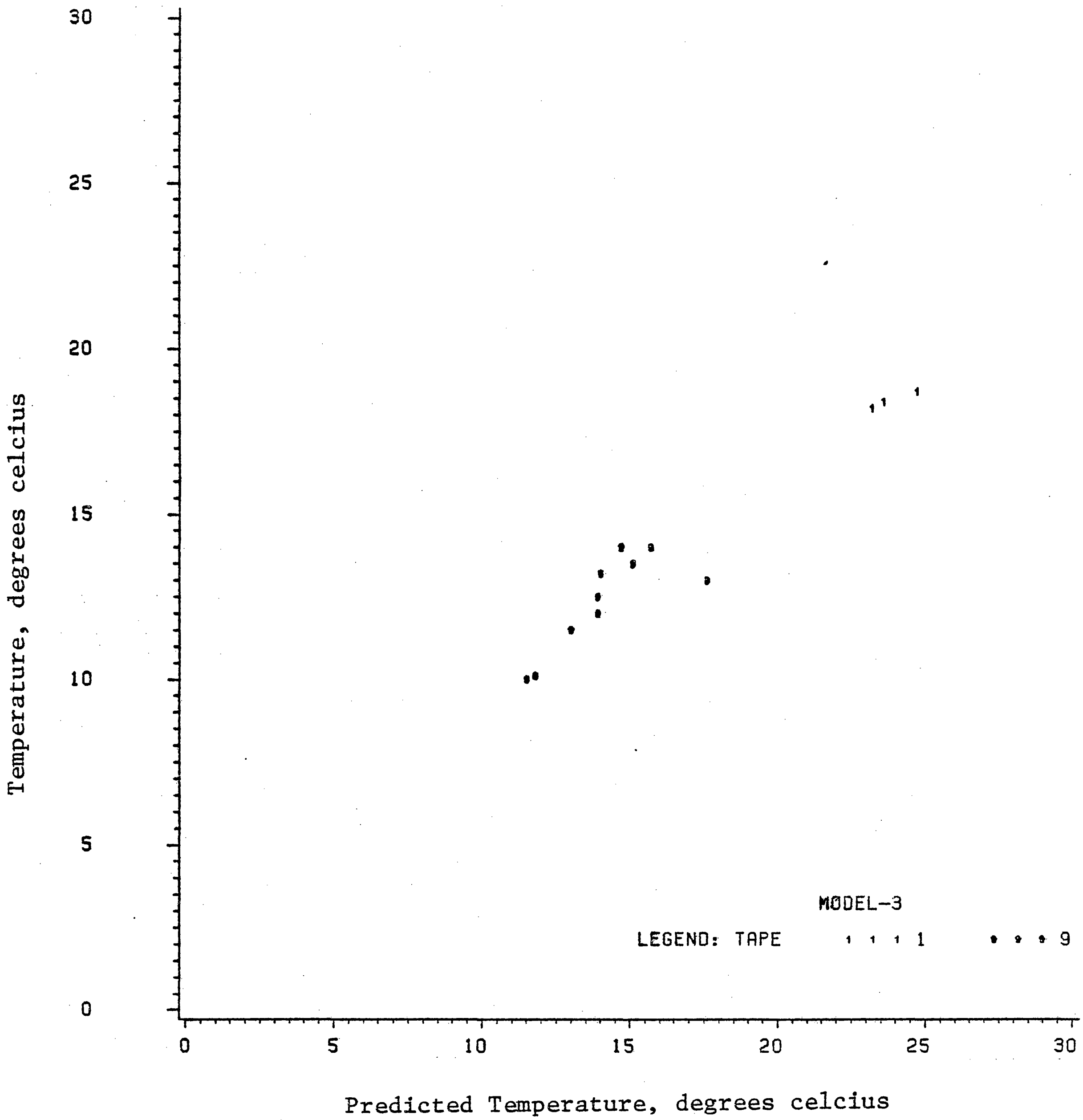


Figure 5.5 Application of Equation 5.3 to 13 Exact Match Points

(b) Data Points for Regression

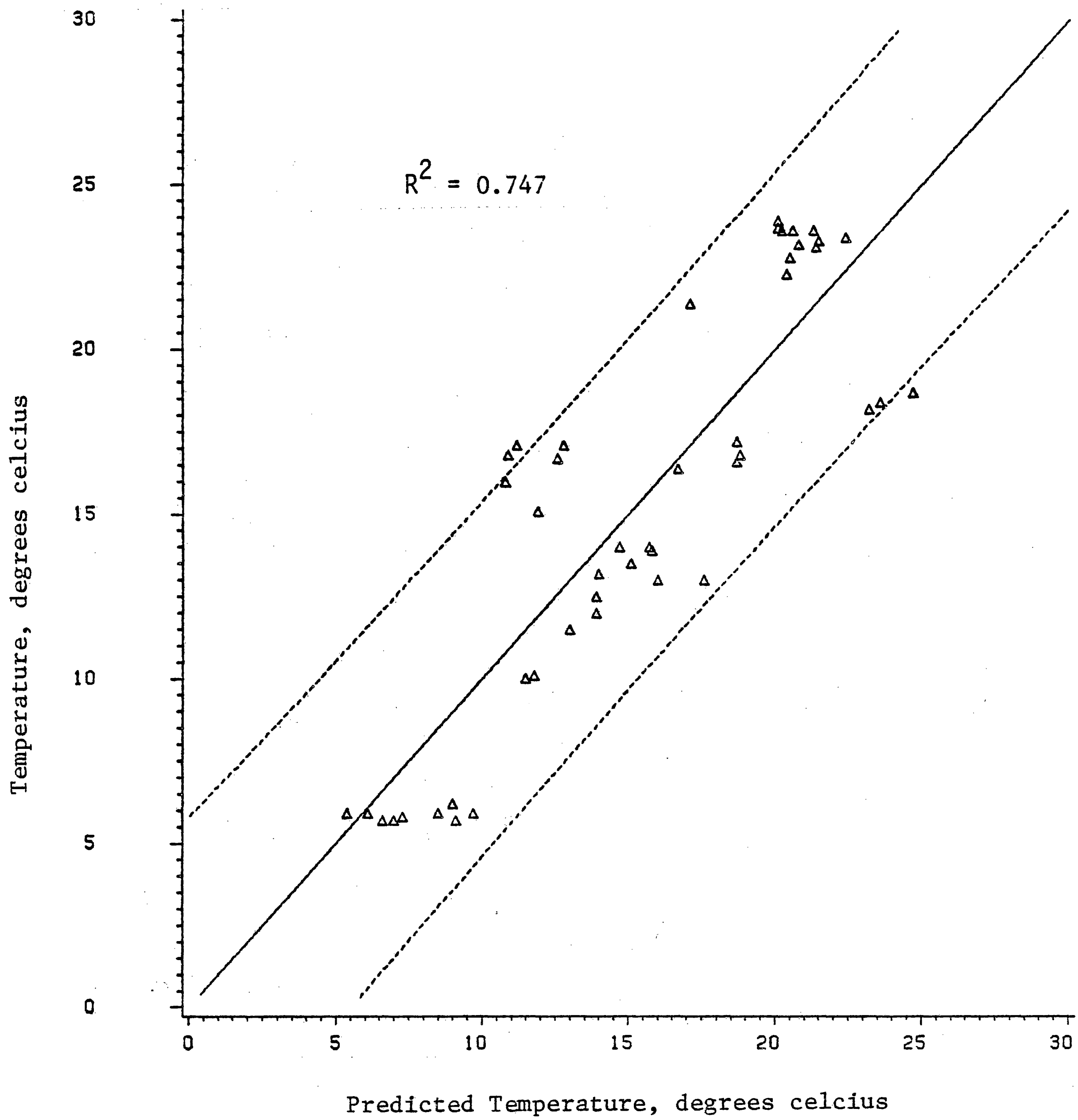


Figure 5.6 Application of Equation 5.3 to 46 Point Dataset (Tape 3 Deleted)

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 3 with 90 Percent Confidence Limits

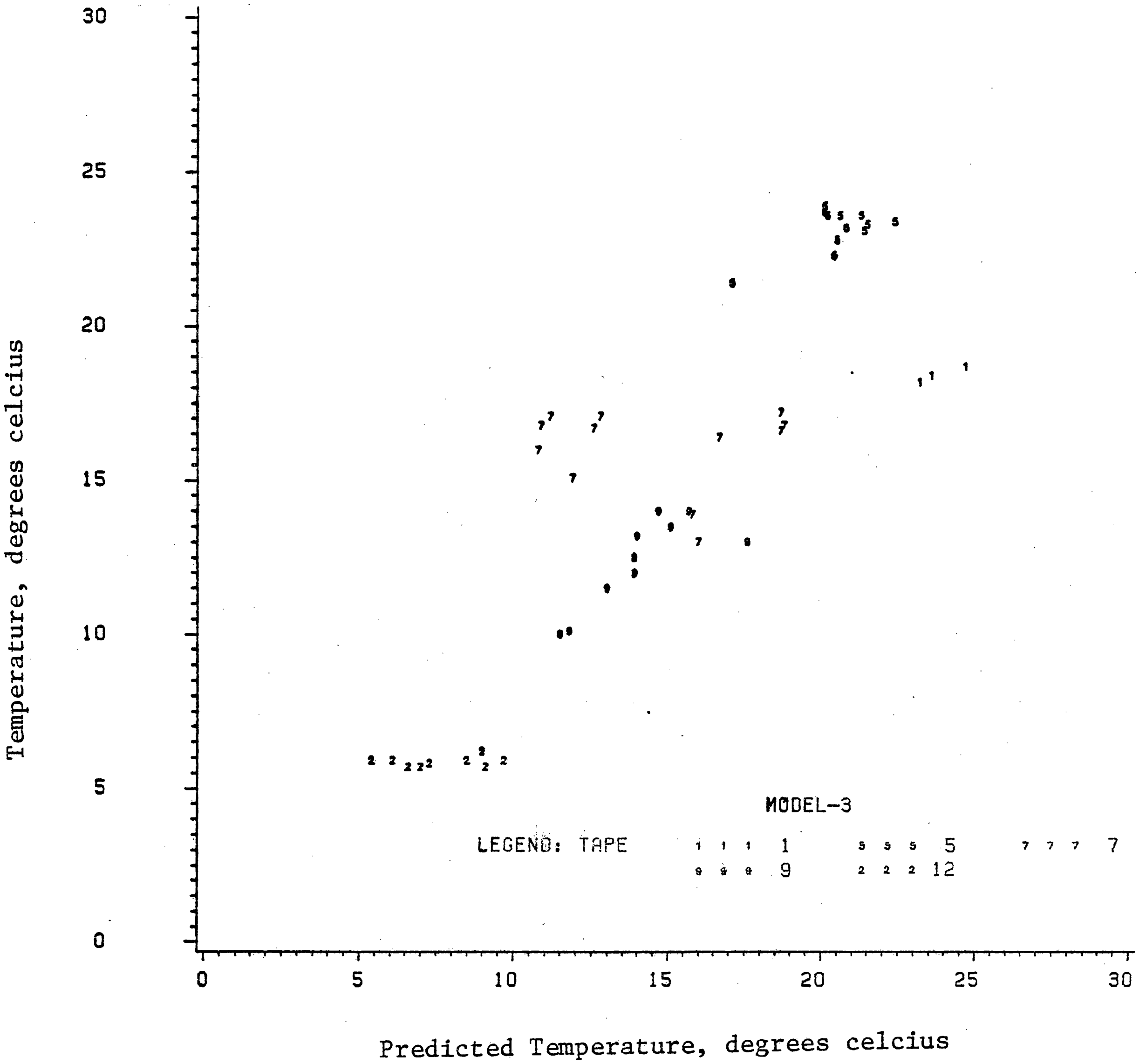


Figure 5.6 Application of Equation 5.3 to 46 Point Dataset (Tape 3 Deleted)

(b) Data Points for Regression

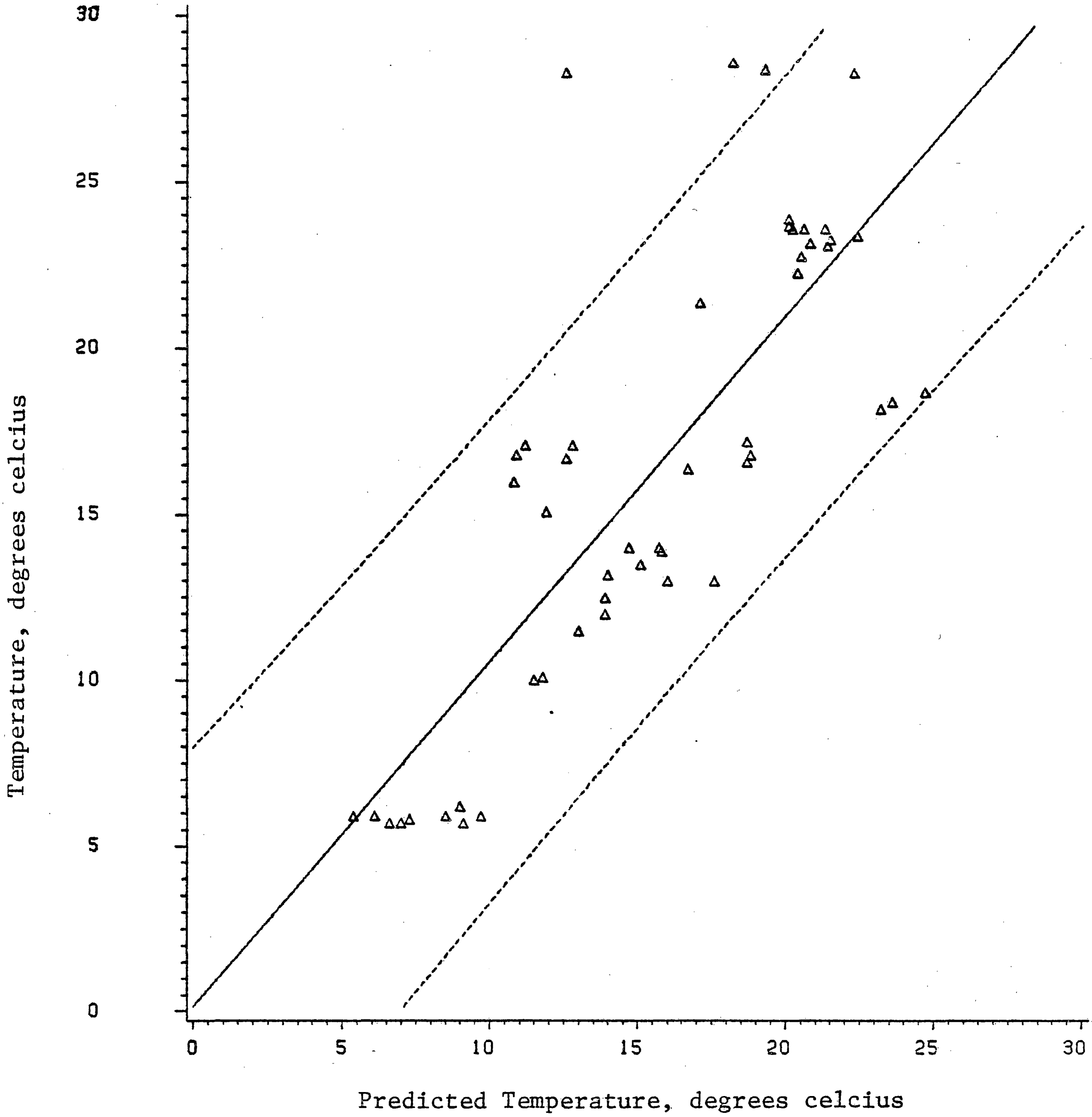


Figure 5.7 Application of Equation 5.3 to 50 Point Dataset

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 3 with 90 Percent Confidence Limits

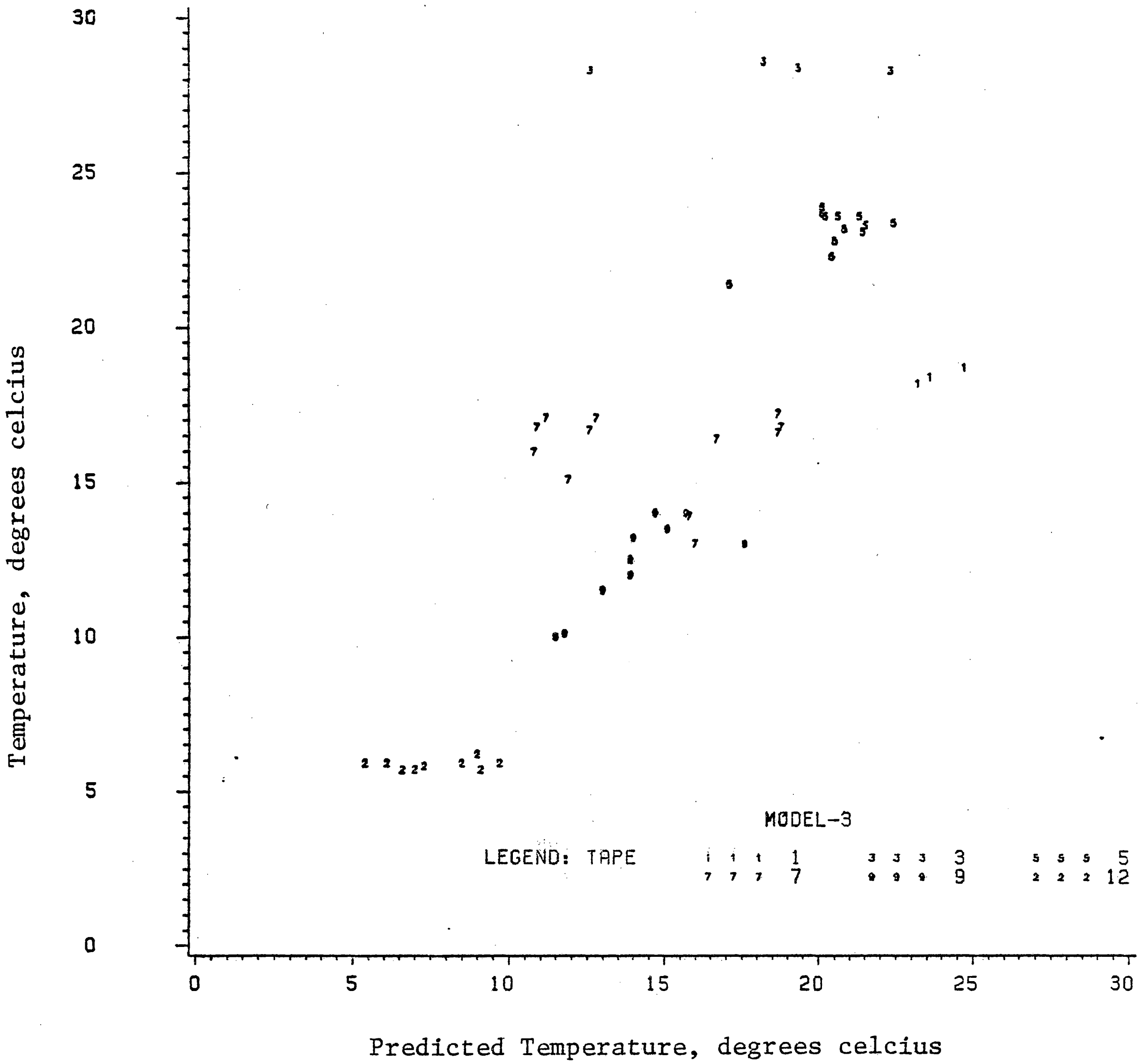


Figure 5.7 Application of Equation 5.3 to 50 Point Dataset

(b) Data Points for Regression

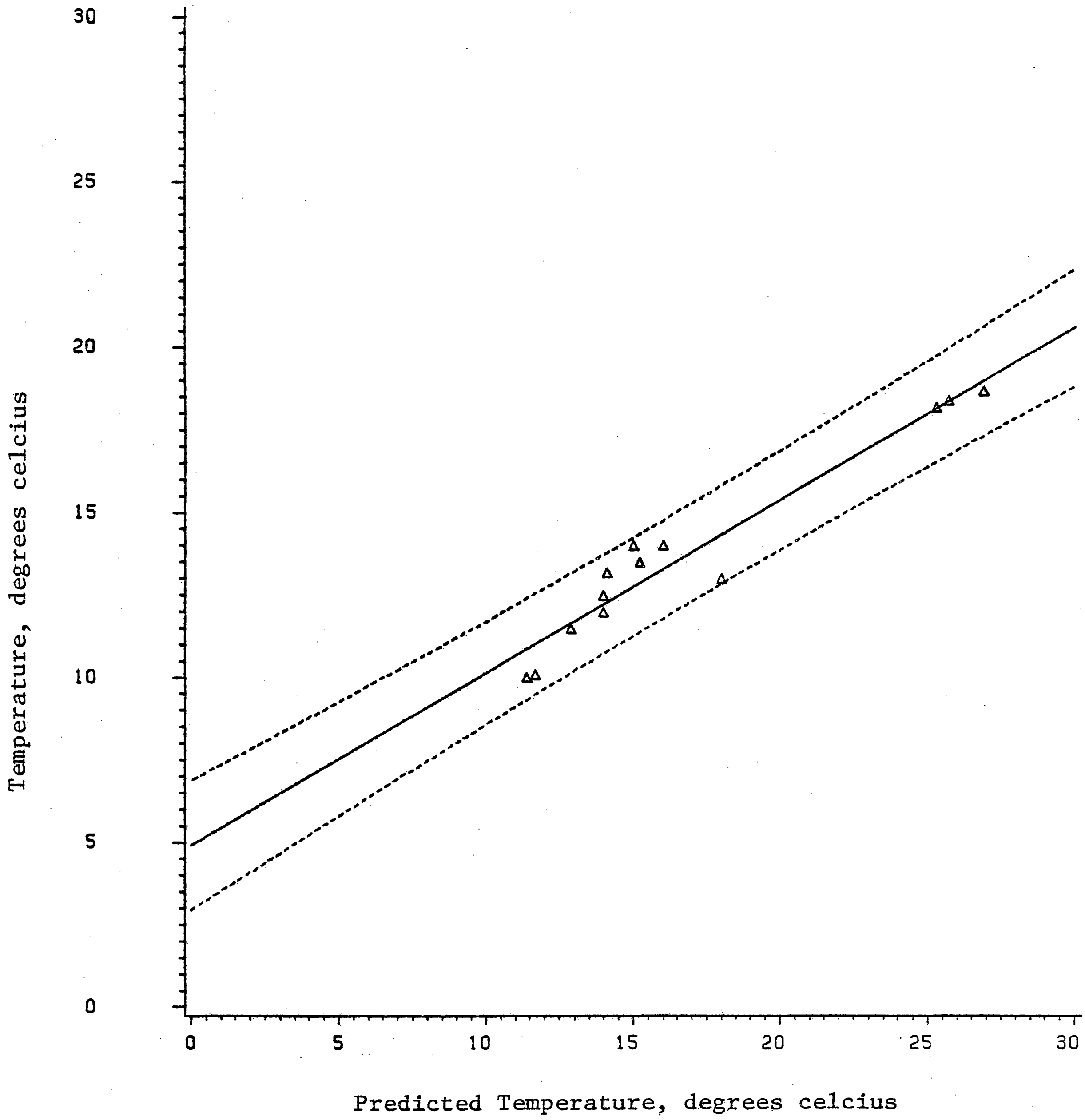


Figure 5.8 Application of Equation 5.4 to 13 Exact Match Points

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 4 with 90 Percent Confidence Limits

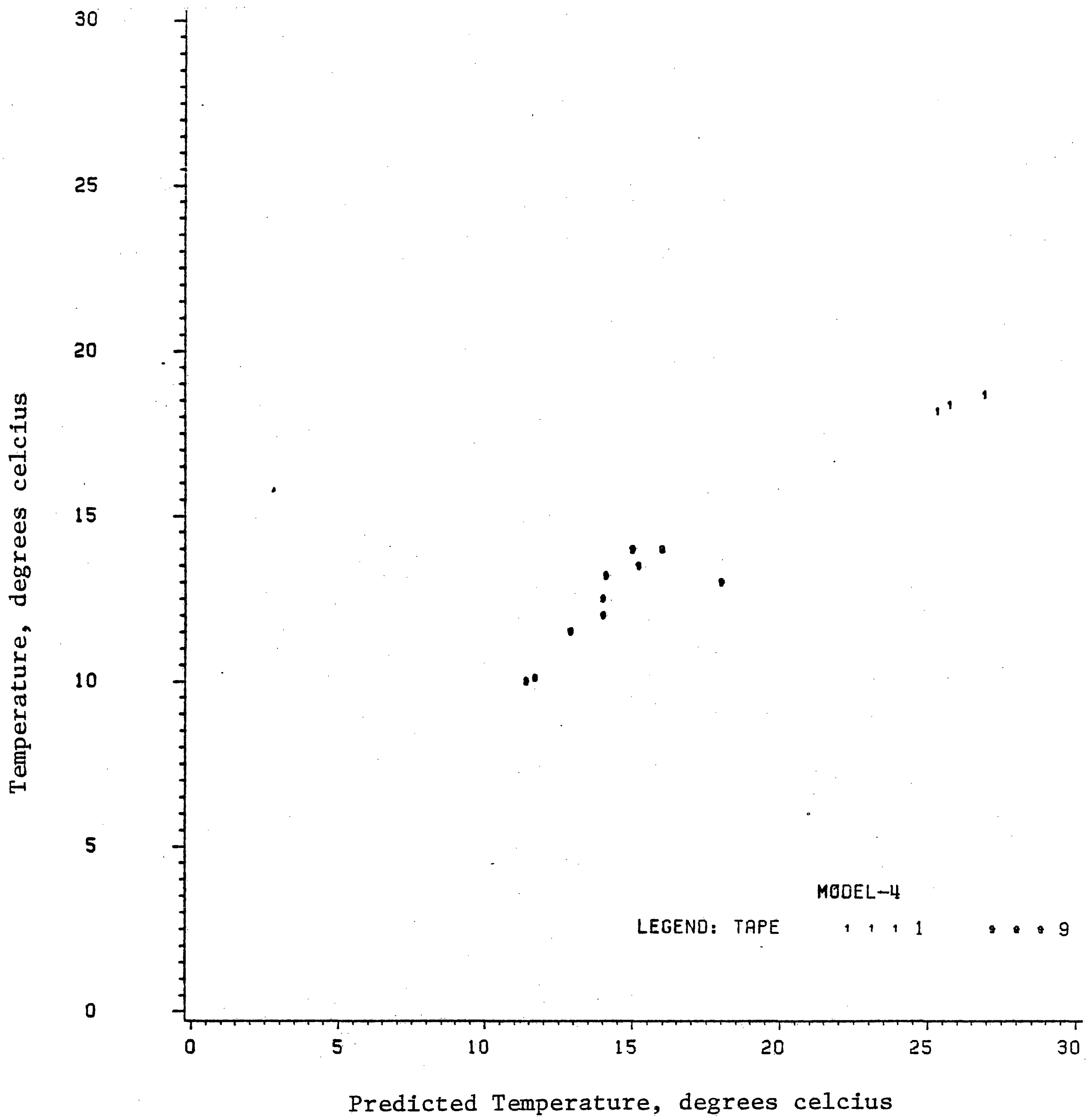


Figure 5.8 Application of Equation 5.4 to 13 Exact Match Points

(b) Data Points for Regression

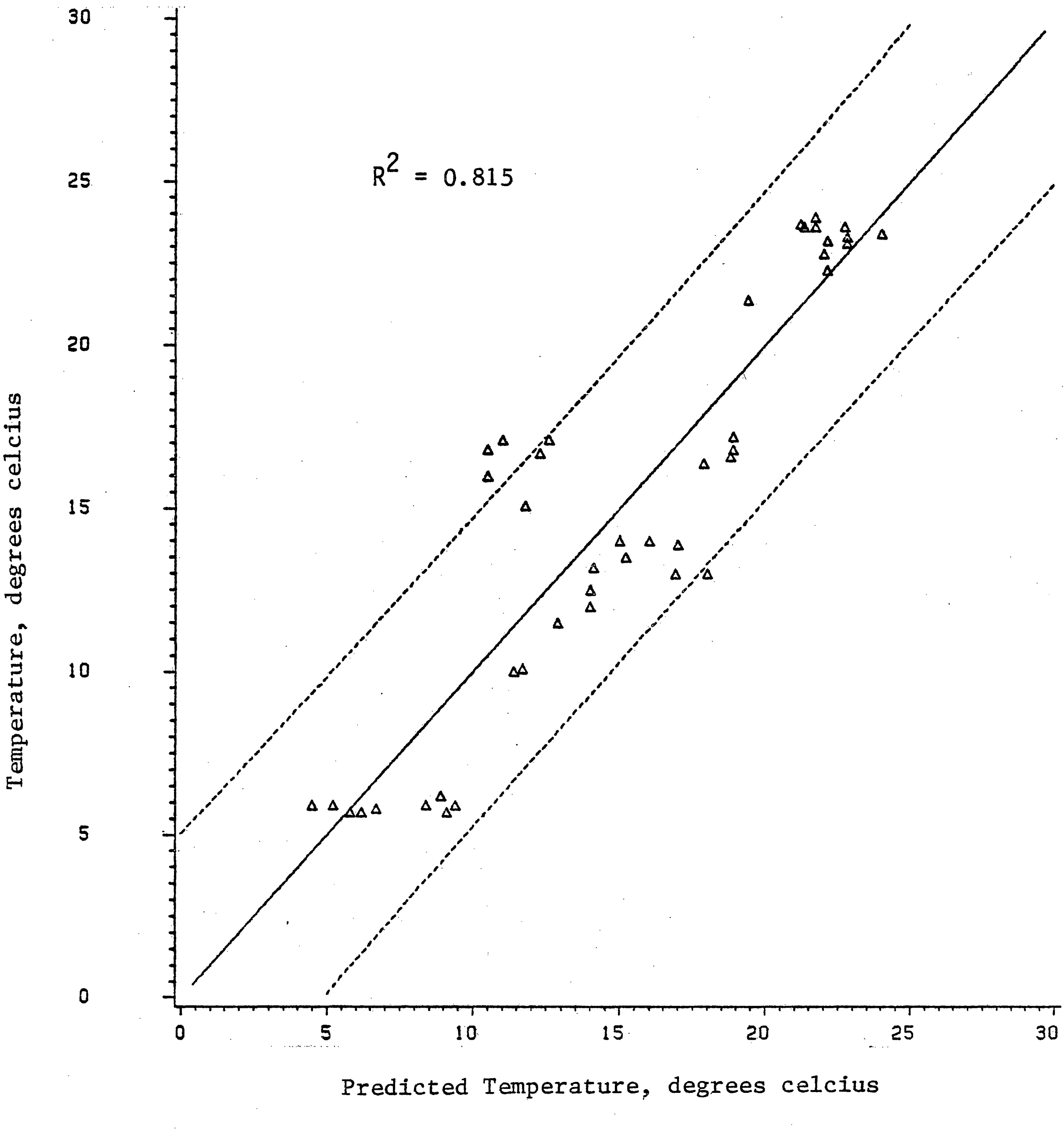


Figure 5.9 Application of Equation 5.4 to 43 Point Dataset (Tapes 1 and 3 Deleted)

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 4 with 90 Percent Confidence Limits

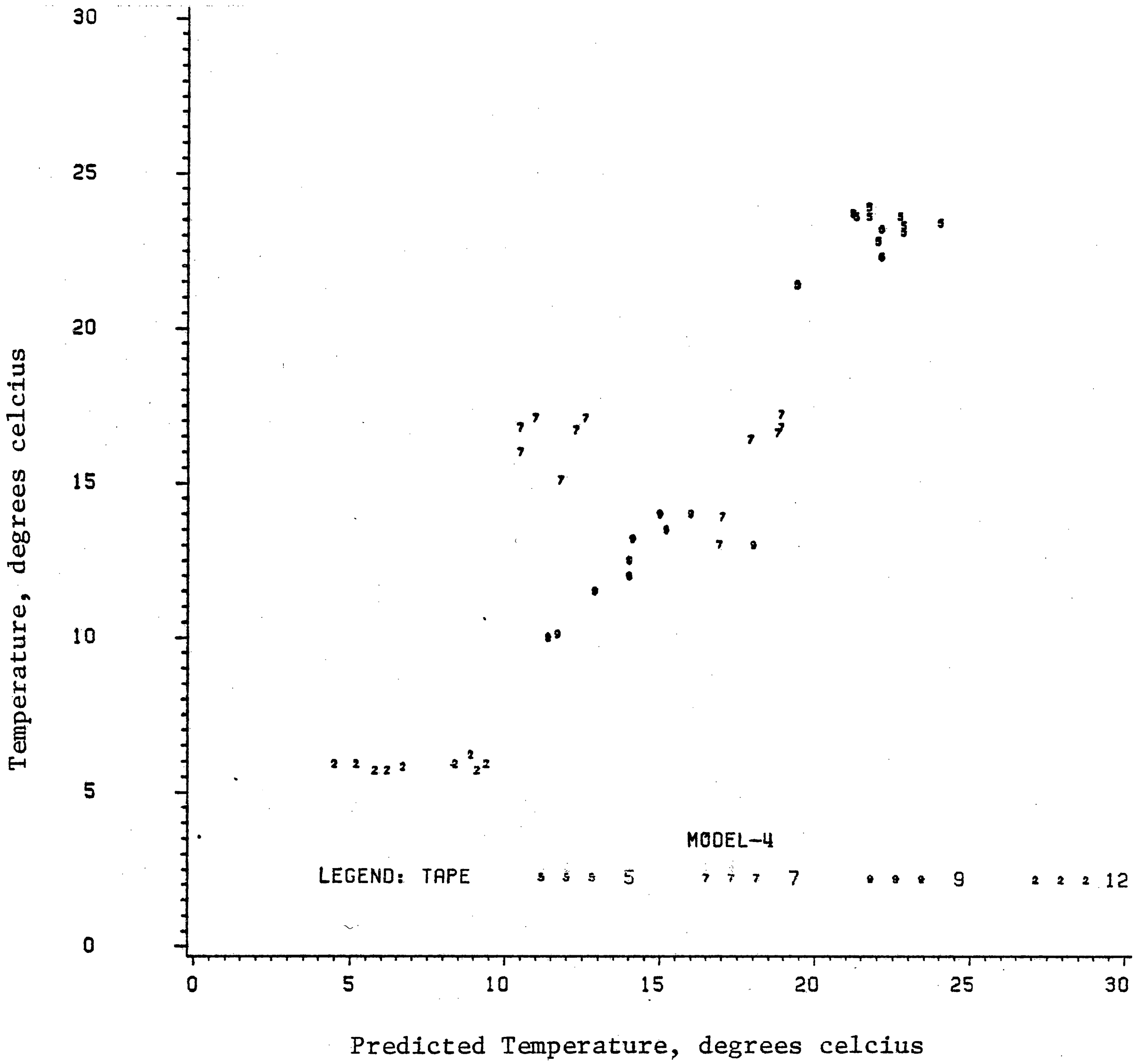


Figure 5.9 Application of Equation 5.4 to 43 Point Dataset (Tapes 1 and 3 Deleted)

(b) Data Points for Regression

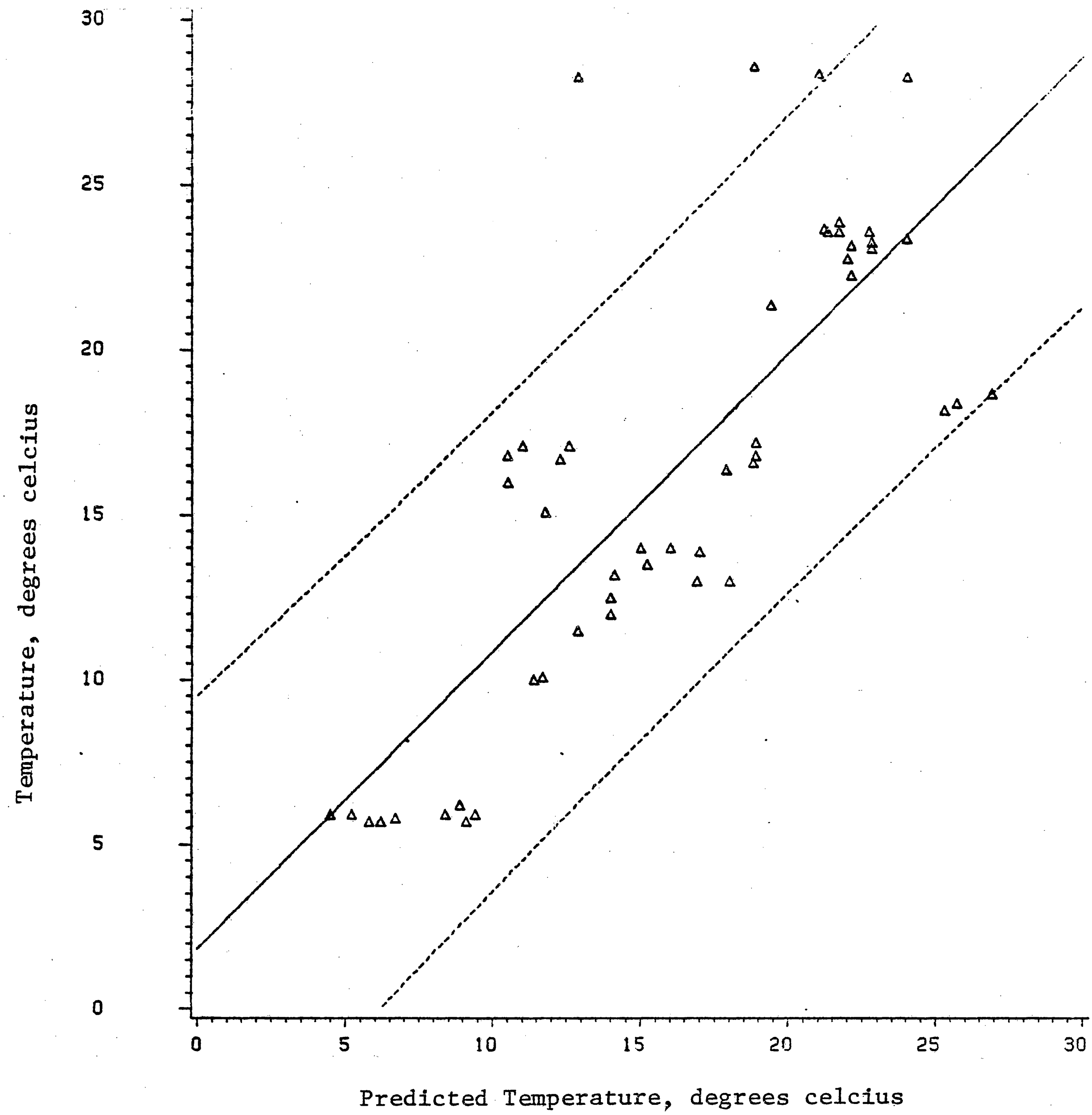


Figure 5.10 Application of Equation 5.4 to 50 Point Dataset

(b) Data Points for Regression

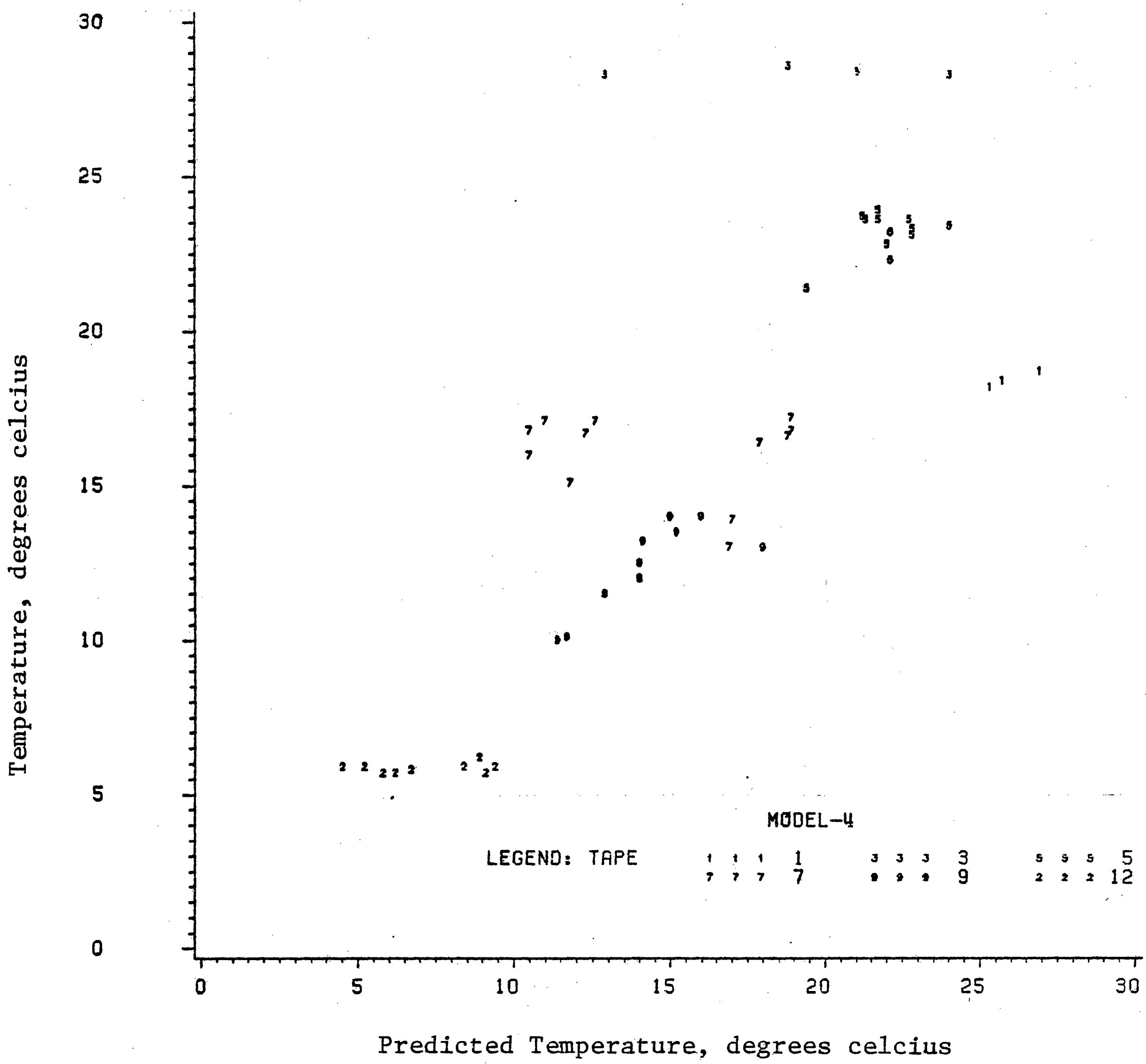
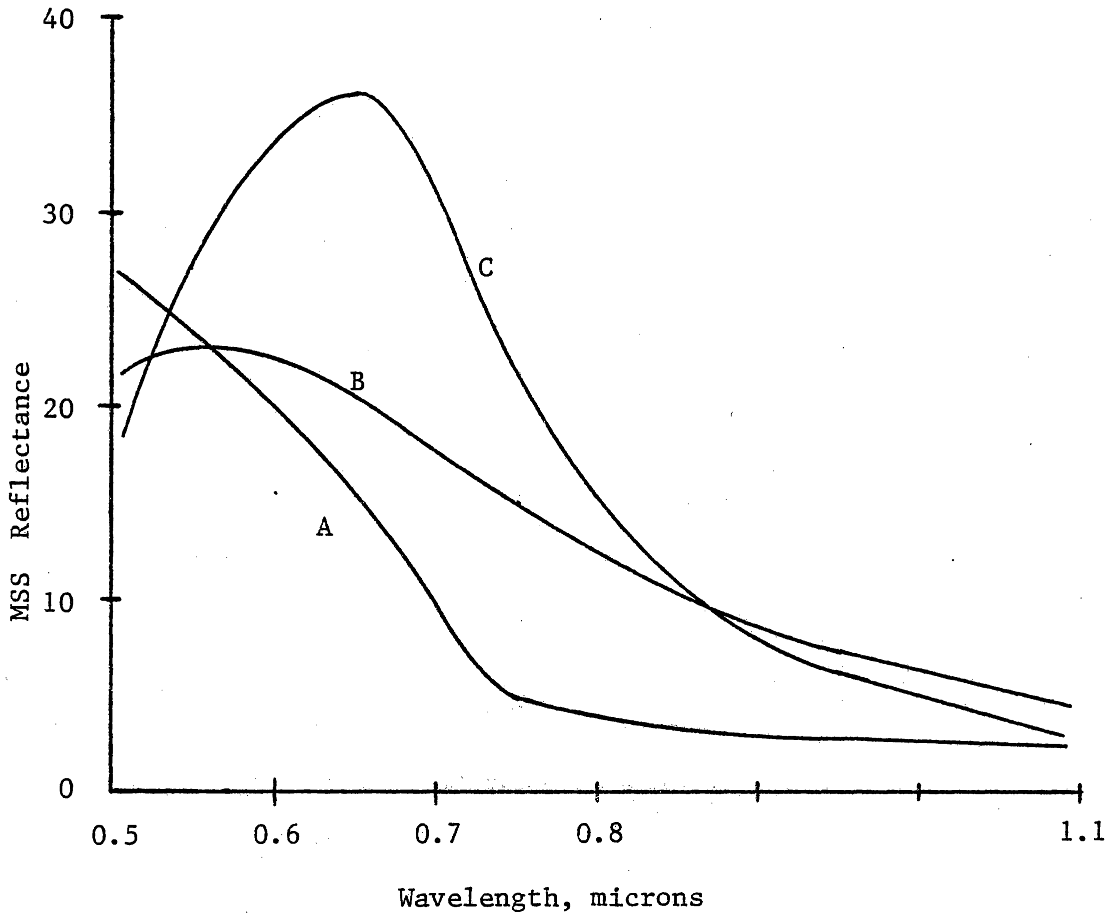


Figure 5.10 Application of Equation 5.4 to 50 Point Dataset

(a) Linear Regression of Temperature (Degrees Celcius) versus Model 4 with 90 Percent Confidence Limits

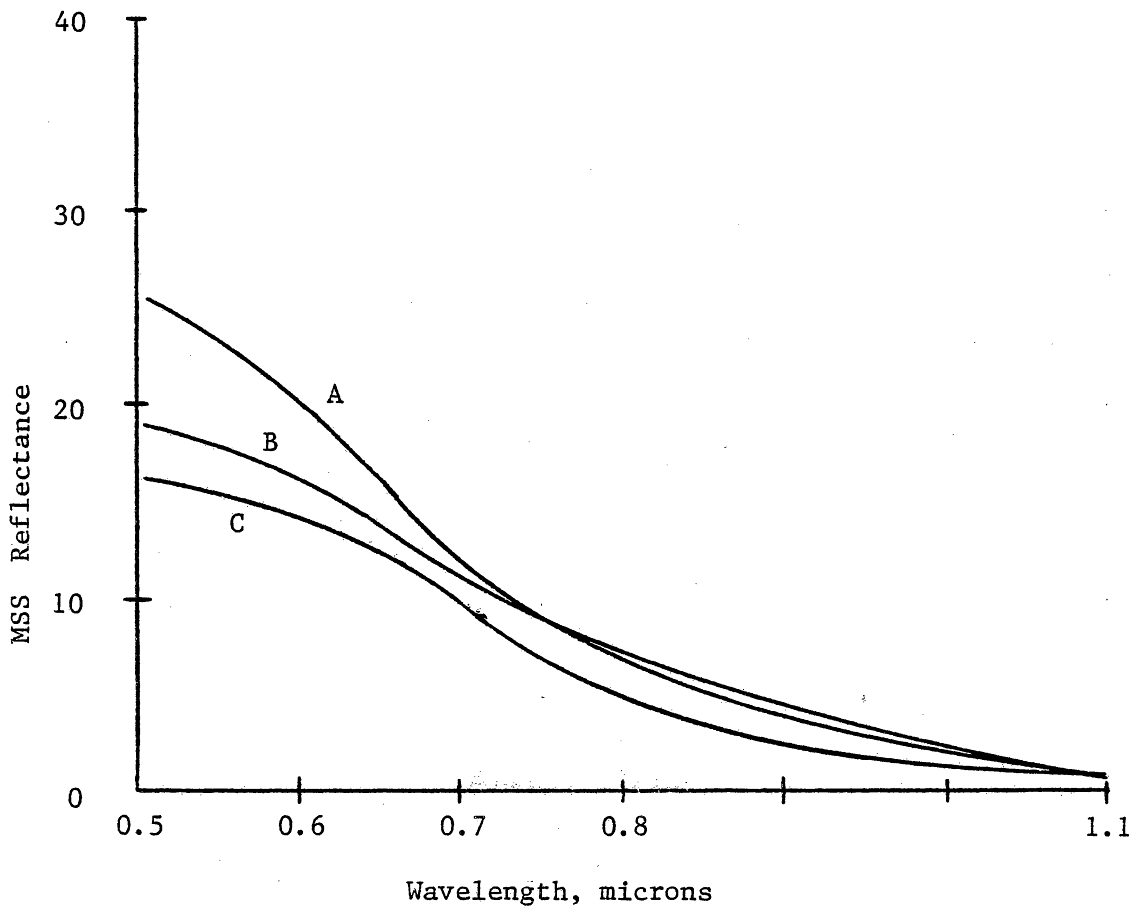


A : TSS = 4.3 ppm, T = 18.7 degrees celcius

B : TSS = 5.6 ppm, T = 18.4 degrees celcius

C : TSS =19.2 ppm, T = 21.4 degrees celcius

Figure 6.1 Effect of Total Suspended Solids in Kerr Reservoir on Irradiance Detected by Landsat MSS



