AAEC/E505

AAEC/E505

AUSTRALIAN ATOMIC ENERGY COMMISSION

RESEARCH ESTABLISHMENT

LUCAS HEIGHTS

METEOROLOGICAL AND RADIATION MEASUREMENTS AT NABARLEK, NORTHERN TERRITORY JUNE TO JULY 1979

by

G.H. CLARK
D.R. DAVY
E.O.K. BENDUN
B. O'BRIEN

September 1981

ISBN 0 642 59719 7

AUSTRALIAN ATOMIC ENERGY COMMISSION
RESEARCH ESTABLISHMENT
LUCAS HEIGHTS

METEOROLOGICAL AND RADIATION MEASUREMENTS AT NABARLEK, NORTHERN TERRITORY JUNE TO JULY 1979

by

G.H. CLARK
D.R. DAVY
E.O.K. BENDUN
B. O'BRIEN

ABSTRACT

A three-week meteorological and radiation measurement program was conducted near the then developing uranium mine at Nabarlek in the Northern Territory. The two-filter tube radiation measuring technique was checked and compared with the continuous radon monitor and instant working level meter techniques. In general, the Nabarlek meteorology was characterised by weak stable layers and good ventilation conditions with winds rarely less than 1 m s^{-1}. Within the waste rock pit, even at a depth of only 18 m, there was modification of the airflow patterns, with lower wind speeds (up to 42 per cent decrease on the surrounding 'free-air' speeds), variable wind directions and changed atmospheric stability. A comparison of wind measurements made near the open pit with those taken at the permanent meteorological station some 800 m away gave evidence of horizontal changes in the wind field over the

(Continued)

site. Strong daytime winds gusting higher than 10 m s^{-1} caused a visible suspension of dust from the site. Dust deposition samples indicated that thorium-230 in air on site was a factor of twelve below the maximum permissible concentration for employees in Australia, but uranium was lower by several orders of magnitude. The concentrations of radioactivity in the aquatic food pathway, external radiation levels and radon daughter concentrations from deposited dust were likewise at least two orders of magnitude below the maximum concentrations permissible in Australia.

National Library of Australia card number and ISBN 0 642 59719 7

The following descriptors have been selected from the INIS Thesaurus to describe the subject content of this report for information retrieval purposes. For further details please refer to IAEA-INIS-12 (INIS: Manual for Indexing) and IAEA-INIS-13 (INIS: Thesaurus) published in Vienna by the International Atomic Energy Agency.

NABARLEK DEPOSIT; URANIUM; URANIUM MINES; MINING; NORTHERN TERRITORY; METEOROLOGY; WIND; RADIATION MONITORING; RADON; URANIUM ORES; DUSTS; INHALATION

CONTENTS

(Continued)

CONTENTS (Continued)

(Continued)

1. INTRODUCTION

At the invitation of Queensland Mines Ltd (QML) the AAEC made radiation and meteorological measurements near the open pit of the QML uranium mine at Nabarlek in the Northern Territory. On 14 June 1979, we constructed and instrumented a small meteorological tower (AAEC) near the QML continuous radon monitor to correlate wind speeds, temperatures and atmospheric stability with the radon and other AAEC radiation measurements. These meteorological data were supplemented with balloon data to 500 m altitude. Radon air concentrations and working levels were measured using the Lucas cups and Rolle methods respectively. These measurements were taken near the AAEC tower in the developing ore pit and deeper waste rock pit. Radon profiles were measured above ground level on the tower and using balloon-borne sampling lines to altitudes of 50 m. Wind statistics between the pit (AAEC) and QML meteorological stations are discussed in relation to radiation measurements and natural ventilation of the pit. Dust samples resulting from suspension and deposition processes were collected at representative sites. One major purpose of this work was to measure the effect of artificial methods (fans and space heaters) on atmospheric mixing within the pit. The work was prematurely terminated on 7 July 1979 by industrial strike action at Nabarlek.

2. ATMOSPHERIC DISPERSION CONSIDERATIONS IN URANIUM MINING

Atmospheric pollutants released from uranium mining and milling operations can be broadly divided into particulates and gases. A cloud of uranium dust will be liberated during the blasting of ore in the open pit, and more continuous releases will take place from the crushing plant and rod mill. Additional releases of uranium dust could be produced by wind action on the ore and waste dumps and by vehicular movements through the area. Yellowcake dust also will be continuously released from the treatment plant. Radon gas has sources in the mining operations and pit walls, dumps and stockpiles, crushing and milling plants, and tailings dam. Sulphur dioxide releases may also have to be considered in subsequent sulphuric acid production processes associated with the mill.

The following discussion will concentrate only on radon gas and uranium dust releases associated with the early phases of mining which were under way during the field trip in June and July 1979.

2.1 Radon Gas

The concentration (C_0) of radon gas at the air-soil interface depends on both soil and meteorological parameters. It can be expressed in terms of

$$C_0 = \frac{a}{\lambda_\alpha}\left(\frac{D_s}{K}\right)^{1/2} \tag{1}$$

where a = supply of radon per unit time, λ_α = fraction of radon decaying/unit time, K = atmospheric eddy diffusivity, D_s = molecular diffusion coefficient in soil.

The diurnal variations in D_s and K will determine the trend in radon emanation to the atmosphere.