A : T = 18.2 degrees celcius, TSS = 4.4 ppm

B : T = 23.6 degrees celcius, TSS = 4.0 ppm

C : T = 28.6 degrees celcius, TSS = 3.6 ppm

Figure 6.2 Effect of Temperature in Kerr Reservoir on Irradiance Detected by Landsat MSS

APPENDIX A

Kerr Reservoir Field Data

APPENDIX A

---------------------------------- DATE=30APR81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	1	.	.	.	.	.	.	.	.	.	1
24	1	1345	1.5	20.50	112	11.066	11	.	.	.	1
24	1	1345	5.0	20.50	110	10.060	10	.	.	.	1
24	1	1345	10.0	20.00	90	10.060	10	.	.	.	1
24	1	1345	15.0	17.75	350	9.054	9	.	.	.	1
22	1	1120	2.0	20.50	140	16.096	16	.	.	.	1
22	1	1120	5.0	20.00	15	7.042	7	.	.	.	1
22	1	1120	10.0	19.00	255	5.030	5	.	.	.	1
22	1	1120	15.0	17.00	205	4.024	4	.	.	.	1
22	1	1120	20.0	15.70	235	6.036	6	.	.	.	1
22	1	1120	25.0	15.20	305	3.018	3	.	.	.	1
20	1	1010	1.0	20.00	0	0.000	0	.	.	.	1
20	1	1010	10.0	19.75	0	10.060	10	.	.	.	1
20	1	1010	20.0	16.50	30	0.000	0	.	.	.	1
18	1	1500	5.0	20.00	140	19.114	19	.	.	.	1
18	1	1500	10.0	19.50	105	9.054	9	.	.	.	1
18	1	1500	15.0	17.20	50	2.012	2	.	.	.	1
18	1	1500	20.0	16.00	325	5.030	5	.	.	.	1
18	1	1500	25.0	15.90	.	.	.	.	.	.	1
15	1	1600	5.0	20.10	170	14.084	14	21.8	.	.	1
15	1	1600	10.0	19.20	188	3.018	3	21.8	.	.	1
15	1	1600	15.0	17.20	225	1.006	1	21.8	.	.	1
15	1	1600	20.0	16.50	260	0.000	0	21.8	.	.	1
15	1	1600	25.0	16.00	278	1.006	1	21.8	.	.	1
15	1	1600	30.0	15.80	292	1.006	1	21.8	.	.	1
11	1	1700	5.0	18.20	60	16.096	16	.	.	.	1
11	1	1700	10.0	17.80	65	12.072	12	.	.	.	1
11	1	1700	15.0	16.50	90	4.024	4	.	.	.	1
11	1	1700	20.0	16.20	142	0.000	0	.	.	.	1
11	1	1700	25.0	15.60	205	6.036	6	.	.	.	1
11	1	1700	30.0	15.20	195	8.048	8	.	.	.	1
11	1	1700	35.0	14.90	205	0.000	0	.	.	.	1
11	1	1700	40.0	14.50	155	4.024	4	.	.	.	1
11	1	1700	45.0	14.00	150	0.000	0	.	.	.	1
11	1	1700	50.0	13.20	105	2.012	2	.	.	.	1
11	1	1700	55.0	12.20	60	11.066	11	.	.	.	1
11	1	1700	60.0	11.80	45	12.072	12	.	.	.	1
11	1	1700	66.0	11.60	.	.	.	.	.	.	1

APPENDIX A (continued)

---------------------------------- DATE=01MAY81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
8	1	835	5	18.2	248	18.108	18	.	.	.	1
8	1	835	10	18.0	265	9.054	9	.	.	.	1
8	1	835	15	18.0	245	5.030	5	.	.	.	1
8	1	835	20	17.7	235	1.006	1	.	.	.	1
8	1	835	30	15.6	205	5.030	5	.	.	.	1
8	1	835	40	15.0	130	4.024	4	.	.	.	1
8	1	835	50	13.9	97	4.024	4	.	.	.	1
8	1	835	60	12.8	75	1.006	1	.	.	.	1
5	1	945	5	18.1	260	11.066	11	15.5	.	.	1
5	1	945	10	18.0	265	10.060	10	15.5	.	.	1
5	1	945	15	18.1	270	8.048	8	15.5	.	.	1
5	1	945	20	17.9	295	4.024	4	15.5	.	.	1
5	1	945	30	16.4	150	7.042	7	15.5	.	.	1
5	1	945	40	15.2	97	10.060	10	15.5	.	.	1
5	1	945	50	13.2	55	5.030	5	15.5	.	.	1
5	1	945	60	11.8	260	3.018	3	15.5	.	.	1
3	1	1100	5	19.5	290	9.054	9	.	.	.	1
3	1	1100	10	19.1	245	7.042	7	.	.	.	1
3	1	1100	15	18.8	200	3.018	3	.	.	.	1
3	1	1100	20	17.5	110	14.084	14	.	.	.	1
3	1	1100	30	15.9	125	3.018	3	.	.	.	1
3	1	1100	40	15.2	180	1.006	1	.	.	.	1
3	1	1100	50	13.0	283	1.006	1	.	.	.	1
3	1	1100	60	11.8	80	0.000	0	.	.	.	1
D	1	1153	5	18.7	262	3.018	3	.	.	.	1
D	1	1153	10	18.7	200	10.060	10	.	.	.	1
D	1	1153	15	18.1	180	7.042	7	.	.	.	1
D	1	1153	20	17.4	.	.	.	.	.	.	1
G	1	1320	5	18.2	.	.	.	.	.	.	1
G	1	1320	10	17.1	.	.	.	.	.	.	1
G	1	1320	15	17.0	.	.	.	.	.	.	1
G	1	1320	20	16.5	.	.	.	.	.	.	1
G	1	1320	30	15.5	.	.	.	.	.	.	1
G	1	1320	40	14.6	.	.	.	.	.	.	1
G	1	1320	50	13.5	.	.	.	.	.	.	1
K	1	1250	5	18.4	215	10.060	10	.	.	.	1
K	1	1250	10	17.6	270	4.024	4	.	.	.	1
K	1	1250	15	16.3	325	12.072	12	.	.	.	1
K	1	1250	20	16.0	308	10.060	10	.	.	.	1
K	1	1250	30	15.1	300	23.138	23	.	.	.	1
K	1	1250	40	14.2	.	.	.	.	.	.	1

APPENDIX A (continued)

----------------------------------- DATE=18MAY81 -----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	2	.	.	.	.	.	.	.	.	.	1
24	2	835	5	21.0	305	7.042	7	16.8	.	.	1
24	2	835	10	20.2	263	0.000	0	16.8	.	.	1
24	2	835	15	19.8	173	4.024	4	16.8	.	.	1
24	2	835	17	19.3	.	.	.	16.8	.	.	1
22	2	1000	5	20.5	270	6.036	6	.	.	.	1
22	2	1000	10	20.0	30	2.012	2	.	.	.	1
22	2	1000	15	19.0	.	.	.	.	.	.	1
20	2	1140	5	20.0	240	2.012	2	.	.	.	1
20	2	1140	10	19.8	165	1.006	1	.	.	.	1
20	2	1140	15	19.5	250	2.012	2	.	.	.	1
20	2	1140	20	18.5	135	0.000	0	.	.	.	1
20	2	1140	21	18.3	.	.	.	.	.	.	1
18	2	1230	5	19.8	175	3.018	3	.	.	.	1
18	2	1230	10	19.6	140	4.024	4	.	.	.	1
18	2	1230	15	19.0	125	6.036	6	.	.	.	1
18	2	1230	20	18.5	65	5.030	5	.	.	.	1
18	2	1230	25	17.8	.	.	.	.	.	.	1
15	2	1345	5	19.2	60	5.030	5	.	.	.	1
15	2	1345	10	19.0	130	3.018	3	.	.	.	1
15	2	1345	15	18.8	165	1.006	1	.	.	.	1
15	2	1345	20	18.2	145	4.024	4	.	.	.	1
15	2	1345	25	17.5	105	5.030	5	.	.	.	1
15	2	1345	30	16.0	.	.	.	.	.	.	1
11	2	1430	5	19.5	45	2.012	2	16.5	.	0	1
11	2	1430	10	19.0	60	5.030	5	16.5	.	0	1
11	2	1430	15	18.6	130	4.024	4	16.5	.	0	1
11	2	1430	20	18.1	195	7.042	7	16.5	.	0	1
11	2	1430	30	16.9	195	5.030	5	16.5	.	0	1
11	2	1430	40	15.0	60	14.084	14	16.5	.	0	1
11	2	1430	50	14.0	45	22.132	22	16.5	.	0	1
11	2	1430	60	13.1	45	22.132	22	16.5	.	0	1
11	2	1430	62	12.9	.	.	.	16.5	.	0	1
8	2	1530	5	19.2	55	0.000	0	.	.	.	1
8	2	1530	10	19.0	110	2.012	2	.	.	.	1
8	2	1530	15	18.8	30	2.012	2	.	.	.	1
8	2	1530	20	18.1	100	2.012	2	.	.	.	1
8	2	1530	30	17.5	45	1.006	1	.	.	.	1
8	2	1530	40	15.5	60	8.048	8	.	.	.	1
8	2	1530	50	14.1	65	8.048	8	.	.	.	1
8	2	1530	56	13.8	.	.	.	.	.	.	1
5	2	900	5	18.9	315	2.012	2	.	.	.	1
5	2	900	10	19.0	80	4.024	4	.	.	.	1
5	2	900	15	19.0	40	5.030	5	.	.	.	1
5	2	900	20	19.0	305	10.060	10	.	.	.	1
5	2	900	30	18.1	15	15.090	15	.	.	.	1
5	2	900	34	17.0	120	23.138	23	.	.	.	1
5	2	900	40	15.5	105	16.096	16	.	.	.	1
5	2	900	50	13.6	120	2.012	2	.	.	.	1
5	2	900	60	12.2	45	0.000	0	.	.	.	1

APPENDIX A (continued)

------------------------------------ DATE=19MAY81 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
3	2	1330	5	17.7	105	6.036	6	.	.	.	1
3	2	1330	10	17.8	120	11.066	11	.	.	.	1
3	2	1330	15	17.8	110	9.054	9	.	.	.	1
3	2	1330	20	17.8	75	13.078	13	.	.	.	1
3	2	1330	30	14.8	90	8.048	8	.	.	.	1
3	2	1330	40	14.0	35	6.036	6	.	.	.	1
3	2	1330	50	12.2	90	8.048	8	.	.	.	1
3	2	1330	56	11.2	.	.	.	.	.	.	1
D	2	1230	5	17.2	175	8.048	8	.	.	.	1
D	2	1230	10	17.3	275	14.084	14	.	.	.	1
D	2	1230	15	17.5	195	7.042	7	.	.	.	1
D	2	1230	18	17.3	.	.	.	.	.	.	1
G	2	1115	5	18.2	290	8.048	8	.	.	.	1
G	2	1115	10	18.1	320	10.060	10	.	.	.	1
G	2	1115	15	18.1	315	11.066	11	.	.	.	1
G	2	1115	20	18.0	295	14.084	14	.	.	.	1
G	2	1115	30	18.0	315	13.078	13	.	.	.	1
G	2	1115	36	16.8	15	16.096	16	.	.	.	1
G	2	1115	40	15.8	345	14.084	14	.	.	.	1
G	2	1115	50	15.5	.	.	.	.	.	.	1
K	2	1000	5	18.9	180	17.102	17	.	.	.	1
K	2	1000	10	19.0	150	15.090	15	.	.	.	1
K	2	1000	15	19.0	135	8.048	8	.	.	.	1
K	2	1000	20	19.0	90	8.048	8	.	.	.	1
K	2	1000	30	18.2	15	8.048	8	.	.	.	1
K	2	1000	40	17.2	.	.	.	.	.	.	1

APPENDIX A (continued)

------------------------------------ DATE=24JUN81 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	3	845	5	28.8	165	25.150	25	75	.	5.0	1
24	3	1000	5	28.4	310	11.066	11	.	0	0.0	1
24	3	1000	10	28.2	335	1.006	1	.	0	0.0	1
24	3	1000	15	28.0	235	3.018	3	.	0	0.0	1
22	3	1130	5	28.4	345	3.018	3	.	0	2.5	1
22	3	1130	10	28.2	290	2.012	2	.	0	2.5	1
22	3	1130	15	28.0	260	11.066	11	.	0	2.5	1
20	3	1200	5	28.8	15	15.090	15	.	0	10.0	1
20	3	1200	10	28.6	30	7.042	7	.	0	10.0	1
20	3	1200	15	28.2	160	8.048	8	.	0	10.0	1
20	3	1200	20	26.5	175	20.120	20	.	0	10.0	1
18	3	1815	5	29.7	285	6.036	6	.	.	7.0	1
18	3	1815	10	29.0	20	11.066	11	.	.	7.0	1
18	3	1815	15	28.6	180	6.036	6	.	.	7.0	1
18	3	1815	20	28.0	.	.	.	.	.	7.0	1
15	3	1330	5	28.9	25	17.102	17	.	.	0.0	1
15	3	1330	10	28.6	330	12.072	12	.	.	0.0	1
15	3	1330	15	27.9	45	11.066	11	.	.	0.0	1
15	3	1330	20	26.0	100	9.054	9	.	.	0.0	1
15	3	1330	30	22.8	195	8.048	8	.	.	0.0	1
15	3	1330	33	22.0	155	4.024	4	.	.	0.0	1
11	3	1420	5	30.0	210	12.072	12	92	.	2.5	1
11	3	1420	10	29.8	270	14.084	14	92	.	2.5	1
11	3	1420	15	29.0	210	21.126	21	92	.	2.5	1
11	3	1420	20	26.8	240	1.006	1	92	.	2.5	1
11	3	1420	30	22.0	45	18.108	18	92	.	2.5	1
11	3	1420	40	19.7	40	12.072	12	92	.	2.5	1
11	3	1420	50	18.2	60	0.000	0	92	.	2.5	1
11	3	1420	58	17.5	.	.	.	92	.	2.5	1
8	3	1530	5	29.7	280	11.066	11	.	0	2.5	1
8	3	1530	10	29.2	10	0.000	0	.	0	2.5	1
8	3	1530	15	29.1	30	1.006	1	.	0	2.5	1
8	3	1530	20	25.6	90	4.024	4	.	0	2.5	1
8	3	1530	30	21.2	330	0.000	0	.	0	2.5	1
8	3	1530	40	18.9	20	4.024	4	.	0	2.5	1
8	3	1530	50	18.0	125	2.012	2	.	0	2.5	1
8	3	1530	56	17.0	.	.	.	.	0	2.5	1
5	3	1700	5	29.5	90	3.018	3	.	.	6.0	1
5	3	1700	10	29.1	135	11.066	11	.	.	6.0	1
5	3	1700	15	29.0	105	7.042	7	.	.	6.0	1
5	3	1700	20	25.8	165	23.138	23	.	.	6.0	1
5	3	1700	30	20.8	145	17.102	17	.	.	6.0	1
5	3	1700	40	18.5	245	2.012	2	.	.	6.0	1
5	3	1700	50	17.7	55	5.030	5	.	.	6.0	1
5	3	1700	57	16.9	.	.	.	.	.	6.0	1

APPENDIX A (continued)

------------------------------------ DATE=25JUN81 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
3	3	830	5	28.8	45	12.072	12	75	5	7	1
3	3	830	10	28.7	0	11.066	11	75	5	7	1
3	3	830	15	28.7	52	9.054	9	75	5	7	1
3	3	830	20	28.4	305	3.018	3	75	5	7	1
3	3	830	22	24.5	.	.	.	75	5	7	1
3	3	830	27	23.0	.	.	.	75	5	7	1
3	3	830	30	20.5	215	9.054	9	75	5	7	1
3	3	830	40	18.5	170	5.030	5	75	5	7	1
3	3	830	50	14.5	180	2.012	2	75	5	7	1
3	3	830	60	12.5	215	6.036	6	75	5	7	1
D	3	930	5	28.5	35	33.198	33	.	.	13	1
D	3	930	10	28.3	35	24.144	24	.	.	13	1
D	3	930	15	28.2	20	14.084	14	.	.	13	1
D	3	930	16	28.1	.	.	.	.	.	13	1
G	3	1015	5	28.5	27	23.138	23	.	.	10	1
G	3	1015	10	28.3	15	20.120	20	.	.	10	1
G	3	1015	15	28.2	15	25.150	25	.	.	10	1
G	3	1015	20	23.9	75	8.048	8	.	.	10	1
G	3	1015	30	19.5	150	2.012	2	.	.	10	1
G	3	1015	40	18.0	130	13.078	13	.	.	10	1
G	3	1015	50	17.0	140	10.060	10	.	.	10	1
G	3	1015	53	16.5	.	.	.	.	.	10	1
K	3	1100	5	28.6	10	15.090	15	.	.	5	1
K	3	1100	10	28.3	20	27.162	27	.	.	5	1
K	3	1100	15	26.0	195	19.114	19	.	.	5	1
K	3	1100	20	24.7	240	7.042	7	.	.	5	1
K	3	1100	21	22.5	.	.	.	.	.	5	1
K	3	1100	22	22.2	.	.	.	.	.	5	1
K	3	1100	23	22.0	.	.	.	.	.	5	1
K	3	1100	24	20.5	.	.	.	.	.	5	1
K	3	1100	25	20.3	210	11.066	11	.	.	5	1
K	3	1100	30	19.0	195	21.126	21	.	.	5	1
K	3	1100	35	18.3	.	.	.	.	.	5	1

APPENDIX A (continued)

------------------------------------ DATE=16AUG81 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	4	815	2.0	28.2	.	.	.	25.9	.	0	1
100	4	815	5.0	28.2	200	7.042	7	25.9	.	0	1
24	4	915	2.0	28.2	55	6.036	6	27.8	.	0	1
24	4	915	5.0	28.1	135	0.000	0	27.8	.	0	1
24	4	915	10.0	28.1	340	4.024	4	27.8	.	0	1
24	4	915	15.0	28.0	345	1.006	1	27.8	.	0	1
24	4	915	17.0	27.4	.	.	.	27.8	.	0	1
22	4	940	2.0	28.2	210	13.078	13	27.8	.	0	1
22	4	940	5.0	28.1	105	9.054	9	27.8	.	0	1
22	4	940	10.0	28.1	120	2.012	2	27.8	.	0	1
22	4	940	15.0	28.1	40	3.018	3	27.8	.	0	1
22	4	940	20.0	28.1	345	1.006	1	27.8	.	0	1
22	4	940	22.5	27.7	130	12.072	12	27.8	.	0	1
20	4	1010	2.0	28.5	110	7.042	7	29.0	.	0	1
20	4	1010	5.0	28.4	85	7.042	7	29.0	.	0	1
20	4	1010	10.0	28.3	295	6.036	6	29.0	.	0	1
20	4	1010	15.0	28.2	310	5.030	5	29.0	.	0	1
20	4	1010	20.0	28.0	210	3.018	3	29.0	.	0	1
20	4	1010	25.0	27.5	200	13.078	13	29.0	.	0	1
20	4	1010	29.0	27.2	160	10.060	10	29.0	.	0	1
18	4	1045	2.0	28.5	350	11.066	11	28.0	.	0	1
18	4	1045	5.0	28.3	350	5.030	5	28.0	.	0	1
18	4	1045	10.0	28.2	330	12.072	12	28.0	.	0	1
18	4	1045	15.0	28.1	305	8.048	8	28.0	.	0	1
18	4	1045	18.0	28.1	320	4.024	4	28.0	.	0	1
15	4	1115	2.0	28.9	170	28.168	28	28.7	.	0	1
15	4	1115	5.0	28.6	180	9.054	9	28.7	.	0	1
15	4	1115	10.0	28.5	345	1.006	1	28.7	.	0	1
15	4	1115	15.0	28.3	40	6.036	6	28.7	.	0	1
15	4	1115	20.0	28.2	60	9.054	9	28.7	.	0	1
15	4	1115	25.0	27.5	150	2.012	2	28.7	.	0	1
15	4	1115	30.0	27.1	170	2.012	2	28.7	.	0	1
15	4	1115	30.5	.	.	.	.	28.7	.	0	1
11	4	1150	2.0	28.5	85	14.084	14	26.5	.	0	1
11	4	1150	5.0	28.5	130	9.054	9	26.5	.	0	1
11	4	1150	10.0	27.4	125	3.018	3	26.5	.	0	1
11	4	1150	15.0	27.2	270	5.030	5	26.5	.	0	1
11	4	1150	20.0	27.1	335	8.048	8	26.5	.	0	1
11	4	1150	25.0	27.0	300	6.036	6	26.5	.	0	1
11	4	1150	30.0	25.8	225	27.162	27	26.5	.	0	1
11	4	1150	35.0	24.8	225	7.042	7	26.5	.	0	1
11	4	1150	40.0	23.7	250	15.090	15	26.5	.	0	1
11	4	1150	45.0	21.8	325	7.042	7	26.5	.	0	1
11	4	1150	50.0	20.2	65	18.108	18	26.5	.	0	1
11	4	1150	55.0	19.3	55	0.000	0	26.5	.	0	1
11	4	1150	60.0	18.0	35	15.090	15	26.5	.	0	1
8	4	1355	2.0	28.2	120	26.156	26	27.2	.	7	1
8	4	1355	5.0	28.2	130	23.138	23	27.2	.	7	1
8	4	1355	10.0	27.8	15	2.012	2	27.2	.	7	1
8	4	1355	15.0	27.4	20	7.042	7	27.2	.	7	1
8	4	1355	20.0	27.4	55	14.084	14	27.2	.	7	1
8	4	1355	30.0	27.0	250	7.042	7	27.2	.	7	1
8	4	1355	40.0	24.8	255	8.048	8	27.2	.	7	1
8	4	1355	50.0	21.0	225	6.036	6	27.2	.	7	1
8	4	1355	57.5	18.9	210	0.000	0	27.2	.	7	1
5	4	1440	2.0	28.4	30	4.024	4	26.8	.	9	1
5	4	1440	5.0	28.0	195	10.060	10	26.8	.	9	1
5	4	1440	10.0	27.6	80	6.036	6	26.8	.	9	1
5	4	1440	15.0	27.5	140	3.018	3	26.8	.	9	1

APPENDIX A (continued)

------------------------------------ DATE=16AUG81 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
5	4	1440	20	27.3	345	1.006	1	26.8	.	9	1
5	4	1440	25	27.3	240	7.042	7	26.8	.	9	1
5	4	1440	30	26.9	290	15.090	15	26.8	.	9	1
5	4	1440	40	25.6	330	14.084	14	26.8	.	9	1
5	4	1440	50	20.3	315	8.048	8	26.8	.	9	1
5	4	1440	60	18.3	260	2.012	2	26.8	.	9	1
3	4	1510	2	28.1	115	10.060	10	26.8	.	2	1
3	4	1510	5	28.1	110	6.036	6	26.8	.	2	1
3	4	1510	10	27.9	250	13.078	13	26.8	.	2	1
3	4	1510	15	27.5	175	6.036	6	26.8	.	2	1
3	4	1510	20	27.4	320	5.030	5	26.8	.	2	1
3	4	1510	25	27.3	305	4.024	4	26.8	.	2	1
3	4	1510	30	27.3	295	1.006	1	26.8	.	2	1
3	4	1510	40	25.0	85	5.030	5	26.8	.	2	1
3	4	1510	50	21.1	100	8.048	8	26.8	.	2	1
3	4	1510	60	18.4	305	3.018	3	26.8	.	2	1
D	4	1540	2	28.6	45	19.114	19	.	.	0	1
D	4	1540	5	28.0	55	10.060	10	.	.	0	1
D	4	1540	10	27.6	265	9.054	9	.	.	0	1
D	4	1540	15	27.3	245	29.174	29	.	.	0	1
D	4	1540	20	27.2	230	30.180	30	.	.	0	1
D	4	1540	25	27.2	230	28.168	28	.	.	0	1
D	4	1540	30	26.6	250	27.162	27	.	.	0	1
D	4	1540	40	24.5	235	11.066	11	.	.	0	1

------------------------------------ DATE=17AUG81 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
G	4	1040	2.0	27.0	215	21.126	21	20.8	.	20	1
G	4	1040	5.0	27.0	245	21.126	21	20.8	.	20	1
G	4	1040	10.0	27.0	185	18.108	18	20.8	.	20	1
G	4	1040	15.0	27.0	160	9.054	9	20.8	.	20	1
G	4	1040	20.0	27.0	250	18.108	18	20.8	.	20	1
G	4	1040	30.0	25.5	30	9.054	9	20.8	.	20	1
G	4	1040	40.0	23.5	45	10.060	10	20.8	.	20	1
K	4	1115	2.0	27.0	225	23.138	23	21.5	.	15	1
K	4	1115	5.0	26.8	210	19.114	19	21.5	.	15	1
K	4	1115	10.0	26.8	215	17.102	17	21.5	.	15	1
K	4	1115	15.0	26.8	205	14.084	14	21.5	.	15	1
K	4	1115	20.0	26.8	290	15.090	15	21.5	.	15	1
K	4	1115	30.0	26.6	35	20.120	20	21.5	.	15	1
K	4	1115	32.5	25.5	.	.	.	21.5	.	15	1

APPENDIX A (continued)

------------------------------------ DATE=03SEP81 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	5	1125	2.0	26.8	325	3.018	3	27.1	.	4	1
24	5	1200	2.0	26.8	290	22.132	22	28.6	.	6	1
24	5	1200	5.0	26.5	280	5.030	5	28.6	.	6	1
24	5	1200	10.0	26.1	305	3.018	3	28.6	.	6	1
22	5	1240	2.0	26.9	165	2.012	2	31.0	.	6	1
22	5	1240	5.0	26.8	135	9.054	9	31.0	.	6	1
22	5	1240	8.0	26.8	140	7.042	7	31.0	.	6	1
20	5	1305	2.0	26.9	360	23.138	23	26.5	.	6	1
20	5	1305	5.0	26.8	355	11.066	11	26.5	.	6	1
20	5	1305	10.0	26.5	320	5.030	5	26.5	.	6	1
20	5	1305	15.0	26.3	195	4.024	4	26.5	.	6	1
20	5	1305	18.2	26.1	210	11.066	11	26.5	.	6	1
18	5	1440	2.0	26.8	300	24.144	24	29.9	.	5	1
18	5	1440	5.0	26.8	290	18.108	18	29.9	.	5	1
18	5	1440	10.0	26.3	255	9.054	9	29.9	.	5	1
18	5	1440	15.0	26.0	275	6.036	6	29.9	.	5	1
18	5	1440	20.0	25.9	22	8.048	8	29.9	.	5	1
15	5	1530	2.0	27.0	355	17.102	17	34.8	.	5	1
15	5	1530	5.0	26.4	45	11.066	11	34.8	.	5	1
15	5	1530	10.0	25.2	45	7.042	7	34.8	.	5	1
15	5	1530	15.0	25.1	225	4.024	4	34.8	.	5	1
15	5	1530	20.0	25.1	197	14.084	14	34.8	.	5	1
15	5	1530	30.0	24.9	195	14.084	14	34.8	.	5	1
11	5	1600	2.0	27.1	240	20.120	20	28.9	.	3	1
11	5	1600	5.0	26.8	210	24.144	24	28.9	.	3	1
11	5	1600	10.0	25.9	255	19.114	19	28.9	.	3	1
11	5	1600	15.0	25.7	303	8.048	8	28.9	.	3	1
11	5	1600	20.0	25.2	60	12.072	12	28.9	.	3	1
11	5	1600	30.0	24.9	45	15.090	15	28.9	.	3	1
11	5	1600	40.0	24.1	55	3.018	3	28.9	.	3	1
11	5	1600	50.0	23.2	45	7.042	7	28.9	.	3	1
11	5	1600	59.0	21.0	50	3.018	3	28.9	.	3	1
8	5	1700	2.0	27.0	315	9.054	9	27.1	.	8	1
8	5	1700	5.0	26.5	68	14.084	14	27.1	.	8	1
8	5	1700	10.0	25.8	250	16.096	16	27.1	.	8	1
8	5	1700	15.0	25.4	230	7.042	7	27.1	.	8	1
8	5	1700	20.0	25.3	205	5.030	5	27.1	.	8	1
8	5	1700	30.0	24.9	105	1.006	1	27.1	.	8	1
8	5	1700	40.0	24.1	290	9.054	9	27.1	.	8	1
8	5	1700	50.0	23.4	210	3.018	3	27.1	.	8	1
8	5	1700	56.0	22.5	.	.	.	27.1	.	8	1
5	5	1745	2.0	26.9	305	24.144	24	25.8	.	10	1
5	5	1745	5.0	26.5	310	18.108	18	25.8	.	10	1
5	5	1745	10.0	26.0	63	3.018	3	25.8	.	10	1
5	5	1745	15.0	25.8	34	5.030	5	25.8	.	10	1
5	5	1745	20.0	25.5	175	9.054	9	25.8	.	10	1
5	5	1745	30.0	24.5	160	17.102	17	25.8	.	10	1
5	5	1745	40.0	24.0	80	11.066	11	25.8	.	10	1
5	5	1745	50.0	23.1	150	7.042	7	25.8	.	10	1
5	5	1745	52.0	22.2	.	.	.	25.8	.	10	1
5	5	1745	56.0	21.2	.	.	.	25.8	.	10	1
5	5	1745	59.0	20.0	135	2.012	2	25.8	.	10	1
3	5	1820	2.0	26.3	305	20.120	20	24.9	.	10	1
3	5	1820	5.0	26.3	300	14.084	14	24.9	.	10	1
3	5	1820	10.0	25.6	220	5.030	5	24.9	.	10	1
3	5	1820	15.0	25.2	165	7.042	7	24.9	.	10	1
3	5	1820	20.0	24.5	90	17.102	17	24.9	.	10	1
3	5	1820	30.0	24.0	135	11.066	11	24.9	.	10	1
3	5	1820	40.0	23.9	100	7.042	7	24.9	.	10	1

APPENDIX A (continued)

DATE=03SEP81

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
3	5	1820	50.0	22.9	64	4.024	4	24.9	.	10	1
3	5	1820	53.5	21.8	.	.	.	24.9	.	10	1
3	5	1820	59.0	20.8	32	2.012	2	24.9	.	10	1
D	5	1900	2.0	26.7	285	10.060	10	24.0	.	7	1
D	5	1900	5.0	26.8	310	7.042	7	24.0	.	7	1
D	5	1900	10.0	26.0	320	4.024	4	24.0	.	7	1
D	5	1900	15.0	24.9	180	6.036	6	24.0	.	7	1
D	5	1900	20.0	24.5	195	2.012	2	24.0	.	7	1
D	5	1900	30.0	24.1	105	3.018	3	24.0	.	7	1

DATE=04SEP81

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
G	5	1230	2	26.1	285	5.030	5	25.3	.	5	1
G	5	1230	5	26.0	300	9.054	9	25.3	.	5	1
G	5	1230	10	25.8	110	15.090	15	25.3	.	5	1
G	5	1230	15	25.2	45	11.066	11	25.3	.	5	1
G	5	1230	20	25.2	110	7.042	7	25.3	.	5	1
G	5	1230	25	24.0	.	.	.	25.3	.	5	1
G	5	1230	30	24.0	10	10.060	10	25.3	.	5	1
K	5	1305	2	26.7	295	3.018	3	24.9	.	5	1
K	5	1305	5	26.5	240	5.030	5	24.9	.	5	1
K	5	1305	10	26.0	195	6.036	6	24.9	.	5	1
K	5	1305	15	24.8	300	2.012	2	24.9	.	5	1
K	5	1305	20	24.1	300	4.024	4	24.9	.	5	1
K	5	1305	30	23.9	255	4.024	4	24.9	.	5	1

APPENDIX A (continued)

---------------------------------- DATE=08OCT81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	6	1200	2.0	16.9	.	11.066	11	16	.	14	A
100	6	1200	4.5	16.9	165	9.054	9	16	.	14	A
100	6	1230	2.0	19.0	.	.	.	16	.	.	C
100	6	1215	2.0	15.9	130	12.072	12	16	.	.	1
100	6	1215	5.0	17.1	150	12.072	12	16	.	.	1
24	6	1250	2.0	18.1	135	16.096	16	.	.	.	A
24	6	1250	5.0	18.0	140	14.084	14	.	.	.	A
24	6	1325	2.0	17.9	180	18.108	18	.	.	.	C
24	6	1340	2.0	20.0	180	16.096	16	.	.	.	D
24	6	1340	5.0	19.8	195	10.060	10	.	.	.	D
24	6	1340	9.0	19.5	165	3.018	3	.	.	.	D
24	6	1310	2.0	17.8	180	10.060	10	.	.	6	1
24	6	1310	5.0	17.8	180	10.060	10	.	.	6	1
24	6	1310	10.0	17.8	315	8.048	8	.	.	6	1
24	6	1310	12.0	.	.	8.048	8	.	.	6	1
24	6	1310	15.0	17.4	350	15.090	15	.	.	6	1
24	6	1310	18.0	17.4	255	5.030	5	.	.	6	1
22	6	1415	2.0	20.0	160	22.132	22	.	.	.	B
22	6	1415	5.0	20.1	175	19.114	19	.	.	.	B
22	6	1415	10.0	19.8	175	9.054	9	.	.	.	B
22	6	1430	2.0	19.4	145	23.138	23	.	.	.	C
22	6	1430	5.0	19.5	160	21.126	21	.	.	.	C
22	6	1430	10.0	19.6	155	17.102	17	.	.	.	C
22	6	1400	2.0	20.8	200	8.048	8	.	.	12	1
22	6	1400	5.0	20.7	325	8.048	8	.	.	12	1
22	6	1400	9.0	20.1	285	10.060	10	.	.	12	1
20	6	1355	2.0	20.7	175	19.114	19	.	.	5	A
20	6	1355	5.0	19.3	165	16.096	16	.	.	5	A
20	6	1355	10.0	18.8	80	5.030	5	.	.	5	A
20	6	1355	15.0	18.8	20	11.066	11	.	.	5	A
20	6	1355	20.0	18.8	15	8.048	8	.	.	5	A
20	6	1355	25.0	18.6	5	.	.	.	.	5	A
20	6	1520	2.0	18.7	140	13.078	13	.	.	.	1
20	6	1520	5.0	18.7	95	8.048	8	.	.	.	1
20	6	1520	10.0	18.4	345	10.060	10	.	.	.	1
20	6	1520	15.0	18.2	355	14.084	14	.	.	.	1
20	6	1520	20.0	18.2	315	9.054	9	.	.	.	1
20	6	1520	25.0	18.1	210	11.066	11	.	.	.	1
18	6	1550	2.0	19.9	170	8.048	8	.	.	.	A
18	6	1550	5.0	19.9	175	6.036	6	.	.	.	A
18	6	1550	10.0	19.8	305	12.072	12	.	.	.	A
18	6	1550	15.0	19.3	300	7.042	7	.	.	.	A
18	6	1550	20.0	19.2	5	7.042	7	.	.	.	A
18	6	1550	23.0	19.2	.	.	.	.	.	.	A
18	6	1630	2.0	19.2	140	18.108	18	.	.	.	C
18	6	1630	5.0	19.3	140	11.066	11	.	.	.	C
18	6	1630	10.0	19.2	185	9.054	9	.	.	.	C
18	6	1630	15.0	19.2	255	6.036	6	.	.	.	C
18	6	1630	20.0	19.2	330	8.048	8	.	.	.	C
18	6	1640	2.0	19.4	175	16.096	16	.	.	.	D
18	6	1640	5.0	19.3	105	11.066	11	.	.	.	D
18	6	1640	10.0	19.3	115	7.042	7	.	.	.	D
18	6	1640	15.0	19.3	80	4.024	4	.	.	.	D
18	6	1640	20.0	19.3	295	6.036	6	.	.	.	D
18	6	1610	2.0	19.5	160	14.084	14	.	.	.	1
18	6	1610	5.0	19.4	170	12.072	12	.	.	.	1
18	6	1610	10.0	19.3	225	2.012	2	.	.	.	1
18	6	1610	15.0	19.2	255	5.030	5	.	.	.	1
18	6	1610	20.0	19.1	15	2.012	2	.	.	.	1

APPENDIX A (continued)

---------------------------------- DATE=08OCT81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
18	6	1610	25	19.1	240	11.066	11	.	.	.	1
18	6	1610	30	19.1	230	4.024	4	.	.	.	1
15	6	1730	2	20.0	175	12.072	12	.	.	.	A
15	6	1730	5	20.0	160	12.072	12	.	.	.	A
15	6	1730	10	20.0	155	7.042	7	.	.	.	A
15	6	1730	15	20.0	135	7.042	7	.	.	.	A
15	6	1730	20	20.0	210	9.054	9	.	.	.	A
15	6	1730	30	20.0	240	6.036	6	.	.	.	A
15	6	1730	40	19.8	105	6.036	6	.	.	.	A
15	6	1730	44	19.6	120	7.042	7	.	.	.	A
15	6	1810	2	20.0	140	9.054	9	.	.	0	C
15	6	1810	5	20.0	110	11.066	11	.	.	0	C
15	6	1810	10	20.1	140	7.042	7	.	.	0	C
15	6	1810	15	20.0	40	3.018	3	.	.	0	C
15	6	1810	20	20.0	20	14.084	14	.	.	0	C
15	6	1810	30	20.0	330	8.048	8	.	.	0	C
15	6	1810	40	20.0	75	5.030	5	.	.	0	C
15	6	1840	2	20.0	195	10.060	10	.	.	0	D
15	6	1840	5	20.0	210	3.018	3	.	.	0	D
15	6	1840	10	20.0	225	8.048	8	.	.	0	D
15	6	1840	15	20.0	15	5.030	5	.	.	0	D
15	6	1840	20	20.0	325	6.036	6	.	.	0	D
15	6	1840	30	19.9	350	0.000	0	.	.	0	D
15	6	1750	2	20.1	100	10.060	10	.	.	.	1
15	6	1750	5	20.1	145	12.072	12	.	.	.	1
15	6	1750	10	20.1	30	1.006	1	.	.	.	1
15	6	1750	15	20.1	60	5.030	5	.	.	.	1
15	6	1750	20	20.0	290	4.024	4	.	.	.	1
15	6	1750	24	20.0	300	7.042	7	.	.	.	1

APPENDIX A (continued)

---------------------------------- DATE=09OCT81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
11	6	1130	2	20.1	.	0.000	0	16.8	.	0	A
11	6	1130	5	20.1	25	6.036	6	16.8	.	0	A
11	6	1130	10	20.1	110	3.018	3	16.8	.	0	A
11	6	1130	15	20.1	295	5.030	5	16.8	.	0	A
11	6	1130	20	20.0	160	8.048	8	16.8	.	0	A
11	6	1130	30	20.0	125	3.018	3	16.8	.	0	A
11	6	1130	40	20.0	70	4.024	4	16.8	.	0	A
11	6	1130	50	19.9	65	8.048	8	16.8	.	0	A
11	6	1130	54	19.9	50	9.054	9	16.8	.	0	A
11	6	1200	2	20.1	230	14.084	14	.	.	0	1
11	6	1200	5	20.0	230	11.066	11	.	.	0	1
11	6	1200	10	20.0	215	7.042	7	.	.	0	1
11	6	1200	15	20.0	275	16.096	16	.	.	0	1
11	6	1200	20	19.9	180	15.090	15	.	.	0	1
11	6	1200	30	19.9	225	4.024	4	.	.	0	1
11	6	1200	40	19.9	145	9.054	9	.	.	0	1
11	6	1200	50	19.9	85	5.030	5	.	.	0	1
11	6	1200	58	19.9	50	9.054	9	.	.	0	1
8	6	1225	2	20.3	120	15.090	15	.	.	5	1
8	6	1225	5	20.2	135	10.060	10	.	.	5	1
8	6	1225	10	20.1	180	1.006	1	.	.	5	1
8	6	1225	15	20.1	30	4.024	4	.	.	5	1
8	6	1225	20	20.1	35	15.090	15	.	.	5	1
8	6	1225	30	20.1	30	1.006	1	.	.	5	1
8	6	1225	40	20.1	320	4.024	4	.	.	5	1
8	6	1225	50	20.1	355	7.042	7	.	.	5	1
8	6	1225	56	20.1	345	5.030	5	.	.	5	1
5	6	1300	2	20.2	120	1.006	1	.	.	0	1
5	6	1300	5	20.2	70	3.018	3	.	.	0	1
5	6	1300	10	20.2	165	10.060	10	.	.	0	1
5	6	1300	15	20.2	250	7.042	7	.	.	0	1
5	6	1300	20	20.1	10	11.066	11	.	.	0	1
5	6	1300	30	20.1	10	3.018	3	.	.	0	1
5	6	1300	40	20.2	250	12.072	12	.	.	0	1
5	6	1300	50	20.1	260	4.024	4	.	.	0	1
5	6	1300	58	20.1	330	1.006	1	.	.	0	1
3	6	1330	2	20.3	345	2.012	2	.	.	0	1
3	6	1330	5	20.3	30	5.030	5	.	.	0	1
3	6	1330	10	20.2	140	6.036	6	.	.	0	1
3	6	1330	15	20.2	150	11.066	11	.	.	0	1
3	6	1330	20	20.2	225	6.036	6	.	.	0	1
3	6	1330	30	20.2	170	1.006	1	.	.	0	1
3	6	1330	40	20.2	95	8.048	8	.	.	0	1
3	6	1330	50	20.2	75	11.066	11	.	.	0	1
3	6	1330	60	20.2	60	7.042	7	.	.	0	1
D	6	1630	2	20.1	80	4.024	4	.	.	.	1
D	6	1630	5	20.1	35	2.012	2	.	.	.	1
D	6	1630	10	19.9	120	5.030	5	.	.	.	1
D	6	1630	15	19.9	120	5.030	5	.	.	.	1
D	6	1630	20	19.9	100	6.036	6	.	.	.	1
D	6	1630	25	19.9	70	6.036	6	.	.	.	1
D	6	1630	30	19.9	135	8.048	8	.	.	.	1
D	6	1630	35	19.9	15	5.030	5	.	.	.	1
G	6	1610	2	20.1	325	5.030	5	14.3	.	.	1
G	6	1610	5	20.0	320	7.042	7	14.3	.	.	1
G	6	1610	10	19.9	10	6.036	6	14.3	.	.	1
G	6	1610	15	19.9	70	9.054	9	14.3	.	.	1
G	6	1610	20	19.9	30	6.036	6	14.3	.	.	1
G	6	1610	25	19.9	295	7.042	7	14.3	.	.	1

APPENDIX A (continued)

------------------------------------ DATE=09OCT81 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
K	6	1530	2	20.2	270	18.108	18	.	.	0	1
K	6	1530	5	19.9	230	7.042	7	.	.	0	1
K	6	1530	10	19.7	20	13.078	13	.	.	0	1
K	6	1530	15	19.7	215	6.036	6	.	.	0	1
K	6	1530	20	19.6	260	3.018	3	.	.	0	1
K	6	1530	30	19.4	.	10.060	10	.	.	0	1

APPENDIX A (continued)

---------------------------------- DATE=15NOV81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	7	1000	3.0	10.1	250	5.030	5	15.5	.	14	1
100	7	1000	5.0	10.0	240	9.054	9	15.5	.	14	1
24	7	1050	2.0	10.0	345	8.048	8	.	.	.	1
24	7	1050	5.0	10.0	340	13.078	13	.	.	.	1
22	7	1145	2.0	12.0	265	15.090	15	.	.	3	1
22	7	1145	5.0	11.5	345	8.048	8	.	.	3	1
22	7	1145	10.0	11.5	330	9.054	9	.	.	3	1
22	7	1145	12.0	11.0	.	.	.	.	.	3	1
20	7	1315	2.0	11.5	10	12.072	12	.	.	15	1
20	7	1315	5.0	11.5	25	15.090	15	.	.	15	1
20	7	1315	10.0	11.5	330	5.030	5	.	.	15	1
20	7	1315	15.0	11.5	0	.	.	.	.	15	1
20	7	1315	20.0	11.5	360	.	.	.	.	15	1
20	7	1315	24.0	11.5	15	.	.	.	.	15	1
18	7	1410	2.0	12.5	210	10.060	10	.	12	15	1
18	7	1410	5.0	12.5	235	17.102	17	.	12	15	1
18	7	1410	10.0	12.5	225	9.054	9	.	12	15	1
18	7	1410	15.0	12.5	90	19.114	19	.	12	15	1
15	7	1530	2.0	13.2	180	20.120	20	10.0	.	18	1
15	7	1530	5.0	13.2	195	17.102	17	10.0	.	18	1
15	7	1530	10.0	13.2	270	10.060	10	10.0	.	18	1
15	7	1530	15.0	13.2	210	9.054	9	10.0	.	18	1
15	7	1530	20.0	13.2	120	11.066	11	10.0	.	18	1
15	7	1530	25.0	13.2	180	10.060	10	10.0	.	18	1
11	7	1645	2.0	13.5	25	11.066	11	.	4	7	1
11	7	1645	5.0	13.8	20	5.030	5	.	4	7	1
11	7	1645	10.0	13.8	290	15.090	15	.	4	7	1
11	7	1645	15.0	13.8	200	14.084	14	.	4	7	1
11	7	1645	20.0	13.8	225	12.072	12	.	4	7	1
11	7	1645	30.0	13.8	45	10.060	10	.	4	7	1
11	7	1645	40.0	13.8	33	5.030	5	.	4	7	1
11	7	1645	50.0	13.5	350	10.060	10	.	4	7	1
11	7	1645	55.0	13.5	.	.	.	.	4	7	1
8	7	.	.	.	.	.	.	.	.	.	1
5	7	1410	2.0	14.0	120	17.102	17	16.5	10	12	1
5	7	1410	5.0	14.0	135	12.072	12	16.5	10	12	1
5	7	1410	10.0	14.0	105	9.054	9	16.5	10	12	1
5	7	1410	15.0	14.0	50	8.048	8	16.5	10	12	1
5	7	1410	20.0	14.0	290	8.048	8	16.5	10	12	1
5	7	1410	30.0	14.0	295	6.036	6	16.5	10	12	1
5	7	1410	40.0	13.8	235	6.036	6	16.5	10	12	1
5	7	1410	50.0	13.8	40	9.054	9	16.5	10	12	1
5	7	1410	59.0	13.8	.	.	.	16.5	10	12	1
3	7	1330	2.0	14.0	215	13.078	13	.	.	11	1
3	7	1330	5.0	14.2	125	12.072	12	.	.	11	1
3	7	1330	10.0	14.2	110	13.078	13	.	.	11	1
3	7	1330	15.0	14.2	270	16.096	16	.	.	11	1
3	7	1330	20.0	14.2	255	23.138	23	.	.	11	1
3	7	1330	30.0	14.2	225	8.048	8	.	.	11	1
3	7	1330	40.0	13.9	240	15.090	15	.	.	11	1
3	7	1330	50.0	13.9	300	18.108	18	.	.	11	1
3	7	1330	60.0	13.8	290	8.048	8	.	.	11	1
G	7	1230	2.0	13.0	160	17.102	17	.	.	10	1
G	7	1230	5.0	13.0	125	11.066	11	.	.	10	1
G	7	1230	10.0	13.0	80	7.042	7	.	.	10	1
G	7	1230	15.0	13.0	345	10.060	10	.	.	10	1
G	7	1230	20.0	13.0	200	5.030	5	.	.	10	1
G	7	1230	30.0	12.8	315	11.066	11	.	.	10	1
G	7	1230	37.5	12.5	.	.	.	.	.	10	1

APPENDIX A (continued)

---------------------------------- DATE=15NOV81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
K	7	1115	2	13.5	170	15.090	15	.	.	8	1
K	7	1115	5	12.5	195	17.102	17	.	.	8	1
K	7	1115	10	12.5	60	9.054	9	.	.	8	1

---------------------------------- DATE=15NOV81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
D	7	.	.	.	.	.	.	.	.	.	1

APPENDIX A (continued)

---------------------------------- DATE=03DEC81 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	8	1117	2	7.0	.	.	.	12.1	.	.	1
100	8	1117	4	7.0	190	13.078	13	12.1	.	.	1
24	8	1145	3	7.0	170	8.048	8	.	8	10	1
24	8	1145	5	7.0	210	3.018	3	.	8	10	1
24	8	1145	9	7.0	160	4.024	4	.	8	10	1
22	8	1215	3	7.2	300	4.024	4	.	.	.	1
22	8	1215	5	7.5	285	8.048	8	.	.	.	1
22	8	1215	10	7.5	315	9.054	9	.	.	.	1
20	8	1240	3	7.8	200	11.066	11	.	12	15	1
20	8	1240	5	7.8	210	6.036	6	.	12	15	1
20	8	1240	10	7.8	225	8.048	8	.	12	15	1
20	8	1240	15	7.8	330	22.132	22	.	12	15	1
20	8	1240	20	7.8	335	22.132	22	.	12	15	1
20	8	1240	22	.	.	.	.	.	12	15	1
18	8	1350	2	9.0	105	18.108	18	12.0	.	.	1
18	8	1350	5	9.0	120	19.114	19	12.0	.	.	1
18	8	1350	10	9.0	180	20.120	20	12.0	.	.	1
18	8	1350	15	9.0	55	11.066	11	12.0	.	.	1
18	8	1350	20	9.0	135	8.048	8	12.0	.	.	1
18	8	1350	24	.	.	.	.	12.0	.	.	1
15	8	.	2	9.8	145	16.096	16	.	.	.	1
15	8	.	5	9.8	135	15.090	15	.	.	.	1
15	8	.	10	9.8	135	8.048	8	.	.	.	1
15	8	.	15	9.8	175	9.054	9	.	.	.	1
15	8	.	20	9.8	170	1.006	1	.	.	.	1
15	8	.	25	9.8	200	15.090	15	.	.	.	1
11	8	.	2	10.2	80	9.054	9	.	.	.	1
11	8	.	5	10.3	45	9.054	9	.	.	.	1
11	8	.	10	10.3	50	5.030	5	.	.	.	1
11	8	.	15	10.2	90	8.048	8	.	.	.	1
11	8	.	20	10.6	95	9.054	9	.	.	.	1
11	8	.	30	10.9	355	13.078	13	.	.	.	1
11	8	.	40	10.7	135	3.018	3	.	.	.	1
11	8	.	50	10.2	50	3.018	3	.	.	.	1
8	8	.	2	11.0	155	9.054	9	.	.	.	1
8	8	.	5	11.1	160	13.078	13	.	.	.	1
8	8	.	10	11.1	165	18.108	18	.	.	.	1
8	8	.	15	11.1	180	13.078	13	.	.	.	1
8	8	.	20	11.1	180	13.078	13	.	.	.	1
8	8	.	30	11.1	185	4.024	4	.	.	.	1
8	8	.	40	11.1	135	2.012	2	.	.	.	1
8	8	.	50	11.1	355	4.024	4	.	.	.	1
5	8	.	2	11.3	220	14.084	14	.	.	.	1
5	8	.	5	11.3	210	7.042	7	.	.	.	1
5	8	.	10	11.3	170	8.048	8	.	.	.	1
5	8	.	15	11.3	95	7.042	7	.	.	.	1
5	8	.	20	11.5	135	9.054	9	.	.	.	1
5	8	.	30	11.5	110	6.036	6	.	.	.	1
5	8	.	4	11.4	5	7.042	7	.	.	.	1
5	8	.	50	11.3	290	1.006	1	.	.	.	1
3	8	.	.	.	.	.	.	.	.	.	1
D	8	.	.	.	.	.	.	.	.	.	1
G	8	.	.	.	.	.	.	.	.	.	1
K	8	.	.	.	.	.	.	.	.	.	1

APPENDIX A (continued)

---------------------------------- DATE=12FEB82 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	9	1150	2	5.5	130	8.048	8	8	.	0	1
100	9	1150	5	4.5	120	6.036	6	8	.	0	1
100	9	1150	10	4.5	115	6.036	6	8	.	0	1
24	9	1220	2	5.3	140	12.072	12	.	.	.	1
24	9	1220	5	5.0	125	13.078	13	.	.	.	1
22	9	1250	2	5.3	285	1.006	1	.	.	.	1
22	9	1250	5	5.2	230	6.036	6	.	.	.	1
22	9	1250	10	5.0	115	5.030	5	.	.	.	1
22	9	1250	15	4.5	90	11.066	11	.	.	.	1
22	9	1250	20	4.3	100	7.042	7	.	.	.	1
20	9	1315	2	5.0	245	5.030	5	.	.	.	1
20	9	1315	5	5.0	160	7.042	7	.	.	.	1
20	9	1315	10	4.8	155	6.036	6	.	.	.	1
20	9	1315	15	4.8	85	14.084	14	.	.	.	1
20	9	1315	20	4.9	155	12.072	12	.	.	.	1
20	9	1315	25	4.9	150	13.078	13	.	.	.	1
18	9	.	.	.	.	.	.	.	.	.	1
15	9	1420	2	4.6	310	11.066	11	.	.	5	1
15	9	1420	5	4.8	225	3.018	3	.	.	5	1
15	9	1420	10	4.8	225	6.036	6	.	.	5	1
15	9	1420	15	4.8	345	10.060	10	.	.	5	1
15	9	1420	20	4.4	150	5.030	5	.	.	5	1
15	9	1420	25	4.4	55	5.030	5	.	.	5	1
15	9	1420	30	4.4	340	4.024	4	.	.	5	1
15	9	1420	40	4.4	350	2.012	2	.	.	5	1
11	9	1500	2	4.9	315	2.012	2	.	.	0	1
11	9	1500	5	4.8	10	1.006	1	.	.	0	1
11	9	1500	10	4.8	75	1.006	1	.	.	0	1
11	9	1500	15	4.7	65	4.024	4	.	.	0	1
11	9	1500	20	4.6	65	7.042	7	.	.	0	1
11	9	1500	30	4.6	62	8.048	8	.	.	0	1
11	9	1500	40	4.6	85	9.054	9	.	.	0	1
11	9	1500	50	4.6	60	2.012	2	.	.	0	1
11	9	1500	60	4.6	40	7.042	7	.	.	0	1
8	9	1540	2	4.2	130	3.018	3	.	.	0	1
8	9	1540	5	4.1	55	5.030	5	.	.	0	1
8	9	1540	10	4.1	70	6.036	6	.	.	0	1
8	9	1540	15	4.0	155	6.036	6	.	.	0	1
8	9	1540	20	4.0	145	0.000	0	.	.	0	1
8	9	1540	30	4.1	200	2.012	2	.	.	0	1
8	9	1540	40	4.1	210	1.006	1	.	.	0	1
8	9	1540	50	4.1	185	2.012	2	.	.	0	1
8	9	1540	60	4.2	115	6.036	6	.	.	0	1
5	9	1620	2	3.8	225	4.024	4	.	.	3	1
5	9	1620	5	3.7	190	1.006	1	.	.	3	1
5	9	1620	10	3.7	165	2.012	2	.	.	3	1
5	9	1620	15	3.7	170	1.006	1	.	.	3	1
5	9	1620	20	3.6	155	1.006	1	.	.	3	1
5	9	1620	30	3.6	185	8.048	8	.	.	3	1
5	9	1620	40	3.6	170	5.030	5	.	.	3	1
5	9	1620	50	3.7	130	7.042	7	.	.	3	1
5	9	1620	60	3.7	135	8.048	8	.	.	3	1
3	9	1730	2	3.8	205	3.018	3	.	.	.	1
3	9	1730	5	3.7	180	2.012	2	.	.	.	1
3	9	1730	10	3.7	170	2.012	2	.	.	.	1
3	9	1730	15	3.7	190	1.006	1	.	.	.	1
3	9	1730	20	3.7	225	1.006	1	.	.	.	1
3	9	1730	30	3.7	240	1.006	1	.	.	.	1
3	9	1730	40	3.7	160	3.018	3	.	.	.	1

APPENDIX A (continued)

------------------------------------ DATE=12FEB82 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
3	9	1730	50	3.7	130	2.012	2	.	.	.	1
3	9	1730	60	3.7	135	1.006	1	.	.	.	1
D	9	1700	2	3.5	290	7.042	7	.	.	.	1
D	9	1700	5	3.5	280	4.024	4	.	.	.	1
D	9	1700	10	3.5	310	5.030	5	.	.	.	1
D	9	1700	15	3.5	205	5.030	5	.	.	.	1
D	9	1700	20	3.4	115	6.036	6	.	.	.	1
D	9	1700	30	3.5	45	3.018	3	.	.	.	1
D	9	1700	40	3.5	35	5.030	5	.	.	.	1
D	9	1700	50	3.4	80	5.030	5	.	.	.	1
D	9	1700	60	3.4	50	1.006	1	.	.	.	1

------------------------------------ DATE=13FEB82 ------------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
G	9	1430	2	4.1	165	12.072	12	.	3	5	1
G	9	1430	5	4.1	90	3.018	3	.	3	5	1
G	9	1430	10	4.1	60	11.066	11	.	3	5	1
G	9	1430	15	4.1	295	9.054	9	.	3	5	1
G	9	1430	20	4.1	300	4.024	4	.	3	5	1
G	9	1430	30	4.1	240	5.030	5	.	3	5	1
G	9	1430	40	4.1	5	8.048	8	.	3	5	1
K	9	1345	2	4.6	225	18.108	18	4.9	.	.	1
K	9	1345	5	4.6	135	7.042	7	4.9	.	.	1
K	9	1345	10	4.6	205	9.054	9	4.9	.	.	1
K	9	1345	15	4.6	255	11.066	11	4.9	.	.	1
K	9	1345	20	4.5	95	11.066	11	4.9	.	.	1
K	9	1345	30	4.4	305	2.012	2	4.9	.	.	1
K	9	1345	36	4.4	280	6.036	6	4.9	.	.	1

APPENDIX A (continued)

---------------------------------- DATE=02MAR82 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
100	10	1020	2	5.4	150	21.126	21	7.2	.	.	1
100	10	1020	5	5.1	175	23.138	23	7.2	.	.	1
100	10	1020	10	5.0	185	14.084	14	7.2	.	.	1
24	10	1046	2	5.6	110	12.072	12	.	.	.	1
24	10	1046	5	5.5	135	15.090	15	.	.	.	1
24	10	1046	9	5.0	140	17.102	17	.	.	.	1
22	10	1100	2	6.3	125	21.126	21	8.3	.	6	1
22	10	1100	5	6.1	115	6.036	6	8.3	.	6	1
22	10	1100	10	5.0	130	8.048	8	8.3	.	6	1
22	10	1100	15	4.9	127	7.042	7	8.3	.	6	1
22	10	1100	20	4.9	120	5.030	5	8.3	.	6	1
22	10	1100	25	4.9	150	10.060	10	8.3	.	6	1
20	10	1120	2	7.1	120	12.072	12	.	.	7	1
20	10	1120	5	7.0	120	10.060	10	.	.	7	1
20	10	1120	10	6.8	145	15.090	15	.	.	7	1
20	10	1120	15	6.4	175	4.024	4	.	.	7	1
20	10	1120	20	6.2	190	9.054	9	.	.	7	1
18	10	.	2	7.2	105	34.204	34	11.7	.	11	1
18	10	.	5	7.0	120	20.120	20	11.7	.	11	1
18	10	.	10	7.0	230	19.114	19	11.7	.	11	1
18	10	.	15	6.7	325	11.066	11	11.7	.	11	1
18	10	.	20	6.6	195	9.054	9	11.7	.	11	1
18	10	.	25	6.4	235	5.030	5	11.7	.	11	1
18	10	.	30	6.3	305	6.036	6	11.7	.	11	1
18	10	.	35	6.2	330	6.036	6	11.7	.	11	1
15	10	.	2	7.0	100	28.168	28	.	.	8	1
15	10	.	5	6.9	70	14.084	14	.	.	8	1
15	10	.	10	6.8	150	16.096	16	.	.	8	1
15	10	.	15	6.4	205	13.078	13	.	.	8	1
15	10	.	20	6.0	205	6.036	6	.	.	8	1
15	10	.	25	6.0	230	8.048	8	.	.	8	1
15	10	.	30	6.0	295	8.048	8	.	.	8	1
15	10	.	35	6.0	330	13.078	13	.	.	8	1
11	10	.	2	6.9	60	21.126	21	.	.	15	1
11	10	.	5	6.9	60	25.150	25	.	.	15	1
11	10	.	10	6.8	80	17.102	17	.	.	15	1
11	10	.	15	6.5	60	17.102	17	.	.	15	1
11	10	.	20	6.4	110	11.066	11	.	.	15	1
11	10	.	30	6.3	140	12.072	12	.	.	15	1
11	10	.	40	6.3	20	14.084	14	.	.	15	1
11	10	.	50	6.3	60	5.030	5	.	.	15	1
8	10	.	2	6.9	120	24.144	24	.	.	9	1
8	10	.	5	7.0	115	27.162	27	.	.	9	1
8	10	.	10	6.9	90	18.108	18	.	.	9	1
8	10	.	15	6.8	125	10.060	10	.	.	9	1
8	10	.	20	6.6	180	13.078	13	.	.	9	1
8	10	.	30	6.2	170	14.084	14	.	.	9	1
8	10	.	40	6.2	105	15.090	15	.	.	9	1
8	10	.	50	6.2	340	15.090	15	.	.	9	1
8	10	.	60	6.1	170	22.132	22	.	.	9	1
5	10	.	2	6.4	135	20.120	20	.	.	9	1
5	10	.	5	6.4	95	25.150	25	.	.	9	1
5	10	.	10	6.4	155	34.204	34	.	.	9	1
5	10	.	15	6.3	110	8.048	8	.	.	9	1
5	10	.	20	6.2	160	21.126	21	.	.	9	1
5	10	.	30	5.9	109	8.048	8	.	.	9	1
5	10	.	40	5.7	90	6.036	6	.	.	9	1
5	10	.	50	5.6	285	6.036	6	.	.	9	1
5	10	.	60	5.5	160	21.126	21	.	.	9	1

APPENDIX A (continued)

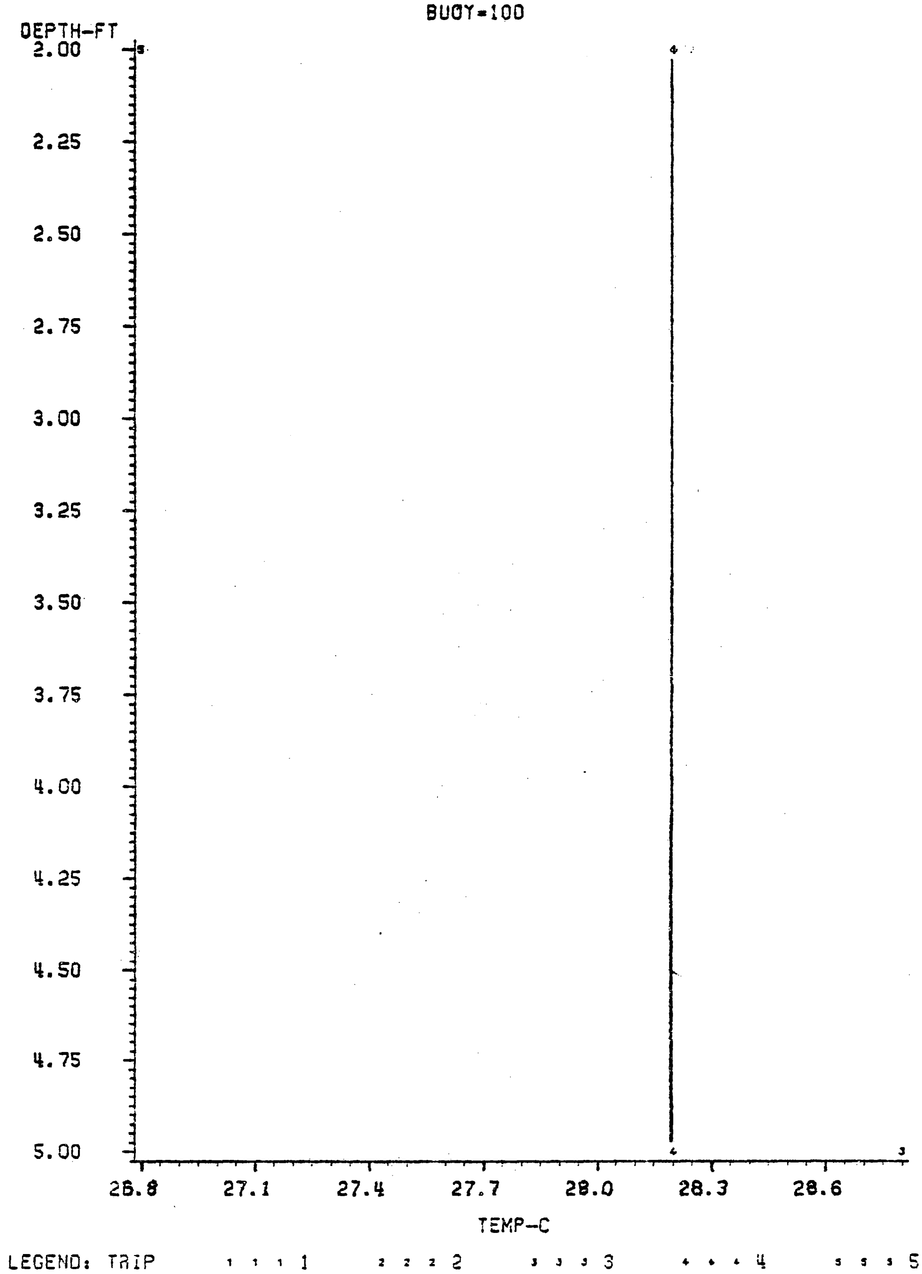
---------------------------------- DATE=02MAR82 ----------------------------------

BUOY	TRIP	TIME	DEPTH_FT	TEMP_C	CURDIR	VELOCITY	CLICKS	ATDEGC	MINWIND	MAXWIND	XSECTN
3	10	.	2	5.5	185	18.108	18	.	.	20	1
3	10	.	5	5.3	210	.	.	.	.	20	1
3	10	.	10	5.4	220	.	.	.	.	20	1
3	10	.	20	5.3	225	.	.	.	.	20	1
3	10	.	30	5.4	230	.	.	.	.	20	1
3	10	.	40	5.1	250	.	.	.	.	20	1
3	10	.	50	5.0	230	.	.	.	.	20	1
3	10	.	60	5.0	230	.	.	.	.	20	1
D	10	.	.	.	.	.	.	.	.	.	1
G	10	.	.	.	.	.	.	.	.	.	1
K	10	.	.	.	.	.	.	.	.	.	1

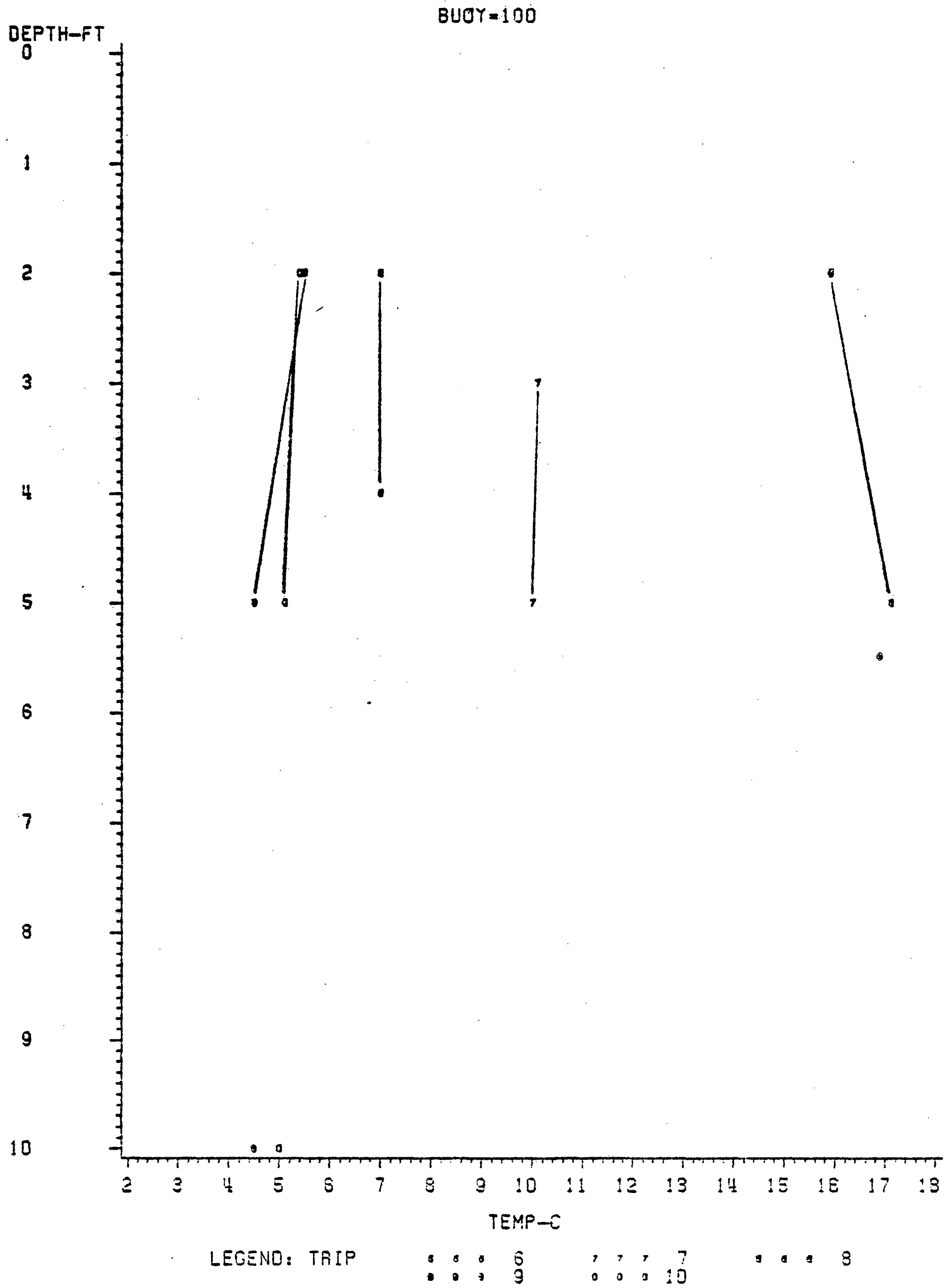
APPENDIX B

Temperature Plots

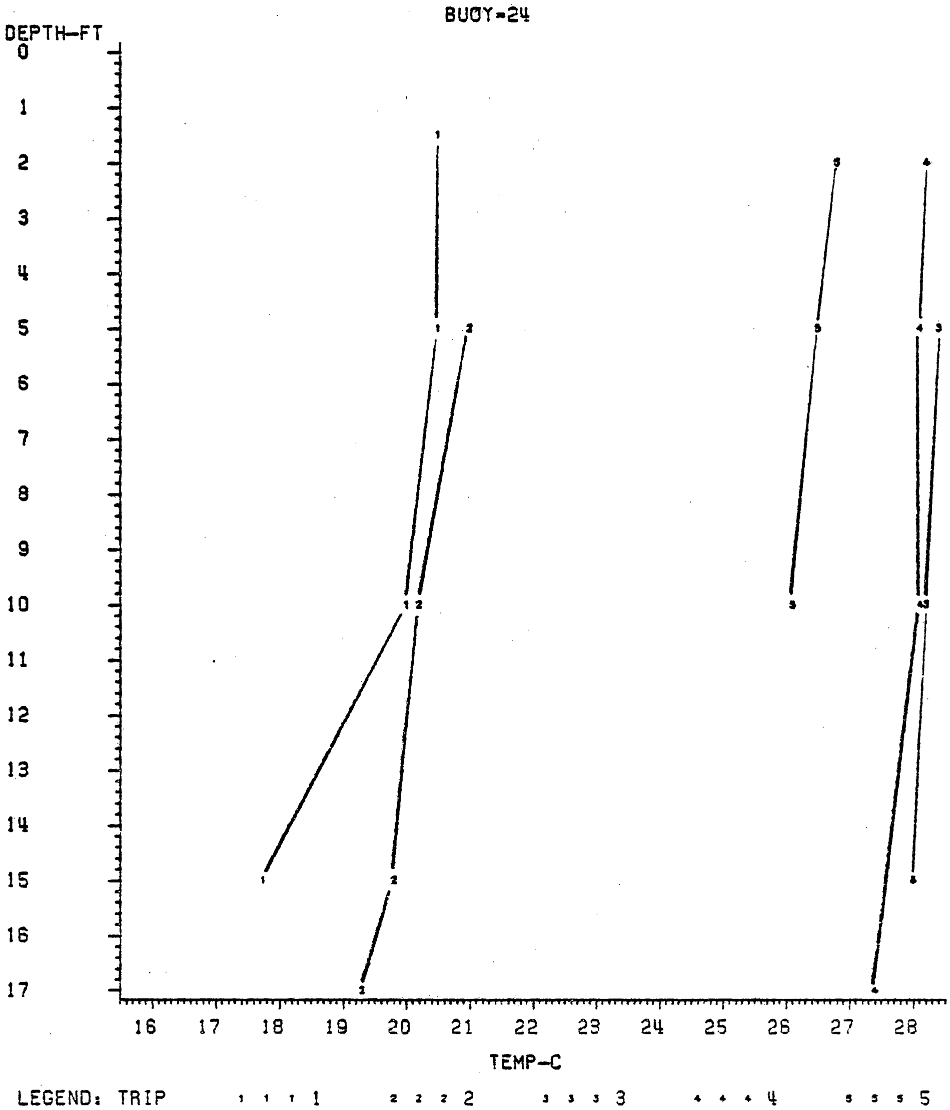
APPENDIX B


BUOY=100
DEPTH-FT
2.00
2.25
2.50
2.75
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
26.8
27.1
27.4
27.7
28.0
28.3
28.6
TEMP-C
LEGEND: TRIP 1 2 3 4 5

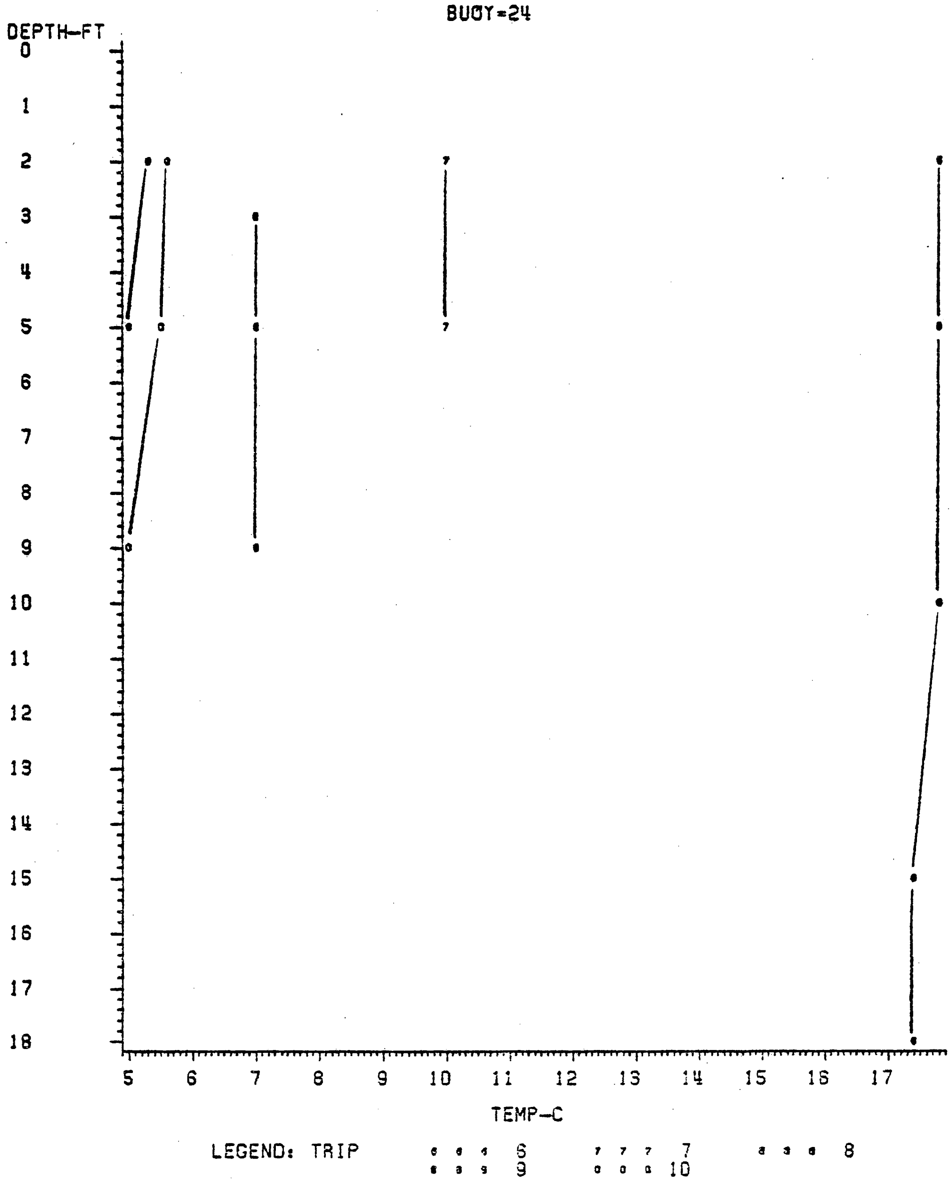
APPENDIX B (continued)



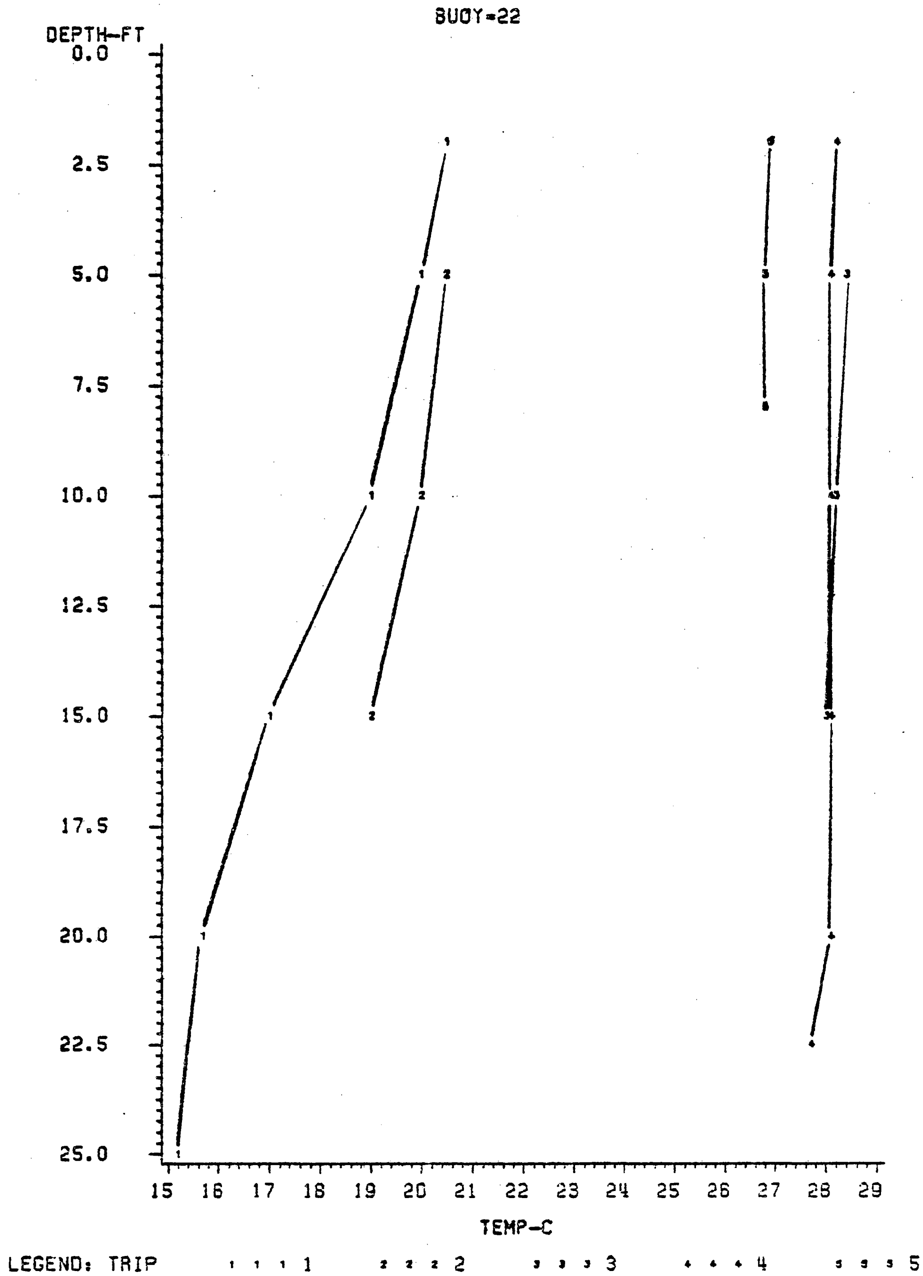
APPENDIX B (continued)



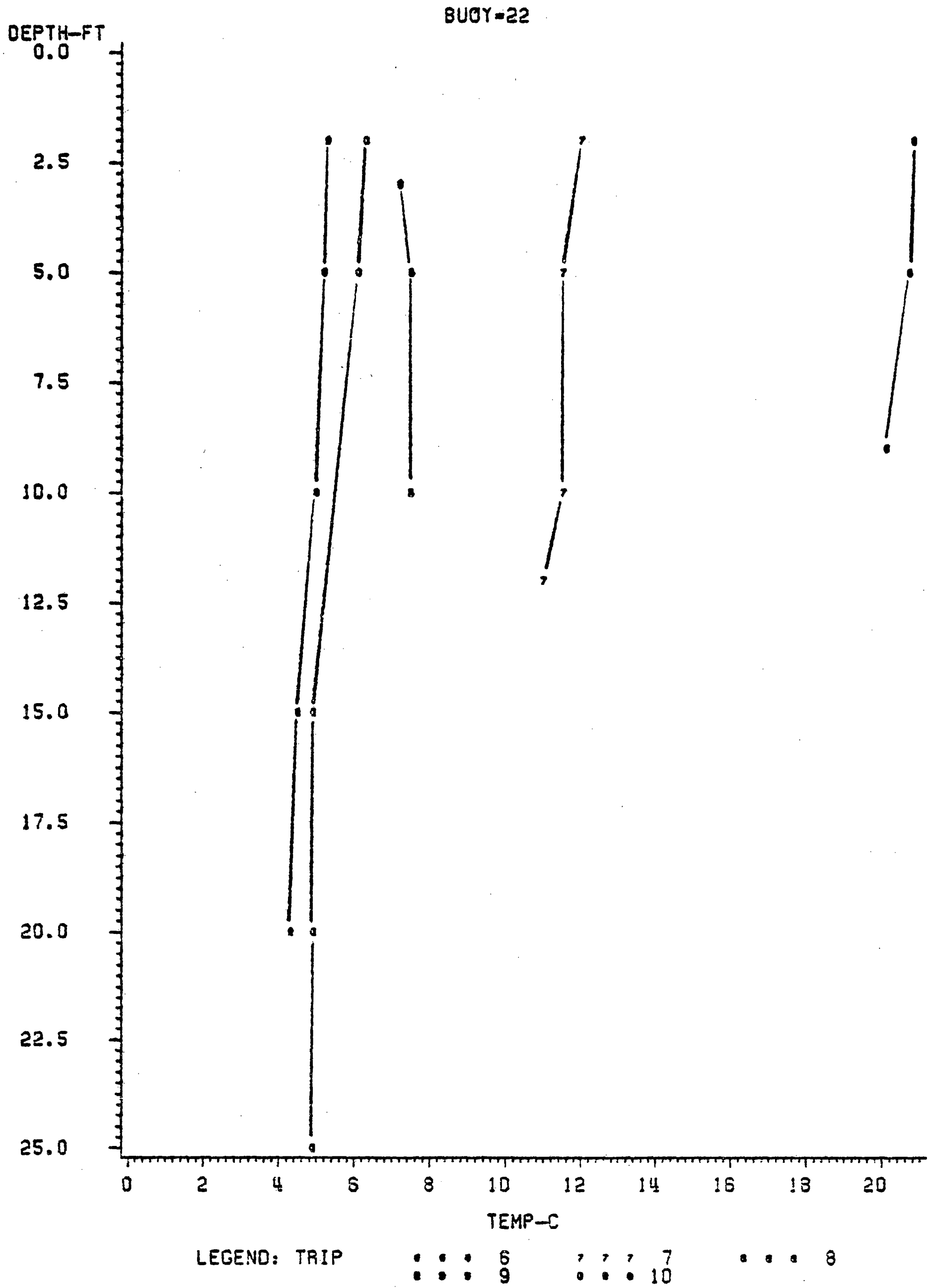
APPENDIX B (continued)



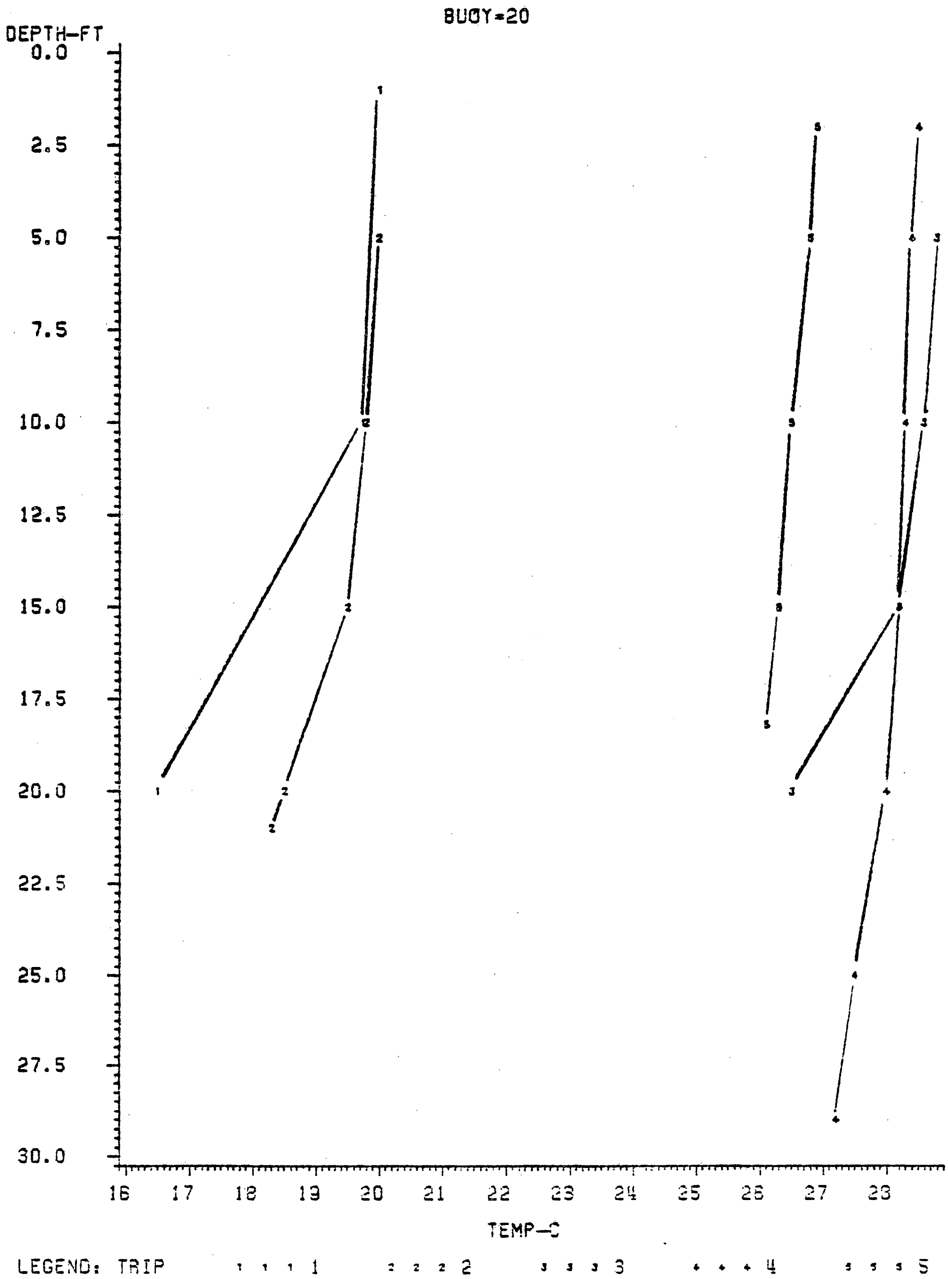
APPENDIX B (continued)



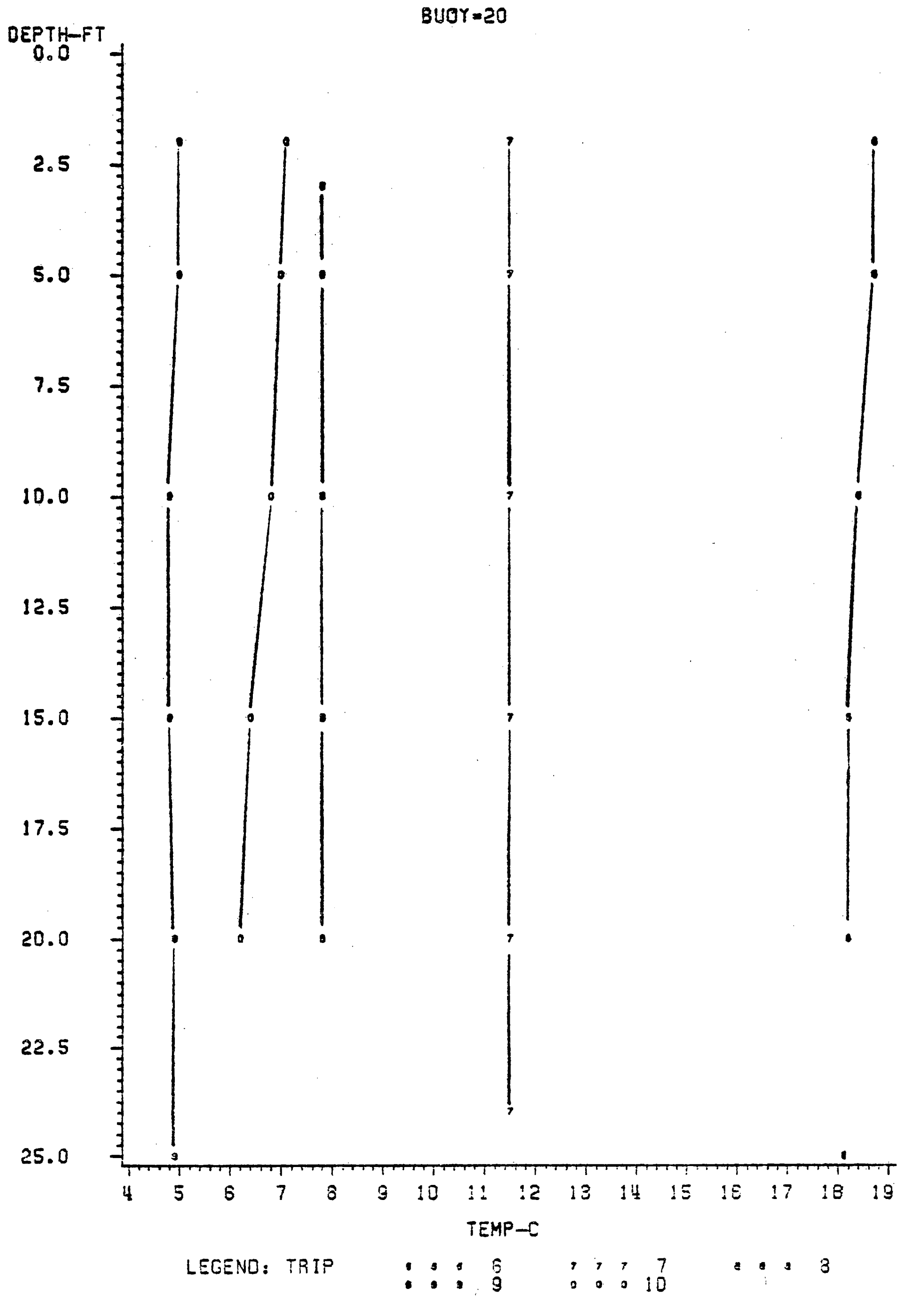
APPENDIX B (continued)



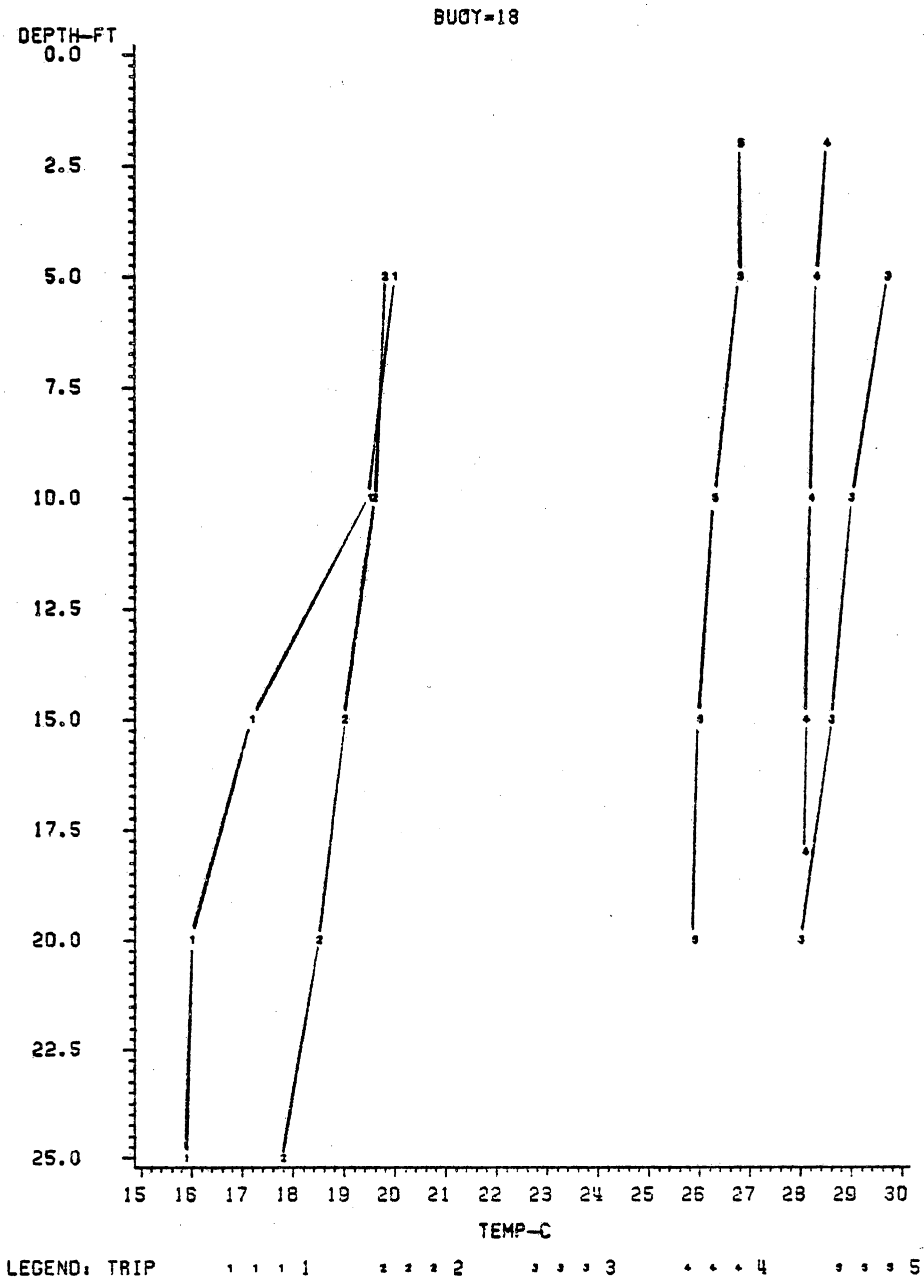
APPENDIX B (continued)