Some important influences on radon emanation are:

(a) soil permeability, e.g. radon flux from lava fields which is only a small fraction of that from deep volcanic soils;

(b) increased daytime atmospheric turbulence. (This increases exhalation and can be balanced by downward convective motions in the soil [Reiter 1978] due to temperature variations with depth. In dark loamy soils, the soil effect (D_s) dominates but with white sandy soils atmospheric turbulence is more important, thus giving a secondary daytime maximum);

(c) a layer of humus and decaying material on the ground. (This can decrease radon emanation by up to 97 per cent compared to bare soil, which is the usual condition near mines);

(d) increased soil moisture. (This decreases the radon emanation rate. With moist soil (air: void fraction 0.17) versus average conditions (0.40), the emanation was decreased three-fold);

(e) decreases in atmospheric pressure. (These cause the soil to 'breathe' and increase emanation [Clements and Wilkening 1974]).

Once the radon enters the atmosphere it is subject to dispersion processes which are a function of the prevailing atmospheric turbulence. At the same time, radon-222 radioactively decays ($\tau_{1/2}$ = 3.823 days) into short-lived daughter products such as ^{214}Pb (26.8 min) and ^{214}Bi (19.7 min) before these decay to the longer-lived ^{210}Pb (21 years). The isotopes ^{214}Pb and ^{214}Bi are readily attached to aerosol particles with a size distribution such that 80 per cent lie in the range 0.01 to 0.1 μm. Because dust particles in this size range still have a significant deposition velocity (caused by thermo- and diffuso-phoresis), the radon daughters may deposit out of the air onto the ground, vegetation, etc. This may lead to disequilibrium with the radon gas air concentration. The aerosols can also be inhaled, up to 60 per cent of the particles being deposited in different regions of the respiratory system.

2.2 Uranium Dust

The different sources of uranium dust around a mine will probably have variable particle size distributions and subsequently a range of deposition velocities. For instance, wind suspension of dust from the ore dumps and stockpiles will be influenced not only by meteorological factors, but also by surface features such as weathering, soil particle size distribution and chemical nature of the soil. For releases of dust from elevated vents in the mills, filters will presumably remove a certain fraction of the larger particles and lead to a new size distribution of those dusts emitted to the atmosphere. In the open pit, uranium dust released from vehicular activity and ore blasting is the most difficult to define. Each blast will probably be unique in terms of the particle size spectra produced because of the diversity of ore and rock types involved.

Clark [1977] has summarised the atmospheric influences on atmospheric dispersion, deposition (both dry and wet) and (re)suspension of uranium dust. These influences require very sophisticated measurement techniques which were beyond the scope and capabilities of the reported field trip. Instead a modest program to measure meteorological, radiation and dust deposition was undertaken to study the early phases of a developing uranium mine.

3. METEOROLOGICAL INSTRUMENTATION TEMPORARILY INSTALLED AT NABARLEK

A portable tower (9.8 m) was erected on the west side of the ore body (location 9605N, 10081E) near the QML Eberline continuous radon monitor (Figure 1). Ambient temperature (at 9.8 m) and differential air temperature (1.7 m (at 4.35 m until 1250 CST, 16 June 1979) and 9.8 m) were measured using radiation shielded (unaspirated) YSI thermistors. Soil temperature difference between 1 and 62 cm below the surface was monitored with similar YSI thermistors sealed in a protective plastic tubing. The outputs from these thermistors were fed through balanced bridge circuits to a continuously recording Leeds and Northrup Speedomax W recorder.

Wind speed measurements were taken at random times using sensitive Cassella cup anemometers at 1.7 and 9.8 m altitudes; there was no continuous recording of these data. The anemometers were used for direct comparison with other AAEC radon measurements taken nearby. In addition, continuous wind speed and direction records were available from a Woefle anemometer at 10 m altitude in the QML meterological station, about 900 m north-west of the AAEC tower site. To investigate ventilation characteristics of the open pit as it was mined progressively deeper, another portable Cassella anemometer (at 1.7 m) was quickly deployed wherever tests were required. Smoke flare photography was used for qualitative investigation of atmospheric dispersion at these locations.

To extend the meteorological measurements to higher altitudes, a tethered radiosonde-type system was flown from a balloon to altitudes up to 500 m. Profiles of wet and dry bulb temperature, wind speed and direction were monitored during flights lasting about 20 minutes. Initially profiles were measured in the 'free air' on flat terrain outside the open pit, but just before the experiments were terminated, several flights were made from within the waste rock pit.

3.1 Instrument Sensitivity and Calibration

The Cassella cup anemometers were provided with individual calibration charts by the manufacturer. These indicated a very low starting speed of 0.16 m s^{-1} probably because of the chopper/photo cell technique which they incorporated and so minimised the starting torque problems associated with other instruments, such as those which use a d.c. generator. Because the anemometers had seldom been used and were thus in near-factory condition, it was not considered necessary to have them recalibrated in a national standards facility after these experiments. The Woefle anemometer, manufactured by the Lambrecht company, has a threshold speed of approximately 0.6 m s^{-1} for the cups and 0.4 m s^{-1} for the vane. It was not possible to calibrate the Woefle anemometer in the field for accurate wind speed measurements. Nevertheless, an annual calibration in a national standards facility wind tunnel is recommended.

The temperature sensors were calibrated in constant temperature water baths at Lucas Heights after the field experiments. The same battery supply which was used at Nabarlek together with a new set of batteries to the bridge circuit were individually calibrated with output to the field recorder. Data for both the old and new batteries were combined to give the following sensor accuracies:

Ambient air temperature	0.11 to 0.20°C
Air temperature difference	0.12°C
Soil temperature difference	0.09 to 0.13°C

For this study these accuracies were considered acceptable for the purposes of correlation with the continuous and special radon measurements.

4. BALLOON PROFILES IN THE 'FREE AIR' OVER NABARLEK

During the early phases of mining, when there was no mechanical activity on the ore body, the launch site for the free air balloon profiling experiments was located just above the western edge of the waste rock pit, near grid point 9583N 10132E. All the June profiles were taken from this site. Subsequently the launch site was moved west across the road and south of the ore-mixing stockpile.

The following sections will contain brief discussions and interpretation of data from each flight preceding some general conclusions.

Date: 16 June 1979

Time: 2017 to 2036 CST

This flight to 300 metres was typified by a nearly neutral atmosphere through the entire layer. Wind speeds increased from 3 m s^{-1} near the surface to 8 m s^{-1} at 90 m, above which they remained constant. The wind direction fluctuated between east and south-east through the 300 m layer.

Date: 20 June 1979

Time: 0507 to 0525 CST

The lower atmosphere to 250 m was only slightly stable ($\frac{\partial \theta}{\partial z}$* = 0.86 K per 100 m) with a south-east wind having speeds uniformly increasing from 2 m s^{-1} at ground level, to 11 m s^{-1} above. At the AAEC tower, a positive gradient of 0.32°C was registered between 1.7 and 9.8 m.

Time: 0602 to 0620 CST

A surface temperature inversion up to 50 m, with a slightly stable layer aloft, was measured on the ascent profile. The transient nature of stable layers at Nabarlek was demonstrated by the virtual elimination of the surface stable layer during the balloon's descent to ground level. Accompanying (and possibly causing) the decreasing atmospheric stability was an increase in ground level wind speeds from 1 to 4 m s^{-1}. Winds aloft were from the east-south-east at speeds of 11 m s^{-1} near 270 m.

Date: 21 June 1979

Time: 0510 to 0525 CST

The lower atmosphere had a nearly neutral stability, relatively strong wind speeds (3 m s^{-1}) at ground level, and a turbulent south-east wind increasing to 9 m s^{-1} at 235 m. Also a lapse of temperature was registered on the AAEC tower (-0.12°C/8.1 m).

Time: 0556 to 0619 CST

Near-surface winds increased to 6 m s^{-1} and became more turbulent from the south-south-east. These strongly dispersive conditions kept the radon concentrations at background level.

---

* $\frac{\partial \theta}{\partial z}$ = potential temperature gradients; $\approx$ 0 - neutral atmosphere; < 0 - unstable atmosphere; > 0 - stable atmosphere.

Date: 23 June 1979

Time: 0445 to 0510 CST

Winds from the south-east were light (1-1.5 m s^{-1}) with low turbulence (trace 8). A weak inversion (<0.12°C/8.1 m) was registered on the AAEC tower and extended to 110 m altitude, above which the atmosphere had a neutral stability. Light winds were measured up to 70 m, increased to 5 m s^{-1} at 120 m, remained constant to 240 m and increased to 7 m s^{-1} at the top of the profile (360 m).

Time: 0603 to 0621 CST

Further evidence of the transient nature of stable layers at Nabarlek can be seen in Figure 2. In this case, on ascent a slightly stable layer existed to 135 m which was topped by a 50 m deep, very stable layer in which the gradient of potential temperature was 8.4 K per 100 m. On the descent profile this stable layer had been destroyed completely, only a nearly neutral to slightly stable layer remaining to 295 m. Wind speeds increased with altitude from 2 m s^{-1} at the surface, to 5 m s^{-1} at 100 m, remained constant to 240 m and then increased to 9 m s^{-1} at 295 m. Even allowing for the increase in recorded speed caused by retrieval of the balloon during descent, we observed a general increase in wind speed through the layer which coincided with destruction of the elevated inversion. At 100 m, speeds were 8 m s^{-1} and at the surface had doubled to 4 m s^{-1}. During this period the continuous radon levels had risen to 22 pCi L^{-1} and a radon concentration profile registered at the AAEC tower (see Table 28) indicated higher values at the top, possibly evidence of an upward mixing of the radon gas in the layer below 135 m. The AAEC tower radon concentration profiles are discussed in more detail in later sections.

Date: 24 June 1979

Time: 0437 to 0459 CST

A slight inversion was measured to 60 m ($\frac{\partial \theta}{\partial z}$ = 1.8 K per 100 m; AAEC tower 0.19°C per 8.1 m) with a nearly neutral stability aloft. Winds increased from 1 m s^{-1} to 6 m s^{-1} at the top of the surface inversion, decreased to 4.5 m s^{-1} at 130 m and then uniformly increased to 7 m s^{-1} at the top of the profile, 390 m. The wind direction was from the south-east with no vertical shear.

Time: 0602 to 0628 CST

A very slight, stable layer (average $\frac{\partial\theta}{\partial z}$ = 0.40 K per 100 m) was measured through the profile to 418 m. The uniform wind direction from the east-south-east above the balloon launchsite contrasted with that from the south simultaneously measured at the QML meteorological station. The wind speed increased from 1.5 m s^{-1} (surface) to 5 m s^{-1} through the stronger surface inversion (3.2 K per 100 m) to 40 m. The speeds remained uniform to 300 m, increasing to 8 m s^{-1} at the top of the profile.

Date: 2 July 1979

Time: 0607 to 9999* CST

Equipment malfunction caused the premature conclusion of this flight before the descent was completed. A surface inversion with a strong potential temperature gradient of 4.18 K per 100 m extended up to 55 m, the atmosphere being only slightly stable (0.23 K per 100 m) up to 265 m. Winds near the surface were less than 1 m s^{-1} and increased uniformly to 7 m s^{-1} at the top, with low turbulence and no directional shear from the east.