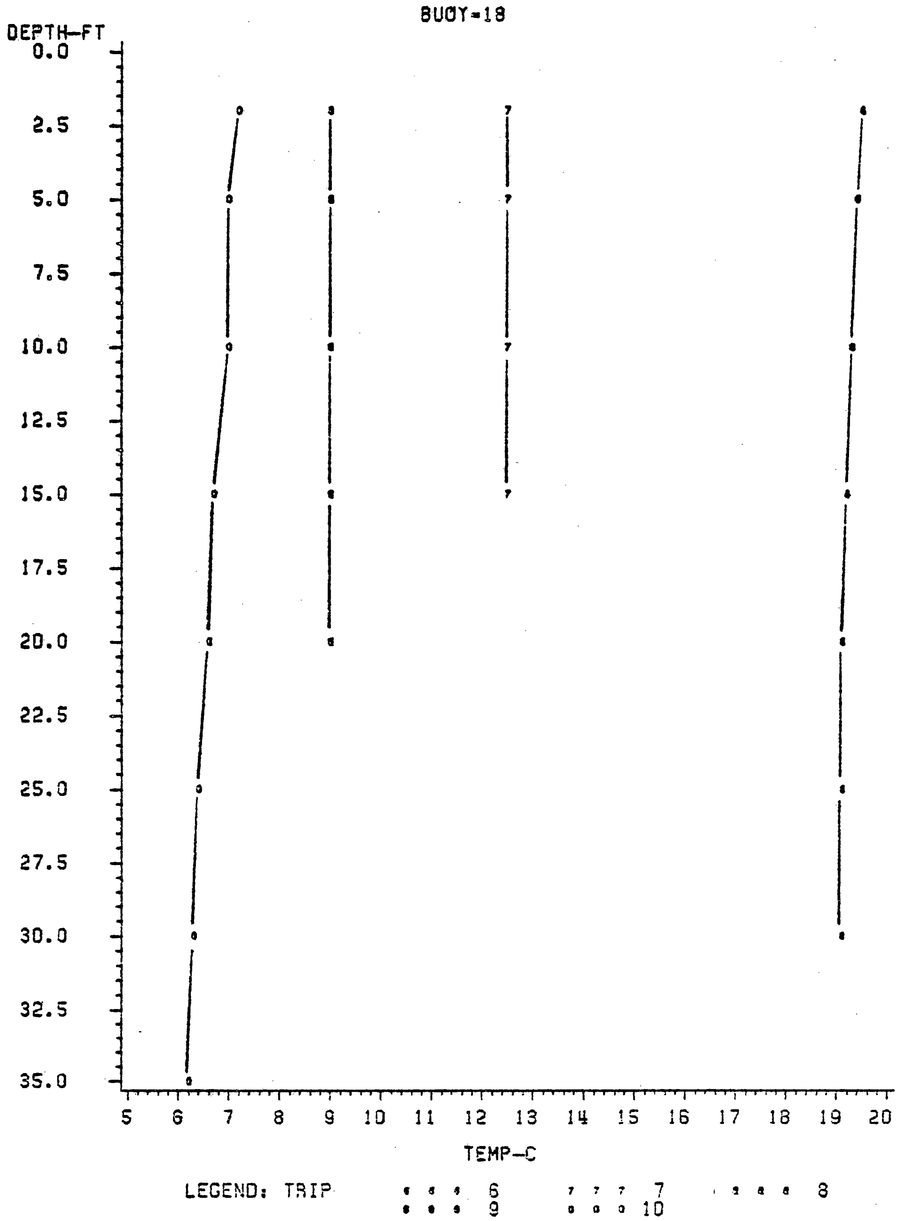
APPENDIX B (continued)



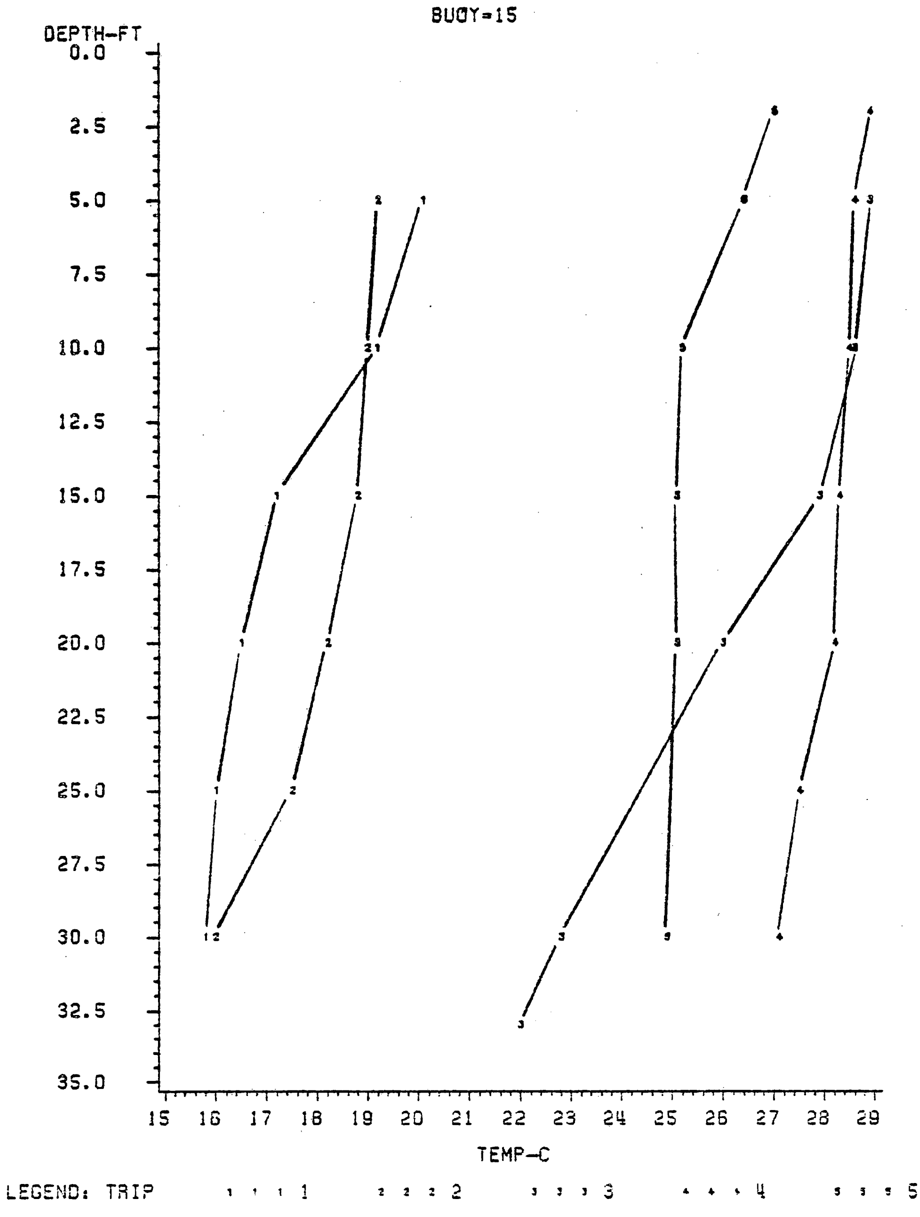
APPENDIX B (continued)



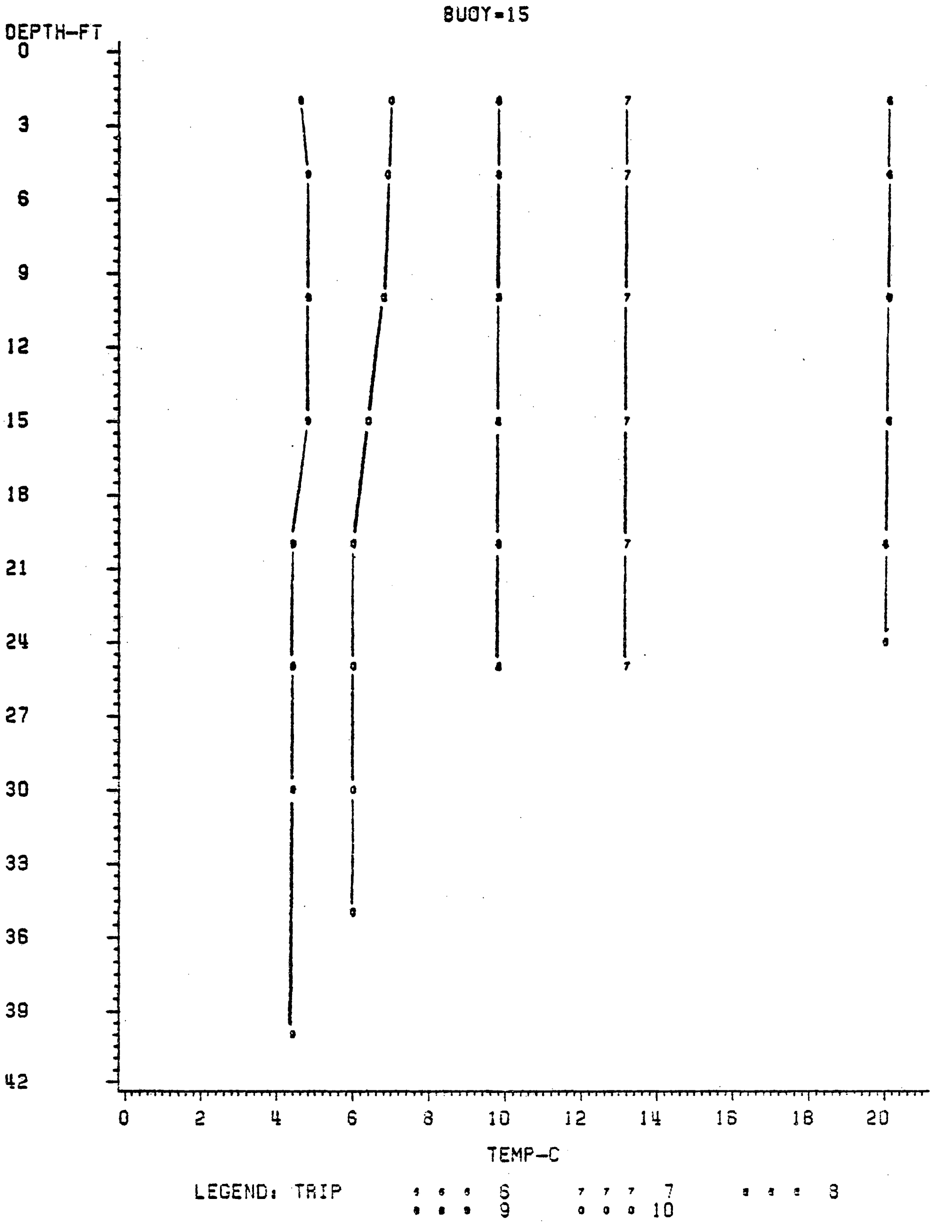
APPENDIX B (continued)



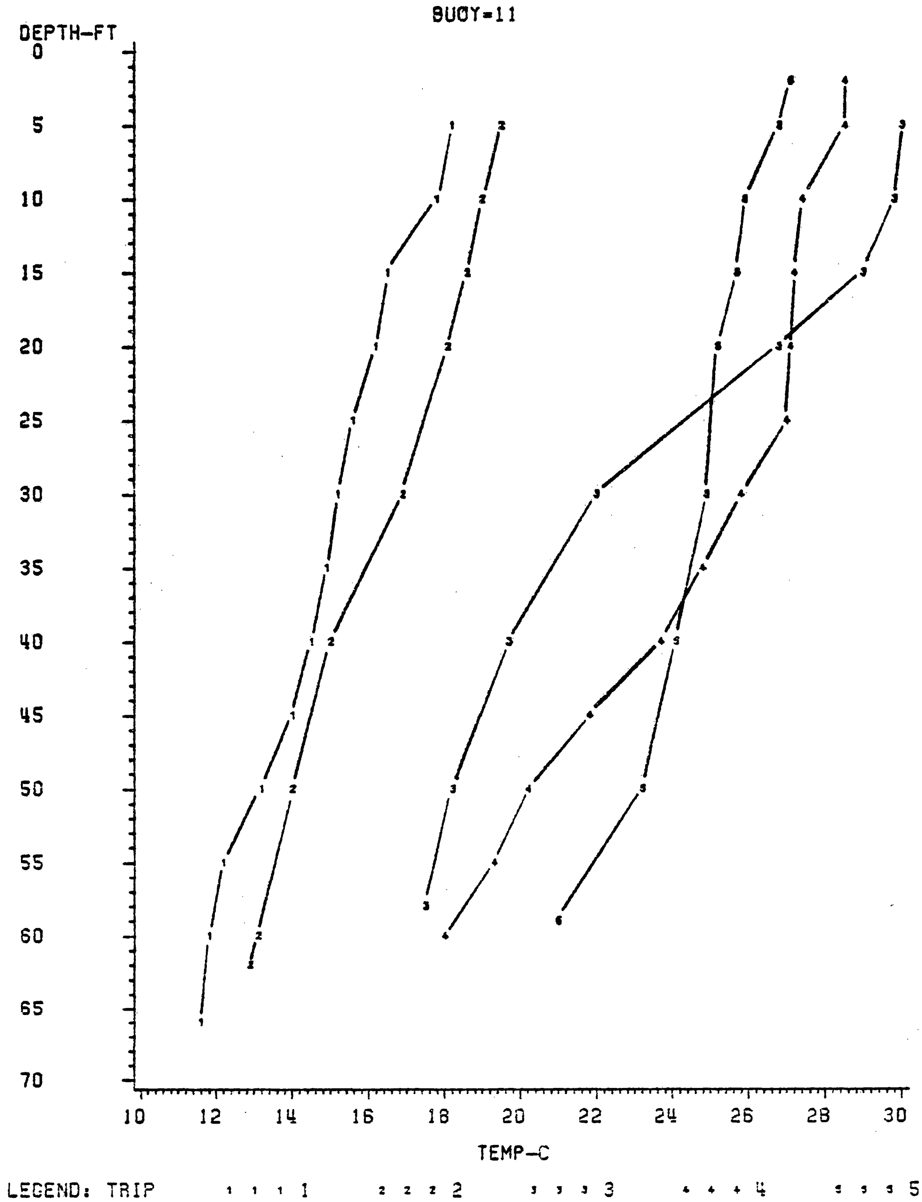
APPENDIX B (continued)



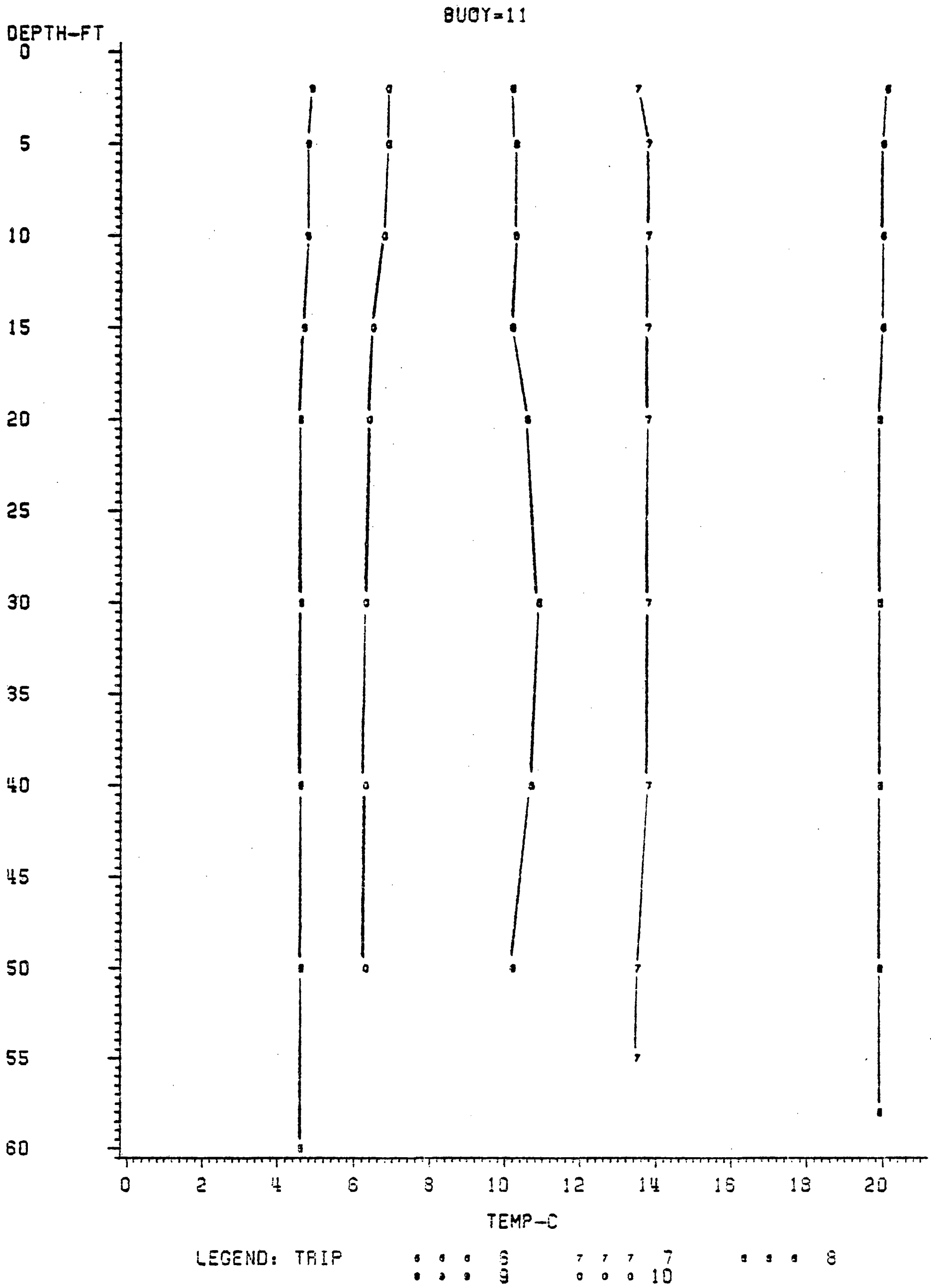
APPENDIX B (continued)



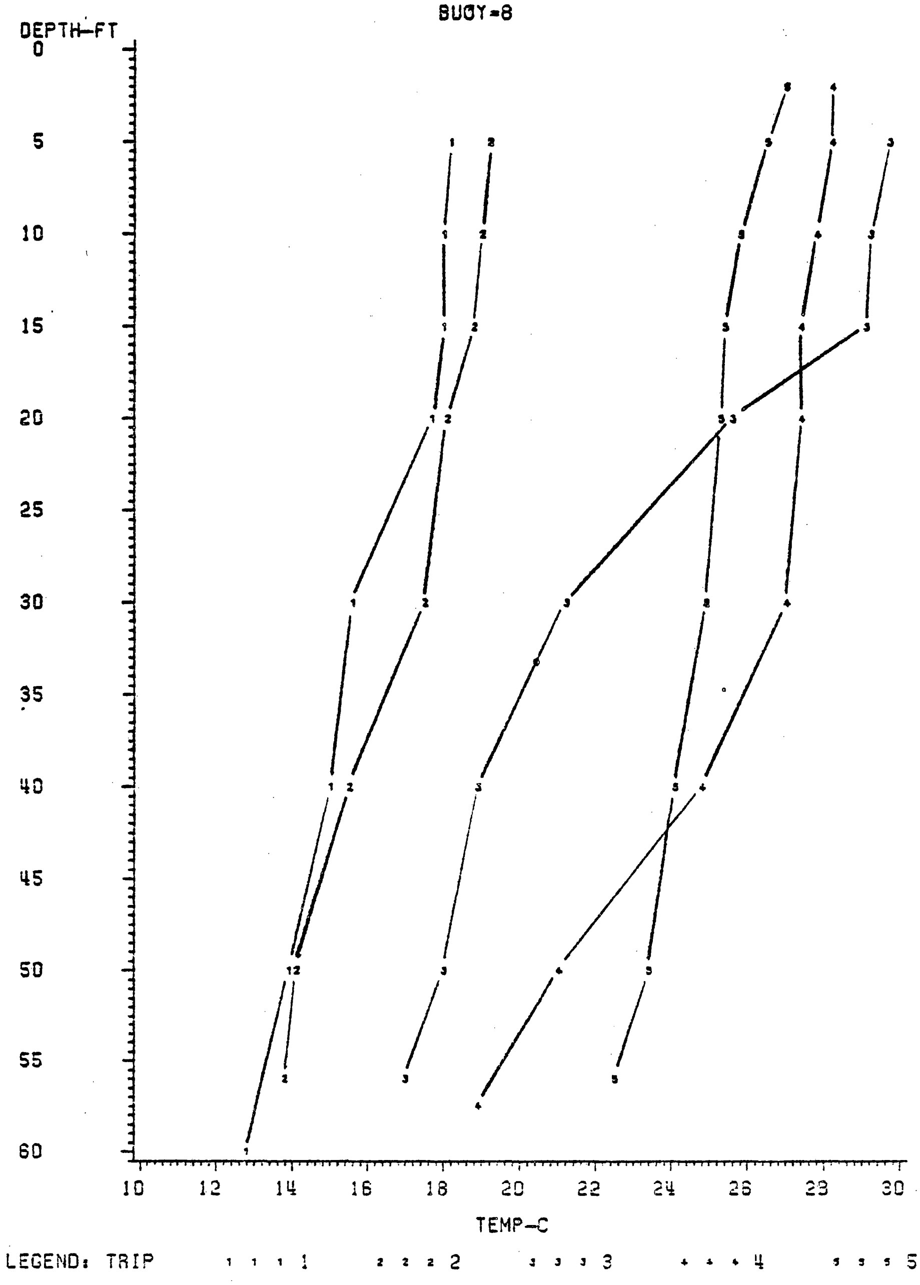
APPENDIX B (continued)



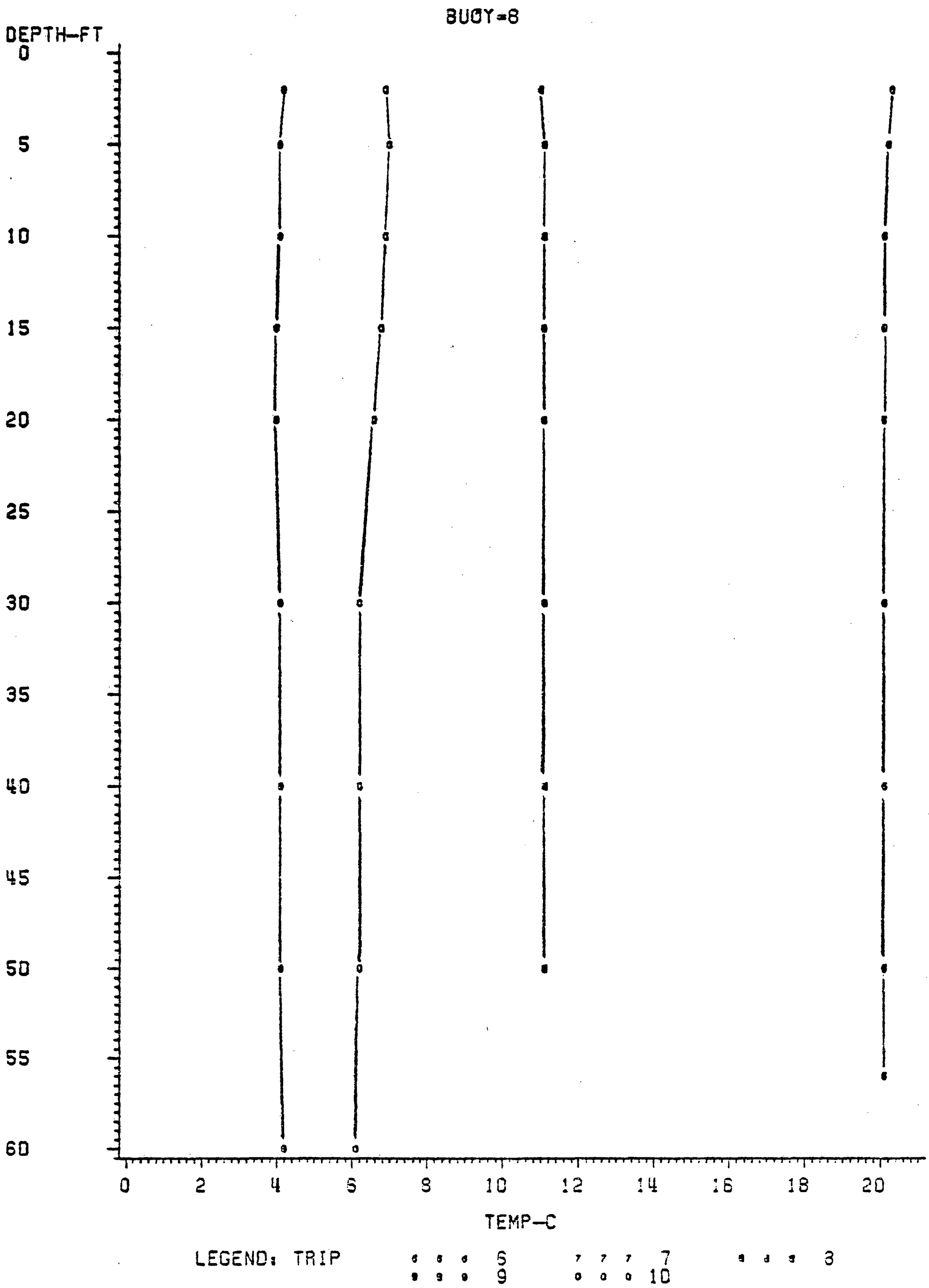
APPENDIX B (continued)



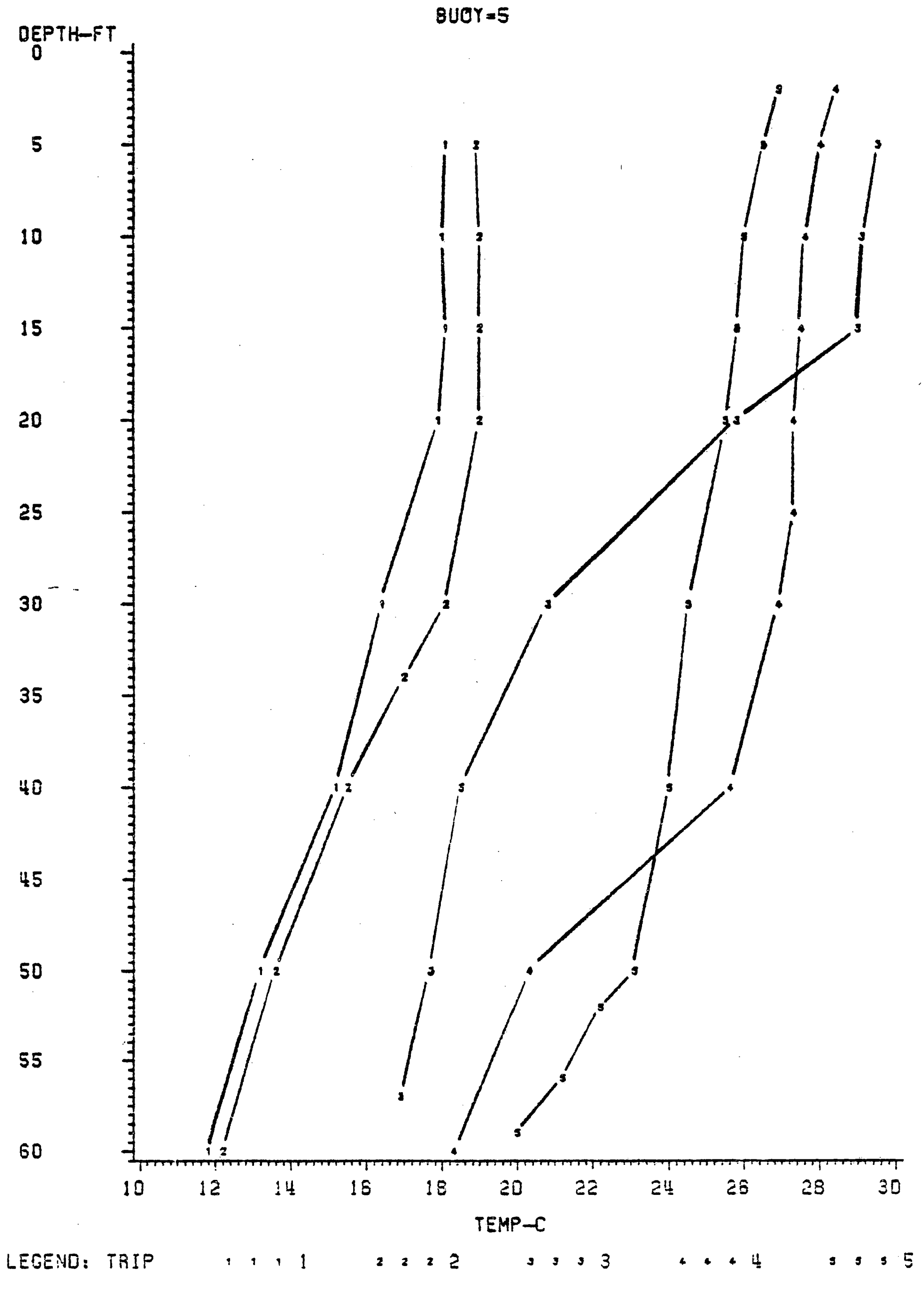
APPENDIX B (continued)



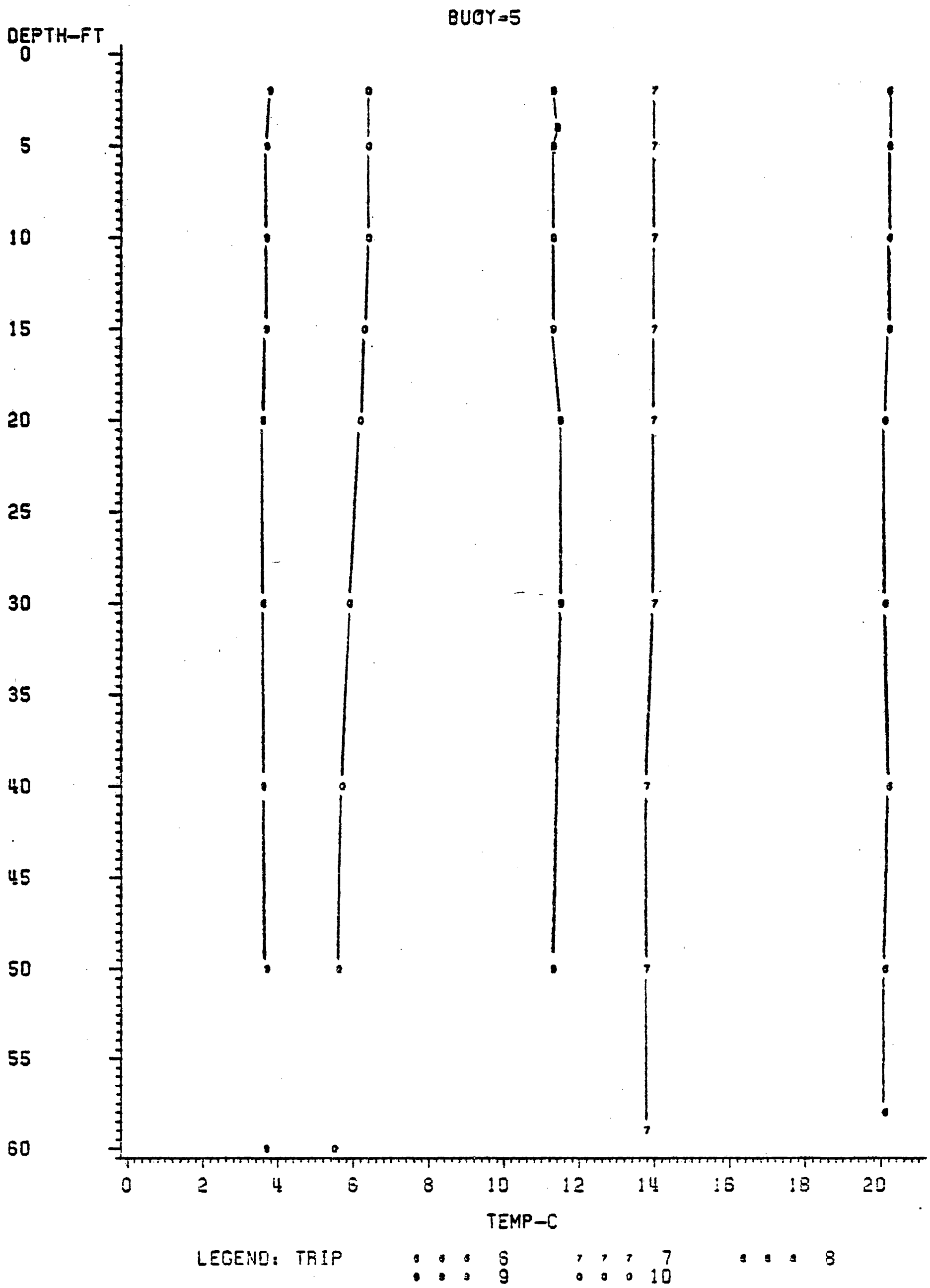
APPENDIX B (continued)



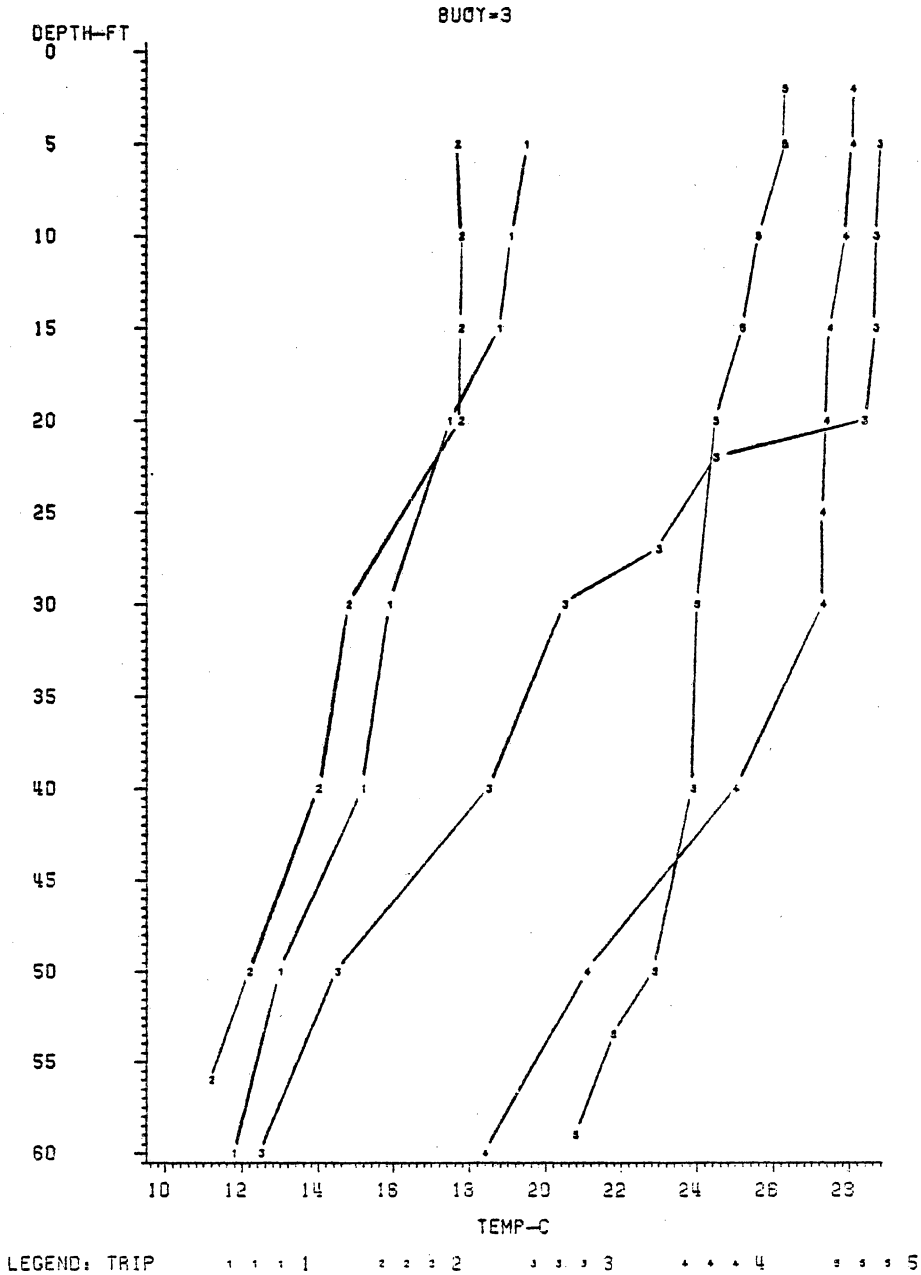
APPENDIX B (continued)



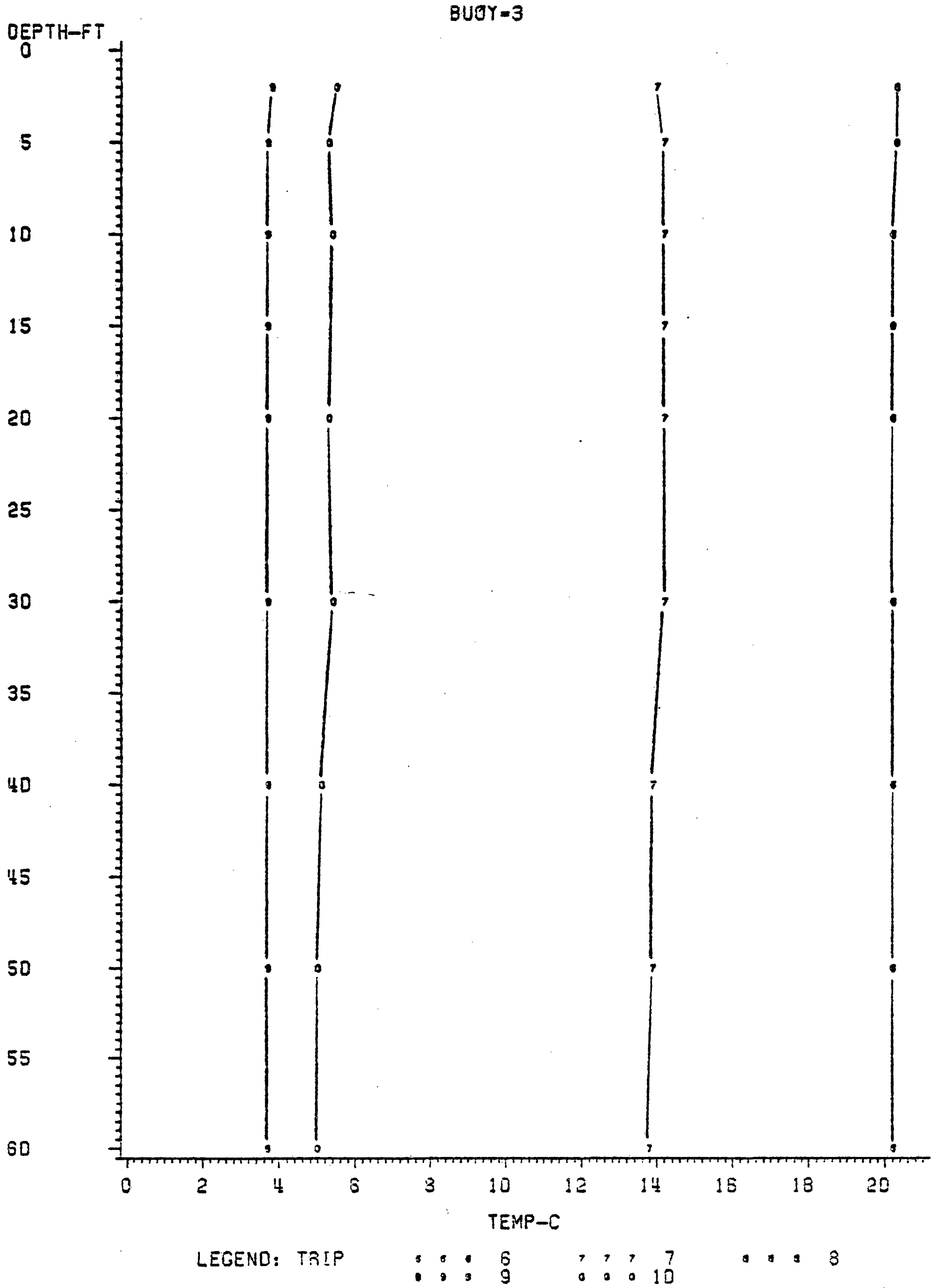
APPENDIX B (continued)



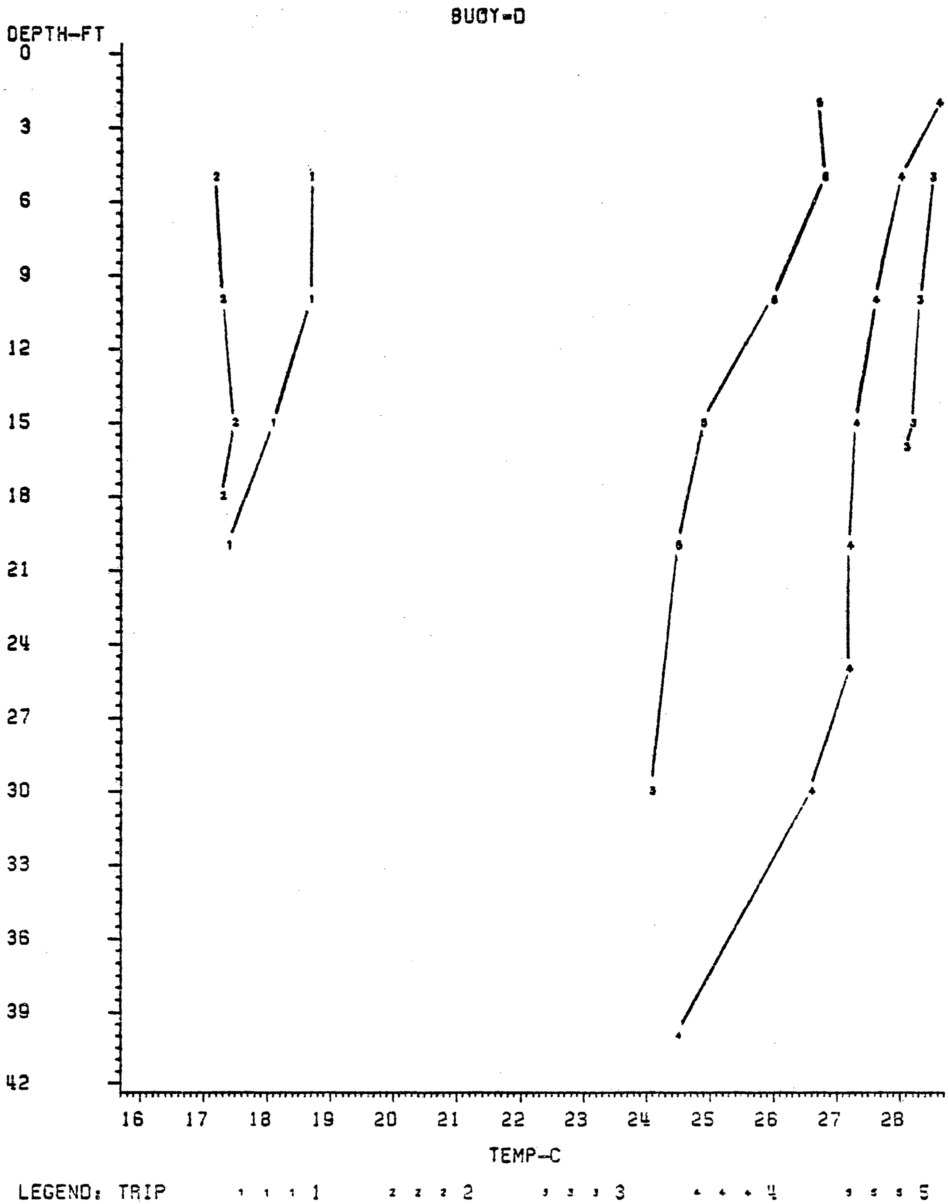
APPENDIX B (continued)



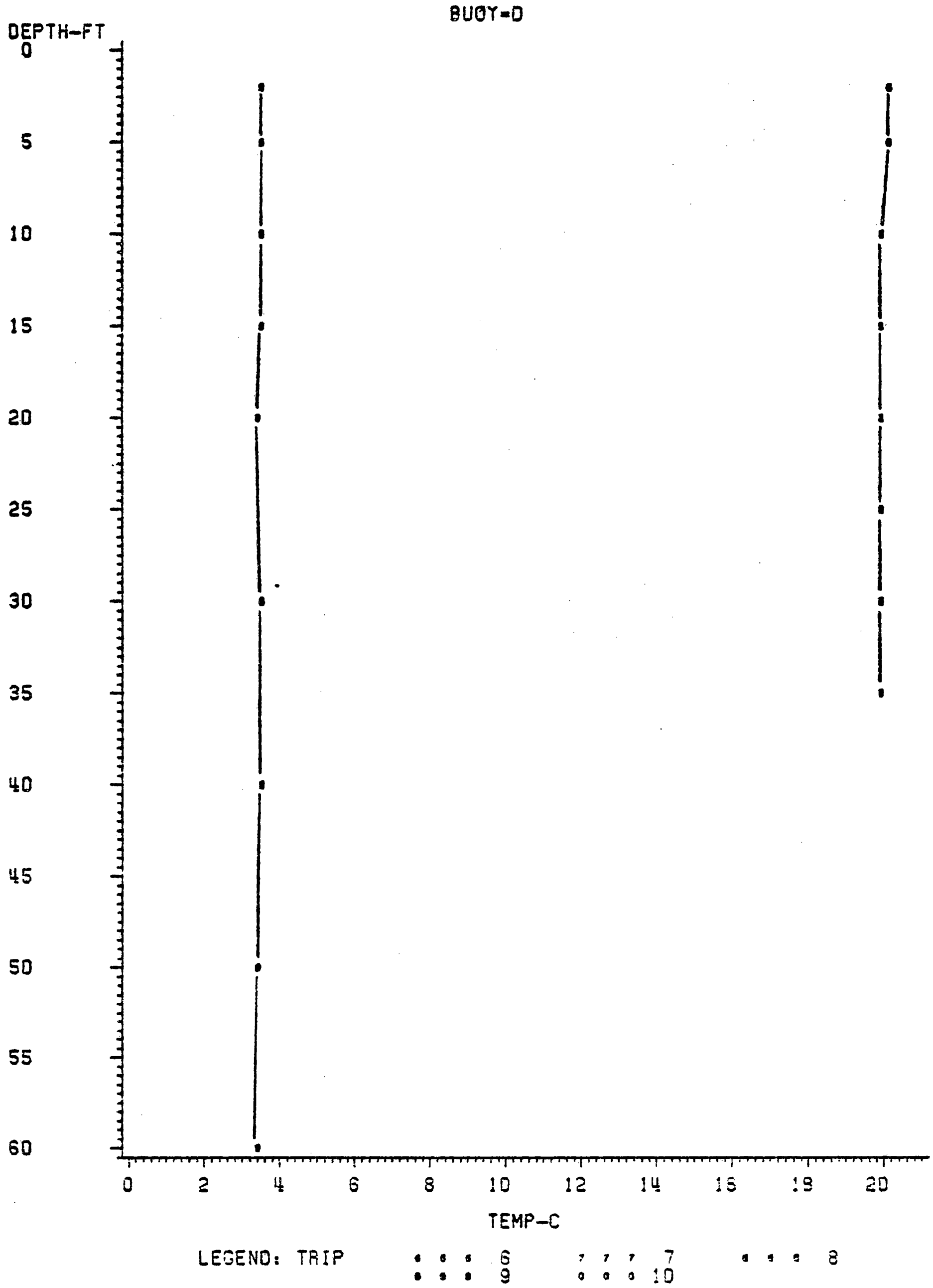
APPENDIX B (continued)