Time: 1940 to 2002 CST

The atmosphere had a neutral stability to 445 m. Winds were less than 6 m s^{-1} at the top of the flight and decreased uniformly to 1 m s^{-1} at ground level. As seems typical at Nabarlek, the wind direction showed only a very slight vertical shear from north-north-east near the ground to north-east above.

Time: 2051 to 2105 CST

Again a slightly stable atmosphere, winds from the east-north-east backing to north-east at 290 m with speeds increasing from less than 1 m s^{-1} at ground level to 7 m s^{-1} aloft.

* No descent profile because of battery failure

4.1 Summary

This brief series of balloon flights demonstrated that, for the duration of the experimental program, surface temperature inversions were weak and extended to less than 150 m above ground level. Frequently the inversions were transient. Winds near the surface were rarely less than 1 m s^{-1}, increasing to 6 to 8 m s^{-1} at altitudes near 300 m. There was no significant vertical shear of wind direction which means near-surface anemometers would represent upper level wind directions. This is important when considering the direction of transport of pollutants which may reach higher altitudes.

5. OPEN PIT VENTILATION CHARACTERISTICS: BALLOON FLIGHTS, ANEMOMETER COMPARISONS, SMOKE FLARE RELEASES AND GENERAL OBSERVATIONS

5.1 Balloon Flights

To investigate the atmospheric stability and natural ventilation characteristics of the open pit before the atmospheric boundary layer was modified by space heaters and fans, the balloon system was flown from the waste rock pit when it was 18 m deep. These balloon profiles are discussed below.

Date: 4 July 1979

Time: 0619 to 0640 CST

The atmospheric stability within the pit was less than in the 'free air' immediately above (Figure 3). The surface inversion ($\frac{\partial\theta}{\partial z}$ = 4.4 K per 100 m) extended to 78 m on the ascent profile, and 65 m on the descent. The atmosphere above was only slightly stable, with a potential temperature gradient of 0.8 K per 100 m. There was a small elevated inversion on the ascent profile but this had disappeared by the time of the descent. Trees on the eastern boundary of the pit probably caused shadows to approximately 30 m above the pit floor as shown in the wind speed and highly variable wind direction profiles in this layer. Wind speeds increased from 0.5 to 4 m s^{-1} at the top of the surface inversion above which the gradient averaged 1.15 m s^{-1} per 100 m. The wind direction aloft was from the east, but in the pit was from the south which compared with a very light (at threshold anemometer speed) south-west direction at the QML meteorological station.

Time: 0651 to 0710 CST

The shapes of the ascent and descent temperature profiles were very similar to those recorded for the first flight, with descent temperatures warmer than those on ascent where an elevated inversion was observed above 250 m. Otherwise, comments relating to the influences of pit and vegetation are the same as those above.

Date: 5 July 1979

Time: 0604 to 0618 CST

Wind speeds aloft were much higher than on the previous day. This was reflected in the less stable atmosphere and diminished influence of the pit on the temperature and wind profiles (Figure 4). The shapes of the ascent and descent profiles, which were the same for this flight, have been averaged for plotting purposes. Winds were from the east-south-east above the pit, with speeds rapidly increasing to above 10 m s^{-1} at 220 m.

Time: 0653 to 0712 CST

After sunrise the lower atmosphere began to warm and become less stable. Winds were becoming even stronger, 10 m s^{-1} being measured at 150 m above the pit floor. Except for the lower 15 m where winds were light and variable, the wind direction aloft remained from the east-south-east.

5.2 Anemometer Comparisons

The existing natural wind ventilation in the developing mine - waste rock pit, was studied via a portable, sensitive Cassella anemometer which was temporarily located in the pit to measure ten-minute average wind speeds for comparison with simultaneous statistics from the AAEC tower, in its well exposed, 'free air' location (Table 1).

When very light winds prevailed in the 'free air', there was similarly a lack of ventilation in the pit. With stronger winds (> 1.5 m s^{-1}) the pit caused wind speed decreases of up to 42 per cent. At this stage of mining (for both 12 and 19 m depths) the pit was still acting like a shallow valley, possibly funnelling any winds with a south-east to north-west axial component. It seemed reasonable to assume that, as the pit continued to deepen, ventilation would have further diminished (even under stronger winds and daytime conditions). This would have had obvious and important implications for a build-up of radon concentrations in the pit. This study was intended to examine these influences.

The presence of vehicles working in the pit made little difference (< 0.2 m s^{-1}) to the average wind speed statistics.

5.3 <u>Smoke Flare Releases and General Observations</u>

To study atmospheric dispersion in the mine pit qualitatively, Schermuly smoke flares which burnt for approximately 1 minute were released and photographed. Three tests were conducted at:

17 June 1979	2210 CST
23 June 1979	0545 and 0548 CST
3 July 1979	0655 CST.

Anemometer statistics from the same period are listed in Table 1.

On 17 June an east wind with an average speed of 1.9 m s^{-1} at 2200 CST was registered at the QML meteorological tower. Smoke from a red flare rose out of the pit and drifted west, dispersing and becoming invisible after 1.5 minutes. With lighter winds on 23 June (< 1 m s^{-1} at the AAEC tower and 0.3 m s^{-1} in the pit) the smoke remained visible for much longer. A red flare was released initially. Because the higher temperature made it more buoyant, the smoke at first rose vertically from the pit, then slowly drifted north-west and was still visible after 2.25 minutes. An orange flare with less buoyant smoke was then released. This showed entirely different characteristics, initially drifting and dispersing slowly toward the south-south-west before disappearing some 3 minutes later. The QML meteorological tower registered consistent, low turbulence, south-east winds during this test.

On 3 July, winds were again very light in the vicinity of the pit. On this occasion the less buoyant orange smoke slowly advected to the northern end of the pit where it appeared to stagnate. Six minutes after release it was still clearly visible. At this time a relatively strong inversion was measured at 0.73 to 1.73°C per 8.1 m (in transition from one half-hour average to the next). The implication for observations of radon levels will be discussed more fully in a later section; however, above-background levels of radon were observed during this period.

Although our studies were prematurely terminated because industrial action at the Nabarlek site brought mining operations to a halt, several observations and conclusions can be drawn on ventilation in the mine pit. Waste heat, in the form of exhaust fumes which were often clearly visible rising out of the open pit, was being discharged indicating effective atmospheric mixing and suggesting that any radon gas present was being dispersed. In addition, there was still good natural ventilation of the pit at this stage of development.

The next phase of our studies would have involved balloon measurements with and without vehicles idling (as a source of artificial waste heat) to look at modification of the lower atmospheric boundary layer. Simultaneous radon measurements would be expected to reflect the improved atmospheric mixing with vehicles in the pit.

6. INTERPRETATION OF RADIATION MEASUREMENTS - DETAILED METEOROLOGICAL COMPARISONS

6.1 Data Collection

The AAEC tower was installed on 14 June and data were collected almost continuously (allowing for the erratic behaviour of the generator power supply) until 5 July 1979. The temperature and radon data were subsequently extracted from charts as 30-minute averages; radon was measured using the Eberline continuous radon monitor. Simultaneously, similar averages were obtained for wind direction and turbulence trace type (see Figure 5 for the classification scheme; Clark and Bendun [1974] also give a description), and 60-minute averages for wind speed were taken from the anemometer charts in the QML meteorological station. To compare wind speed statistics taken at the AAEC tower with those from the QML station, 10-minute average Cassella wind-cup speeds were taken at random times at the tower. These data are presented in tabular form (Tables 2 to 23) and plotted for visual comparison (Figures 6 to 27). The relationship between the radiation measurements and routine meteorological observations is discussed in detail in the sections following.

In the tables, missing data are represented by a series of asterisks and on the plots these points are located on the minimum line. Missing wind direction data are plotted on the lower north axis and no turbulence trace (index) is indicated by 99. It should be re-emphasised that initially the separation of the air temperature difference sensors was only 4.45 m until 1250 CST, 16 June when this was increased to 8.1 m. The hose inlet of the continuous radon monitor was generally about 1 m above the ground but on several occasions (25 and 26 June), when it was placed closer to the ground, it appeared to malfunction. Any other period of apparent equipment malfunction will also be noted in this description.

6.2 General Comments

With the soil temperature probe placed in bare soil the amplitude of the differential soil temperature curve was much larger at night than during the day. One explanation might be seen in Figure 28 where there is a schematic representation of the diurnal trends in the soil temperatures at depths of 1 and 60 cm. The features to note are the damped amplitude and phase lag (time) of the temperature wave at 60 cm compared with the near-surface characteristics. Soon after sunrise, when the air temperatures begin to rise, there is only a slight phase lag in the rise in the 1 cm soil-temperature. Because the 60 cm soil-temperature does not react as quickly, the differential soil temperatures also begin to fall soon after the air temperature rises.

Wind measurements at the AAEC tower must be compared with those from the QML meteorological station before the QML data can be used for longer term comparisons with the continuous temperature and radon data during the later stages of mining. In general, ten-minute average windspeeds were measured at the AAEC tower; occasionally there were longer averaging periods. These data are compared with simultaneous measurements over the same averaging periods at the meteorological station (Table 24 and Figure 29).

There is no obvious trend in the wind data. At several higher wind speeds there was a tendency for the meteorological station anemometer to underestimate the speeds, possibly because of the influence of surrounding trees. With light winds less than 2 m s^{-1}, there is a wide spread of data around the line of equality. These data may be put in better perspective by reference to Table 25 where wind directions and speeds are compared during the balloon experiments via observations made when balloon wind directions were available near the mine pit. At stronger wind speeds (> 1.5 m s^{-1}) wind directions measured at the two sites compare well, but when the speeds fall near the anemometer threshold (0.6 m s^{-1} for the meteorological station) there are some large differences (e.g. 4 July 1979).

In other studies [Li 1974] it has been shown that these low speeds are most important to an increase in the radon air concentrations and working levels. The data presented above suggest wind measurements (especially the wind directions) at the meteorological station may not be representative under such conditions. Horizontal inhomogeneities in the wind field which are caused by topographic influences have been observed elsewhere [Start and Wendell 1974, Sherman 1978] and these could explain the Nabarlek measurements. It would have been preferable to take wind direction measurements at the mine pit.

Continuous radon monitor data in Tables 2 to 23 (column 5) have been compared with the intermittent mine pit 'free air' wind speed measurements (column 9) and meteorological station wind directions (column 7) under stable conditions (positive temperature difference on the AAEC tower) in Table 26; these data are also plotted in Figure 30.