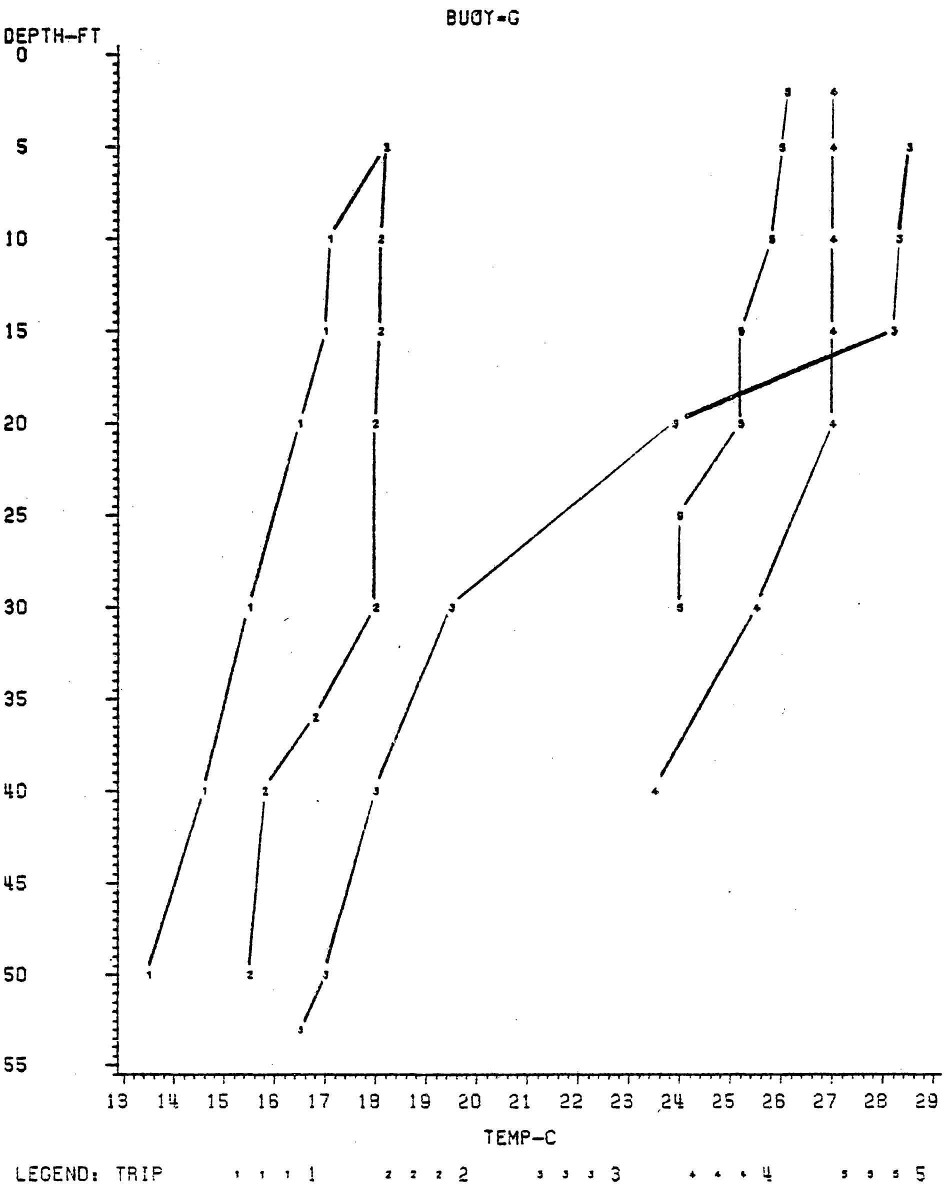
APPENDIX B (continued)



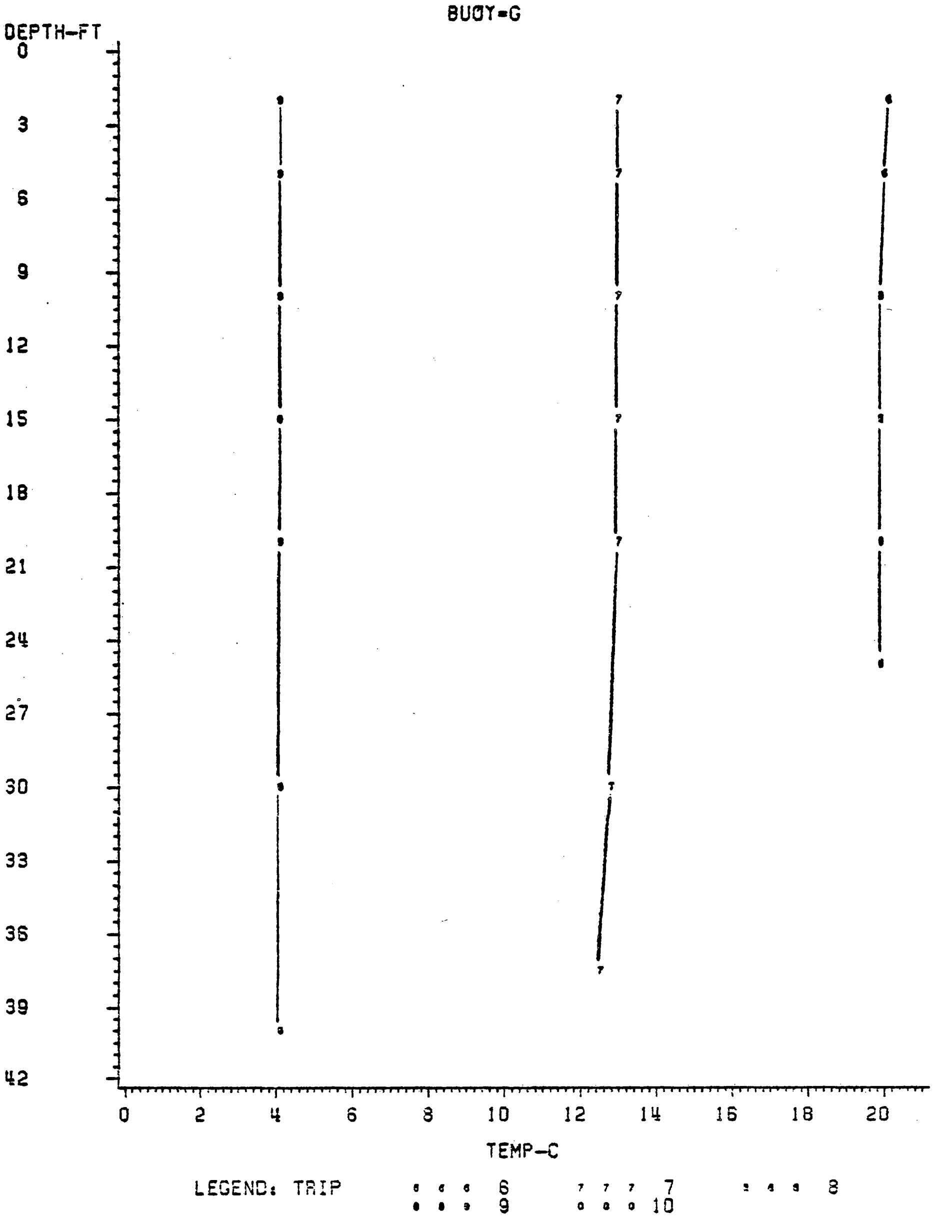
APPENDIX B (continued)



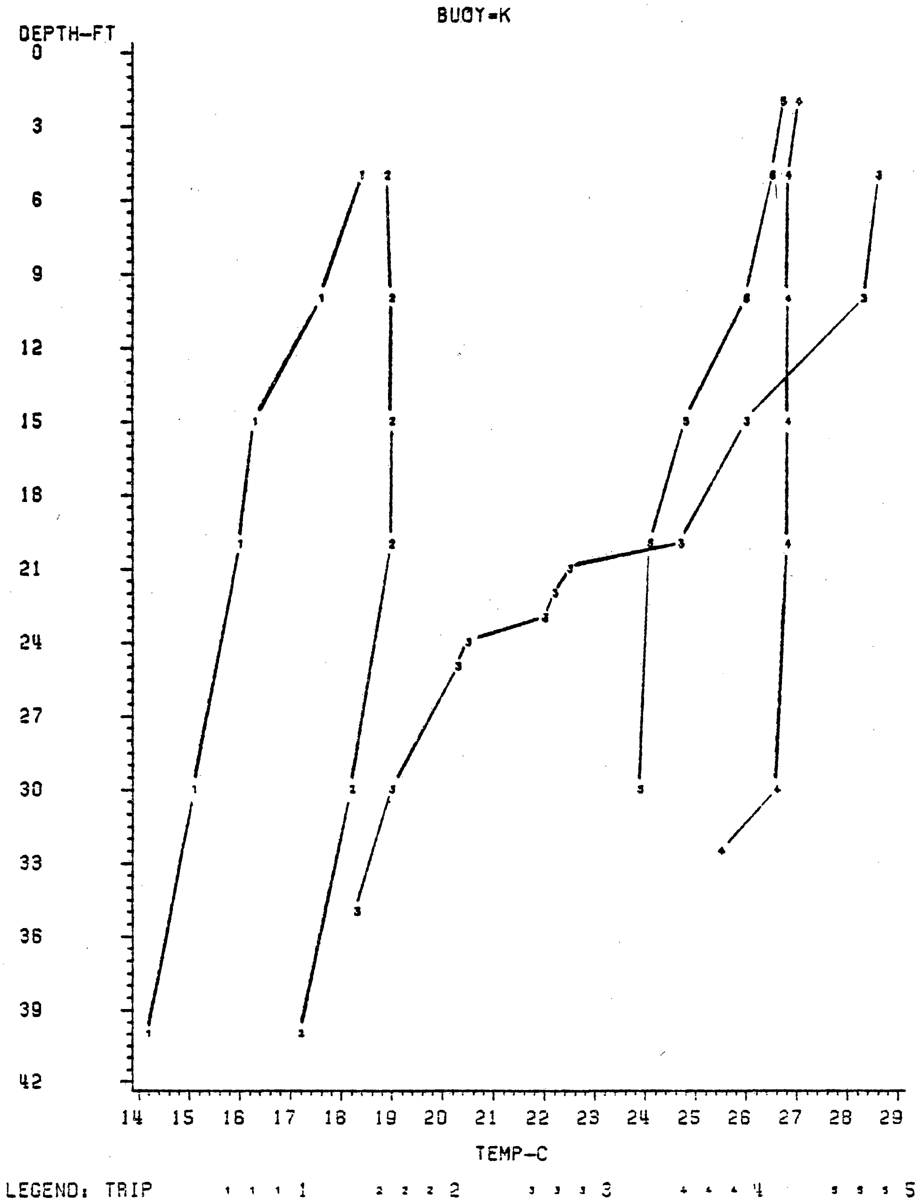
APPENDIX B (continued)



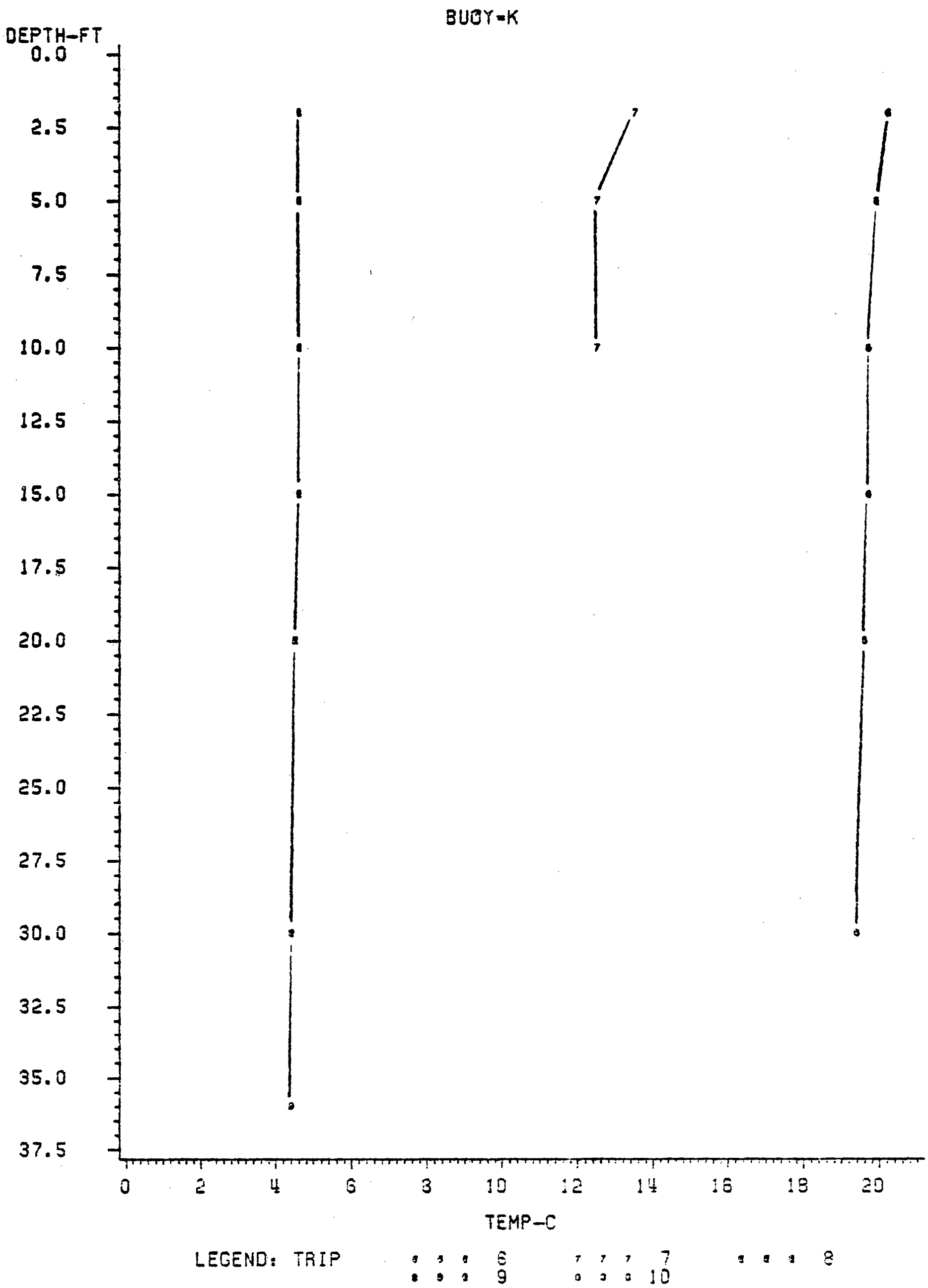
APPENDIX B (continued)



APPENDIX B (continued)



APPENDIX B (continued)



APPENDIX C

Landsat Data Smoothing Program

APPENDIX C

```
C$JOB          WATFIV
      INTEGER Z1(5,5),C
      DIMENSION Z(5,5)
      CHARACTER T*2,S*2,B*1,BU*3
C***   ***   ***   ***   ***   ***   ***   ***   ***   ***
C QUERY USER FOR CATALOGUEING INFORMATION
    1 WRITE(4,2)
    2 FORMAT(1X,'INPUT TAPE NUMBER (RIGHT JUSTIFY, TWO CHARACTERS)')
      READ(3,3,ERR=1)T
    3 FORMAT(A2)
    9 WRITE(4,10)
   10 FORMAT(1X,'INPUT LANDSAT BAND (4-7, ONE CHARACTER)')
      READ(3,11,ERR=9)B
   11 FORMAT(A1)
    6 WRITE(4,7)
    7 FORMAT(1X,'INPUT BUOY (LEFT JUSTIFY, 3 CHAR.,FILL IN SPACES)')
      READ(3,5,ERR=6)BU
    5 FORMAT(A3)
C***   ***   ***   ***   ***   ***   ***   ***   ***   ***
C ESTABLISH STATION CORRESPONDING TO USER INPUTTED BUOY
      IF(BU.EQ.'100')S=' 1'
      IF(BU.EQ.'24 ')S=' 2'
      IF(BU.EQ.'22 ')S=' 3'
      IF(BU.EQ.'20 ')S=' 4'
      IF(BU.EQ.'18 ')S=' 5'
      IF(BU.EQ.'15 ')S=' 6'
      IF(BU.EQ.'11 ')S=' 7'
      IF(BU.EQ.'8  ')S=' 8'
      IF(BU.EQ.'5  ')S=' 9'
      IF(BU.EQ.'3  ')S='10'
      IF(BU.EQ.'D  ')S='11'
      IF(BU.EQ.'G  ')S='12'
      IF(BU.EQ.'K  ')S='13'
C***   ***   ***   ***   ***   ***   ***   ***   ***   ***
C QUERY USER FOR INPUT OF PIXEL REFLECTANCE VALUES (RAW DATA)
   13 WRITE(4,14)
   14 FORMAT(1X,'INPUT FIRST LINE'/1X,'X XX XX XX XX')
      READ(3,15,ERR=13)(Z1(1,N),N=1,5)
   15 FORMAT(I2,4(1X,I2))
   16 WRITE(4,17)
   17 FORMAT(1X,'INPUT SECOND LINE'/1X,'X XX XX XX XX')
      READ(3,15,ERR=16)(Z1(2,N),N=1,5)
   18 WRITE(4,19)
   19 FORMAT(1X,'INPUT THIRD LINE'/1X,'X XX XX XX XX')
      READ(3,15,ERR=18)(Z1(3,N),N=1,5)
   20 WRITE(4,21)
   21 FORMAT(1X,'INPUT FOURTH LINE'/1X,'X XX XX XX XX')
      READ(3,15,ERR=20)(Z1(4,N),N=1,5)
   22 WRITE(4,23)
   23 FORMAT(1X,'INPUT FIFTH LINE'/1X,'X XX XX XX XX')
      READ(3,15,ERR=22)(Z1(5,N),N=1,5)
      DO 200 M=1,5
      DO 205 N=1,5
      Z(M,N)=Z1(M,N)
  205 CONTINUE
```

APPENDIX C (continued)

```
  200 CONTINUE
C ***   ***   ***   ***   ***   ***   ***   ***   ***   ***
C  COMPUTATION OF AVERAGE (SMOOTHING) VALUES
      C=Z(3,3)
      T2=(Z(2,2)+Z(2,3)+Z(2,4)+
     1   Z(3,2)+Z(3,3)+Z(3,4)+
     1   Z(4,2)+Z(4,3)+Z(4,4))/9.0
      TR=(Z(1,2)+Z(1,3)+Z(1,4)+Z(1,5)+
     2    Z(2,2)+Z(2,3)+Z(2,4)+Z(2,5)+
     2    Z(3,2)+Z(3,3)+Z(3,4)+Z(3,5)+
     2    Z(4,2)+Z(4,3)+Z(4,4)+Z(4,5))/16.0
      TL=(Z(1,1)+Z(1,2)+Z(1,3)+Z(1,4)+
     3    Z(2,1)+Z(2,2)+Z(2,3)+Z(2,4)+
     3    Z(3,1)+Z(3,2)+Z(3,3)+Z(3,4)+
     3    Z(4,1)+Z(4,2)+Z(4,3)+Z(4,4))/16.0
      BR=(Z(2,2)+Z(2,3)+Z(2,4)+Z(2,5)+
     4    Z(3,2)+Z(3,3)+Z(3,4)+Z(3,5)+
     4    Z(4,2)+Z(4,3)+Z(4,4)+Z(4,5)+
     4    Z(5,2)+Z(5,3)+Z(5,4)+Z(5,5))/16.0
      BL=(Z(2,1)+Z(2,2)+Z(2,3)+Z(2,4)+
     5    Z(3,1)+Z(3,2)+Z(3,3)+Z(3,4)+
     5    Z(4,1)+Z(4,2)+Z(4,3)+Z(4,4)+
     5    Z(5,1)+Z(5,2)+Z(5,3)+Z(5,4))/16.0
      F=(Z(1,1)+Z(1,2)+Z(1,3)+Z(1,4)+Z(1,5)+
     6   Z(2,1)+Z(2,2)+Z(2,3)+Z(2,4)+Z(2,5)+
     6   Z(3,1)+Z(3,2)+Z(3,3)+Z(3,4)+Z(3,5)+
     6   Z(4,1)+Z(4,2)+Z(4,3)+Z(4,4)+Z(4,5)+
     6   Z(5,1)+Z(5,2)+Z(5,3)+Z(5,4)+Z(5,5))/25.0
C***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***
C QUERY USER FOR CORRECTNESS OF DATA BEFORE WRITING TO FILES
   42 WRITE(4,43)T,B,S,BU
   43 FORMAT(1X,'TAPE ',A2,'  BAND ',A1,'  STATION ',A2,'  BUOY ',A3/)
      DO 350 M=1,5
      WRITE(4,44)(Z1(M,N),N=1,5)
   44 FORMAT(5(3X,I2)/)
  350 CONTINUE
      WRITE(4,45)
   45 FORMAT(1X,'IS THE ABOVE CORRECT?  ( YES=1 , QUIT=9 , START THIS
     8 ONE OVER = 8 )')
      READ(3,46)I
   46 FORMAT(I1)
      IF(I.EQ.9)GO TO 90
      IF(I.EQ.1)GO TO 299
      IF(I.EQ.8)GO TO 65
      WRITE(4,47)
   47 FORMAT(1X,'INPUT COORDINATES OF INCORRECT POINT (ROW COL)')
      READ(3,48)M,N
   48 FORMAT(I1,1X,I1)
      WRITE(4,49)
   49 FORMAT(1X,'INPUT CORRECT PIXEL VALUE (RIGHT JUSTIFY, 2 CHAR.)')
      READ(3,351)Z1(M,N)
  351 FORMAT(I2)
      GO TO 42
C***   ***   ***   ***   ***   ***   ***   ***   ***   ***   ***
C WRITE TO TWO FILES
```

APPENDIX C (continued)

```
  299 DO 300 M=1,5
      WRITE(10,50)T,B,S,BU,(Z1(M,N),N=1,5),M
  300 CONTINUE
   50 FORMAT(T2,'TAPE ',A2,'  BAND ',A1,'  STATION ',A2,'  BUOY ',A3,
     7       4X,5(I2,3X),'ROW ',I1)
      WRITE(8,60)T,B,S,BU,C,T2,TL,TR,BL,BR,F
   60 FORMAT(T2,A2,1X,A1,1X,A2,1X,A3,1X,I2,6(1X,F5.2))
C***  ***  ***  ***  ***  ***  ***  ***  ***  ***  ***
C QUERY USER FOR CONTINUATION OF PROGRAM
   65 WRITE(4,70)
   70 FORMAT(1X,'DIFFERENT TAPE? ( YES=1 , QUIT=9 )')
      READ(3,75)I
   75 FORMAT(I1)
      IF(I.EQ.1)GO TO 1
      IF(I.EQ.9)GO TO 90
      WRITE(4,80)
   80 FORMAT(1X,'DIFFERENT BAND? ( YES=1 , QUIT=9 )')
      READ(3,75)I
      IF(I.EQ.1)GO TO 9
      IF(I.EQ.9)GO TO 90
      GO TO 6
   90 STOP
      END
C$ENTRY
```

APPENDIX D

Raw Landsat Data

APPENDIX D

TAPE	1	BAND	4	STATION	11	BUOY	D	24	24	25	24	24	ROW	1
TAPE	1	BAND	4	STATION	11	BUOY	D	25	25	24	22	24	ROW	2
TAPE	1	BAND	4	STATION	11	BUOY	D	25	25	23	21	24	ROW	3
TAPE	1	BAND	4	STATION	11	BUOY	D	24	24	24	24	24	ROW	4
TAPE	1	BAND	4	STATION	11	BUOY	D	24	22	23	24	24	ROW	5
TAPE	1	BAND	4	STATION	12	BUOY	G	23	23	23	23	24	ROW	1
TAPE	1	BAND	4	STATION	12	BUOY	G	24	24	24	24	23	ROW	2
TAPE	1	BAND	4	STATION	12	BUOY	G	23	23	23	23	23	ROW	3
TAPE	1	BAND	4	STATION	12	BUOY	G	23	22	23	23	23	ROW	4
TAPE	1	BAND	4	STATION	12	BUOY	G	23	22	23	23	23	ROW	5
TAPE	1	BAND	4	STATION	13	BUOY	K	23	21	20	22	25	ROW	1
TAPE	1	BAND	4	STATION	13	BUOY	K	23	19	19	23	31	ROW	2
TAPE	1	BAND	4	STATION	13	BUOY	K	20	19	22	29	36	ROW	3
TAPE	1	BAND	4	STATION	13	BUOY	K	17	18	25	33	39	ROW	4
TAPE	1	BAND	4	STATION	13	BUOY	K	21	24	32	38	44	ROW	5
TAPE	1	BAND	5	STATION	11	BUOY	D	17	17	16	16	16	ROW	1
TAPE	1	BAND	5	STATION	11	BUOY	D	16	16	16	15	16	ROW	2
TAPE	1	BAND	5	STATION	11	BUOY	D	15	16	16	15	16	ROW	3
TAPE	1	BAND	5	STATION	11	BUOY	D	16	16	15	15	15	ROW	4
TAPE	1	BAND	5	STATION	11	BUOY	D	15	15	15	15	15	ROW	5
TAPE	1	BAND	5	STATION	12	BUOY	G	16	17	16	16	16	ROW	1
TAPE	1	BAND	5	STATION	12	BUOY	G	16	17	16	16	16	ROW	2
TAPE	1	BAND	5	STATION	12	BUOY	G	17	16	16	16	16	ROW	3
TAPE	1	BAND	5	STATION	12	BUOY	G	16	15	16	17	16	ROW	4
TAPE	1	BAND	5	STATION	12	BUOY	G	16	15	16	17	16	ROW	5
TAPE	1	BAND	5	STATION	13	BUOY	K	15	16	14	17	22	ROW	1
TAPE	1	BAND	5	STATION	13	BUOY	K	17	14	17	19	30	ROW	2
TAPE	1	BAND	5	STATION	13	BUOY	K	16	14	20	28	35	ROW	3
TAPE	1	BAND	5	STATION	13	BUOY	K	14	15	21	34	39	ROW	4
TAPE	1	BAND	5	STATION	13	BUOY	K	16	20	28	38	45	ROW	5
TAPE	1	BAND	6	STATION	11	BUOY	D	10	9	9	9	9	ROW	1
TAPE	1	BAND	6	STATION	11	BUOY	D	9	9	9	9	9	ROW	2
TAPE	1	BAND	6	STATION	11	BUOY	D	9	9	9	10	9	ROW	3
TAPE	1	BAND	6	STATION	11	BUOY	D	10	9	10	11	10	ROW	4
TAPE	1	BAND	6	STATION	11	BUOY	D	9	8	9	8	9	ROW	5
TAPE	1	BAND	6	STATION	12	BUOY	G	10	10	9	10	10	ROW	1
TAPE	1	BAND	6	STATION	12	BUOY	G	8	9	9	10	10	ROW	2
TAPE	1	BAND	6	STATION	12	BUOY	G	7	7	9	9	9	ROW	3
TAPE	1	BAND	6	STATION	12	BUOY	G	8	9	9	9	9	ROW	4
TAPE	1	BAND	6	STATION	12	BUOY	G	8	8	9	10	8	ROW	5
TAPE	1	BAND	6	STATION	13	BUOY	K	11	10	10	12	16	ROW	1
TAPE	1	BAND	6	STATION	13	BUOY	K	13	10	13	12	24	ROW	2
TAPE	1	BAND	6	STATION	13	BUOY	K	11	8	16	21	31	ROW	3
TAPE	1	BAND	6	STATION	13	BUOY	K	9	10	16	29	33	ROW	4
TAPE	1	BAND	6	STATION	13	BUOY	K	13	19	25	35	41	ROW	5
TAPE	1	BAND	7	STATION	11	BUOY	D	1	1	1	1	4	ROW	1
TAPE	1	BAND	7	STATION	11	BUOY	D	2	2	2	2	3	ROW	2
TAPE	1	BAND	7	STATION	11	BUOY	D	3	3	3	3	3	ROW	3
TAPE	1	BAND	7	STATION	11	BUOY	D	3	3	3	3	3	ROW	4
TAPE	1	BAND	7	STATION	11	BUOY	D	2	2	1	3	2	ROW	5
TAPE	1	BAND	7	STATION	12	BUOY	G	3	3	3	3	1	ROW	1
TAPE	1	BAND	7	STATION	12	BUOY	G	3	2	4	2	2	ROW	2
TAPE	1	BAND	7	STATION	12	BUOY	G	2	1	4	1	4	ROW	3
TAPE	1	BAND	7	STATION	12	BUOY	G	2	1	2	3	3	ROW	4
TAPE	1	BAND	7	STATION	12	BUOY	G	2	2	2	3	2	ROW	5

APPENDIX D (continued)

TAPE	1	BAND	7	STATION	13	BUOY	K	5	3	3	3	5	ROW	1
TAPE	1	BAND	7	STATION	13	BUOY	K	5	4	4	6	14	ROW	2
TAPE	1	BAND	7	STATION	13	BUOY	K	4	4	6	11	21	ROW	3
TAPE	1	BAND	7	STATION	13	BUOY	K	4	4	8	18	22	ROW	4
TAPE	1	BAND	7	STATION	13	BUOY	K	6	9	16	25	27	ROW	5
TAPE	3	BAND	4	STATION	1	BUOY	100	21	21	20	20	20	ROW	1
TAPE	3	BAND	4	STATION	1	BUOY	100	23	22	22	22	22	ROW	2
TAPE	3	BAND	4	STATION	1	BUOY	100	24	24	23	22	25	ROW	3
TAPE	3	BAND	4	STATION	1	BUOY	100	24	24	22	21	23	ROW	4
TAPE	3	BAND	4	STATION	1	BUOY	100	22	22	22	22	23	ROW	5
TAPE	3	BAND	4	STATION	2	BUOY	24	16	16	16	16	16	ROW	1
TAPE	3	BAND	4	STATION	2	BUOY	24	16	17	16	16	16	ROW	2
TAPE	3	BAND	4	STATION	2	BUOY	24	15	15	14	14	14	ROW	3
TAPE	3	BAND	4	STATION	2	BUOY	24	15	15	14	15	14	ROW	4
TAPE	3	BAND	4	STATION	2	BUOY	24	15	14	14	15	15	ROW	5
TAPE	3	BAND	4	STATION	3	BUOY	22	19	19	20	19	19	ROW	1
TAPE	3	BAND	4	STATION	3	BUOY	22	21	19	21	21	21	ROW	2
TAPE	3	BAND	4	STATION	3	BUOY	22	21	20	21	21	21	ROW	3
TAPE	3	BAND	4	STATION	3	BUOY	22	22	22	22	22	22	ROW	4
TAPE	3	BAND	4	STATION	3	BUOY	22	24	23	23	25	23	ROW	5
TAPE	3	BAND	4	STATION	4	BUOY	20	15	16	15	15	16	ROW	1
TAPE	3	BAND	4	STATION	4	BUOY	20	15	15	14	14	15	ROW	2
TAPE	3	BAND	4	STATION	4	BUOY	20	15	15	15	16	15	ROW	3
TAPE	3	BAND	4	STATION	4	BUOY	20	15	16	16	16	15	ROW	4
TAPE	3	BAND	4	STATION	4	BUOY	20	16	16	16	16	15	ROW	5
TAPE	3	BAND	5	STATION	1	BUOY	100	21	19	20	19	19	ROW	1
TAPE	3	BAND	5	STATION	1	BUOY	100	22	21	21	21	21	ROW	2
TAPE	3	BAND	5	STATION	1	BUOY	100	24	23	22	22	23	ROW	3
TAPE	3	BAND	5	STATION	1	BUOY	100	24	23	23	24	22	ROW	4
TAPE	3	BAND	5	STATION	1	BUOY	100	25	24	23	24	22	ROW	5
TAPE	3	BAND	5	STATION	2	BUOY	24	22	22	20	22	23	ROW	1
TAPE	3	BAND	5	STATION	2	BUOY	24	20	21	20	21	20	ROW	2
TAPE	3	BAND	5	STATION	2	BUOY	24	20	20	22	21	20	ROW	3
TAPE	3	BAND	5	STATION	2	BUOY	24	22	22	22	22	22	ROW	4
TAPE	3	BAND	5	STATION	2	BUOY	24	22	22	22	22	23	ROW	5
TAPE	3	BAND	5	STATION	3	BUOY	22	17	17	18	17	16	ROW	1
TAPE	3	BAND	5	STATION	3	BUOY	22	17	19	19	17	17	ROW	2
TAPE	3	BAND	5	STATION	3	BUOY	22	17	19	19	17	17	ROW	3
TAPE	3	BAND	5	STATION	3	BUOY	22	18	19	20	20	20	ROW	4
TAPE	3	BAND	5	STATION	3	BUOY	22	19	20	22	22	23	ROW	5
TAPE	3	BAND	5	STATION	4	BUOY	20	11	12	11	11	12	ROW	1
TAPE	3	BAND	5	STATION	4	BUOY	20	11	11	11	12	12	ROW	2
TAPE	3	BAND	5	STATION	4	BUOY	20	12	11	12	12	11	ROW	3
TAPE	3	BAND	5	STATION	4	BUOY	20	13	13	13	13	13	ROW	4
TAPE	3	BAND	5	STATION	4	BUOY	20	14	15	14	13	13	ROW	5
TAPE	3	BAND	6	STATION	1	BUOY	100	11	11	10	9	13	ROW	1
TAPE	3	BAND	6	STATION	1	BUOY	100	13	12	13	11	8	ROW	2
TAPE	3	BAND	6	STATION	1	BUOY	100	13	13	14	14	13	ROW	3
TAPE	3	BAND	6	STATION	1	BUOY	100	12	12	12	12	12	ROW	4
TAPE	3	BAND	6	STATION	1	BUOY	100	13	12	13	13	12	ROW	5
TAPE	3	BAND	6	STATION	2	BUOY	24	13	11	13	14	14	ROW	1
TAPE	3	BAND	6	STATION	2	BUOY	24	12	12	12	11	10	ROW	2
TAPE	3	BAND	6	STATION	2	BUOY	24	12	12	12	11	10	ROW	3
TAPE	3	BAND	6	STATION	2	BUOY	24	13	12	12	12	12	ROW	4
TAPE	3	BAND	6	STATION	2	BUOY	24	13	11	11	12	13	ROW	5

APPENDIX D (continued)

TAPE	3	BAND	6	STATION	3	BUOY	22	13	12	12	11	9	ROW	1
TAPE	3	BAND	6	STATION	3	BUOY	22	11	12	15	12	11	ROW	2
TAPE	3	BAND	6	STATION	3	BUOY	22	11	11	16	14	11	ROW	3
TAPE	3	BAND	6	STATION	3	BUOY	22	13	13	16	16	13	ROW	4
TAPE	3	BAND	6	STATION	3	BUOY	22	13	15	16	16	15	ROW	5
TAPE	3	BAND	6	STATION	4	BUOY	20	6	6	7	6	7	ROW	1
TAPE	3	BAND	6	STATION	4	BUOY	20	6	6	6	6	7	ROW	2
TAPE	3	BAND	6	STATION	4	BUOY	20	6	6	6	8	7	ROW	3
TAPE	3	BAND	6	STATION	4	BUOY	20	7	8	8	8	7	ROW	4
TAPE	3	BAND	6	STATION	4	BUOY	20	8	9	10	9	8	ROW	5
TAPE	3	BAND	7	STATION	1	BUOY	100	2	3	3	2	2	ROW	1
TAPE	3	BAND	7	STATION	1	BUOY	100	4	3	2	2	2	ROW	2
TAPE	3	BAND	7	STATION	1	BUOY	100	4	2	1	0	4	ROW	3
TAPE	3	BAND	7	STATION	1	BUOY	100	3	3	1	2	2	ROW	4
TAPE	3	BAND	7	STATION	1	BUOY	100	2	3	2	3	2	ROW	5
TAPE	3	BAND	7	STATION	2	BUOY	24	0	2	2	6	3	ROW	1
TAPE	3	BAND	7	STATION	2	BUOY	24	2	2	2	3	1	ROW	2
TAPE	3	BAND	7	STATION	2	BUOY	24	4	3	3	3	2	ROW	3
TAPE	3	BAND	7	STATION	2	BUOY	24	3	3	1	2	3	ROW	4
TAPE	3	BAND	7	STATION	2	BUOY	24	2	2	1	3	3	ROW	5
TAPE	3	BAND	7	STATION	3	BUOY	22	6	4	7	5	3	ROW	1
TAPE	3	BAND	7	STATION	3	BUOY	22	3	3	6	6	6	ROW	2
TAPE	3	BAND	7	STATION	3	BUOY	22	4	4	6	5	5	ROW	3
TAPE	3	BAND	7	STATION	3	BUOY	22	5	5	8	6	5	ROW	4
TAPE	3	BAND	7	STATION	3	BUOY	22	5	7	9	8	6	ROW	5
TAPE	3	BAND	7	STATION	4	BUOY	20	2	1	0	1	2	ROW	1
TAPE	3	BAND	7	STATION	4	BUOY	20	1	1	1	3	1	ROW	2
TAPE	3	BAND	7	STATION	4	BUOY	20	3	1	1	1	3	ROW	3
TAPE	3	BAND	7	STATION	4	BUOY	20	3	2	2	2	2	ROW	4
TAPE	3	BAND	7	STATION	4	BUOY	20	1	2	2	2	2	ROW	5
TAPE	5	BAND	4	STATION	1	BUOY	100	26	27	25	25	27	ROW	1
TAPE	5	BAND	4	STATION	1	BUOY	100	27	25	25	24	26	ROW	2
TAPE	5	BAND	4	STATION	1	BUOY	100	29	26	27	27	27	ROW	3
TAPE	5	BAND	4	STATION	1	BUOY	100	29	29	29	29	29	ROW	4
TAPE	5	BAND	4	STATION	1	BUOY	100	31	31	28	29	31	ROW	5
TAPE	5	BAND	4	STATION	2	BUOY	24	24	24	22	23	23	ROW	1
TAPE	5	BAND	4	STATION	2	BUOY	24	24	24	22	22	22	ROW	2
TAPE	5	BAND	4	STATION	2	BUOY	24	22	23	21	22	24	ROW	3
TAPE	5	BAND	4	STATION	2	BUOY	24	22	22	21	22	24	ROW	4
TAPE	5	BAND	4	STATION	2	BUOY	24	24	22	22	19	19	ROW	5
TAPE	5	BAND	4	STATION	3	BUOY	22	20	20	20	20	20	ROW	1
TAPE	5	BAND	4	STATION	3	BUOY	22	20	19	20	20	20	ROW	2
TAPE	5	BAND	4	STATION	3	BUOY	22	21	20	20	20	20	ROW	3
TAPE	5	BAND	4	STATION	3	BUOY	22	24	24	22	21	21	ROW	4
TAPE	5	BAND	4	STATION	3	BUOY	22	22	22	21	20	21	ROW	5
TAPE	5	BAND	4	STATION	4	BUOY	20	18	18	21	21	21	ROW	1
TAPE	5	BAND	4	STATION	4	BUOY	20	20	20	21	21	19	ROW	2
TAPE	5	BAND	4	STATION	4	BUOY	20	20	20	19	19	19	ROW	3
TAPE	5	BAND	4	STATION	4	BUOY	20	19	19	19	19	19	ROW	4
TAPE	5	BAND	4	STATION	4	BUOY	20	19	19	19	19	19	ROW	5
TAPE	5	BAND	4	STATION	5	BUOY	18	18	18	18	18	18	ROW	1
TAPE	5	BAND	4	STATION	5	BUOY	18	19	19	19	19	19	ROW	2
TAPE	5	BAND	4	STATION	5	BUOY	18	18	18	18	18	18	ROW	3
TAPE	5	BAND	4	STATION	5	BUOY	18	18	18	18	18	18	ROW	4
TAPE	5	BAND	4	STATION	5	BUOY	18	18	18	18	18	18	ROW	5

APPENDIX D (continued)

TAPE	5	BAND	4	STATION	6	BUOY	15	18	18	19	19	19	ROW	1
TAPE	5	BAND	4	STATION	6	BUOY	15	20	19	19	18	19	ROW	2
TAPE	5	BAND	4	STATION	6	BUOY	15	20	19	19	19	19	ROW	3
TAPE	5	BAND	4	STATION	6	BUOY	15	19	19	20	20	19	ROW	4
TAPE	5	BAND	4	STATION	6	BUOY	15	18	18	19	19	19	ROW	5
TAPE	5	BAND	4	STATION	7	BUOY	11	18	18	19	18	19	ROW	1
TAPE	5	BAND	4	STATION	7	BUOY	11	18	18	19	19	19	ROW	2
TAPE	5	BAND	4	STATION	7	BUOY	11	18	17	18	18	18	ROW	3
TAPE	5	BAND	4	STATION	7	BUOY	11	17	17	18	18	18	ROW	4
TAPE	5	BAND	4	STATION	7	BUOY	11	17	18	18	18	18	ROW	5
TAPE	5	BAND	4	STATION	8	BUOY	8	18	19	18	18	18	ROW	1
TAPE	5	BAND	4	STATION	8	BUOY	8	17	18	18	17	17	ROW	2
TAPE	5	BAND	4	STATION	8	BUOY	8	17	17	18	17	17	ROW	3
TAPE	5	BAND	4	STATION	8	BUOY	8	16	17	19	18	16	ROW	4
TAPE	5	BAND	4	STATION	8	BUOY	8	17	18	19	18	17	ROW	5
TAPE	5	BAND	4	STATION	9	BUOY	5	18	18	16	16	15	ROW	1
TAPE	5	BAND	4	STATION	9	BUOY	5	18	18	17	17	16	ROW	2
TAPE	5	BAND	4	STATION	9	BUOY	5	18	18	18	18	19	ROW	3
TAPE	5	BAND	4	STATION	9	BUOY	5	17	18	18	18	19	ROW	4
TAPE	5	BAND	4	STATION	9	BUOY	5	18	18	18	19	19	ROW	5
TAPE	5	BAND	4	STATION	10	BUOY	3	19	19	16	16	19	ROW	1
TAPE	5	BAND	4	STATION	10	BUOY	3	19	18	18	18	19	ROW	2
TAPE	5	BAND	4	STATION	10	BUOY	3	19	18	19	19	19	ROW	3
TAPE	5	BAND	4	STATION	10	BUOY	3	19	19	19	19	19	ROW	4
TAPE	5	BAND	4	STATION	10	BUOY	3	19	19	19	19	19	ROW	5
TAPE	5	BAND	4	STATION	11	BUOY	D	20	21	20	20	21	ROW	1
TAPE	5	BAND	4	STATION	11	BUOY	D	19	19	20	20	20	ROW	2
TAPE	5	BAND	4	STATION	11	BUOY	D	21	21	21	21	20	ROW	3
TAPE	5	BAND	4	STATION	11	BUOY	D	20	20	21	20	20	ROW	4
TAPE	5	BAND	4	STATION	11	BUOY	D	18	19	20	19	19	ROW	5
TAPE	5	BAND	4	STATION	12	BUOY	G	21	20	20	20	18	ROW	1
TAPE	5	BAND	4	STATION	12	BUOY	G	21	19	19	19	19	ROW	2
TAPE	5	BAND	4	STATION	12	BUOY	G	20	19	19	19	20	ROW	3
TAPE	5	BAND	4	STATION	12	BUOY	G	19	18	20	23	21	ROW	4
TAPE	5	BAND	4	STATION	12	BUOY	G	18	20	21	20	19	ROW	5
TAPE	5	BAND	5	STATION	1	BUOY	100	34	33	31	32	36	ROW	1
TAPE	5	BAND	5	STATION	1	BUOY	100	37	35	34	33	35	ROW	2
TAPE	5	BAND	5	STATION	1	BUOY	100	39	37	38	35	35	ROW	3
TAPE	5	BAND	5	STATION	1	BUOY	100	40	38	38	37	36	ROW	4
TAPE	5	BAND	5	STATION	1	BUOY	100	41	38	40	40	39	ROW	5
TAPE	5	BAND	5	STATION	2	BUOY	24	22	22	22	20	22	ROW	1
TAPE	5	BAND	5	STATION	2	BUOY	24	21	21	21	20	21	ROW	2
TAPE	5	BAND	5	STATION	2	BUOY	24	21	20	20	20	19	ROW	3
TAPE	5	BAND	5	STATION	2	BUOY	24	22	21	21	21	19	ROW	4
TAPE	5	BAND	5	STATION	2	BUOY	24	23	21	22	23	20	ROW	5
TAPE	5	BAND	5	STATION	3	BUOY	22	19	20	20	17	19	ROW	1
TAPE	5	BAND	5	STATION	3	BUOY	22	19	19	21	17	19	ROW	2
TAPE	5	BAND	5	STATION	3	BUOY	22	19	18	21	19	18	ROW	3
TAPE	5	BAND	5	STATION	3	BUOY	22	19	19	19	19	17	ROW	4
TAPE	5	BAND	5	STATION	3	BUOY	22	19	19	18	19	18	ROW	5
TAPE	5	BAND	5	STATION	4	BUOY	20	18	18	17	15	15	ROW	1
TAPE	5	BAND	5	STATION	4	BUOY	20	18	17	16	15	15	ROW	2
TAPE	5	BAND	5	STATION	4	BUOY	20	16	16	16	17	17	ROW	3
TAPE	5	BAND	5	STATION	4	BUOY	20	16	16	16	17	17	ROW	4
TAPE	5	BAND	5	STATION	4	BUOY	20	16	16	16	16	16	ROW	5

APPENDIX D (continued)