It was expected that with increasing atmospheric stability ($\Delta T_{air}\uparrow$) and decreasing wind speed, the radon air concentrations would increase. The radon air concentrations appear independent of wind speed and direction. However, the influence of wind direction should be very clear with such a concentrated and well defined ore body. Any winds from outside the north-west through east to south-east sector will advect radon-free air over the AAEC sampling tower. In these light wind conditions the balloon data have shown the meteorological station wind directions were not representative of the AAEC tower/mine pit. This observation may explain why there is no clear correlation between radon, stability and direction in Table 26.

In Table 27 a series of radon working levels, measured using the Rolle method, are compared with the balloon, AAEC tower and meteorological station wind statistics. Note the interesting period on 2 July between 0600 and 0635 CST; winds were very light and the balloon indicated a north-east wind direction; the highest working level of 0.084 was observed during this period. Because working levels reflect the age of the radon in air, the light winds which were blowing across the ore body would have led to high values. Either light winds occurring at other times (e.g. 1 July), when the wind could have been away from the ore body, (no anemometer wind direction data available), or stronger winds (e.g. 3 and 4 July) would have led to lower working levels. It is postulated that the wind direction measured at the meteorological station on 3 July between 0520 and 0540 was again not characteristic of that near the mine pit where radon working levels were again higher. These data are summarised in Figure 31 where the radon air concentrations generally decrease with wind speed, although there are insufficient data to investigate this more completely.

In addition, on several days a continuous time history of radon air concentrations and working levels was measured by the AAEC using a radon monitor similar to that used in the Eberline system and the Rolle method respectively. In Figure 32, the 2 to 3 July data are plotted. Balloon profiles were measured from 1940 to 2002 and 2051 to 2105 CST. These indicate that a slight radiation inversion approximately 10 m deep had formed between profiles (see Table 20 also) but the layer above had a near neutral atmospheric stability to 300 m. At the mine pit, winds near the ground were gusting at 1 to 2 m s^{-1} from the north-east, tending more to the north-north-east aloft. The rise in radon concentration to 27 pCi L^{-1} may be explained by the development of the shallow inversion with accompanying winds which kept the working levels low.

On the morning of 3 July 1979 (Figure 32), both the radon air concentrations and working levels showed a peak at 0545 CST when the surface inversion was intensifying (Table 20) and winds were very light (0.8 m s^{-1} at the mine pit). The tower radon profile at 0600 CST, which was obtained using Lucas cups, corresponded to a minimum in the time history of radon concentrations.

Lower radon concentrations on 4 July 1979 in the waste rock pit probably reflected the decreased atmospheric stability and change of sampling location, although the winds remained light. At the meteorological station a west to south-west direction was indicated, but above the mine pit (see Figure 3) there was more of an easterly component. The peak in radon concentrations and working levels after 0600 CST corresponded to decreasing stability in the surface temperature inversion. A uniform radon concentration profile was measured in the 'free air' to 10 m. The overall lower readings are attributed to lower radon emanation from the waste rock pit.

Winds were considerably stronger, with increased turbulent mixing (trace 3, see Table 23) and near-background radon air concentrations and working levels. Although conditions were not ideal for testing a radon balloon profiling technique to extend the concentration measurements up to 50 m above ground level, it appeared to work successfully, producing the results plotted in Figure 33.

A summary of all the radon concentration profiles taken on the AAEC tower (9605N 10081E) is presented in Table 28 together with supporting meteorological data. The high concentration at 9.8 m on 23 June 1979 at 0545 CST has been discussed in terms of the breakdown of an elevated temperature inversion (Figure 2) caused by atmospheric mixing processes. The other high values of note occurred on 2 July 1979 at 0715 CST. Winds were light (0.7 m s^{-1} at the meteorological station) and the surface inversion probably near its most stable for that morning (Table 20), just before being eroded by solar radiation heating.

The diurnal cycle of radon emanation from bare soil beside the ore body was studied on 20 June 1979 from 0542 to 1630 CST (Table 29). Bottomless 44-gallon drums were sealed at the times shown in Table 29, and the rate of radon build-up determined from the average of two Lucas cup samples taken after the indicated period. There was a decrease in emanation by a factor of four from early morning to 1200 CST. At the same time, the atmospheric stability changed from stable to very unstable conditions (from differential temperature (ΔT_{air}) measurements on the AAEC tower) but, possibly more importantly, the wind speeds increased in excess of 7 m s^{-1} and became very turbulent. Other studies [Reiter 1978] have indicated that increased atmospheric turbulence causing increased emanation could be balanced by downward convective motions in the soil. The daytime soil temperature profiles from Nabarlek indicate only a relatively small daytime value for ΔT_{soil} (1-62 cm) and suggest special conditions may apply in this tropical location. Decreasing atmospheric pressure causing 'breathing' of the soil is another factor to be considered [Clements and Wilkening 1974]. Diurnal trends in radon emanation have been measured, but more detailed analyses are required to reveal the significant causes.

In relation to diurnal trends in the radiation measurements at other uranium mines (e.g. Koongarra), Davy et al. [1978] have observed a late afternoon peak in radon air concentration. Similar observations at Nabarlek can be seen in Tables 11, 12, 20, 21. In these cases, the air temperature difference at the AAEC tower generally became more stable (changing from a negative to positive gradient) and wind speed decreased. The differential soil temperatures on three of these days were increasing (surface cooling) but only on one day was there a transition from positive to negative (23 June

1979; Table 11) which corresponded with the radon air concentration maximum. It appears that the late afternoon peak is more directly correlated with a change in atmospheric stability and possibly with decreasing wind speeds.

A final summary of meteorological data collected from the anemometer in the meteorological station is presented in Tables 30 and 31. These tables indicate that for the period of the study the prevailing wind direction was from the south-east to north-east sector, with other wind directions usually being associated with the lower speeds and probably observed at night or under stable conditions. The lower turbulence categories (5 to 10) collectively account for 27 per cent of all observations, with the light meandering winds being measured on only 4 per cent of occasions. These statistics confirm the good natural ventilation which resulted in low radon concentrations during the June-July 1979 field trip to Nabarlek.

7. DUST SUSPENSION AND DEPOSITION OBSERVATIONS

At Nabarlek, strong daytime winds were observed to cause suspension of dust from the ore body, even without the additional disturbance of vehicular activity. Winds in excess of 4 m s^{-1} were observed 29 per cent of the time (Table 31) with most of these in the very turbulent categories 2 and 3 (see Figure 5). The wind speeds in this table represent 30-minute averages. Table 24 shows clearly that several 10-minute measurements exceeded 9 m s^{-1} with instantaneous gusts probably even higher. Obviously the winds at Nabarlek have the potential for significant dust suspension.

In general, the vehicular service roads were well watered to suppress dust. In the early phases of mining, the ore body was also watered where the graders and scrapers were operating. However, this ceased when the pit deepened and became more rugged, particularly during the nocturnal operations when, in addition, some strong winds occasionally occurred (e.g. 21 June 1979 at 0538 to 0548 CST).

To measure the subsequent deposition patterns of dust being advected away from the mine/mill site, passive samplers, consisting of open 11.5 cm diameter funnels with collecting flasks below, were deployed to the locations shown in Figure 1. The samplers were placed clear of immediate vegetation influences at a height of 3 m above the ground. At two locations (7 and 9) additional samplers were placed at a height of 1.6 m. The results are presented in Table

32.

These data may not be truly representative; when the water/dust sampler (water being used to clean the funnels on removal of the sampler) was being transported back to Lucas Heights all the water leaked from the bottles, thus also taking some of the dust. Therefore the final samples analysed by the AAEC's Analytical Chemistry Section are some unknown fraction of those originally collected.

With this reservation in mind, it is interesting to note the different spatial distributions of uranium and aluminium dusts. For the samplers at 3 m altitude the highest uranium dust deposition is observed at locations 1, 6 and further downwind at number 8. The lower sampler at position 7 has the highest uranium content of all locations. The sources of uranium ore dust are well defined - the mine pit and small ore mixing and bogum stockpiles close to the mine pit (see Figure 1). This source configuration is reflected in the downwind decrease of uranium dust in samplers 1 to 2 to 10 (see also Figure 32). Although sampler location 6 was close to the mine pit, prevailing south-east winds did not traverse the ore body itself. Consequently deposition of uranium dust at position 6 was lower than near the AAEC tower.

By contrast, the aluminium content which is more to be expected of background topsoils at Nabarlek, was observed in larger quantities downwind of the service roads (e.g. sampler location 8) and near earth works associated with the evaporation ponds (sampler location 11). The spatial distribution of aluminium dust sources is widespread and difficult to define. Sampler location 5 is considered to be an upwind, background station.

It is interesting to compare the ratios between deposition at the different sampler heights.

Sampler Location	Ratios Uranium	Ratios Aluminium
9 (1.6 m) : 4 (3 m)	3.18	4.31
7 (1.6 m) : 6 (3 m)	2.13	2.32

The differences between sites might be explained in terms of the sources of dust and in particular the mechanisms of dispersion and resuspension. Near the pit, there is a larger source of material available for both initial suspension (by wind and vehicular activity), dispersion and subsequent resuspension. With increasing downwind distance from the primary source (the mine pit) there is an increased contribution from resuspension. It is suggested that this may explain the relative increase in deposition observed at the 1.6 m level.

The data for uranium dust deposition rate (Table 32) are plotted in Figure 34 as a function of distance downwind from the mine pit; the pit was considered the primary source, as the bogum and ore mixing stockpiles were not significant at this stage of development. Data from Site 5 were not plotted, as only 1.4 per cent of winds occurred from the north to north-west sector and this was therefore considered an upwind, background location. The 3 m deposition rate curve was a best fit (by eye); it suggests possibly a slightly elevated source which would be consistent with vehicular movement causing above ground billowing of the dust. In discussing the shape of the curve, one must remember that the deposition rate data have been integrated over all prevailing meteorological conditions and are taken at locations with different orientations with respect to the source. As such, the curve would not be expected to conform in shape to those along the axis of maximum deposition under an advecting elevated plume (see Turner [1970] for example).

To develop the 1.6 m curve, the observed data at two points (locations 9 and 7) were compared with the 3 m curve and an average ratio computed. The 3 m curve was then simply scaled upwards to give a 1.6 m curve of the same shape, the underlying assumption being that the same transport and deposition mechanisms caused the observed 1.6 and 3 m deposition rates. A much more sophisticated measurement program would have been necessary to confirm this assumption.

7.1 Inhalation Aspects

Considering an average dust deposition velocity together with the ground deposition measurements enables an average air concentration to be calculated for comparison with the dust inhalation standards in the Code of Practice [Commonwealth Department of Health 1977]. Because dust particle deposition velocities are a function of many variables (e.g. particle size, atmospheric turbulence and measurement height), a value of 1 cm s^{-1} was assumed appropriate as a long-term average for dusts generated at Nabarlek. This value is also consistent with the deposition velocity used in the Uranium Dispersion and Dosimetry (UDAD) Code [Momeni et al. 1979] which was incorporated in the generic Environmental Impact Statement for uranium mills

[USNRC 1979].