TAPE 5	BAND 5	STATION 5	BUOY 18	13	14	13	13	13	ROW 1
TAPE 5	BAND 5	STATION 5	BUOY 18	13	14	14	14	14	ROW 2
TAPE 5	BAND 5	STATION 5	BUOY 18	14	14	14	14	14	ROW 3
TAPE 5	BAND 5	STATION 5	BUOY 18	14	14	13	14	13	ROW 4
TAPE 5	BAND 5	STATION 5	BUOY 18	13	14	13	14	13	ROW 5
TAPE 5	BAND 5	STATION 6	BUOY 15	16	15	14	15	16	ROW 1
TAPE 5	BAND 5	STATION 6	BUOY 15	16	15	13	15	17	ROW 2
TAPE 5	BAND 5	STATION 6	BUOY 15	16	15	14	15	16	ROW 3
TAPE 5	BAND 5	STATION 6	BUOY 15	15	15	15	15	15	ROW 4
TAPE 5	BAND 5	STATION 6	BUOY 15	16	15	15	15	15	ROW 5
TAPE 5	BAND 5	STATION 7	BUOY 11	14	14	14	14	14	ROW 1
TAPE 5	BAND 5	STATION 7	BUOY 11	15	14	15	15	15	ROW 2
TAPE 5	BAND 5	STATION 7	BUOY 11	15	15	15	15	15	ROW 3
TAPE 5	BAND 5	STATION 7	BUOY 11	15	15	13	14	14	ROW 4
TAPE 5	BAND 5	STATION 7	BUOY 11	14	14	14	13	14	ROW 5
TAPE 5	BAND 5	STATION 8	BUOY 8	15	15	14	14	15	ROW 1
TAPE 5	BAND 5	STATION 8	BUOY 8	15	15	14	14	14	ROW 2
TAPE 5	BAND 5	STATION 8	BUOY 8	14	14	14	14	13	ROW 3
TAPE 5	BAND 5	STATION 8	BUOY 8	14	14	13	13	13	ROW 4
TAPE 5	BAND 5	STATION 8	BUOY 8	14	14	13	14	13	ROW 5
TAPE 5	BAND 5	STATION 9	BUOY 5	13	14	14	12	13	ROW 1
TAPE 5	BAND 5	STATION 9	BUOY 5	13	14	14	13	13	ROW 2
TAPE 5	BAND 5	STATION 9	BUOY 5	13	13	14	14	13	ROW 3
TAPE 5	BAND 5	STATION 9	BUOY 5	13	14	14	13	13	ROW 4
TAPE 5	BAND 5	STATION 9	BUOY 5	14	14	14	13	13	ROW 5
TAPE 5	BAND 5	STATION 10	BUOY 3	13	13	13	14	14	ROW 1
TAPE 5	BAND 5	STATION 10	BUOY 3	14	14	15	14	14	ROW 2
TAPE 5	BAND 5	STATION 10	BUOY 3	14	14	15	14	15	ROW 3
TAPE 5	BAND 5	STATION 10	BUOY 3	14	14	14	14	16	ROW 4
TAPE 5	BAND 5	STATION 10	BUOY 3	14	15	15	15	15	ROW 5
TAPE 5	BAND 5	STATION 11	BUOY D	16	16	17	17	17	ROW 1
TAPE 5	BAND 5	STATION 11	BUOY D	16	16	16	16	16	ROW 2
TAPE 5	BAND 5	STATION 11	BUOY D	16	16	15	14	15	ROW 3
TAPE 5	BAND 5	STATION 11	BUOY D	15	16	15	14	16	ROW 4
TAPE 5	BAND 5	STATION 11	BUOY D	15	16	16	15	16	ROW 5
TAPE 5	BAND 5	STATION 12	BUOY G	16	16	16	16	16	ROW 1
TAPE 5	BAND 5	STATION 12	BUOY G	16	16	16	16	16	ROW 2
TAPE 5	BAND 5	STATION 12	BUOY G	15	15	16	16	16	ROW 3
TAPE 5	BAND 5	STATION 12	BUOY G	15	15	16	16	16	ROW 4
TAPE 5	BAND 5	STATION 12	BUOY G	15	15	15	15	16	ROW 5
TAPE 5	BAND 6	STATION 1	BUOY 100	20	19	16	16	18	ROW 1
TAPE 5	BAND 6	STATION 1	BUOY 100	22	21	17	16	18	ROW 2
TAPE 5	BAND 6	STATION 1	BUOY 100	23	24	22	21	22	ROW 3
TAPE 5	BAND 6	STATION 1	BUOY 100	24	25	23	24	24	ROW 4
TAPE 5	BAND 6	STATION 1	BUOY 100	26	27	25	24	24	ROW 5
TAPE 5	BAND 6	STATION 2	BUOY 24	13	13	13	13	13	ROW 1
TAPE 5	BAND 6	STATION 2	BUOY 24	12	12	13	11	12	ROW 2
TAPE 5	BAND 6	STATION 2	BUOY 24	13	12	12	11	11	ROW 3
TAPE 5	BAND 6	STATION 2	BUOY 24	13	13	13	12	12	ROW 4
TAPE 5	BAND 6	STATION 2	BUOY 24	13	13	13	12	12	ROW 5
TAPE 5	BAND 6	STATION 3	BUOY 22	12	12	13	10	12	ROW 1
TAPE 5	BAND 6	STATION 3	BUOY 22	11	12	13	10	11	ROW 2
TAPE 5	BAND 6	STATION 3	BUOY 22	10	12	12	11	10	ROW 3
TAPE 5	BAND 6	STATION 3	BUOY 22	11	11	12	12	11	ROW 4
TAPE 5	BAND 6	STATION 3	BUOY 22	11	11	11	11	12	ROW 5

APPENDIX D (continued)

TAPE 5	BAND 6	STATION 4	BUOY 20	11	10	9	11	11	ROW 1
TAPE 5	BAND 6	STATION 4	BUOY 20	10	10	10	10	12	ROW 2
TAPE 5	BAND 6	STATION 4	BUOY 20	10	10	10	9	11	ROW 3
TAPE 5	BAND 6	STATION 4	BUOY 20	10	9	10	10	10	ROW 4
TAPE 5	BAND 6	STATION 4	BUOY 20	11	9	10	11	11	ROW 5
TAPE 5	BAND 6	STATION 5	BUOY 18	9	9	9	9	9	ROW 1
TAPE 5	BAND 6	STATION 5	BUOY 18	9	9	9	9	10	ROW 2
TAPE 5	BAND 6	STATION 5	BUOY 18	9	9	8	8	9	ROW 3
TAPE 5	BAND 6	STATION 5	BUOY 18	9	10	8	9	10	ROW 4
TAPE 5	BAND 6	STATION 5	BUOY 18	9	10	9	10	11	ROW 5
TAPE 5	BAND 6	STATION 6	BUOY 15	9	9	9	9	9	ROW 1
TAPE 5	BAND 6	STATION 6	BUOY 15	10	9	9	9	9	ROW 2
TAPE 5	BAND 6	STATION 6	BUOY 15	10	10	9	9	10	ROW 3
TAPE 5	BAND 6	STATION 6	BUOY 15	10	10	10	10	10	ROW 4
TAPE 5	BAND 6	STATION 6	BUOY 15	10	10	10	10	10	ROW 5
TAPE 5	BAND 6	STATION 7	BUOY 11	10	9	10	9	9	ROW 1
TAPE 5	BAND 6	STATION 7	BUOY 11	9	9	10	9	9	ROW 2
TAPE 5	BAND 6	STATION 7	BUOY 11	9	10	9	9	9	ROW 3
TAPE 5	BAND 6	STATION 7	BUOY 11	8	9	9	9	9	ROW 4
TAPE 5	BAND 6	STATION 7	BUOY 11	9	9	9	9	9	ROW 5
TAPE 5	BAND 6	STATION 8	BUOY 8	10	10	10	10	10	ROW 1
TAPE 5	BAND 6	STATION 8	BUOY 8	9	10	9	9	10	ROW 2
TAPE 5	BAND 6	STATION 8	BUOY 8	9	8	8	9	10	ROW 3
TAPE 5	BAND 6	STATION 8	BUOY 8	9	8	8	9	10	ROW 4
TAPE 5	BAND 6	STATION 8	BUOY 8	9	10	8	9	9	ROW 5
TAPE 5	BAND 6	STATION 9	BUOY 5	8	9	9	8	9	ROW 1
TAPE 5	BAND 6	STATION 9	BUOY 5	8	8	9	9	9	ROW 2
TAPE 5	BAND 6	STATION 9	BUOY 5	8	8	8	9	9	ROW 3
TAPE 5	BAND 6	STATION 9	BUOY 5	8	9	9	10	10	ROW 4
TAPE 5	BAND 6	STATION 9	BUOY 5	9	9	9	10	9	ROW 5
TAPE 5	BAND 6	STATION 10	BUOY 3	9	9	12	9	9	ROW 1
TAPE 5	BAND 6	STATION 10	BUOY 3	9	10	12	10	10	ROW 2
TAPE 5	BAND 6	STATION 10	BUOY 3	9	8	10	10	8	ROW 3
TAPE 5	BAND 6	STATION 10	BUOY 3	9	9	10	10	8	ROW 4
TAPE 5	BAND 6	STATION 10	BUOY 3	9	10	10	9	9	ROW 5
TAPE 5	BAND 6	STATION 11	BUOY D	10	10	10	11	11	ROW 1
TAPE 5	BAND 6	STATION 11	BUOY D	10	10	10	10	10	ROW 2
TAPE 5	BAND 6	STATION 11	BUOY D	11	11	10	10	11	ROW 3
TAPE 5	BAND 6	STATION 11	BUOY D	11	11	10	10	11	ROW 4
TAPE 5	BAND 6	STATION 11	BUOY D	11	11	10	10	10	ROW 5
TAPE 5	BAND 6	STATION 12	BUOY G	10	12	11	10	9	ROW 1
TAPE 5	BAND 6	STATION 12	BUOY G	10	11	11	10	10	ROW 2
TAPE 5	BAND 6	STATION 12	BUOY G	10	10	10	11	11	ROW 3
TAPE 5	BAND 6	STATION 12	BUOY G	11	10	11	11	11	ROW 4
TAPE 5	BAND 6	STATION 12	BUOY G	10	10	9	10	11	ROW 5
TAPE 5	BAND 7	STATION 1	BUOY 100	6	6	6	5	6	ROW 1
TAPE 5	BAND 7	STATION 1	BUOY 100	6	6	6	6	6	ROW 2
TAPE 5	BAND 7	STATION 1	BUOY 100	6	7	5	7	6	ROW 3
TAPE 5	BAND 7	STATION 1	BUOY 100	7	7	4	7	7	ROW 4
TAPE 5	BAND 7	STATION 1	BUOY 100	6	4	6	6	4	ROW 5
TAPE 5	BAND 7	STATION 2	BUOY 24	3	3	3	3	3	ROW 1
TAPE 5	BAND 7	STATION 2	BUOY 24	3	3	3	3	3	ROW 2
TAPE 5	BAND 7	STATION 2	BUOY 24	3	4	3	4	3	ROW 3
TAPE 5	BAND 7	STATION 2	BUOY 24	3	4	3	4	4	ROW 4
TAPE 5	BAND 7	STATION 2	BUOY 24	3	2	3	4	3	ROW 5

APPENDIX D (continued)

TAPE	5	BAND	7	STATION	3	BUOY	22	3	4	2	3	2	ROW	1
TAPE	5	BAND	7	STATION	3	BUOY	22	3	3	4	3	4	ROW	2
TAPE	5	BAND	7	STATION	3	BUOY	22	4	4	4	4	4	ROW	3
TAPE	5	BAND	7	STATION	3	BUOY	22	3	3	3	3	3	ROW	4
TAPE	5	BAND	7	STATION	3	BUOY	22	5	3	3	3	3	ROW	5
TAPE	5	BAND	7	STATION	4	BUOY	20	3	3	3	3	4	ROW	1
TAPE	5	BAND	7	STATION	4	BUOY	20	3	3	3	3	3	ROW	2
TAPE	5	BAND	7	STATION	4	BUOY	20	2	2	2	3	3	ROW	3
TAPE	5	BAND	7	STATION	4	BUOY	20	2	2	2	2	2	ROW	4
TAPE	5	BAND	7	STATION	4	BUOY	20	3	3	3	1	1	ROW	5
TAPE	5	BAND	7	STATION	5	BUOY	18	2	4	3	1	2	ROW	1
TAPE	5	BAND	7	STATION	5	BUOY	18	3	4	4	1	2	ROW	2
TAPE	5	BAND	7	STATION	5	BUOY	18	2	2	2	3	3	ROW	3
TAPE	5	BAND	7	STATION	5	BUOY	18	1	2	2	1	2	ROW	4
TAPE	5	BAND	7	STATION	5	BUOY	18	2	2	2	1	1	ROW	5
TAPE	5	BAND	7	STATION	6	BUOY	15	4	4	3	3	3	ROW	1
TAPE	5	BAND	7	STATION	6	BUOY	15	3	5	4	3	2	ROW	2
TAPE	5	BAND	7	STATION	6	BUOY	15	2	4	5	2	3	ROW	3
TAPE	5	BAND	7	STATION	6	BUOY	15	3	4	4	3	3	ROW	4
TAPE	5	BAND	7	STATION	6	BUOY	15	3	3	4	2	1	ROW	5
TAPE	5	BAND	7	STATION	7	BUOY	11	2	3	1	2	2	ROW	1
TAPE	5	BAND	7	STATION	7	BUOY	11	3	3	3	3	3	ROW	2
TAPE	5	BAND	7	STATION	7	BUOY	11	3	3	3	3	3	ROW	3
TAPE	5	BAND	7	STATION	7	BUOY	11	3	3	3	3	3	ROW	4
TAPE	5	BAND	7	STATION	7	BUOY	11	3	3	3	3	3	ROW	5
TAPE	5	BAND	7	STATION	7	BUOY	11	2	3	4	2	1	ROW	1
TAPE	5	BAND	7	STATION	7	BUOY	11	3	3	1	2	1	ROW	2
TAPE	5	BAND	7	STATION	7	BUOY	11	3	2	1	3	2	ROW	3
TAPE	5	BAND	7	STATION	7	BUOY	11	3	3	3	3	3	ROW	4
TAPE	5	BAND	7	STATION	7	BUOY	11	3	3	3	2	2	ROW	5
TAPE	5	BAND	7	STATION	9	BUOY	5	3	3	3	4	4	ROW	1
TAPE	5	BAND	7	STATION	9	BUOY	5	2	2	3	4	3	ROW	2
TAPE	5	BAND	7	STATION	9	BUOY	5	2	2	4	2	2	ROW	3
TAPE	5	BAND	7	STATION	9	BUOY	5	3	4	4	2	2	ROW	4
TAPE	5	BAND	7	STATION	9	BUOY	5	3	4	4	3	3	ROW	5
TAPE	5	BAND	7	STATION	10	BUOY	3	3	3	3	3	0	ROW	1
TAPE	5	BAND	7	STATION	10	BUOY	3	2	4	2	2	1	ROW	2
TAPE	5	BAND	7	STATION	10	BUOY	3	1	4	1	2	3	ROW	3
TAPE	5	BAND	7	STATION	10	BUOY	3	1	3	2	3	3	ROW	4
TAPE	5	BAND	7	STATION	10	BUOY	3	3	3	5	3	3	ROW	5
TAPE	5	BAND	7	STATION	11	BUOY	D	2	3	4	3	3	ROW	1
TAPE	5	BAND	7	STATION	11	BUOY	D	2	3	4	2	3	ROW	2
TAPE	5	BAND	7	STATION	11	BUOY	D	4	4	2	2	4	ROW	3
TAPE	5	BAND	7	STATION	11	BUOY	D	4	5	3	3	5	ROW	4
TAPE	5	BAND	7	STATION	11	BUOY	D	3	5	4	4	4	ROW	5
TAPE	5	BAND	7	STATION	12	BUOY	G	4	4	4	4	3	ROW	1
TAPE	5	BAND	7	STATION	12	BUOY	G	5	4	4	5	4	ROW	2
TAPE	5	BAND	7	STATION	12	BUOY	G	5	4	4	6	4	ROW	3
TAPE	5	BAND	7	STATION	12	BUOY	G	3	4	5	5	4	ROW	4
TAPE	5	BAND	7	STATION	12	BUOY	G	3	3	5	6	5	ROW	5
TAPE	7	BAND	4	STATION	1	BUOY	100	17	15	15	17	20	ROW	1
TAPE	7	BAND	4	STATION	1	BUOY	100	18	17	17	18	18	ROW	2
TAPE	7	BAND	4	STATION	1	BUOY	100	18	17	17	18	18	ROW	3
TAPE	7	BAND	4	STATION	1	BUOY	100	18	19	19	18	19	ROW	4
TAPE	7	BAND	4	STATION	1	BUOY	100	19	19	19	18	19	ROW	5

APPENDIX D (continued)

TAPE	7	BAND	4	STATION	2	BUOY	24	20	19	18	18	19	ROW	1
TAPE	7	BAND	4	STATION	2	BUOY	24	19	20	19	19	19	ROW	2
TAPE	7	BAND	4	STATION	2	BUOY	24	21	22	19	20	20	ROW	3
TAPE	7	BAND	4	STATION	2	BUOY	24	21	21	21	21	21	ROW	4
TAPE	7	BAND	4	STATION	2	BUOY	24	20	20	20	21	20	ROW	5
TAPE	7	BAND	4	STATION	3	BUOY	22	20	20	19	19	18	ROW	1
TAPE	7	BAND	4	STATION	3	BUOY	22	19	20	18	19	19	ROW	2
TAPE	7	BAND	4	STATION	3	BUOY	22	19	20	19	19	19	ROW	3
TAPE	7	BAND	4	STATION	3	BUOY	22	21	21	21	20	19	ROW	4
TAPE	7	BAND	4	STATION	3	BUOY	22	21	21	22	21	18	ROW	5
TAPE	7	BAND	4	STATION	4	BUOY	20	12	12	13	13	13	ROW	1
TAPE	7	BAND	4	STATION	4	BUOY	20	13	13	13	13	14	ROW	2
TAPE	7	BAND	4	STATION	4	BUOY	20	12	12	12	12	12	ROW	3
TAPE	7	BAND	4	STATION	4	BUOY	20	12	12	12	13	13	ROW	4
TAPE	7	BAND	4	STATION	4	BUOY	20	12	12	12	13	13	ROW	5
TAPE	7	BAND	4	STATION	5	BUOY	18	11	11	11	11	11	ROW	1
TAPE	7	BAND	4	STATION	5	BUOY	18	11	11	12	11	11	ROW	2
TAPE	7	BAND	4	STATION	5	BUOY	18	11	12	13	11	11	ROW	3
TAPE	7	BAND	4	STATION	5	BUOY	18	12	12	12	12	11	ROW	4
TAPE	7	BAND	4	STATION	5	BUOY	18	12	12	11	12	11	ROW	5
TAPE	7	BAND	4	STATION	6	BUOY	15	12	11	12	11	12	ROW	1
TAPE	7	BAND	4	STATION	6	BUOY	15	12	12	12	11	11	ROW	2
TAPE	7	BAND	4	STATION	6	BUOY	15	11	12	12	12	11	ROW	3
TAPE	7	BAND	4	STATION	6	BUOY	15	11	11	11	12	12	ROW	4
TAPE	7	BAND	4	STATION	6	BUOY	15	12	12	11	11	11	ROW	5
TAPE	7	BAND	4	STATION	7	BUOY	11	12	12	12	12	12	ROW	1
TAPE	7	BAND	4	STATION	7	BUOY	11	12	11	12	12	12	ROW	2
TAPE	7	BAND	4	STATION	7	BUOY	11	11	11	11	11	11	ROW	3
TAPE	7	BAND	4	STATION	7	BUOY	11	11	11	11	11	11	ROW	4
TAPE	7	BAND	4	STATION	7	BUOY	11	11	11	11	13	12	ROW	5
TAPE	7	BAND	4	STATION	8	BUOY	8	12	13	13	12	13	ROW	1
TAPE	7	BAND	4	STATION	8	BUOY	8	13	13	13	13	13	ROW	2
TAPE	7	BAND	4	STATION	8	BUOY	8	12	12	12	12	12	ROW	3
TAPE	7	BAND	4	STATION	8	BUOY	8	12	12	12	12	13	ROW	4
TAPE	7	BAND	4	STATION	8	BUOY	8	12	12	12	12	12	ROW	5
TAPE	7	BAND	4	STATION	9	BUOY	5	11	12	11	11	11	ROW	1
TAPE	7	BAND	4	STATION	9	BUOY	5	11	12	11	12	11	ROW	2
TAPE	7	BAND	4	STATION	9	BUOY	5	11	11	11	13	11	ROW	3
TAPE	7	BAND	4	STATION	9	BUOY	5	12	11	12	12	12	ROW	4
TAPE	7	BAND	4	STATION	9	BUOY	5	12	12	12	11	12	ROW	5
TAPE	7	BAND	4	STATION	10	BUOY	3	11	11	12	12	12	ROW	1
TAPE	7	BAND	4	STATION	10	BUOY	3	11	11	12	12	12	ROW	2
TAPE	7	BAND	4	STATION	10	BUOY	3	12	11	12	12	12	ROW	3
TAPE	7	BAND	4	STATION	10	BUOY	3	11	11	12	12	12	ROW	4
TAPE	7	BAND	4	STATION	10	BUOY	3	11	11	12	11	11	ROW	5
TAPE	7	BAND	4	STATION	11	BUOY	D	13	11	10	12	10	ROW	1
TAPE	7	BAND	4	STATION	11	BUOY	D	11	11	11	12	11	ROW	2
TAPE	7	BAND	4	STATION	11	BUOY	D	12	12	11	11	11	ROW	3
TAPE	7	BAND	4	STATION	11	BUOY	D	12	12	11	11	10	ROW	4
TAPE	7	BAND	4	STATION	11	BUOY	D	11	11	11	11	10	ROW	5
TAPE	7	BAND	4	STATION	12	BUOY	G	11	12	11	11	11	ROW	1
TAPE	7	BAND	4	STATION	12	BUOY	G	11	11	11	11	11	ROW	2
TAPE	7	BAND	4	STATION	12	BUOY	G	11	11	13	11	11	ROW	3
TAPE	7	BAND	4	STATION	12	BUOY	G	12	11	12	12	11	ROW	4
TAPE	7	BAND	4	STATION	12	BUOY	G	12	11	10	12	12	ROW	5

APPENDIX D (continued)

TAPE 7	BAND 5	STATION 1	BUOY 100	27	27	26	26	27	ROW 1
TAPE 7	BAND 5	STATION 1	BUOY 100	28	28	27	27	28	ROW 2
TAPE 7	BAND 5	STATION 1	BUOY 100	28	30	29	29	29	ROW 3
TAPE 7	BAND 5	STATION 1	BUOY 100	27	29	29	29	29	ROW 4
TAPE 7	BAND 5	STATION 1	BUOY 100	28	29	29	28	29	ROW 5
TAPE 7	BAND 5	STATION 2	BUOY 24	33	32	32	32	27	ROW 1
TAPE 7	BAND 5	STATION 2	BUOY 24	35	35	35	33	29	ROW 2
TAPE 7	BAND 5	STATION 2	BUOY 24	34	34	34	33	33	ROW 3
TAPE 7	BAND 5	STATION 2	BUOY 24	33	33	34	35	35	ROW 4
TAPE 7	BAND 5	STATION 2	BUOY 24	34	32	34	36	35	ROW 5
TAPE 7	BAND 5	STATION 3	BUOY 22	30	29	28	27	26	ROW 1
TAPE 7	BAND 5	STATION 3	BUOY 22	30	28	29	30	29	ROW 2
TAPE 7	BAND 5	STATION 3	BUOY 22	31	29	29	29	29	ROW 3
TAPE 7	BAND 5	STATION 3	BUOY 22	32	31	30	32	30	ROW 4
TAPE 7	BAND 5	STATION 3	BUOY 22	34	33	33	34	31	ROW 5
TAPE 7	BAND 5	STATION 4	BUOY 20	12	11	12	12	11	ROW 1
TAPE 7	BAND 5	STATION 4	BUOY 20	12	11	11	12	12	ROW 2
TAPE 7	BAND 5	STATION 4	BUOY 20	12	12	12	12	12	ROW 3
TAPE 7	BAND 5	STATION 4	BUOY 20	13	13	13	12	13	ROW 4
TAPE 7	BAND 5	STATION 4	BUOY 20	13	13	13	12	13	ROW 5
TAPE 7	BAND 5	STATION 5	BUOY 18	9	9	9	9	9	ROW 1
TAPE 7	BAND 5	STATION 5	BUOY 18	9	9	9	9	9	ROW 2
TAPE 7	BAND 5	STATION 5	BUOY 18	10	9	10	10	9	ROW 3
TAPE 7	BAND 5	STATION 5	BUOY 18	9	9	10	9	9	ROW 4
TAPE 7	BAND 5	STATION 5	BUOY 18	9	9	9	9	9	ROW 5
TAPE 7	BAND 5	STATION 6	BUOY 15	11	10	9	9	9	ROW 1
TAPE 7	BAND 5	STATION 6	BUOY 15	10	9	9	9	9	ROW 2
TAPE 7	BAND 5	STATION 6	BUOY 15	9	9	9	10	9	ROW 3
TAPE 7	BAND 5	STATION 6	BUOY 15	10	9	10	10	9	ROW 4
TAPE 7	BAND 5	STATION 6	BUOY 15	9	10	10	10	10	ROW 5
TAPE 7	BAND 5	STATION 7	BUOY 11	9	9	9	9	9	ROW 1
TAPE 7	BAND 5	STATION 7	BUOY 11	9	10	9	9	9	ROW 2
TAPE 7	BAND 5	STATION 7	BUOY 11	9	10	9	9	8	ROW 3
TAPE 7	BAND 5	STATION 7	BUOY 11	9	9	9	9	8	ROW 4
TAPE 7	BAND 5	STATION 7	BUOY 11	9	9	9	9	8	ROW 5
TAPE 7	BAND 5	STATION 8	BUOY 8	10	9	10	10	10	ROW 1
TAPE 7	BAND 5	STATION 8	BUOY 8	9	8	10	10	10	ROW 2
TAPE 7	BAND 5	STATION 8	BUOY 8	10	9	10	10	10	ROW 3
TAPE 7	BAND 5	STATION 8	BUOY 8	10	9	10	10	9	ROW 4
TAPE 7	BAND 5	STATION 8	BUOY 8	9	9	9	10	9	ROW 5
TAPE 7	BAND 5	STATION 9	BUOY 5	9	9	9	9	9	ROW 1
TAPE 7	BAND 5	STATION 9	BUOY 5	9	9	9	9	8	ROW 2
TAPE 7	BAND 5	STATION 9	BUOY 5	9	9	9	9	8	ROW 3
TAPE 7	BAND 5	STATION 9	BUOY 5	9	9	8	9	9	ROW 4
TAPE 7	BAND 5	STATION 9	BUOY 5	8	9	8	9	9	ROW 5
TAPE 7	BAND 5	STATION 10	BUOY 3	9	9	9	8	9	ROW 1
TAPE 7	BAND 5	STATION 10	BUOY 3	8	8	9	8	8	ROW 2
TAPE 7	BAND 5	STATION 10	BUOY 3	8	9	8	8	8	ROW 3
TAPE 7	BAND 5	STATION 10	BUOY 3	8	9	8	8	8	ROW 4
TAPE 7	BAND 5	STATION 10	BUOY 3	8	9	9	8	9	ROW 5
TAPE 7	BAND 5	STATION 11	BUOY D	8	7	8	8	8	ROW 1
TAPE 7	BAND 5	STATION 11	BUOY D	8	8	8	8	8	ROW 2
TAPE 7	BAND 5	STATION 11	BUOY D	8	8	6	6	8	ROW 3
TAPE 7	BAND 5	STATION 11	BUOY D	7	7	7	7	8	ROW 4
TAPE 7	BAND 5	STATION 11	BUOY D	7	7	8	8	8	ROW 5

APPENDIX D (continued)

TAPE	7	BAND	5	STATION	12	BUOY	G	8	8	8	8	8	ROW	1
TAPE	7	BAND	5	STATION	12	BUOY	G	8	8	8	8	8	ROW	2
TAPE	7	BAND	5	STATION	12	BUOY	G	7	8	8	7	8	ROW	3
TAPE	7	BAND	5	STATION	12	BUOY	G	7	8	8	7	8	ROW	4
TAPE	7	BAND	5	STATION	12	BUOY	G	8	8	9	8	8	ROW	5
TAPE	7	BAND	6	STATION	1	BUOY	100	22	22	23	23	22	ROW	1
TAPE	7	BAND	6	STATION	1	BUOY	100	22	22	23	23	22	ROW	2
TAPE	7	BAND	6	STATION	1	BUOY	100	24	23	23	23	24	ROW	3
TAPE	7	BAND	6	STATION	1	BUOY	100	24	24	23	22	24	ROW	4
TAPE	7	BAND	6	STATION	1	BUOY	100	24	23	22	23	23	ROW	5
TAPE	7	BAND	6	STATION	2	BUOY	24	28	29	26	25	23	ROW	1
TAPE	7	BAND	6	STATION	2	BUOY	24	28	30	29	27	23	ROW	2
TAPE	7	BAND	6	STATION	2	BUOY	24	27	27	27	25	24	ROW	3
TAPE	7	BAND	6	STATION	2	BUOY	24	26	25	23	25	28	ROW	4
TAPE	7	BAND	6	STATION	2	BUOY	24	26	26	25	27	29	ROW	5
TAPE	7	BAND	6	STATION	3	BUOY	22	21	21	21	18	16	ROW	1
TAPE	7	BAND	6	STATION	3	BUOY	22	21	22	22	21	19	ROW	2
TAPE	7	BAND	6	STATION	3	BUOY	22	22	24	23	21	21	ROW	3
TAPE	7	BAND	6	STATION	3	BUOY	22	25	25	22	22	24	ROW	4
TAPE	7	BAND	6	STATION	3	BUOY	22	27	26	25	25	24	ROW	5
TAPE	7	BAND	6	STATION	4	BUOY	20	4	4	5	4	5	ROW	1
TAPE	7	BAND	6	STATION	4	BUOY	20	3	3	5	3	5	ROW	2
TAPE	7	BAND	6	STATION	4	BUOY	20	5	4	5	5	5	ROW	3
TAPE	7	BAND	6	STATION	4	BUOY	20	5	6	4	5	6	ROW	4
TAPE	7	BAND	6	STATION	4	BUOY	20	5	6	5	5	6	ROW	5
TAPE	7	BAND	6	STATION	5	BUOY	18	4	3	3	3	3	ROW	1
TAPE	7	BAND	6	STATION	5	BUOY	18	2	3	3	3	3	ROW	2
TAPE	7	BAND	6	STATION	5	BUOY	18	0	2	2	3	2	ROW	3
TAPE	7	BAND	6	STATION	5	BUOY	18	3	3	2	2	2	ROW	4
TAPE	7	BAND	6	STATION	5	BUOY	18	4	3	2	2	3	ROW	5
TAPE	7	BAND	6	STATION	6	BUOY	15	3	4	4	3	3	ROW	1
TAPE	7	BAND	6	STATION	6	BUOY	15	4	4	5	4	4	ROW	2
TAPE	7	BAND	6	STATION	6	BUOY	15	4	3	3	3	4	ROW	3
TAPE	7	BAND	6	STATION	6	BUOY	15	3	2	2	2	3	ROW	4
TAPE	7	BAND	6	STATION	6	BUOY	15	4	3	2	2	4	ROW	5
TAPE	7	BAND	6	STATION	7	BUOY	11	5	5	4	4	4	ROW	1
TAPE	7	BAND	6	STATION	7	BUOY	11	2	2	3	2	3	ROW	2
TAPE	7	BAND	6	STATION	7	BUOY	11	3	3	3	3	3	ROW	3
TAPE	7	BAND	6	STATION	7	BUOY	11	4	4	2	2	3	ROW	4
TAPE	7	BAND	6	STATION	7	BUOY	11	2	2	0	1	2	ROW	5
TAPE	7	BAND	6	STATION	8	BUOY	8	3	2	2	3	3	ROW	1
TAPE	7	BAND	6	STATION	8	BUOY	8	2	2	2	2	2	ROW	2
TAPE	7	BAND	6	STATION	8	BUOY	8	2	2	3	3	3	ROW	3
TAPE	7	BAND	6	STATION	8	BUOY	8	3	3	3	4	4	ROW	4
TAPE	7	BAND	6	STATION	8	BUOY	8	4	5	3	3	3	ROW	5
TAPE	7	BAND	6	STATION	9	BUOY	5	3	2	4	3	3	ROW	1
TAPE	7	BAND	6	STATION	9	BUOY	5	3	3	3	3	3	ROW	2
TAPE	7	BAND	6	STATION	9	BUOY	5	2	2	2	3	2	ROW	3
TAPE	7	BAND	6	STATION	9	BUOY	5	4	4	2	4	1	ROW	4
TAPE	7	BAND	6	STATION	9	BUOY	5	5	3	2	3	2	ROW	5
TAPE	7	BAND	6	STATION	10	BUOY	3	2	2	3	3	2	ROW	1
TAPE	7	BAND	6	STATION	10	BUOY	3	3	2	2	3	3	ROW	2
TAPE	7	BAND	6	STATION	10	BUOY	3	2	2	3	4	2	ROW	3
TAPE	7	BAND	6	STATION	10	BUOY	3	2	2	3	2	1	ROW	4
TAPE	7	BAND	6	STATION	10	BUOY	3	2	2	2	1	3	ROW	5

APPENDIX D (continued)

TAPE	7	BAND	6	STATION	11	BUOY	D	1	1	2	1	1	ROW	1
TAPE	7	BAND	6	STATION	11	BUOY	D	2	2	4	2	1	ROW	2
TAPE	7	BAND	6	STATION	11	BUOY	D	2	4	3	2	2	ROW	3
TAPE	7	BAND	6	STATION	11	BUOY	D	2	3	2	2	2	ROW	4
TAPE	7	BAND	6	STATION	11	BUOY	D	2	2	2	2	2	ROW	5
TAPE	7	BAND	6	STATION	12	BUOY	G	2	2	2	3	3	ROW	1
TAPE	7	BAND	6	STATION	12	BUOY	G	1	0	0	0	1	ROW	2
TAPE	7	BAND	6	STATION	12	BUOY	G	0	1	1	1	2	ROW	3
TAPE	7	BAND	6	STATION	12	BUOY	G	1	2	3	2	2	ROW	4
TAPE	7	BAND	6	STATION	12	BUOY	G	3	3	3	2	1	ROW	5
TAPE	7	BAND	7	STATION	1	BUOY	100	6	8	7	9	9	ROW	1
TAPE	7	BAND	7	STATION	1	BUOY	100	8	7	6	9	9	ROW	2
TAPE	7	BAND	7	STATION	1	BUOY	100	10	8	5	7	8	ROW	3
TAPE	7	BAND	7	STATION	1	BUOY	100	8	7	5	7	7	ROW	4
TAPE	7	BAND	7	STATION	1	BUOY	100	7	7	7	7	9	ROW	5
TAPE	7	BAND	7	STATION	2	BUOY	24	10	9	9	7	7	ROW	1
TAPE	7	BAND	7	STATION	2	BUOY	24	10	10	10	9	9	ROW	2
TAPE	7	BAND	7	STATION	2	BUOY	24	8	9	10	10	11	ROW	3
TAPE	7	BAND	7	STATION	2	BUOY	24	10	10	10	10	12	ROW	4
TAPE	7	BAND	7	STATION	2	BUOY	24	9	11	11	10	11	ROW	5
TAPE	7	BAND	7	STATION	3	BUOY	22	5	6	6	5	3	ROW	1
TAPE	7	BAND	7	STATION	3	BUOY	22	4	4	4	5	5	ROW	2
TAPE	7	BAND	7	STATION	3	BUOY	22	4	4	4	4	4	ROW	3
TAPE	7	BAND	7	STATION	3	BUOY	22	6	5	6	5	3	ROW	4
TAPE	7	BAND	7	STATION	3	BUOY	22	6	7	7	6	3	ROW	5
TAPE	7	BAND	7	STATION	4	BUOY	20	0	0	0	1	0	ROW	1
TAPE	7	BAND	7	STATION	4	BUOY	20	0	0	0	1	0	ROW	2
TAPE	7	BAND	7	STATION	4	BUOY	20	0	1	0	0	1	ROW	3
TAPE	7	BAND	7	STATION	4	BUOY	20	0	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	4	BUOY	20	0	0	1	0	0	ROW	5
TAPE	7	BAND	7	STATION	5	BUOY	18	0	0	0	0	0	ROW	1
TAPE	7	BAND	7	STATION	5	BUOY	18	0	0	0	0	0	ROW	2
TAPE	7	BAND	7	STATION	5	BUOY	18	0	1	0	0	0	ROW	3
TAPE	7	BAND	7	STATION	5	BUOY	18	0	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	5	BUOY	18	0	0	0	0	0	ROW	5
TAPE	7	BAND	7	STATION	6	BUOY	15	0	0	0	0	0	ROW	1
TAPE	7	BAND	7	STATION	6	BUOY	15	0	0	0	0	0	ROW	2
TAPE	7	BAND	7	STATION	6	BUOY	15	0	0	0	0	0	ROW	3
TAPE	7	BAND	7	STATION	6	BUOY	15	0	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	6	BUOY	15	0	1	0	0	0	ROW	5
TAPE	7	BAND	7	STATION	7	BUOY	11	0	0	0	0	0	ROW	1
TAPE	7	BAND	7	STATION	7	BUOY	11	0	0	0	0	0	ROW	2
TAPE	7	BAND	7	STATION	7	BUOY	11	1	0	0	1	0	ROW	3
TAPE	7	BAND	7	STATION	7	BUOY	11	1	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	7	BUOY	11	0	0	0	0	0	ROW	5
TAPE	7	BAND	7	STATION	8	BUOY	8	0	0	1	0	0	ROW	1
TAPE	7	BAND	7	STATION	8	BUOY	8	0	0	0	0	0	ROW	2
TAPE	7	BAND	7	STATION	8	BUOY	8	0	0	0	1	1	ROW	3
TAPE	7	BAND	7	STATION	8	BUOY	8	0	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	8	BUOY	8	0	0	0	0	0	ROW	5
TAPE	7	BAND	7	STATION	9	BUOY	5	0	0	0	0	0	ROW	1
TAPE	7	BAND	7	STATION	9	BUOY	5	0	0	0	0	0	ROW	2
TAPE	7	BAND	7	STATION	9	BUOY	5	0	0	0	0	0	ROW	3
TAPE	7	BAND	7	STATION	9	BUOY	5	0	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	9	BUOY	5	0	0	0	0	0	ROW	5

APPENDIX D (continued)

TAPE	7	BAND	7	STATION	10	BUOY	3	0	0	0	0	0	ROW	1
TAPE	7	BAND	7	STATION	10	BUOY	3	0	0	0	0	0	ROW	2
TAPE	7	BAND	7	STATION	10	BUOY	3	0	0	0	0	0	ROW	3
TAPE	7	BAND	7	STATION	10	BUOY	3	0	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	10	BUOY	3	0	0	0	0	0	ROW	5
TAPE	7	BAND	7	STATION	11	BUOY	D	0	0	0	0	0	ROW	1
TAPE	7	BAND	7	STATION	11	BUOY	D	0	0	0	0	0	ROW	2
TAPE	7	BAND	7	STATION	11	BUOY	D	0	0	0	0	0	ROW	3
TAPE	7	BAND	7	STATION	11	BUOY	D	0	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	11	BUOY	D	0	0	0	0	0	ROW	5
TAPE	7	BAND	7	STATION	12	BUOY	G	0	0	1	0	0	ROW	1
TAPE	7	BAND	7	STATION	12	BUOY	G	0	0	0	0	0	ROW	2
TAPE	7	BAND	7	STATION	12	BUOY	G	1	0	0	0	0	ROW	3
TAPE	7	BAND	7	STATION	12	BUOY	G	1	0	0	0	0	ROW	4
TAPE	7	BAND	7	STATION	12	BUOY	G	0	0	0	0	0	ROW	5
TAPE	9	BAND	4	STATION	1	BUOY	100	14	14	13	14	14	ROW	1
TAPE	9	BAND	4	STATION	1	BUOY	100	12	13	14	14	14	ROW	2
TAPE	9	BAND	4	STATION	1	BUOY	100	12	12	12	14	13	ROW	3
TAPE	9	BAND	4	STATION	1	BUOY	100	13	13	11	13	13	ROW	4
TAPE	9	BAND	4	STATION	1	BUOY	100	13	13	13	13	13	ROW	5
TAPE	9	BAND	4	STATION	2	BUOY	24	13	14	12	12	13	ROW	1
TAPE	9	BAND	4	STATION	2	BUOY	24	14	14	13	13	13	ROW	2
TAPE	9	BAND	4	STATION	2	BUOY	24	14	12	14	13	12	ROW	3
TAPE	9	BAND	4	STATION	2	BUOY	24	12	12	12	14	13	ROW	4
TAPE	9	BAND	4	STATION	2	BUOY	24	12	13	11	13	13	ROW	5
TAPE	9	BAND	4	STATION	3	BUOY	22	13	12	13	13	13	ROW	1
TAPE	9	BAND	4	STATION	3	BUOY	22	13	12	13	14	13	ROW	2
TAPE	9	BAND	4	STATION	3	BUOY	22	13	14	13	13	14	ROW	3
TAPE	9	BAND	4	STATION	3	BUOY	22	13	14	13	12	14	ROW	4
TAPE	9	BAND	4	STATION	3	BUOY	22	13	13	13	12	11	ROW	5
TAPE	9	BAND	4	STATION	4	BUOY	20	13	14	14	14	14	ROW	1
TAPE	9	BAND	4	STATION	4	BUOY	20	13	13	13	13	13	ROW	2
TAPE	9	BAND	4	STATION	4	BUOY	20	13	13	12	12	13	ROW	3
TAPE	9	BAND	4	STATION	4	BUOY	20	12	13	12	13	13	ROW	4
TAPE	9	BAND	4	STATION	4	BUOY	20	12	13	15	13	13	ROW	5
TAPE	9	BAND	4	STATION	5	BUOY	18	12	14	15	15	14	ROW	1
TAPE	9	BAND	4	STATION	5	BUOY	18	12	13	14	14	13	ROW	2
TAPE	9	BAND	4	STATION	5	BUOY	18	13	13	13	13	13	ROW	3
TAPE	9	BAND	4	STATION	5	BUOY	18	13	13	13	13	12	ROW	4
TAPE	9	BAND	4	STATION	5	BUOY	18	13	13	13	12	13	ROW	5
TAPE	9	BAND	4	STATION	6	BUOY	15	12	12	12	12	13	ROW	1
TAPE	9	BAND	4	STATION	6	BUOY	15	12	13	13	13	13	ROW	2
TAPE	9	BAND	4	STATION	6	BUOY	15	14	14	13	13	14	ROW	3
TAPE	9	BAND	4	STATION	6	BUOY	15	13	14	13	13	14	ROW	4
TAPE	9	BAND	4	STATION	6	BUOY	15	12	13	13	13	14	ROW	5
TAPE	9	BAND	4	STATION	7	BUOY	11	11	11	12	12	11	ROW	1
TAPE	9	BAND	4	STATION	7	BUOY	11	11	11	13	12	11	ROW	2
TAPE	9	BAND	4	STATION	7	BUOY	11	12	14	14	13	12	ROW	3
TAPE	9	BAND	4	STATION	7	BUOY	11	13	14	14	13	12	ROW	4
TAPE	9	BAND	4	STATION	7	BUOY	11	12	13	13	12	11	ROW	5
TAPE	9	BAND	4	STATION	8	BUOY	8	13	13	14	14	15	ROW	1
TAPE	9	BAND	4	STATION	8	BUOY	8	13	13	15	15	14	ROW	2
TAPE	9	BAND	4	STATION	8	BUOY	8	13	12	12	13	13	ROW	3
TAPE	9	BAND	4	STATION	8	BUOY	8	13	12	12	12	13	ROW	4
TAPE	9	BAND	4	STATION	8	BUOY	8	13	13	13	13	13	ROW	5

APPENDIX D (continued)

TAPE	9	BAND	4	STATION	9	BUOY	5	14	14	15	14	14	ROW	1
TAPE	9	BAND	4	STATION	9	BUOY	5	14	14	14	14	14	ROW	2
TAPE	9	BAND	4	STATION	9	BUOY	5	15	13	15	13	13	ROW	3
TAPE	9	BAND	4	STATION	9	BUOY	5	14	13	14	13	13	ROW	4
TAPE	9	BAND	4	STATION	9	BUOY	5	13	13	13	13	13	ROW	5
TAPE	9	BAND	4	STATION	10	BUOY	3	15	12	13	14	12	ROW	1
TAPE	9	BAND	4	STATION	10	BUOY	3	14	13	14	15	12	ROW	2
TAPE	9	BAND	4	STATION	10	BUOY	3	14	14	14	14	13	ROW	3
TAPE	9	BAND	4	STATION	10	BUOY	3	13	13	13	13	13	ROW	4
TAPE	9	BAND	4	STATION	10	BUOY	3	13	14	14	13	12	ROW	5
TAPE	9	BAND	4	STATION	11	BUOY	D	13	13	14	13	13	ROW	1
TAPE	9	BAND	4	STATION	11	BUOY	D	13	14	14	13	14	ROW	2
TAPE	9	BAND	4	STATION	11	BUOY	D	15	15	15	15	15	ROW	3
TAPE	9	BAND	4	STATION	11	BUOY	D	15	15	14	15	15	ROW	4
TAPE	9	BAND	4	STATION	11	BUOY	D	13	13	13	13	13	ROW	5
TAPE	9	BAND	4	STATION	12	BUOY	G	13	12	14	13	13	ROW	1
TAPE	9	BAND	4	STATION	12	BUOY	G	16	14	14	15	15	ROW	2
TAPE	9	BAND	4	STATION	12	BUOY	G	15	15	14	14	14	ROW	3
TAPE	9	BAND	4	STATION	12	BUOY	G	15	14	13	14	16	ROW	4
TAPE	9	BAND	4	STATION	12	BUOY	G	15	13	13	14	16	ROW	5
TAPE	9	BAND	5	STATION	1	BUOY	100	14	13	13	14	13	ROW	1
TAPE	9	BAND	5	STATION	1	BUOY	100	14	13	13	14	13	ROW	2
TAPE	9	BAND	5	STATION	1	BUOY	100	14	14	14	14	14	ROW	3
TAPE	9	BAND	5	STATION	1	BUOY	100	14	14	14	14	14	ROW	4
TAPE	9	BAND	5	STATION	1	BUOY	100	14	14	14	14	14	ROW	5
TAPE	9	BAND	5	STATION	2	BUOY	24	13	13	13	13	13	ROW	1
TAPE	9	BAND	5	STATION	2	BUOY	24	13	13	13	13	13	ROW	2
TAPE	9	BAND	5	STATION	2	BUOY	24	13	13	13	13	13	ROW	3
TAPE	9	BAND	5	STATION	2	BUOY	24	13	14	15	13	13	ROW	4
TAPE	9	BAND	5	STATION	2	BUOY	24	14	15	15	14	13	ROW	5
TAPE	9	BAND	5	STATION	3	BUOY	22	13	13	13	13	14	ROW	1
TAPE	9	BAND	5	STATION	3	BUOY	22	13	13	13	14	13	ROW	2
TAPE	9	BAND	5	STATION	3	BUOY	22	13	13	14	14	13	ROW	3
TAPE	9	BAND	5	STATION	3	BUOY	22	14	13	15	14	14	ROW	4
TAPE	9	BAND	5	STATION	3	BUOY	22	14	14	16	14	14	ROW	5
TAPE	9	BAND	5	STATION	4	BUOY	20	16	15	15	14	15	ROW	1
TAPE	9	BAND	5	STATION	4	BUOY	20	15	14	16	14	14	ROW	2
TAPE	9	BAND	5	STATION	4	BUOY	20	15	14	14	14	14	ROW	3
TAPE	9	BAND	5	STATION	4	BUOY	20	15	15	14	15	15	ROW	4
TAPE	9	BAND	5	STATION	4	BUOY	20	15	15	16	15	15	ROW	5
TAPE	9	BAND	5	STATION	5	BUOY	18	14	14	13	14	14	ROW	1
TAPE	9	BAND	5	STATION	5	BUOY	18	14	14	12	13	15	ROW	2
TAPE	9	BAND	5	STATION	5	BUOY	18	14	14	14	15	15	ROW	3
TAPE	9	BAND	5	STATION	5	BUOY	18	14	15	15	15	15	ROW	4
TAPE	9	BAND	5	STATION	5	BUOY	18	15	15	15	15	15	ROW	5
TAPE	9	BAND	5	STATION	6	BUOY	15	13	13	13	13	13	ROW	1
TAPE	9	BAND	5	STATION	6	BUOY	15	13	13	13	13	13	ROW	2
TAPE	9	BAND	5	STATION	6	BUOY	15	13	13	13	13	14	ROW	3
TAPE	9	BAND	5	STATION	6	BUOY	15	13	13	13	12	12	ROW	4
TAPE	9	BAND	5	STATION	6	BUOY	15	13	13	14	13	12	ROW	5
TAPE	9	BAND	5	STATION	7	BUOY	11	12	13	13	12	11	ROW	1
TAPE	9	BAND	5	STATION	7	BUOY	11	12	12	13	12	12	ROW	2
TAPE	9	BAND	5	STATION	7	BUOY	11	12	12	12	11	12	ROW	3
TAPE	9	BAND	5	STATION	7	BUOY	11	13	13	12	11	11	ROW	4
TAPE	9	BAND	5	STATION	7	BUOY	11	12	12	12	11	10	ROW	5

APPENDIX D (continued)

TAPE	9	BAND	5	STATION	8	BUOY	8	13	14	14	13	13	ROW	1
TAPE	9	BAND	5	STATION	8	BUOY	8	13	14	13	13	13	ROW	2
TAPE	9	BAND	5	STATION	8	BUOY	8	14	13	14	14	12	ROW	3
TAPE	9	BAND	5	STATION	8	BUOY	8	14	13	14	13	12	ROW	4
TAPE	9	BAND	5	STATION	8	BUOY	8	14	13	13	13	13	ROW	5
TAPE	9	BAND	5	STATION	9	BUOY	5	13	13	13	13	14	ROW	1
TAPE	9	BAND	5	STATION	9	BUOY	5	13	14	13	13	14	ROW	2
TAPE	9	BAND	5	STATION	9	BUOY	5	13	14	13	13	14	ROW	3
TAPE	9	BAND	5	STATION	9	BUOY	5	14	14	14	14	13	ROW	4
TAPE	9	BAND	5	STATION	9	BUOY	5	14	14	14	14	12	ROW	5
TAPE	9	BAND	5	STATION	10	BUOY	3	12	12	11	11	11	ROW	1
TAPE	9	BAND	5	STATION	10	BUOY	3	12	12	12	11	11	ROW	2
TAPE	9	BAND	5	STATION	10	BUOY	3	12	12	12	11	12	ROW	3
TAPE	9	BAND	5	STATION	10	BUOY	3	13	12	12	11	12	ROW	4
TAPE	9	BAND	5	STATION	10	BUOY	3	13	10	11	12	12	ROW	5
TAPE	9	BAND	5	STATION	11	BUOY	D	12	13	12	13	13	ROW	1
TAPE	9	BAND	5	STATION	11	BUOY	D	12	13	12	13	13	ROW	2
TAPE	9	BAND	5	STATION	11	BUOY	D	12	13	12	13	12	ROW	3
TAPE	9	BAND	5	STATION	11	BUOY	D	13	13	13	13	13	ROW	4
TAPE	9	BAND	5	STATION	11	BUOY	D	13	13	13	13	13	ROW	5
TAPE	9	BAND	5	STATION	12	BUOY	G	12	13	12	13	13	ROW	1
TAPE	9	BAND	5	STATION	12	BUOY	G	13	13	12	12	12	ROW	2
TAPE	9	BAND	5	STATION	12	BUOY	G	12	12	12	12	12	ROW	3
TAPE	9	BAND	5	STATION	12	BUOY	G	12	12	12	12	13	ROW	4
TAPE	9	BAND	5	STATION	12	BUOY	G	12	12	12	12	13	ROW	5
TAPE	9	BAND	6	STATION	1	BUOY	100	5	5	5	5	5	ROW	1
TAPE	9	BAND	6	STATION	1	BUOY	100	6	5	5	5	6	ROW	2
TAPE	9	BAND	6	STATION	1	BUOY	100	5	6	5	5	6	ROW	3
TAPE	9	BAND	6	STATION	1	BUOY	100	6	7	6	6	7	ROW	4
TAPE	9	BAND	6	STATION	1	BUOY	100	7	7	6	6	7	ROW	5
TAPE	9	BAND	6	STATION	2	BUOY	24	5	6	6	6	6	ROW	1
TAPE	9	BAND	6	STATION	2	BUOY	24	3	5	5	5	5	ROW	2
TAPE	9	BAND	6	STATION	2	BUOY	24	5	5	5	5	5	ROW	3
TAPE	9	BAND	6	STATION	2	BUOY	24	5	5	5	5	5	ROW	4
TAPE	9	BAND	6	STATION	2	BUOY	24	5	5	6	5	6	ROW	5
TAPE	9	BAND	6	STATION	3	BUOY	22	8	8	7	6	7	ROW	1
TAPE	9	BAND	6	STATION	3	BUOY	22	6	7	6	6	6	ROW	2
TAPE	9	BAND	6	STATION	3	BUOY	22	5	6	7	6	7	ROW	3
TAPE	9	BAND	6	STATION	3	BUOY	22	6	7	8	7	8	ROW	4
TAPE	9	BAND	6	STATION	3	BUOY	22	7	7	7	7	7	ROW	5
TAPE	9	BAND	6	STATION	4	BUOY	20	6	7	6	6	6	ROW	1
TAPE	9	BAND	6	STATION	4	BUOY	20	7	6	8	7	7	ROW	2
TAPE	9	BAND	6	STATION	4	BUOY	20	9	7	8	8	7	ROW	3
TAPE	9	BAND	6	STATION	4	BUOY	20	7	5	7	7	8	ROW	4
TAPE	9	BAND	6	STATION	4	BUOY	20	6	6	6	6	8	ROW	5
TAPE	9	BAND	6	STATION	5	BUOY	18	6	8	8	5	6	ROW	1
TAPE	9	BAND	6	STATION	5	BUOY	18	6	8	7	6	6	ROW	2
TAPE	9	BAND	6	STATION	5	BUOY	18	8	7	7	6	6	ROW	3
TAPE	9	BAND	6	STATION	5	BUOY	18	8	8	7	7	8	ROW	4
TAPE	9	BAND	6	STATION	5	BUOY	18	7	8	8	7	7	ROW	5
TAPE	9	BAND	6	STATION	6	BUOY	15	6	7	6	6	6	ROW	1
TAPE	9	BAND	6	STATION	6	BUOY	15	7	7	7	7	7	ROW	2
TAPE	9	BAND	6	STATION	6	BUOY	15	5	5	5	6	6	ROW	3
TAPE	9	BAND	6	STATION	6	BUOY	15	6	6	5	5	7	ROW	4
TAPE	9	BAND	6	STATION	6	BUOY	15	6	6	7	5	7	ROW	5

APPENDIX D (continued)

TAPE	9	BAND	6	STATION	7	BUOY	11	5	5	6	6	5	ROW	1
TAPE	9	BAND	6	STATION	7	BUOY	11	7	7	7	6	7	ROW	2
TAPE	9	BAND	6	STATION	7	BUOY	11	6	7	6	5	7	ROW	3
TAPE	9	BAND	6	STATION	7	BUOY	11	4	5	5	5	5	ROW	4
TAPE	9	BAND	6	STATION	7	BUOY	11	6	6	6	6	5	ROW	5
TAPE	9	BAND	6	STATION	8	BUOY	8	6	6	7	6	6	ROW	1
TAPE	9	BAND	6	STATION	8	BUOY	8	6	5	8	7	7	ROW	2
TAPE	9	BAND	6	STATION	8	BUOY	8	6	6	6	6	6	ROW	3
TAPE	9	BAND	6	STATION	8	BUOY	8	6	6	6	7	7	ROW	4
TAPE	9	BAND	6	STATION	8	BUOY	8	7	6	6	7	7	ROW	5
TAPE	9	BAND	6	STATION	9	BUOY	5	6	8	6	7	6	ROW	1
TAPE	9	BAND	6	STATION	9	BUOY	5	7	7	7	7	6	ROW	2
TAPE	9	BAND	6	STATION	9	BUOY	5	7	7	7	7	7	ROW	3
TAPE	9	BAND	6	STATION	9	BUOY	5	8	5	6	8	7	ROW	4
TAPE	9	BAND	6	STATION	9	BUOY	5	8	6	6	9	6	ROW	5
TAPE	9	BAND	6	STATION	10	BUOY	3	6	6	5	6	5	ROW	1
TAPE	9	BAND	6	STATION	10	BUOY	3	8	6	5	5	5	ROW	2
TAPE	9	BAND	6	STATION	10	BUOY	3	8	6	6	5	6	ROW	3
TAPE	9	BAND	6	STATION	10	BUOY	3	6	6	6	6	6	ROW	4
TAPE	9	BAND	6	STATION	10	BUOY	3	7	8	7	6	6	ROW	5
TAPE	9	BAND	6	STATION	11	BUOY	D	6	8	6	7	7	ROW	1
TAPE	9	BAND	6	STATION	11	BUOY	D	7	7	7	7	7	ROW	2
TAPE	9	BAND	6	STATION	11	BUOY	D	8	8	8	7	7	ROW	3
TAPE	9	BAND	6	STATION	11	BUOY	D	8	6	6	8	6	ROW	4
TAPE	9	BAND	6	STATION	11	BUOY	D	8	6	7	8	6	ROW	5
TAPE	9	BAND	6	STATION	12	BUOY	G	8	8	7	7	6	ROW	1
TAPE	9	BAND	6	STATION	12	BUOY	G	8	8	8	8	8	ROW	2
TAPE	9	BAND	6	STATION	12	BUOY	G	8	6	7	9	9	ROW	3
TAPE	9	BAND	6	STATION	12	BUOY	G	7	7	7	8	8	ROW	4
TAPE	9	BAND	6	STATION	12	BUOY	G	6	8	8	6	6	ROW	5
TAPE	9	BAND	7	STATION	1	BUOY	100	0	0	0	0	1	ROW	1
TAPE	9	BAND	7	STATION	1	BUOY	100	0	0	0	0	1	ROW	2
TAPE	9	BAND	7	STATION	1	BUOY	100	0	0	0	0	0	ROW	3
TAPE	9	BAND	7	STATION	1	BUOY	100	0	1	0	0	0	ROW	4
TAPE	9	BAND	7	STATION	1	BUOY	100	1	2	0	0	1	ROW	5
TAPE	9	BAND	7	STATION	2	BUOY	24	0	0	0	1	0	ROW	1
TAPE	9	BAND	7	STATION	2	BUOY	24	0	0	0	1	0	ROW	2
TAPE	9	BAND	7	STATION	2	BUOY	24	1	1	0	1	0	ROW	3
TAPE	9	BAND	7	STATION	2	BUOY	24	1	0	0	0	0	ROW	4
TAPE	9	BAND	7	STATION	2	BUOY	24	0	0	0	0	0	ROW	5
TAPE	9	BAND	7	STATION	3	BUOY	22	0	0	0	0	0	ROW	1
TAPE	9	BAND	7	STATION	3	BUOY	22	0	0	1	1	0	ROW	2
TAPE	9	BAND	7	STATION	3	BUOY	22	1	1	1	1	0	ROW	3
TAPE	9	BAND	7	STATION	3	BUOY	22	1	0	0	1	0	ROW	4
TAPE	9	BAND	7	STATION	3	BUOY	22	0	0	0	0	0	ROW	5
TAPE	9	BAND	7	STATION	4	BUOY	20	2	1	0	0	0	ROW	1
TAPE	9	BAND	7	STATION	4	BUOY	20	3	2	0	1	0	ROW	2
TAPE	9	BAND	7	STATION	4	BUOY	20	2	2	0	2	2	ROW	3
TAPE	9	BAND	7	STATION	4	BUOY	20	1	1	0	1	1	ROW	4
TAPE	9	BAND	7	STATION	4	BUOY	20	0	0	0	0	0	ROW	5
TAPE	9	BAND	7	STATION	5	BUOY	18	1	1	1	1	1	ROW	1
TAPE	9	BAND	7	STATION	5	BUOY	18	1	1	1	1	1	ROW	2
TAPE	9	BAND	7	STATION	5	BUOY	18	1	1	1	1	1	ROW	3
TAPE	9	BAND	7	STATION	5	BUOY	18	1	0	1	2	2	ROW	4
TAPE	9	BAND	7	STATION	5	BUOY	18	0	0	0	2	1	ROW	5

APPENDIX D (continued)

TAPE	9	BAND	7	STATION	6	BUOY	15	0	1	1	0	0	ROW	1
TAPE	9	BAND	7	STATION	6	BUOY	15	0	2	0	0	0	ROW	2
TAPE	9	BAND	7	STATION	6	BUOY	15	1	1	1	1	1	ROW	3
TAPE	9	BAND	7	STATION	6	BUOY	15	1	3	1	0	1	ROW	4
TAPE	9	BAND	7	STATION	6	BUOY	15	2	2	2	0	1	ROW	5
TAPE	9	BAND	7	STATION	7	BUOY	11	2	2	0	2	1	ROW	1
TAPE	9	BAND	7	STATION	7	BUOY	11	2	2	2	1	1	ROW	2
TAPE	9	BAND	7	STATION	7	BUOY	11	1	1	2	0	1	ROW	3
TAPE	9	BAND	7	STATION	7	BUOY	11	0	0	0	0	2	ROW	4
TAPE	9	BAND	7	STATION	7	BUOY	11	0	0	0	0	0	ROW	5
TAPE	9	BAND	7	STATION	8	BUOY	8	3	1	1	2	2	ROW	1
TAPE	9	BAND	7	STATION	8	BUOY	8	2	1	0	2	2	ROW	2
TAPE	9	BAND	7	STATION	8	BUOY	8	1	2	1	3	0	ROW	3
TAPE	9	BAND	7	STATION	8	BUOY	8	1	2	0	1	0	ROW	4
TAPE	9	BAND	7	STATION	8	BUOY	8	1	2	0	0	0	ROW	5
TAPE	9	BAND	7	STATION	9	BUOY	5	2	1	1	1	1	ROW	1
TAPE	9	BAND	7	STATION	9	BUOY	5	2	2	2	2	2	ROW	2
TAPE	9	BAND	7	STATION	9	BUOY	5	2	2	2	2	2	ROW	3
TAPE	9	BAND	7	STATION	9	BUOY	5	3	3	3	0	3	ROW	4
TAPE	9	BAND	7	STATION	9	BUOY	5	3	2	2	0	2	ROW	5
TAPE	9	BAND	7	STATION	10	BUOY	3	1	3	3	1	1	ROW	1
TAPE	9	BAND	7	STATION	10	BUOY	3	2	3	3	1	2	ROW	2
TAPE	9	BAND	7	STATION	10	BUOY	3	3	3	3	1	3	ROW	3
TAPE	9	BAND	7	STATION	10	BUOY	3	2	2	2	2	2	ROW	4
TAPE	9	BAND	7	STATION	10	BUOY	3	2	2	2	2	2	ROW	5
TAPE	9	BAND	7	STATION	11	BUOY	D	2	1	3	2	2	ROW	1
TAPE	9	BAND	7	STATION	11	BUOY	D	2	3	2	3	2	ROW	2
TAPE	9	BAND	7	STATION	11	BUOY	D	2	4	2	4	4	ROW	3
TAPE	9	BAND	7	STATION	11	BUOY	D	1	4	3	4	5	ROW	4
TAPE	9	BAND	7	STATION	11	BUOY	D	0	2	2	3	4	ROW	5
TAPE	9	BAND	7	STATION	12	BUOY	G	3	2	3	2	1	ROW	1
TAPE	9	BAND	7	STATION	12	BUOY	G	2	2	2	2	2	ROW	2
TAPE	9	BAND	7	STATION	12	BUOY	G	3	1	2	3	4	ROW	3
TAPE	9	BAND	7	STATION	12	BUOY	G	3	2	3	3	4	ROW	4
TAPE	9	BAND	7	STATION	12	BUOY	G	3	3	3	3	3	ROW	5
TAPE	12	BAND	4	STATION	1	BUOY	100	20	23	26	31	36	ROW	1
TAPE	12	BAND	4	STATION	1	BUOY	100	13	14	15	20	26	ROW	2
TAPE	12	BAND	4	STATION	1	BUOY	100	10	10	9	11	15	ROW	3
TAPE	12	BAND	4	STATION	1	BUOY	100	12	11	10	10	11	ROW	4
TAPE	12	BAND	4	STATION	1	BUOY	100	14	10	8	9	12	ROW	5
TAPE	12	BAND	4	STATION	2	BUOY	24	9	9	10	10	10	ROW	1
TAPE	12	BAND	4	STATION	2	BUOY	24	10	10	10	10	10	ROW	2
TAPE	12	BAND	4	STATION	2	BUOY	24	10	10	10	11	10	ROW	3
TAPE	12	BAND	4	STATION	2	BUOY	24	10	10	11	10	10	ROW	4
TAPE	12	BAND	4	STATION	2	BUOY	24	11	10	11	10	10	ROW	5
TAPE	12	BAND	4	STATION	3	BUOY	22	13	12	14	19	44	ROW	1
TAPE	12	BAND	4	STATION	3	BUOY	22	12	11	12	13	38	ROW	2
TAPE	12	BAND	4	STATION	3	BUOY	22	11	11	11	10	25	ROW	3
TAPE	12	BAND	4	STATION	3	BUOY	22	12	11	10	11	15	ROW	4
TAPE	12	BAND	4	STATION	3	BUOY	22	13	11	11	11	14	ROW	5
TAPE	12	BAND	4	STATION	4	BUOY	20	9	9	9	10	11	ROW	1
TAPE	12	BAND	4	STATION	4	BUOY	20	9	9	9	9	10	ROW	2
TAPE	12	BAND	4	STATION	4	BUOY	20	9	9	9	9	9	ROW	3
TAPE	12	BAND	4	STATION	4	BUOY	20	10	10	11	10	10	ROW	4
TAPE	12	BAND	4	STATION	4	BUOY	20	11	10	10	10	9	ROW	5

APPENDIX D (continued)

TAPE 12	BAND 4	STATION 5	BUOY 18	9	9	9	9	8	ROW 1
TAPE 12	BAND 4	STATION 5	BUOY 18	10	10	10	10	9	ROW 2
TAPE 12	BAND 4	STATION 5	BUOY 18	10	9	9	10	8	ROW 3
TAPE 12	BAND 4	STATION 5	BUOY 18	9	9	8	9	9	ROW 4
TAPE 12	BAND 4	STATION 5	BUOY 18	9	10	9	9	10	ROW 5
TAPE 12	BAND 4	STATION 6	BUOY 15	11	11	10	10	9	ROW 1
TAPE 12	BAND 4	STATION 6	BUOY 15	10	10	9	9	10	ROW 2
TAPE 12	BAND 4	STATION 6	BUOY 15	10	10	10	10	9	ROW 3
TAPE 12	BAND 4	STATION 6	BUOY 15	10	9	10	10	9	ROW 4
TAPE 12	BAND 4	STATION 6	BUOY 15	10	10	10	10	10	ROW 5
TAPE 12	BAND 4	STATION 7	BUOY 11	15	15	15	14	13	ROW 1
TAPE 12	BAND 4	STATION 7	BUOY 11	15	14	15	15	12	ROW 2
TAPE 12	BAND 4	STATION 7	BUOY 11	15	15	15	14	14	ROW 3
TAPE 12	BAND 4	STATION 7	BUOY 11	13	12	13	12	13	ROW 4
TAPE 12	BAND 4	STATION 7	BUOY 11	12	13	12	12	12	ROW 5
TAPE 12	BAND 4	STATION 8	BUOY 8	13	13	15	14	12	ROW 1
TAPE 12	BAND 4	STATION 8	BUOY 8	15	14	14	14	14	ROW 2
TAPE 12	BAND 4	STATION 8	BUOY 8	16	15	14	14	16	ROW 3
TAPE 12	BAND 4	STATION 8	BUOY 8	15	14	15	14	15	ROW 4
TAPE 12	BAND 4	STATION 8	BUOY 8	15	15	17	16	16	ROW 5
TAPE 12	BAND 4	STATION 9	BUOY 5	15	15	14	14	14	ROW 1
TAPE 12	BAND 4	STATION 9	BUOY 5	14	14	12	14	14	ROW 2
TAPE 12	BAND 4	STATION 9	BUOY 5	16	16	15	15	15	ROW 3
TAPE 12	BAND 4	STATION 9	BUOY 5	14	14	14	14	13	ROW 4
TAPE 12	BAND 4	STATION 9	BUOY 5	13	13	13	13	13	ROW 5
TAPE 12	BAND 4	STATION 10	BUOY 3	10	10	10	11	13	ROW 1
TAPE 12	BAND 4	STATION 10	BUOY 3	10	10	9	9	6	ROW 2
TAPE 12	BAND 4	STATION 10	BUOY 3	12	10	8	8	5	ROW 3
TAPE 12	BAND 4	STATION 10	BUOY 3	13	10	9	8	6	ROW 4
TAPE 12	BAND 4	STATION 10	BUOY 3	12	10	9	8	7	ROW 5
TAPE 12	BAND 4	STATION 11	BUOY D	4	4	6	6	5	ROW 1
TAPE 12	BAND 4	STATION 11	BUOY D	5	4	5	5	5	ROW 2
TAPE 12	BAND 4	STATION 11	BUOY D	6	6	5	6	6	ROW 3
TAPE 12	BAND 4	STATION 11	BUOY D	6	6	6	6	6	ROW 4
TAPE 12	BAND 4	STATION 11	BUOY D	7	7	6	7	6	ROW 5
TAPE 12	BAND 4	STATION 12	BUOY G	5	6	5	5	6	ROW 1
TAPE 12	BAND 4	STATION 12	BUOY G	5	4	4	3	4	ROW 2
TAPE 12	BAND 4	STATION 12	BUOY G	5	5	6	4	3	ROW 3
TAPE 12	BAND 4	STATION 12	BUOY G	5	5	6	5	4	ROW 4
TAPE 12	BAND 4	STATION 12	BUOY G	5	6	5	5	6	ROW 5
TAPE 12	BAND 5	STATION 1	BUOY 100	27	31	32	37	42	ROW 1
TAPE 12	BAND 5	STATION 1	BUOY 100	22	23	24	28	34	ROW 2
TAPE 12	BAND 5	STATION 1	BUOY 100	19	20	19	20	24	ROW 3
TAPE 12	BAND 5	STATION 1	BUOY 100	21	22	20	20	21	ROW 4
TAPE 12	BAND 5	STATION 1	BUOY 100	23	21	21	22	21	ROW 5
TAPE 12	BAND 5	STATION 2	BUOY 24	20	20	21	20	21	ROW 1
TAPE 12	BAND 5	STATION 2	BUOY 24	20	20	20	20	21	ROW 2
TAPE 12	BAND 5	STATION 2	BUOY 24	21	21	21	21	21	ROW 3
TAPE 12	BAND 5	STATION 2	BUOY 24	22	20	21	21	22	ROW 4
TAPE 12	BAND 5	STATION 2	BUOY 24	21	19	20	20	22	ROW 5
TAPE 12	BAND 5	STATION 3	BUOY 22	23	23	23	28	43	ROW 1
TAPE 12	BAND 5	STATION 3	BUOY 22	21	23	23	23	32	ROW 2
TAPE 12	BAND 5	STATION 3	BUOY 22	20	22	22	21	24	ROW 3
TAPE 12	BAND 5	STATION 3	BUOY 22	22	21	21	21	22	ROW 4
TAPE 12	BAND 5	STATION 3	BUOY 22	22	22	22	22	22	ROW 5

APPENDIX D (continued)

TAPE 12	BAND 5	STATION 4	BUOY 20	19	20	19	19	19	ROW 1
TAPE 12	BAND 5	STATION 4	BUOY 20	17	20	19	19	19	ROW 2
TAPE 12	BAND 5	STATION 4	BUOY 20	16	18	20	20	21	ROW 3
TAPE 12	BAND 5	STATION 4	BUOY 20	18	17	21	21	22	ROW 4
TAPE 12	BAND 5	STATION 4	BUOY 20	20	19	20	19	19	ROW 5
TAPE 12	BAND 5	STATION 5	BUOY 18	18	18	18	18	18	ROW 1
TAPE 12	BAND 5	STATION 5	BUOY 18	20	19	19	20	19	ROW 2
TAPE 12	BAND 5	STATION 5	BUOY 18	19	20	20	20	20	ROW 3
TAPE 12	BAND 5	STATION 5	BUOY 18	20	19	20	20	20	ROW 4
TAPE 12	BAND 5	STATION 5	BUOY 18	21	18	18	21	18	ROW 5
TAPE 12	BAND 5	STATION 6	BUOY 15	21	22	21	21	22	ROW 1
TAPE 12	BAND 5	STATION 6	BUOY 15	21	21	21	21	21	ROW 2
TAPE 12	BAND 5	STATION 6	BUOY 15	20	20	22	20	20	ROW 3
TAPE 12	BAND 5	STATION 6	BUOY 15	20	21	21	20	20	ROW 4
TAPE 12	BAND 5	STATION 6	BUOY 15	19	21	21	21	20	ROW 5
TAPE 12	BAND 5	STATION 7	BUOY 11	27	27	26	26	26	ROW 1
TAPE 12	BAND 5	STATION 7	BUOY 11	26	25	26	26	26	ROW 2
TAPE 12	BAND 5	STATION 7	BUOY 11	25	25	25	25	25	ROW 3
TAPE 12	BAND 5	STATION 7	BUOY 11	25	27	25	24	24	ROW 4
TAPE 12	BAND 5	STATION 7	BUOY 11	25	27	25	25	24	ROW 5
TAPE 12	BAND 5	STATION 8	BUOY 8	26	24	27	29	26	ROW 1
TAPE 12	BAND 5	STATION 8	BUOY 8	27	27	27	27	27	ROW 2
TAPE 12	BAND 5	STATION 8	BUOY 8	27	26	26	26	26	ROW 3
TAPE 12	BAND 5	STATION 8	BUOY 8	27	26	26	26	27	ROW 4
TAPE 12	BAND 5	STATION 8	BUOY 8	28	28	27	26	28	ROW 5
TAPE 12	BAND 5	STATION 9	BUOY 5	26	27	26	26	24	ROW 1
TAPE 12	BAND 5	STATION 9	BUOY 5	26	29	26	26	25	ROW 2
TAPE 12	BAND 5	STATION 9	BUOY 5	28	29	24	25	28	ROW 3
TAPE 12	BAND 5	STATION 9	BUOY 5	28	27	23	23	27	ROW 4
TAPE 12	BAND 5	STATION 9	BUOY 5	27	26	24	24	25	ROW 5
TAPE 12	BAND 5	STATION 10	BUOY 3	22	22	22	22	24	ROW 1
TAPE 12	BAND 5	STATION 10	BUOY 3	21	21	20	19	19	ROW 2
TAPE 12	BAND 5	STATION 10	BUOY 3	22	23	20	18	16	ROW 3
TAPE 12	BAND 5	STATION 10	BUOY 3	22	21	18	17	16	ROW 4
TAPE 12	BAND 5	STATION 10	BUOY 3	22	18	17	17	17	ROW 5
TAPE 12	BAND 5	STATION 11	BUOY D	13	12	13	13	12	ROW 1
TAPE 12	BAND 5	STATION 11	BUOY D	12	12	13	12	12	ROW 2
TAPE 12	BAND 5	STATION 11	BUOY D	12	12	11	12	12	ROW 3
TAPE 12	BAND 5	STATION 11	BUOY D	12	11	11	12	12	ROW 4
TAPE 12	BAND 5	STATION 11	BUOY D	13	12	12	12	13	ROW 5
TAPE 12	BAND 5	STATION 12	BUOY G	11	11	12	12	13	ROW 1
TAPE 12	BAND 5	STATION 12	BUOY G	11	11	11	12	13	ROW 2
TAPE 12	BAND 5	STATION 12	BUOY G	12	12	12	12	12	ROW 3
TAPE 12	BAND 5	STATION 12	BUOY G	12	12	13	12	12	ROW 4
TAPE 12	BAND 5	STATION 12	BUOY G	11	12	12	12	12	ROW 5
TAPE 12	BAND 6	STATION 1	BUOY 100	20	23	26	31	36	ROW 1
TAPE 12	BAND 6	STATION 1	BUOY 100	13	14	15	20	26	ROW 2
TAPE 12	BAND 6	STATION 1	BUOY 100	10	10	9	11	15	ROW 3
TAPE 12	BAND 6	STATION 1	BUOY 100	12	11	10	10	11	ROW 4
TAPE 12	BAND 6	STATION 1	BUOY 100	14	10	8	9	12	ROW 5
TAPE 12	BAND 6	STATION 2	BUOY 24	9	10	10	10	10	ROW 1
TAPE 12	BAND 6	STATION 2	BUOY 24	10	10	10	10	11	ROW 2
TAPE 12	BAND 6	STATION 2	BUOY 24	10	10	11	10	12	ROW 3
TAPE 12	BAND 6	STATION 2	BUOY 24	10	11	10	10	11	ROW 4
TAPE 12	BAND 6	STATION 2	BUOY 24	10	11	10	10	10	ROW 5

APPENDIX D (continued)

TAPE 12	BAND 6	STATION 3	BUOY 22	13	12	14	19	38	ROW 1
TAPE 12	BAND 6	STATION 3	BUOY 22	12	11	12	13	25	ROW 2
TAPE 12	BAND 6	STATION 3	BUOY 22	11	11	11	10	15	ROW 3
TAPE 12	BAND 6	STATION 3	BUOY 22	12	11	10	11	14	ROW 4
TAPE 12	BAND 6	STATION 3	BUOY 22	13	11	11	11	12	ROW 5
TAPE 12	BAND 6	STATION 4	BUOY 20	9	9	9	10	11	ROW 1
TAPE 12	BAND 6	STATION 4	BUOY 20	9	9	9	9	10	ROW 2
TAPE 12	BAND 6	STATION 4	BUOY 20	9	9	9	9	9	ROW 3
TAPE 12	BAND 6	STATION 4	BUOY 20	10	10	11	10	10	ROW 4
TAPE 12	BAND 6	STATION 4	BUOY 20	11	10	10	10	9	ROW 5
TAPE 12	BAND 6	STATION 5	BUOY 18	9	9	9	9	8	ROW 1
TAPE 12	BAND 6	STATION 5	BUOY 18	10	10	10	10	9	ROW 2
TAPE 12	BAND 6	STATION 5	BUOY 18	10	9	9	10	8	ROW 3
TAPE 12	BAND 6	STATION 5	BUOY 18	9	9	8	9	9	ROW 4
TAPE 12	BAND 6	STATION 5	BUOY 18	9	10	9	9	10	ROW 5
TAPE 12	BAND 6	STATION 6	BUOY 15	11	11	10	10	9	ROW 1
TAPE 12	BAND 6	STATION 6	BUOY 15	10	10	9	9	10	ROW 2
TAPE 12	BAND 6	STATION 6	BUOY 15	10	10	10	10	9	ROW 3
TAPE 12	BAND 6	STATION 6	BUOY 15	10	9	10	10	9	ROW 4
TAPE 12	BAND 6	STATION 6	BUOY 15	10	10	10	10	10	ROW 5
TAPE 12	BAND 6	STATION 7	BUOY 11	15	15	15	14	13	ROW 1
TAPE 12	BAND 6	STATION 7	BUOY 11	15	14	15	15	12	ROW 2
TAPE 12	BAND 6	STATION 7	BUOY 11	15	15	15	14	14	ROW 3
TAPE 12	BAND 6	STATION 7	BUOY 11	13	12	13	12	13	ROW 4
TAPE 12	BAND 6	STATION 7	BUOY 11	12	13	12	12	12	ROW 5
TAPE 12	BAND 6	STATION 8	BUOY 8	13	13	15	14	12	ROW 1
TAPE 12	BAND 6	STATION 8	BUOY 8	15	14	14	14	14	ROW 2
TAPE 12	BAND 6	STATION 8	BUOY 8	16	15	14	14	16	ROW 3
TAPE 12	BAND 6	STATION 8	BUOY 8	15	14	15	14	15	ROW 4
TAPE 12	BAND 6	STATION 8	BUOY 8	15	15	17	16	16	ROW 5
TAPE 12	BAND 6	STATION 9	BUOY 5	15	15	14	14	14	ROW 1
TAPE 12	BAND 6	STATION 9	BUOY 5	14	14	12	14	14	ROW 2
TAPE 12	BAND 6	STATION 9	BUOY 5	16	16	15	15	15	ROW 3
TAPE 12	BAND 6	STATION 9	BUOY 5	14	14	14	14	13	ROW 4
TAPE 12	BAND 6	STATION 9	BUOY 5	13	13	13	13	13	ROW 5
TAPE 12	BAND 6	STATION 10	BUOY 3	10	10	10	11	13	ROW 1
TAPE 12	BAND 6	STATION 10	BUOY 3	10	10	9	9	6	ROW 2
TAPE 12	BAND 6	STATION 10	BUOY 3	12	10	8	8	5	ROW 3
TAPE 12	BAND 6	STATION 10	BUOY 3	13	10	9	8	6	ROW 4
TAPE 12	BAND 6	STATION 10	BUOY 3	12	10	9	8	7	ROW 5
TAPE 12	BAND 6	STATION 11	BUOY D	5	4	5	5	5	ROW 1
TAPE 12	BAND 6	STATION 11	BUOY D	6	6	5	6	6	ROW 2
TAPE 12	BAND 6	STATION 11	BUOY D	6	6	6	6	6	ROW 3
TAPE 12	BAND 6	STATION 11	BUOY D	7	7	6	7	6	ROW 4
TAPE 12	BAND 6	STATION 11	BUOY D	7	7	6	6	6	ROW 5
TAPE 12	BAND 6	STATION 12	BUOY G	3	4	4	3	4	ROW 1
TAPE 12	BAND 6	STATION 12	BUOY G	5	5	6	4	3	ROW 2
TAPE 12	BAND 6	STATION 12	BUOY G	5	5	6	5	4	ROW 3
TAPE 12	BAND 6	STATION 12	BUOY G	5	6	5	5	6	ROW 4
TAPE 12	BAND 6	STATION 12	BUOY G	6	7	7	6	6	ROW 5
TAPE 12	BAND 7	STATION 1	BUOY 100	2	4	3	9	11	ROW 1
TAPE 12	BAND 7	STATION 1	BUOY 100	1	1	0	2	5	ROW 2
TAPE 12	BAND 7	STATION 1	BUOY 100	2	1	0	0	1	ROW 3
TAPE 12	BAND 7	STATION 1	BUOY 100	3	1	1	2	2	ROW 4
TAPE 12	BAND 7	STATION 1	BUOY 100	9	5	6	1	3	ROW 5

APPENDIX D (continued)

TAPE 12	BAND 7	STATION 2	BUOY 24	3	2	2	2	3	ROW 1
TAPE 12	BAND 7	STATION 2	BUOY 24	3	2	2	3	3	ROW 2
TAPE 12	BAND 7	STATION 2	BUOY 24	2	1	3	3	1	ROW 3
TAPE 12	BAND 7	STATION 2	BUOY 24	0	0	1	1	2	ROW 4
TAPE 12	BAND 7	STATION 2	BUOY 24	0	1	0	1	3	ROW 5
TAPE 12	BAND 7	STATION 3	BUOY 22	2	2	3	11	30	ROW 1
TAPE 12	BAND 7	STATION 3	BUOY 22	2	3	2	5	10	ROW 2
TAPE 12	BAND 7	STATION 3	BUOY 22	1	4	2	3	0	ROW 3
TAPE 12	BAND 7	STATION 3	BUOY 22	0	2	2	0	0	ROW 4
TAPE 12	BAND 7	STATION 3	BUOY 22	2	0	3	2	1	ROW 5
TAPE 12	BAND 7	STATION 4	BUOY 20	0	1	2	3	0	ROW 1
TAPE 12	BAND 7	STATION 4	BUOY 20	1	2	2	2	2	ROW 2
TAPE 12	BAND 7	STATION 4	BUOY 20	2	2	0	2	2	ROW 3
TAPE 12	BAND 7	STATION 4	BUOY 20	2	2	0	2	1	ROW 4
TAPE 12	BAND 7	STATION 4	BUOY 20	2	2	0	2	0	ROW 5
TAPE 12	BAND 7	STATION 5	BUOY 18	3	2	1	0	0	ROW 1
TAPE 12	BAND 7	STATION 5	BUOY 18	2	2	2	2	2	ROW 2
TAPE 12	BAND 7	STATION 5	BUOY 18	1	2	1	2	2	ROW 3
TAPE 12	BAND 7	STATION 5	BUOY 18	0	1	0	0	1	ROW 4
TAPE 12	BAND 7	STATION 5	BUOY 18	0	0	0	0	0	ROW 5
TAPE 12	BAND 7	STATION 6	BUOY 15	0	1	1	0	0	ROW 1
TAPE 12	BAND 7	STATION 6	BUOY 15	1	3	2	2	0	ROW 2
TAPE 12	BAND 7	STATION 6	BUOY 15	2	2	2	2	2	ROW 3
TAPE 12	BAND 7	STATION 6	BUOY 15	1	1	2	1	2	ROW 4
TAPE 12	BAND 7	STATION 6	BUOY 15	1	0	1	0	1	ROW 5
TAPE 12	BAND 7	STATION 7	BUOY 11	3	2	3	2	3	ROW 1
TAPE 12	BAND 7	STATION 7	BUOY 11	2	1	2	2	1	ROW 2
TAPE 12	BAND 7	STATION 7	BUOY 11	3	0	3	3	0	ROW 3
TAPE 12	BAND 7	STATION 7	BUOY 11	3	2	5	3	2	ROW 4
TAPE 12	BAND 7	STATION 7	BUOY 11	3	3	4	3	3	ROW 5
TAPE 12	BAND 7	STATION 8	BUOY 8	4	4	3	3	3	ROW 1
TAPE 12	BAND 7	STATION 8	BUOY 8	2	2	4	2	2	ROW 2
TAPE 12	BAND 7	STATION 8	BUOY 8	1	2	3	2	1	ROW 3
TAPE 12	BAND 7	STATION 8	BUOY 8	2	2	2	3	1	ROW 4
TAPE 12	BAND 7	STATION 8	BUOY 8	3	3	3	3	2	ROW 5
TAPE 12	BAND 7	STATION 9	BUOY 5	2	4	2	5	4	ROW 1
TAPE 12	BAND 7	STATION 9	BUOY 5	2	3	2	3	2	ROW 2
TAPE 12	BAND 7	STATION 9	BUOY 5	2	2	2	2	2	ROW 3
TAPE 12	BAND 7	STATION 9	BUOY 5	3	3	3	3	3	ROW 4
TAPE 12	BAND 7	STATION 9	BUOY 5	3	4	2	2	4	ROW 5
TAPE 12	BAND 7	STATION 10	BUOY 3	1	3	3	3	6	ROW 1
TAPE 12	BAND 7	STATION 10	BUOY 3	3	1	3	0	1	ROW 2
TAPE 12	BAND 7	STATION 10	BUOY 3	2	0	0	0	0	ROW 3
TAPE 12	BAND 7	STATION 10	BUOY 3	2	1	1	0	1	ROW 4
TAPE 12	BAND 7	STATION 10	BUOY 3	2	2	3	0	2	ROW 5
TAPE 12	BAND 7	STATION 11	BUOY D	1	0	1	1	1	ROW 1
TAPE 12	BAND 7	STATION 11	BUOY D	0	0	1	1	0	ROW 2
TAPE 12	BAND 7	STATION 11	BUOY D	0	0	0	0	0	ROW 3
TAPE 12	BAND 7	STATION 11	BUOY D	1	0	0	0	1	ROW 4
TAPE 12	BAND 7	STATION 11	BUOY D	1	1	0	1	3	ROW 5
TAPE 12	BAND 7	STATION 12	BUOY G	1	1	1	1	0	ROW 1
TAPE 12	BAND 7	STATION 12	BUOY G	1	1	1	1	1	ROW 2
TAPE 12	BAND 7	STATION 12	BUOY G	0	0	0	1	1	ROW 3
TAPE 12	BAND 7	STATION 12	BUOY G	0	0	0	1	2	ROW 4
TAPE 12	BAND 7	STATION 12	BUOY G	2	2	2	2	2	ROW 5

APPENDIX E

Smoothed Landsat Data

APPENDIX E

TAPE	BAND	STATION	BUOY	C	T	TL	TR	BL	BR	F
1	4	11	D	23	23.56	23.94	23.81	23.69	23.56	23.84
1	4	12	G	23	23.22	23.19	23.19	23.13	23.06	23.12
1	4	13	K	22	23.00	22.06	25.06	23.88	28.19	25.72
1	5	11	D	16	15.56	15.81	15.75	15.56	15.50	15.72
1	5	12	G	16	16.11	16.19	16.13	16.13	16.06	16.12
1	5	13	K	20	20.22	18.19	22.19	20.69	26.06	22.56
1	6	11	D	9	9.44	9.38	9.31	9.19	9.19	9.20
1	6	12	G	9	8.89	8.88	9.19	8.63	8.94	8.92
1	6	13	K	16	15.00	13.19	16.94	16.25	21.44	17.92
1	7	11	D	3	2.67	2.25	2.50	2.50	2.56	2.36
1	7	12	G	4	2.22	2.44	2.44	2.25	2.38	2.40
1	7	13	K	6	7.22	5.75	8.50	8.38	12.44	9.48
3	4	1	100	23	22.44	22.19	22.06	22.56	22.56	22.24
3	4	2	24	14	15.11	15.38	15.25	15.00	14.88	15.16
3	4	3	22	21	21.00	20.63	20.63	21.75	21.69	21.24
3	4	4	20	15	15.22	15.19	15.25	15.38	15.31	15.32
3	5	1	100	22	22.22	21.81	21.44	22.88	22.44	22.08
3	5	2	24	22	21.22	21.19	21.25	21.31	21.38	21.40
3	5	3	22	19	18.78	18.13	18.19	19.00	19.38	18.64
3	5	4	20	12	12.00	11.81	11.88	12.50	12.44	12.24
3	6	1	100	14	12.56	12.00	11.81	12.63	12.25	12.04
3	6	2	24	12	11.78	12.13	11.88	11.88	11.56	12.00
3	6	3	22	16	13.89	13.00	12.75	13.75	13.88	13.08
3	6	4	20	6	6.89	6.63	6.81	7.31	7.44	7.12
3	7	1	100	1	1.78	2.31	2.13	2.31	2.13	2.36
3	7	2	24	3	2.44	2.56	2.50	2.44	2.25	2.40
3	7	3	22	6	5.44	5.19	5.25	5.63	5.94	5.48
3	7	4	20	1	1.56	1.56	1.50	1.75	1.75	1.68
5	4	1	100	29	27.22	27.06	27.06	28.06	28.00	27.76
5	4	2	24	21	22.11	22.50	22.56	22.13	21.94	22.36
5	4	3	22	20	20.67	20.69	20.44	21.00	20.69	20.72
5	4	4	20	19	19.67	19.63	19.69	19.50	19.38	19.48
5	4	5	18	18	18.33	18.25	18.25	18.25	18.25	18.20
5	4	6	15	19	19.11	19.06	19.00	19.06	19.00	18.96
5	4	7	11	18	18.00	18.00	18.19	17.88	18.06	18.04
5	4	8	8	18	17.67	17.63	17.63	17.56	17.56	17.56
5	4	9	5	18	17.78	17.56	17.44	17.88	18.00	17.68
5	4	10	3	19	18.56	18.38	18.38	18.75	18.75	18.60
5	4	11	D	21	20.33	20.25	20.31	19.94	20.00	20.00
5	4	12	G	19	19.44	19.75	19.56	19.63	19.69	19.68
5	5	1	100	38	36.11	35.69	35.19	37.50	36.75	36.44
5	5	2	24	20	20.56	20.94	20.63	21.13	20.63	21.00
5	5	3	22	21	19.11	19.06	18.88	19.00	18.75	18.84
5	5	4	20	16	16.22	16.50	16.25	16.25	16.19	16.32
5	5	5	18	14	13.89	13.69	13.69	13.75	13.75	13.60
5	5	6	15	14	14.67	14.94	15.00	15.00	15.00	15.16
5	5	7	11	15	14.56	14.50	14.44	14.44	14.38	14.36
5	5	8	8	14	13.89	14.13	13.94	13.94	13.69	13.96
5	5	9	5	14	13.67	13.44	13.44	13.56	13.50	13.40
5	5	10	3	15	14.22	13.94	14.19	14.31	14.56	14.24
5	5	11	D	15	15.33	15.69	15.75	15.44	15.50	15.72
5	5	12	G	16	15.78	15.75	15.88	15.50	15.69	15.68
5	6	1	100	22	21.44	20.81	20.38	22.75	22.31	21.64

APPENDIX E (continued)

TAPE	BAND	STATION	BUOY	C	T	TL	TR	BL	BR	F
5	6	2	24	12	12.11	12.44	12.25	12.38	12.13	12.40
5	6	3	22	12	11.67	11.50	11.50	11.31	11.38	11.36
5	6	4	20	10	9.78	9.94	10.13	9.94	10.13	10.20
5	6	5	18	8	8.78	8.88	9.00	9.00	9.25	9.16
5	6	6	15	9	9.44	9.44	9.38	9.69	9.63	9.56
5	6	7	11	9	9.22	9.19	9.19	9.06	9.13	9.12
5	6	8	8	8	8.67	9.06	9.25	8.81	9.00	9.20
5	6	9	5	9	8.89	8.63	8.94	8.81	9.06	8.84
5	6	10	3	10	9.89	9.69	9.63	9.63	9.56	9.48
5	6	11	D	10	10.22	10.31	10.38	10.38	10.31	10.40
5	6	12	G	10	10.56	10.56	10.56	10.31	10.44	10.40
5	7	1	100	5	6.11	6.06	6.06	6.00	5.88	5.92
5	7	2	24	3	3.44	3.25	3.31	3.25	3.31	3.20
5	7	3	22	4	3.44	3.31	3.31	3.44	3.38	3.32
5	7	4	20	2	2.44	2.56	2.69	2.44	2.38	2.56
5	7	5	18	2	2.33	2.31	2.38	2.13	2.13	2.16
5	7	6	15	5	3.78	3.50	3.44	3.38	3.25	3.20
5	7	7	11	3	3.00	2.75	2.75	3.00	3.00	2.80
5	7	7	11	1	2.33	2.56	2.31	2.56	2.31	2.44
5	7	9	5	4	3.00	2.94	3.00	3.00	3.00	3.00
5	7	10	3	1	2.56	2.44	2.44	2.56	2.75	2.52
5	7	11	D	2	3.11	3.13	3.31	3.38	3.56	3.40
5	7	12	G	4	4.56	4.38	4.25	4.44	4.50	4.28
7	4	1	100	17	17.78	17.38	17.63	18.06	18.13	17.88
7	4	2	24	19	20.22	19.88	18.63	20.25	20.19	19.20
7	4	3	22	19	19.67	19.63	19.38	20.06	19.75	19.68
7	4	4	20	12	12.44	12.44	12.63	12.38	12.56	12.52
7	4	5	18	13	11.78	11.50	11.44	11.69	11.56	11.44
7	4	6	15	12	11.67	11.56	11.56	11.56	11.50	11.52
7	4	7	11	11	11.22	11.44	11.44	11.31	11.38	11.48
7	4	8	8	12	12.33	12.38	12.50	12.25	12.31	12.36
7	4	9	5	11	11.67	11.50	11.50	11.63	11.63	11.52
7	4	10	3	12	11.67	11.56	11.75	11.50	11.63	11.56
7	4	11	D	11	11.33	11.44	11.06	11.31	11.06	11.16
7	4	12	G	13	11.44	11.38	11.31	11.38	11.31	11.32
7	5	1	100	29	28.56	27.88	28.06	28.38	28.63	28.08
7	5	2	24	34	34.00	33.56	32.88	34.00	33.75	33.28
7	5	3	22	29	29.67	29.63	29.06	30.88	30.38	30.12
7	5	4	20	12	12.00	12.00	11.94	12.25	12.25	12.16
7	5	5	18	10	9.33	9.25	9.19	9.25	9.19	9.16
7	5	6	15	9	9.33	9.50	9.25	9.50	9.44	9.48
7	5	7	11	9	9.22	9.13	9.00	9.13	8.94	8.96
7	5	8	8	10	9.56	9.63	9.63	9.50	9.50	9.56
7	5	9	5	9	8.89	8.94	8.81	8.81	8.75	8.80
7	5	10	3	8	8.33	8.38	8.38	8.31	8.38	8.40
7	5	11	D	6	7.22	7.50	7.56	7.38	7.50	7.60
7	5	12	G	8	7.78	7.75	7.88	7.81	7.94	7.88
7	6	1	100	23	22.89	22.88	22.88	23.00	22.94	22.92
7	6	2	24	27	26.44	26.69	26.00	26.44	26.25	26.32
7	6	3	22	23	22.44	21.94	21.38	23.31	22.88	22.32
7	6	4	20	5	4.44	4.38	4.63	4.63	4.88	4.72
7	6	5	18	2	2.56	2.56	2.63	2.44	2.50	2.60
7	6	6	15	3	3.11	3.31	3.31	3.13	3.13	3.28

APPENDIX E (continued)

TAPE	BAND	STATION	BUOY	C	T	TL	TR	BL	BR	F
7	6	7	11	3	2.67	3.19	3.13	2.38	2.38	2.84
7	6	8	8	3	2.67	2.56	2.69	2.88	2.94	2.84
7	6	9	5	2	2.89	2.94	2.75	3.00	2.63	2.84
7	6	10	3	3	2.56	2.50	2.44	2.31	2.31	2.32
7	6	11	D	3	2.67	2.19	2.13	2.38	2.31	2.04
7	6	12	G	1	1.11	1.31	1.56	1.44	1.50	1.64
7	7	1	100	5	6.78	7.31	7.38	7.19	7.19	7.48
7	7	2	24	10	9.78	9.44	9.50	9.81	10.19	9.68
7	7	3	22	4	4.56	4.81	4.56	5.06	4.75	4.84
7	7	4	20	0	0.22	0.19	0.25	0.19	0.25	0.20
7	7	5	18	0	0.11	0.06	0.06	0.06	0.06	0.04
7	7	6	15	0	0.00	0.00	0.00	0.06	0.06	0.04
7	7	7	11	0	0.11	0.19	0.06	0.19	0.06	0.12
7	7	8	8	0	0.11	0.13	0.19	0.06	0.13	0.12
7	7	9	5	0	0.00	0.00	0.00	0.00	0.00	0.00
7	7	10	3	0	0.00	0.00	0.00	0.00	0.00	0.00
7	7	11	D	0	0.00	0.00	0.00	0.00	0.00	0.00
7	7	12	G	0	0.00	0.19	0.06	0.13	0.00	0.12
9	4	1	100	12	12.89	13.00	13.19	12.81	13.00	13.08
9	4	2	24	14	13.00	13.00	12.88	12.88	12.81	12.84
9	4	3	22	13	13.11	13.00	13.13	13.00	13.00	12.96
9	4	4	20	12	12.67	12.94	13.06	12.81	12.94	13.04
9	4	5	18	13	13.22	13.31	13.44	13.00	13.00	13.16
9	4	6	15	13	13.22	12.88	13.06	13.06	13.31	13.00
9	4	7	11	14	13.11	12.50	12.44	12.75	12.63	12.28
9	4	8	8	12	12.89	13.06	13.25	12.94	13.00	13.16
9	4	9	5	15	13.67	13.94	13.75	13.63	13.44	13.68
9	4	10	3	14	13.67	13.63	13.25	13.63	13.38	13.36
9	4	11	D	15	14.44	14.13	14.19	14.06	14.13	13.92
9	4	12	G	14	14.11	14.06	14.00	14.25	14.25	14.16
9	5	1	100	14	13.78	13.75	13.63	13.88	13.81	13.76
9	5	2	24	13	13.33	13.19	13.19	13.56	13.50	13.36
9	5	3	22	14	13.67	13.44	13.50	13.81	13.81	13.64
9	5	4	20	14	14.44	14.69	14.50	14.75	14.63	14.76
9	5	5	18	14	14.11	14.00	14.19	14.31	14.50	14.32
9	5	6	15	13	12.89	12.94	12.94	13.00	12.94	12.96
9	5	7	11	12	12.00	12.19	12.00	12.00	11.75	11.92
9	5	8	8	14	13.44	13.50	13.25	13.44	13.13	13.28
9	5	9	5	13	13.56	13.38	13.50	13.63	13.56	13.48
9	5	10	3	12	11.67	11.75	11.56	11.75	11.56	11.68
9	5	11	D	12	12.78	12.63	12.75	12.75	12.81	12.72
9	5	12	G	12	12.11	12.25	12.31	12.13	12.19	12.28
9	6	1	100	5	5.56	5.44	5.56	5.81	5.94	5.76
9	6	2	24	5	5.00	5.06	5.25	4.94	5.13	5.16
9	6	3	22	7	6.67	6.63	6.81	6.56	6.81	6.76
9	6	4	20	8	7.00	6.94	6.88	6.88	6.94	6.84
9	6	5	18	7	7.00	7.00	6.88	7.19	7.06	7.00
9	6	6	15	5	5.89	6.00	6.13	5.94	6.13	6.12
9	6	7	11	6	5.89	5.75	5.88	5.88	5.94	5.80
9	6	8	8	6	6.33	6.13	6.25	6.31	6.44	6.28
9	6	9	5	7	6.78	6.88	6.75	7.00	6.75	6.84
9	6	10	3	6	5.67	6.00	5.63	6.31	5.94	6.08
9	6	11	D	8	7.11	7.13	7.00	7.25	6.94	7.04

APPENDIX E (continued)

TAPE	BAND	STATION	BUOY	C	T	TL	TR	BL	BR	F
9	6	12	G	7	7.56	7.56	7.56	7.44	7.56	7.44
9	7	1	100	0	0.11	0.06	0.19	0.25	0.31	0.28
9	7	2	24	0	0.33	0.38	0.25	0.31	0.19	0.24
9	7	3	22	1	0.67	0.50	0.38	0.50	0.38	0.32
9	7	4	20	0	1.00	1.13	0.81	0.94	0.75	0.84
9	7	5	18	1	1.00	1.00	1.06	0.88	1.00	0.96
9	7	6	15	1	1.00	0.81	0.81	1.06	1.00	0.88
9	7	7	11	2	0.89	1.06	1.06	0.69	0.75	0.88
9	7	8	8	1	1.33	1.44	1.25	1.19	1.00	1.20
9	7	9	5	2	2.00	1.88	1.81	2.00	1.94	1.88
9	7	10	3	3	2.22	2.19	2.19	2.19	2.19	2.12
9	7	11	D	2	3.22	2.63	3.00	2.56	3.19	2.64
9	7	12	G	2	2.22	2.38	2.38	2.50	2.63	2.56
12	4	1	100	9	12.22	15.31	17.38	11.63	12.56	15.44
12	4	2	24	10	10.22	10.00	10.06	10.25	10.19	10.08
12	4	3	22	11	11.11	12.06	16.69	11.31	14.06	15.00
12	4	4	20	9	9.44	9.38	9.56	9.63	9.56	9.60
12	4	5	18	9	9.33	9.31	9.06	9.38	9.25	9.20
12	4	6	15	10	9.67	9.94	9.69	9.81	9.69	9.84
12	4	7	11	15	13.89	14.19	13.81	13.56	13.31	13.60
12	4	8	8	14	14.22	14.31	14.19	14.81	14.81	14.60
12	4	9	5	15	14.22	14.38	14.19	14.00	13.88	14.04
12	4	10	3	8	9.00	9.81	8.88	9.69	8.25	9.32
12	4	11	D	5	5.44	5.38	5.44	5.81	5.75	5.64
12	4	12	G	6	4.67	4.88	4.69	4.88	4.69	4.88
12	5	1	100	19	21.78	24.06	26.06	21.56	22.50	24.56
12	5	2	24	21	20.56	20.56	20.69	20.50	20.63	20.64
12	5	3	22	22	21.89	22.31	24.50	21.75	22.69	23.52
12	5	4	20	20	19.44	18.94	19.63	19.00	19.63	19.24
12	5	5	18	20	19.67	19.25	19.25	19.63	19.44	19.24
12	5	6	15	22	20.78	20.81	20.88	20.63	20.69	20.72
12	5	7	11	25	25.33	25.63	25.50	25.38	25.25	25.48
12	5	8	8	26	26.33	26.50	26.44	26.69	26.63	26.68
12	5	9	5	24	25.78	26.19	25.94	25.94	25.69	25.96
12	5	10	3	20	19.67	20.63	19.88	19.75	18.56	19.84
12	5	11	D	11	11.78	12.06	12.00	11.94	11.94	12.12
12	5	12	G	12	11.89	11.75	12.00	11.81	12.00	11.88
12	6	1	100	9	12.22	15.31	17.38	11.63	12.56	15.44
12	6	2	24	11	10.22	10.06	10.38	10.19	10.44	10.24
12	6	3	22	11	11.11	12.06	14.81	11.31	12.44	13.72
12	6	4	20	9	9.44	9.38	9.56	9.63	9.56	9.60
12	6	5	18	9	9.33	9.31	9.06	9.38	9.25	9.20
12	6	6	15	10	9.67	9.94	9.69	9.81	9.69	9.84
12	6	7	11	15	13.89	14.19	13.81	13.56	13.31	13.60
12	6	8	8	14	14.22	14.31	14.19	14.81	14.81	14.60
12	6	9	5	15	14.22	14.38	14.19	14.25	14.13	14.24
12	6	10	3	8	9.00	9.81	8.88	9.69	8.25	9.32
12	6	11	D	6	6.11	5.81	5.75	6.25	6.13	5.92
12	6	12	G	6	5.22	4.75	4.69	5.50	5.38	5.00
12	7	1	100	0	0.89	2.00	2.69	2.19	1.94	3.00
12	7	2	24	3	1.78	1.88	1.94	1.44	1.69	1.76
12	7	3	22	2	2.56	2.75	4.94	2.06	2.44	3.68
12	7	4	20	0	1.56	1.56	1.56	1.56	1.44	1.44

APPENDIX E (continued)

TAPE	BAND	STATION	BUOY	C	T	TL	TR	BL	BR	F
12	7	5	18	1	1.33	1.31	1.25	0.94	1.06	1.04
12	7	6	15	2	1.89	1.44	1.44	1.44	1.44	1.20
12	7	7	11	3	2.33	2.44	2.13	2.63	2.31	2.44
12	7	8	8	3	2.44	2.56	2.44	2.44	2.31	2.48
12	7	9	5	2	2.56	2.69	2.81	2.56	2.63	2.76
12	7	10	3	0	0.67	1.44	1.44	1.25	0.94	1.60
12	7	11	D	0	0.22	0.38	0.38	0.38	0.50	0.56
12	7	12	G	0	0.56	0.63	0.75	0.88	1.06	0.96

APPENDIX F

Additional RSQUARE, STEPWISE, and BACKWARD Procedures Results

APPENDIX F

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _6BY7_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 11.18622111

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _6BY7_ ENTERED R SQUARE = 0.92604868
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	96.34895438	48.17447719	62.61	0.0001
ERROR	10	7.69412254	0.76941225		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.69564753				
BAND_4	0.55832428	0.06045092	65.63361840	85.30	0.0001
_6BY7_	-0.06584947	0.02063221	7.83740335	10.19	0.0096

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _4X6BY7_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 11.25576265

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _4X6BY7_ ENTERED R SQUARE = 0.92630257
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	96.37536964	48.18768482	62.84	0.0001
ERROR	10	7.66770729	0.76677073		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.48888414				
BAND_4	0.57457484	0.05898661	72.75315906	94.88	0.0001
_4X6BY7_	-0.00511140	0.00159608	7.86381860	10.26	0.0095

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5X6BY7_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 11.38097890

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _5X6BY7_ ENTERED R SQUARE = 0.92675535
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	96.42247834	48.21123917	63.26	0.0001
ERROR	10	7.62059858	0.76205986		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.60262391				
BAND_4	0.56422857	0.05960285	68.29125722	89.61	0.0001
_5X6BY7_	-0.00477260	0.00148128	7.91092731	10.38	0.0091

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _4BY7_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 11.84283457

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _4BY7_ ENTERED R SQUARE = 0.92837838
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	96.59134293	48.29567146	64.81	0.0001
ERROR	10	7.45173399	0.74517340		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.62364830				
BAND_4	0.56147449	0.05912614	67.19830683	90.18	0.0001
_4BY7_	-0.02824841	0.00857872	8.07979190	10.84	0.0081

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _4X4BY7_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 11.88562866

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _4X4BY7_ ENTERED R SQUARE = 0.92852513
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	96.60661133	48.30330567	64.95	0.0001
ERROR	10	7.43646559	0.74364656		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.40942496				
BAND_4	0.57804287	0.05782234	74.31822114	99.94	0.0001
_4X4BY7_	-0.00218551	0.00066241	8.09506030	10.89	0.0080

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5BY7_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 11.96779970

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _5BY7_ ENTERED R SQUARE = 0.92880523
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	96.63575421	48.31787711	65.23	0.0001
ERROR	10	7.40732271	0.74073227		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.67078437				
BAND_4	0.55629246	0.05940303	64.96065259	87.70	0.0001
_5BY7_	-0.02639362	0.00796965	8.12420318	10.97	0.0079

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _4X5BY7_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 12.03799169

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _4X5BY7_ ENTERED R SQUARE = 0.92904277
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	96.66046830	48.33023415	65.46	0.0001
ERROR	10	7.38260862	0.73826086		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.53701332				
BAND_4	0.56692732	0.05838300	69.61324009	94.29	0.0001
_4X5BY7_	-0.00204928	0.00061682	8.14891727	11.04	0.0077

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5X5BY7_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 12.08279756

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _5X5BY7_ ENTERED R SQUARE = 0.92919357
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	96.67615807	48.33807903	65.62	0.0001
ERROR	10	7.36691886	0.73669189		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	5.60424721				
BAND_4	0.56034892	0.05886097	66.76488523	90.63	0.0001
_5X5BY7_	-0.00191293	0.00057461	8.16460703	11.08	0.0076

APPENDIX F (continued)

RSQUARE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
4X4 5X5 4X5 4X6 5X6 4BY5 4BY6 4BY7 5BY6 5BY7
4X4BY5 4X4BY6 4X4BY7 5X5BY4 6X6BY5
4X5BY6 4X5BY7 4X6BY5 4X6BY7 5X6BY4
AND THE RECIPROCALS THEREOF AS INDEPENDENT VARIABLES

N= 50 REGRESSION MODELS FOR DEPENDENT VARIABLE ADJTEMPC

NUMBER IN MODEL	R-SQUARE	VARIABLES IN MODEL
1	0.02564007	_1BY4X5_
1	0.02760783	_5X5_
1	0.02767582	_7BY4X5_
1	0.03227362	BAND_5
1	0.03290005	_1BY4X6_
1	0.04834220	_4X5_
1	0.05780739	_4BY6_
1	0.06213129	_5BY6_
1	0.06476954	_6BY4X5_
1	0.06844126	_4X6_
1	0.07408661	_7BY4X4_
1	0.08062777	_6BY5_
1	0.10473255	_4BY5X5_
1	0.12665166	_5X6BY4_
1	0.12914230	_4X5BY6_
1	0.16779471	_7BY5_
1	0.20062971	_6BY4_
1	0.22694701	_5BY4X6_
1	0.26148196	_5X5BY4_
1	0.33142114	_4X6BY5_
1	0.33421045	_4X4BY6_
1	0.36500733	_4X4_
1	0.41178345	BAND_4
1	0.41680165	_4BY5_
1	0.45851069	_1BY4X4_
1	0.46126297	_1BY4_
1	0.48733055	_5BY4_
1	0.48813236	_6BY4X4_
1	0.60066607	_4X4BY5_
1	0.60742636	_5BY4X4_
2	0.64883827	_5X5BY4_ _1BY4X4_
2	0.64896427	BAND_5 _5BY4_
2	0.65034880	_4BY6_ _5BY4X6_
2	0.65058808	_5BY6_ _6BY4X4_
2	0.65246771	_1BY4_ _5X6BY4_
2	0.65414353	_1BY4_ _4BY5X5_
2	0.65433351	_5X5BY4_ _4X4_
2	0.65512115	_5BY4_ _4X6BY5_
2	0.65545020	_5BY4_ _1BY4X4_
2	0.65639330	_4BY5_ _1BY4X4_
2	0.65686787	_4X4BY5_ _5BY4X4_
2	0.65755717	_1BY5_ _5BY4_
2	0.65915758	_1BY4_ _1BY5_
2	0.65964903	_5BY4_ _1BY4X5_
2	0.66061532	BAND_4 _4BY5_
2	0.66103889	_5X5BY4_ _4X5_
2	0.66223988	BAND_5 _1BY4_
2	0.66383671	_5X6BY4_ _4X6_
2	0.66433750	BAND_4 BAND_5
2	0.66674276	_6BY4X4_ _4X6BY5_
2	0.66704741	_5X5BY4_ _4X6_

APPENDIX F (continued)

RSQUARE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
4X4 5X5 4X5 4X6 5X6 4BY5 4BY6 4BY7 5BY6 5BY7
4X4BY5 4X4BY6 4X4BY7 5X5BY4 6X6BY5
4X5BY6 4X5BY7 4X6BY5 4X6BY7 5X6BY4
AND THE RECIPROCALS THEREOF AS INDEPENDENT VARIABLES

N= 50 REGRESSION MODELS FOR DEPENDENT VARIABLE ADJTEMPC

NUMBER IN MODEL	R-SQUARE	VARIABLES IN MODEL
2	0.66773777	_5BY4_ _4X4_
2	0.67135629	_1BY4_ _4BY5_
2	0.67422091	BAND_5 _5X5BY4_
2	0.67615663	_1BY4_ _5BY4_
2	0.67689067	_1BY4_ _5X5BY4_
2	0.67925564	BAND_4 _5X5BY4_
2	0.68176548	BAND_4 _5BY4_
2	0.68277743	BAND_6 _5X6BY4_
2	0.68786090	_6BY4_ _4X6BY5_

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5BY4_
USING TAPES 1 & 9

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE BAND_4 ENTERED R SQUARE = 0.85072024
C(P) = 3.51755076

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	88.51155103	88.51155103	62.69	0.0001
ERROR	11	15.53152589	1.41195690		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	4.16339038				
BAND_4	0.61731749	0.07796853	88.51155103	62.69	0.0001

STEP 2 VARIABLE _5BY4_ ENTERED R SQUARE = 0.88074363
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	91.63527752	45.81763876	36.93	0.0001
ERROR	10	12.40779941	1.24077994		
TOTAL	12	104.04307692			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	12.03743834				
BAND_4	0.46355308	0.12138190	18.09613647	14.58	0.0034
_5BY4_	-5.85229377	3.68839140	3.12372648	2.52	0.1437

NO OTHER VARIABLES MET THE 0.1500 SIGNIFICANCE LEVEL FOR ENTRY

APPENDIX F (continued)

STEPWISE PROCEDURE WITH THE FOLLOWING AS INDEPENDENT VARIABLES
BAND_4 _5BY4_
USING TAPES 1,3,5,7,9, & 12

STEPWISE REGRESSION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 1 VARIABLE _5BY4_ ENTERED R SQUARE = 0.48733055
C(P) = 29.71606126

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	1	1142.98507236	1142.9850724	45.63	0.0001
ERROR	48	1202.41492764	25.0503110		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	28.04898116				
_5BY4_	-10.51224045	1.55625790	1142.9850724	45.63	0.0001

STEP 2 VARIABLE BAND_4 ENTERED R SQUARE = 0.68176548
C(P) = 3.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	1599.01276513	799.50638256	50.34	0.0001
ERROR	47	746.38723487	15.88057947		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	14.18944824				
BAND_4	0.72500001	0.13529308	456.02769277	28.72	0.0001
_5BY4_	-8.26162990	1.30834722	633.21585867	39.87	0.0001

NO OTHER VARIABLES MET THE 0.1500 SIGNIFICANCE LEVEL FOR ENTRY

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 0 ALL VARIABLES ENTERED R SQUARE = 0.90830381
C(P) = 24.00000000

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	23	2130.33574873	92.62329342	11.20	0.0001
ERROR	26	215.06425127	8.27170197		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-161.1923570				
BAND_4	6.0812838	20.919614	0.6990015	0.08	0.7736
BAND_5	42.3689412	24.682222	24.3737082	2.95	0.0979
BAND_6	-65.3666586	53.807689	12.2072762	1.48	0.2354
_4BY5_	-103.6546897	165.461830	3.2462140	0.39	0.5365
_4BY6_	101.1837404	103.155971	7.9584336	0.96	0.3357
_4BY7_	-4.2344478	2.902058	17.6106862	2.13	0.1565
_5BY6_	-9.8155996	140.110470	0.0405964	0.00	0.9447
_5BY7_	4.4079714	2.844007	19.8706050	2.40	0.1332
_4X4BY5_	6.8800498	16.511344	1.4361943	0.17	0.6803
_4X4BY6_	0.0920356	10.114381	0.0006849	0.00	0.9928
_4X4BY7_	0.3667314	0.250320	17.7541578	2.15	0.1549
_5X5BY4_	1.9364224	8.265802	0.4539678	0.05	0.8166
_6X6BY5_	33.8570711	15.347880	40.2528723	4.87	0.0364
_4X5BY6_	-13.5021483	14.749953	6.9313747	0.84	0.3684
_4X5BY7_	-0.3946564	0.256032	19.6537562	2.38	0.1353
_4X6BY5_	15.5740186	17.938378	6.2349061	0.75	0.3932
_4X6BY7_	0.0361170	0.076336	1.8516432	0.22	0.6401
_5X6BY4_	-6.5108633	16.268738	1.3248427	0.16	0.6923
_4X4_	-0.8366004	0.407147	34.9243352	4.22	0.0501
_5X5_	-1.1508416	0.362711	83.2731215	10.07	0.0039
_4X5_	1.9631495	0.484322	135.9044091	16.43	0.0004
_4X6_	-1.6585477	0.571297	69.7151833	8.43	0.0074
_5X6_	1.1707862	0.520567	41.8404240	5.06	0.0332

STEP 1 VARIABLE _4X4BY6_ REMOVED R SQUARE = 0.90830351
C(P) = 22.00008280

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	22	2130.33506383	96.83341199	12.16	0.0001
ERROR	27	215.06493617	7.96536801		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-159.3799875				
BAND_4	5.9137062	9.737948	2.9375850	0.37	0.5487
BAND_5	42.2155123	17.688318	45.3708504	5.70	0.0243
BAND_6	-65.0217504	37.476999	23.9769276	3.01	0.0941
_4BY5_	-104.8331789	101.052521	8.5725308	1.08	0.3087
_4BY6_	102.0378403	41.990217	47.0361888	5.91	0.0220
_4BY7_	-4.2389544	2.806038	18.1775915	2.28	0.1425
_5BY6_	-10.9694535	58.481310	0.2802474	0.04	0.8526

APPENDIX F (continued)

_5BY7_	4.4130727	2.736089	20.7218025	2.60	0.1184
_4X4BY5_	7.0234457	4.836168	16.7997801	2.11	0.1579
_4X4BY7_	0.3671236	0.241972	18.3358677	2.30	0.1408
_5X5BY4_	2.0047182	3.398158	2.7722056	0.35	0.5601
_6X6BY5_	33.8070026	14.059842	46.0530391	5.78	0.0233
_4X5BY6_	-13.3746703	4.528760	69.4725605	8.72	0.0064
_4X5BY7_	-0.3951164	0.246299	20.4989104	2.57	0.1203
_4X6BY5_	15.4467114	11.017271	15.6577685	1.97	0.1723
_4X6BY7_	0.0361630	0.074745	1.8645591	0.23	0.6324
_5X6BY4_	-6.6392439	7.949214	5.5564159	0.70	0.4109
_4X4_	-0.8352697	0.372874	39.9699919	5.02	0.0335
_5X5_	-1.1527226	0.292470	123.7351202	15.53	0.0005
_4X5_	1.9634140	0.474412	136.4326326	17.13	0.0003
_4X6_	-1.6608870	0.500650	87.6632404	11.01	0.0026
_5X6_	1.1742654	0.346661	91.3963980	11.47	0.0022

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 2 VARIABLE _5BY6_ REMOVED R SQUARE = 0.90818403
C(P) = 20.03396306

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	21	2130.05481639	101.4311817	13.19	0.0001
ERROR	28	215.34518361	7.6908994		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-182.1884589				
BAND_4	7.1105543	7.2283558	7.4422628	0.97	0.3337
BAND_5	40.4853087	14.8304191	57.3145907	7.45	0.0108
BAND_6	-60.1347849	26.4710645	39.6904334	5.16	0.0310
_4BY5_	-88.1203079	46.8432878	27.2166335	3.54	0.0704
_4BY6_	96.1549082	27.4343373	94.4780889	12.28	0.0016
_4BY7_	-4.5787757	2.1055706	36.3694087	4.73	0.0383
_5BY7_	4.7203099	2.1535389	36.9498525	4.80	0.0369
_4X4BY5_	6.3468060	3.1651147	30.9249265	4.02	0.0547
_4X4BY7_	0.3960724	0.1831239	35.9779525	4.68	0.0392
_5X5BY4_	2.0406377	3.3337919	2.8815887	0.37	0.5454
_6X6BY5_	32.5394193	12.1149769	55.4819282	7.21	0.0120
_4X5BY6_	-13.5730184	4.3270409	75.6742296	9.84	0.0040
_4X5BY7_	-0.4206909	0.2015529	33.5062111	4.36	0.0461
_4X6BY5_	14.0230598	7.8470527	24.5611990	3.19	0.0848
_4X6BY7_	0.0345489	0.0729571	1.7246858	0.22	0.6395
_5X6BY4_	-7.2054169	7.2260384	7.6470659	0.99	0.3272
_4X4_	-0.7831343	0.2442358	79.0735154	10.28	0.0034
_5X5_	-1.1133499	0.2001207	238.0434769	30.95	0.0001
_4X5_	1.9066422	0.3589717	216.9677365	28.21	0.0001
_4X6_	-1.6900084	0.4676965	100.4214681	13.06	0.0012
_5X6_	1.1537501	0.3232375	97.9844659	12.74	0.0013

STEP 3 VARIABLE _4X6BY7_ REMOVED R SQUARE = 0.90744868
C(P) = 18.24246740

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	20	2128.33013064	106.4165065	14.22	0.0001
ERROR	29	217.06986936	7.4851679		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-175.2402948				
BAND_4	6.8908815	7.1163215	7.0184304	0.94	0.3409
BAND_5	40.3553770	14.6282135	56.9667942	7.61	0.0099
BAND_6	-59.5375060	26.0849537	38.9944396	5.21	0.0300
_4BY5_	-90.3818750	45.9717135	28.9322932	3.87	0.0589
_4BY6_	96.1006084	27.0646794	94.3730619	12.61	0.0013
_4BY7_	-4.3126749	2.0018787	34.7391719	4.64	0.0397
_5BY7_	4.3190374	1.9531621	36.6014990	4.89	0.0351
_4X4BY5_	6.4795518	3.1102240	32.4868895	4.34	0.0461
_4X4BY7_	0.3686962	0.1714195	34.6272818	4.63	0.0400

APPENDIX F (continued)

_5X5BY4_	2.0510652	3.2888285	2.9112402	0.39	0.5377
_6X6BY5_	32.4245872	11.9494464	55.1131065	7.36	0.0111
_4X5BY6_	-13.7239292	4.2571816	77.7882735	10.39	0.0031
_4X5BY7_	-0.3690606	0.1672357	36.4534865	4.87	0.0354
_4X6BY5_	13.7666343	7.7229333	23.7844181	3.18	0.0851
_5X6BY4_	-7.3620612	7.1212618	7.9999357	1.07	0.3098
_4X4_	-0.7651322	0.2380104	77.3539693	10.33	0.0032
_5X5_	-1.1199091	0.1969525	242.0159630	32.33	0.0001
_4X5_	1.9138991	0.3538150	219.0216443	29.26	0.0001
_4X6_	-1.7249737	0.4556126	107.2939238	14.33	0.0007
_5X6_	1.1724428	0.3164981	102.7170701	13.72	0.0009

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 4 VARIABLE _5X5BY4_ REMOVED R SQUARE = 0.90620742
C(P) = 16.59441918

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	19	2125.41889046	111.8641521	15.26	0.0001
ERROR	30	219.98110954	7.3327037		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-183.7019256				
BAND_4	7.1738414	7.0291425	7.6377067	1.04	0.3156
BAND_5	46.6956341	10.4103261	147.5326086	20.12	0.0001
BAND_6	-72.0191974	16.5578303	138.7247117	18.92	0.0001
_4BY5_	-95.0087746	44.9046647	32.8252959	4.48	0.0428
_4BY6_	103.2179212	24.2896335	132.4135492	18.06	0.0002
_4BY7_	-5.0444776	1.6053061	72.4070466	9.87	0.0038
_5BY7_	5.0273853	1.5726842	74.9316759	10.22	0.0033
_4X4BY5_	6.3815323	3.0744521	31.5921082	4.31	0.0466
_4X4BY7_	0.4313684	0.1374515	72.2206912	9.85	0.0038
_6X6BY5_	35.4396061	10.8159360	78.7251852	10.74	0.0027
_4X5BY6_	-14.9133349	3.7671196	114.9197969	15.67	0.0004
_4X5BY7_	-0.4297206	0.1346477	74.6858883	10.19	0.0033
_4X6BY5_	16.4783913	6.3171858	49.8937859	6.80	0.0140
_5X6BY4_	-3.4724265	3.4018388	7.6401663	1.04	0.3155
_4X4_	-0.7914589	0.2318390	85.4570129	11.65	0.0019
_5X5_	-1.1057352	0.1936341	239.1127430	32.61	0.0001
_4X5_	1.9292492	0.3493447	223.6312476	30.50	0.0001
_4X6_	-1.6586775	0.4385022	104.9166633	14.31	0.0007
_5X6_	1.1006248	0.2917865	104.3307361	14.23	0.0007

STEP 5 VARIABLE BAND_4 REMOVED R SQUARE = 0.90295096
C(P) = 15.51777289

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	18	2117.78118371	117.6545102	16.02	0.0001
ERROR	31	227.61881629	7.3425425		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-164.3214725				
BAND_5	43.2534922	9.8554477	141.4282295	19.26	0.0001
BAND_6	-61.1973819	12.7257132	169.8039885	23.13	0.0001
_4BY5_	-88.8387843	44.5256883	29.2301065	3.98	0.0549
_4BY6_	89.9330622	20.5209873	141.0226026	19.21	0.0001
_4BY7_	-4.4603531	1.5008164	64.8529619	8.83	0.0057
_5BY7_	4.5185326	1.4925581	67.2943844	9.16	0.0049
_4X4BY5_	7.7147906	2.7849698	56.3447925	7.67	0.0094
_4X4BY7_	0.3814413	0.1285375	64.6609641	8.81	0.0057
_6X6BY5_	27.3662102	7.3810995	100.9331118	13.75	0.0008
_4X5BY6_	-12.4817349	2.9199405	134.1678233	18.27	0.0002
_4X5BY7_	-0.3862584	0.1278216	67.0492065	9.13	0.0050

APPENDIX F (continued)

_4X6BY5_	18.7323676	5.9225255	73.4544192	10.00	0.0035
_5X6BY4_	-3.5136466	3.4038803	7.8237339	1.07	0.3099
_4X4_	-0.8239467	0.2297973	94.3962997	12.86	0.0011
_5X5_	-1.1354451	0.1915618	257.9651841	35.13	0.0001
_4X5_	1.9506441	0.3489490	229.4450026	31.25	0.0001
_4X6_	-1.5905900	0.4336882	98.7660702	13.45	0.0009
_5X6_	1.1143642	0.2916713	107.1799287	14.60	0.0006

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 6 VARIABLE _5X6BY4_ REMOVED R SQUARE = 0.89961518
C(P) = 14.46361619

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	17	2109.95744984	124.1151441	16.87	0.0001
ERROR	32	235.44255016	7.3575797		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-138.3521123				
BAND_5	36.4870789	7.3669766	180.4822872	24.53	0.0001
BAND_6	-58.5140563	12.4701323	161.9993457	22.02	0.0001
_4BY5_	-92.7696256	44.4079519	32.1088754	4.36	0.0447
_4BY6_	77.3721299	16.5407678	160.9877202	21.88	0.0001
_4BY7_	-3.5809482	1.2368459	61.6736798	8.38	0.0068
_5BY7_	3.6898696	1.2595727	63.1408616	8.58	0.0062
_4X4BY5_	8.2844859	2.7325310	67.6294595	9.19	0.0048
_4X4BY7_	0.3062093	0.1059863	61.4146639	8.35	0.0069
_6X6BY5_	23.1638712	6.1631769	103.9316906	14.13	0.0007
_4X5BY6_	-10.5771160	2.2654092	160.3895953	21.80	0.0001
_4X5BY7_	-0.3153960	0.1079330	62.8258898	8.54	0.0063
_4X6BY5_	19.7981760	5.8377973	84.6227839	11.50	0.0019
_4X4_	-0.9593241	0.1888912	189.7764867	25.79	0.0001
_5X5_	-1.1131731	0.1905376	251.1302516	34.13	0.0001
_4X5_	2.0412083	0.3380852	268.1990574	36.45	0.0001
_4X6_	-1.3850872	0.3856883	94.8890841	12.90	0.0011
_5X6_	0.9572005	0.2490334	108.6990303	14.77	0.0005

STEP 7 VARIABLE _4BY5_ REMOVED R SQUARE = 0.88592503
C(P) = 16.34538992

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	16	2077.84857439	129.8655359	16.02	0.0001
ERROR	33	267.55142561	8.1076190		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-186.6884061				
BAND_5	34.0076854	7.6323445	160.9650370	19.85	0.0001
BAND_6	-47.3449393	11.8261065	129.9441954	16.03	0.0003
_4BY6_	56.2311053	13.7343690	135.9030331	16.76	0.0003
_4BY7_	-3.9957583	1.2815179	78.8210760	9.72	0.0038
_5BY7_	4.1755425	1.2994980	83.7081798	10.32	0.0029
_4X4BY5_	4.9291711	2.3205962	36.5798544	4.51	0.0412
_4X4BY7_	0.3417551	0.1098143	78.5246007	9.69	0.0038
_6X6BY5_	17.9755668	5.9211422	74.7218364	9.22	0.0047
_4X5BY6_	-8.2308209	2.0652332	128.7779231	15.88	0.0004
_4X5BY7_	-0.3570188	0.1113537	83.3424109	10.28	0.0030
_4X6BY5_	12.9665676	5.0763603	52.8979089	6.52	0.0154
_4X4_	-0.7739701	0.1750487	158.4979735	19.55	0.0001
_5X5_	-0.9575182	0.1840862	219.3537393	27.06	0.0001

APPENDIX F (continued)

_4X5_	1.5700810	0.2644005	285.8991818	35.26	0.0001
_4X6_	-0.8620126	0.3079495	63.5274710	7.84	0.0085
_5X6_	0.7133313	0.2309173	77.3682758	9.54	0.0041

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 8 VARIABLE _4X4BY5_ REMOVED R SQUARE = 0.87032861
C(P) = 18.76767865

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	15	2041.26872003	136.0845813	15.21	0.0001
ERROR	34	304.13127997	8.9450376		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-164.3860057				
BAND_5	28.5810360	7.5543561	128.0392730	14.31	0.0006
BAND_6	-38.7818669	11.6778215	98.6542793	11.03	0.0022
_4BY6_	58.8585553	14.3676107	150.1178249	16.78	0.0002
_4BY7_	-4.2298889	1.3410861	88.9870399	9.95	0.0034
_5BY7_	4.2565595	1.3643723	87.0630337	9.73	0.0037
_4X4BY7_	0.3619132	0.1149147	88.7238091	9.92	0.0034
_6X6BY5_	9.3730115	4.5370328	38.1765466	4.27	0.0465
_4X5BY6_	-7.4968125	2.1386872	109.9109385	12.29	0.0013
_4X5BY7_	-0.3640692	0.1169112	86.7436757	9.70	0.0037
_4X6BY5_	20.2448812	3.9341034	236.8760250	26.48	0.0001
_4X4_	-0.4388720	0.0796746	271.4048623	30.34	0.0001
_5X5_	-0.8911671	0.1905554	195.6401545	21.87	0.0001
_4X5_	1.3140431	0.2471794	252.7998003	28.26	0.0001
_4X6_	-1.1830195	0.2818329	157.6095581	17.62	0.0002
_5X6_	0.9054307	0.2231738	147.2333456	16.46	0.0003

STEP 9 VARIABLE _6X6BY5_ REMOVED R SQUARE = 0.85405141
C(P) = 21.38299805

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	14	2003.09217339	143.0780124	14.63	0.0001
ERROR	35	342.30782661	9.7802236		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-108.4454916				
BAND_5	14.3777326	3.27348278	188.6728753	19.29	0.0001
BAND_6	-16.2719789	4.39284983	134.1951490	13.72	0.0007
_4BY6_	35.5158741	9.27967576	143.2610725	14.65	0.0005
_4BY7_	-4.6100631	1.38903194	107.7303451	11.02	0.0021
_5BY7_	4.6333478	1.41384169	105.0357232	10.74	0.0024
_4X4BY7_	0.3946941	0.11900863	107.5754555	11.00	0.0021
_4X5BY6_	-3.8581798	1.26856716	90.4662923	9.25	0.0044
_4X5BY7_	-0.3965881	0.12113424	104.8320896	10.72	0.0024
_4X6BY5_	14.6624980	2.98978033	235.2264521	24.05	0.0001
_4X4_	-0.4083801	0.08186922	243.3529673	24.88	0.0001
_5X5_	-0.5507647	0.10008333	296.1812036	30.28	0.0001
_4X5_	0.9044696	0.15436091	335.7856174	34.33	0.0001
_4X6_	-0.6877238	0.15491781	192.7410688	19.71	0.0001
_5X6_	0.5118161	0.12151413	173.5094328	17.74	0.0002

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 10 VARIABLE _4X5BY6_ REMOVED R SQUARE = 0.81547961
C(P) = 30.31983942

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	13	1912.62588107	147.1250678	12.24	0.0001
ERROR	36	432.77411893	12.0215033		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-75.60935979				
BAND_5	6.60779539	2.26911766	101.9431200	8.48	0.0061
BAND_6	-9.44965264	4.18740791	61.2209311	5.09	0.0302
_4BY6_	7.86647371	2.06350250	174.7064638	14.53	0.0005
_4BY7_	-4.31435389	1.53621027	94.8176053	7.89	0.0080
_5BY7_	4.84231075	1.56564166	114.9951057	9.57	0.0038
_4X4BY7_	0.36979582	0.13162957	94.8802503	7.89	0.0080
_4X5BY7_	-0.41501061	0.13413072	115.0855184	9.57	0.0038
_4X6BY5_	12.25886430	3.19679660	176.7784193	14.71	0.0005
_4X4_	-0.39586920	0.09065187	229.2496588	19.07	0.0001
_5X5_	-0.32499547	0.07442325	229.2430441	19.07	0.0001
_4X5_	0.60846240	0.13283202	252.2439356	20.98	0.0001
_4X6_	-0.41643945	0.14042704	105.7209385	8.79	0.0053
_5X6_	0.29286402	0.10853112	87.5351048	7.28	0.0105

STEP 11 VARIABLE BAND_6 REMOVED R SQUARE = 0.78937706
C(P) = 35.72108904

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	12	1851.40494998	154.2837458	11.56	0.0001
ERROR	37	493.99505002	13.3512176		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-45.50919713				
BAND_5	1.68300779	0.65509416	88.1222676	6.60	0.0144
_4BY6_	7.27486498	2.15701209	151.8677609	11.37	0.0018
_4BY7_	-3.21921740	1.53604253	58.6428418	4.39	0.0430
_5BY7_	3.61784499	1.54770579	72.9531363	5.46	0.0249
_4X4BY7_	0.27586656	0.13160075	58.6681377	4.39	0.0430
_4X5BY7_	-0.30999016	0.13257363	72.9965663	5.47	0.0249
_4X6BY5_	5.78638007	1.48787015	201.9318044	15.12	0.0004
_4X4_	-0.26139248	0.07199261	176.0075162	13.18	0.0009
_5X5_	-0.20878663	0.05662491	181.5144119	13.60	0.0007
_4X5_	0.51753538	0.13339027	200.9799308	15.05	0.0004
_4X6_	-0.34971047	0.14467174	78.0136701	5.84	0.0207
_5X6_	0.09538774	0.06765616	26.5394177	1.99	0.1669

STEP 12 VARIABLE _5X6_ REMOVED R SQUARE = 0.77806154
C(P) = 36.92954818

APPENDIX F (continued)

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	11	1824.86553225	165.8968666	12.11	0.0001
ERROR	38	520.53446775	13.6982755		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-39.80506257				
BAND_5	1.51790785	0.65286651	74.0470773	5.41	0.0255
_4BY6_	7.46430421	2.18062435	160.5028852	11.72	0.0015
_4BY7_	-3.06602494	1.55198124	53.4618923	3.90	0.0555
_5BY7_	3.27817593	1.54858308	61.3848767	4.48	0.0409
_4X4BY7_	0.26275415	0.13296693	53.4906395	3.90	0.0554
_4X5BY7_	-0.28090626	0.13265008	61.4290400	4.48	0.0408
_4X6BY5_	4.84339167	1.34622805	177.3077852	12.94	0.0009
_4X4_	-0.24500297	0.07196539	158.7673454	11.59	0.0016
_5X5_	-0.14651436	0.03589138	228.2685217	16.66	0.0002

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

_4X5_	0.40257406	0.10692993	194.1596010	14.17	0.0006
_4X6_	-0.16465898	0.06163575	97.7623006	7.14	0.0111

STEP 13 VARIABLE _4BY7_ REMOVED R SQUARE = 0.75526718
C(P) = 41.39277576

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	10	1771.40363991	177.1403640	12.04	0.0001
ERROR	39	573.99636009	14.7178554		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-25.92459735				
BAND_5	1.25568456	0.66259355	52.8580616	3.59	0.0655
_4BY6_	5.38202009	1.97873535	108.8829141	7.40	0.0097
_5BY7_	0.25908196	0.25942013	14.6795087	1.00	0.3241
_4X4BY7_	0.00007534	0.00082647	0.1222956	0.01	0.9278
_4X5BY7_	-0.02227643	0.02216627	14.8644975	1.01	0.3211
_4X6BY5_	3.26425758	1.12282128	124.3918997	8.45	0.0060
_4X4_	-0.12346054	0.03869972	149.7908026	10.18	0.0028
_5X5_	-0.09714997	0.02670616	194.7632129	13.23	0.0008
_4X5_	0.22752517	0.06204354	197.9293642	13.45	0.0007
_4X6_	-0.10411438	0.05543093	51.9232230	3.53	0.0678

STEP 14 VARIABLE _4X4BY7_ REMOVED R SQUARE = 0.75521504
C(P) = 39.40756058

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	9	1771.28134427	196.8090383	13.71	0.0001
ERROR	40	574.11865573	14.3529664		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-26.00267033				
BAND_5	1.25693724	0.65418766	52.9863697	3.69	0.0618
_4BY6_	5.39624092	1.94797012	110.1437223	7.67	0.0085
_5BY7_	0.26114743	0.25520507	15.0291557	1.05	0.3123
_4X5BY7_	-0.02235703	0.02187235	14.9961151	1.04	0.3128
_4X6BY5_	3.27009238	1.10701208	125.2440187	8.73	0.0052
_4X4_	-0.12349519	0.03821514	149.8893371	10.44	0.0025
_5X5_	-0.09712128	0.02637120	194.6752333	13.56	0.0007
_4X5_	0.22757353	0.06126738	198.0280058	13.80	0.0006
_4X6_	-0.10433381	0.05468785	52.2408457	3.64	0.0636

STEP 15 VARIABLE _4X5BY7_ REMOVED R SQUARE = 0.74882119
C(P) = 39.22050248

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	8	1756.28522919	219.5356536	15.28	0.0001

APPENDIX F (continued)

ERROR	41	589.11477081	14.3686529		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-23.44354812				
BAND_5	1.15817714	0.64736679	45.9901891	3.20	0.0810
_4BY6_	5.05954384	1.92096673	99.6779493	6.94	0.0119
_5BY7_	0.00028746	0.00034673	9.8760077	0.69	0.4119
_4X6BY5_	3.11354084	1.09696498	115.7549748	8.06	0.0070
_4X4_	-0.11539593	0.03740508	136.7526816	9.52	0.0036
_5X5_	-0.08950670	0.02531095	179.6842832	12.51	0.0010
_4X5_	0.20559459	0.05740150	184.3286758	12.83	0.0009
_4X6_	-0.09244954	0.05346684	42.9592407	2.99	0.0913

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

STEP 16 VARIABLE _5BY7_ REMOVED R SQUARE = 0.74461040
C(P) = 38.41445358

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	7	1746.40922151	249.4870316	17.49	0.0001
ERROR	42	598.99077849	14.2616852		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-22.48678758				
BAND_5	1.09360866	0.64026824	41.6074229	2.92	0.0950
_4BY6_	5.20228214	1.90610078	106.2348317	7.45	0.0092
_4X6BY5_	3.01668047	1.08665805	109.9116334	7.71	0.0082
_4X4_	-0.11263574	0.03711768	131.3292986	9.21	0.0041
_5X5_	-0.08698610	0.02503398	172.1910763	12.07	0.0012
_4X5_	0.20000517	0.05679162	176.8824630	12.40	0.0010
_4X6_	-0.08736845	0.05291634	38.8777008	2.73	0.1062

STEP 17 VARIABLE _4X6_ REMOVED R SQUARE = 0.72803425
C(P) = 41.11453839

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	6	1707.53152072	284.5885868	19.18	0.0001
ERROR	43	637.86847928	14.8341507		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	-5.69825024				
BAND_5	0.68147886	0.60132384	19.0524412	1.28	0.2634
_4BY6_	3.03032831	1.40680353	68.8295853	4.64	0.0369
_4X6BY5_	1.36657300	0.43507874	146.3499686	9.87	0.0030
_4X4_	-0.07567042	0.03019351	93.1725002	6.28	0.0161
_5X5_	-0.08152128	0.02530733	153.9259801	10.38	0.0024
_4X5_	0.14028296	0.04465230	146.4147823	9.87	0.0030

STEP 18 VARIABLE BAND_5 REMOVED R SQUARE = 0.71991092
C(P) = 41.41786620

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	5	1688.47907957	337.6958159	22.62	0.0001
ERROR	44	656.92092043	14.9300209		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	3.94138535				
_4BY6_	1.89860621	0.99409270	54.4598500	3.65	0.0627
_4X6BY5_	1.05576005	0.33884328	144.9416230	9.71	0.0032
_4X4_	-0.05839424	0.02614676	74.4671111	4.99	0.0307

APPENDIX F (continued)

_5X5_	-0.06150626	0.01818456	170.8022496	11.44	0.0015
_4X5_	0.12501951	0.04271006	127.9250585	8.57	0.0054

STEP 19 VARIABLE _4BY6_ REMOVED R SQUARE = 0.69669107
C(P) = 46.00174097

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	4	1634.01922959	408.5048074	25.84	0.0001
ERROR	45	711.38077041	15.8084616		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	10.03246272				
_4X6BY5_	0.64376172	0.26888233	90.6181929	5.73	0.0209
_4X4_	-0.05521480	0.02685038	66.8497174	4.23	0.0456

APPENDIX F (continued)

STEPWISE PROCEDURE USING THE FOLLOWING
BAND_4 BAND_5 BAND_6
_4BY5_ _4BY6_ _4BY7_ _5BY6_ _5BY7_
_4X4BY5_ _4X4BY6_ _4X4BY7_ _5X5BY4_ _6X6BY5_
_4X5BY6_ _4X5BY7_ _4X6BY5_ _4X6BY7_ _5X6BY4_
_4X4_ _5X5_ _4X5_ _4X6_ _5X6_
AS INDEPENDENT VARIABLES

BACKWARD ELIMINATION PROCEDURE FOR DEPENDENT VARIABLE ADJTEMPC

_5X5_	-0.07119498	0.01796902	248.1645111	15.70	0.0003
_4X5_	0.13850213	0.04334409	161.4145694	10.21	0.0026

STEP 20 VARIABLE _4X4_ REMOVED R SQUARE = 0.66818859
C(P) = 52.08347767

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	3	1567.16951219	522.3898374	30.88	0.0001
ERROR	46	778.23048781	16.9180541		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	9.56088196				
_4X6BY5_	0.43913837	0.25841013	48.8578231	2.89	0.0960
_5X5_	-0.03616238	0.00591211	632.9652716	37.41	0.0001
_4X5_	0.05264616	0.01204538	323.1786341	19.10	0.0001

STEP 21 VARIABLE _4X6BY5_ REMOVED R SQUARE = 0.64735725
C(P) = 55.99010043

	DF	SUM OF SQUARES	MEAN SQUARE	F	PROB>F
REGRESSION	2	1518.31168911	759.1558446	43.14	0.0001
ERROR	47	827.08831089	17.5976236		
TOTAL	49	2345.40000000			

	B VALUE	STD ERROR	TYPE II SS	F	PROB>F
INTERCEPT	11.18136282				
_5X5_	-0.04236844	0.00474179	1404.929892	79.84	0.0001
_4X5_	0.06877185	0.00756696	1453.560276	82.60	0.0001

ALL VARIABLES IN THE MODEL ARE SIGNIFICANT AT THE 0.0001 LEVEL.

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