This deposition velocity is applied to the relationship of deposition rate to downwind distance (x) (see Figure 34), to give an average air concentration (χ):

$$\chi = 1.567 \cdot 10^{-3} x^{2.541-0.348 \log_e x} \qquad (2)$$

where χ is in pCi m^{-3}, x is in metres.

The computed averaged air concentrations and maximum permissible concentrations (mpc) are compared in Tables 3.2.4.1 and 3.2.4.2 of Commonwealth Department of Health [1977] for employees and members of the public (Table 33). It was assumed in computing the mpc that an employee was exposed continuously for 40 hours per week and members of the public for 168 hours per week. The averaged thorium-230 air concentrations which were calculated from Equation (2) assumed equilibrium with the uranium dust.* It is apparent that, although for uranium dust, air concentrations are well below the mpc for thorium-230 (soluble) there is only a factor of twelve for the employee mpc. Because of the uncertainty in these first collected samples in which transportation problems may have caused lower analysed values, it was recommended that dust deposition sampling be continued.

7.2 Radiological Aspects of Deposited Dust

There are many potential pathways leading from deposited radioactive dust to the exposure of man. The relative importance of these pathways is site specific, land use being the determining factor. Using conservative assumptions Healy and Rodgers [1978] made a general assessment of possible pathways. Table 34, taken from their work, summarises their results. If these findings are used as a guide, the environs of Nabarlek can be seen to lead to a maximum of three pathways:

- radium ingestion from aquatic foods contaminated from dust deposited in local catchments,

* Analysis of the dust composite from all samplers indicated that the ^{230}Th activity is approximately half that of the uranium.

- external whole body exposure resulting from the deposited dust, and
- radon daughter exposure to persons who construct dwellings over contaminated land.

7.2.1 <u>Aquatic food pathway</u>

If we take a dust deposition background of 0.5 μg m^{-2} d^{-1} of U (Table 31, sample 5) then Figure 34 indicates that the dust influence would fall to background within approximately 3 km from the source. Ninety-eight per cent of the area within this distance from the Nabarlek pit lies within the Cooper Creek catchment, and the total catchment area for this portion of the stream is approximately 270 km^2. The smallest sub-catchment of interest is that to the south of the pit; it is 25 km^2 in area and passes through a small lagoon before entering the main stream.

The amount of dust deposited in the various sectors of the catchment outside the site boundary during a six-month operating period was calculated by graphically integrating the 1.6 m deposition function in Figure 34 over a site map. The deposition in each of the eight sectors corresponding to the wind directions in Table 30 was calculated according to wind direction frequency. The total deposition rate was calculated to be 10 g d^{-1} of U, of which 7 g d^{-1} falls in the northern half and 3 g d^{-1} falls into the southern catchment.

If ^{226}Ra is assumed to be in equilibrium with U, 10 g of U is equivalent to 120 kBq (3.3 μCi) so 120 kBq d^{-1} of ^{226}Ra would also be released, or 22 MBq (0.6 mCi) in six months of operation. The leachability of radium from Nabarlek ore dust has not been determined, but a maximum value of 3 per cent has been reported by Gera [1978] for thorium ores. This is in reasonable agreement with the leaching rate predicted by laboratory studies of uranium tailings [Levins et al. 1978]. Since wet season catchment yields in this region range from 0.3 to 1.4 m^3/m^2 with an average yield of approximately 0.5 m^3/m^2, the additional ^{226}Ra added to this water from a 270 km^2 catchment is:

$$\frac{22 \times 10^6 \times 0.03}{270 \times 10^9 \times 0.5} = 5\ \mu\text{Bq/L}\ (0.0001\ \text{pCi/L}) \quad .$$

This is a factor of 1000 below the derived limit for ^{226}Ra for this region of 5 mBq/L [A.R. Williams, AAEC/E report, in preparation].

For the smaller, 25 km^2, catchment immediately south of the site which receives 3 g d^{-1} of U or 6.6 MBq (0.18 mCi) during the six-month operation, the increase in ^{226}Ra in run-off water would be

$$\frac{6.6 \times 10^6 \times 0.03}{25 \times 10^9 \times 0.5} = 0.015 \text{ MBq/L } (0.0004 \text{ pCi/L})$$

which is a factor of 333 below the derived limit of 5 mBq/L.

7.2.2 External exposure

The exposure resulting from a given deposition of uranium ore depends on the extent of the deposition, its depth distribution in the soil and the fraction of radon that escapes from the deposited ore to the atmosphere. The last mentioned is important because the gamma exposure comes predominantly from the short-lived radon daughters. For an infinite plane source with a uniform distribution through the soil and no loss of radon, the UK National Council on Radiation Protection and Measurement [NCRPM 1976] gives a value of 1.82 μrem h^{-1}/pCi g^{-1} of ^{238}U in equilibrium with all its daughters (88 per cent of the total comes from ^{214}Bi). This value is too high for the Nabarlek situation where dust deposition of the measured magnitude would persist only for the duration of mining (approximately 30 weeks) and for which a disc source (i.e surface deposition), with an exponential decrease in surface activity away from the mine site (as in Figure 34), is a realistic approximation.

Using a basis of measured ^{226}Ra and ^{210}Pb in top soil from a swamp anomaly, Davy and Conway [1974] concluded that approximately 50 per cent radon loss occurs from these deposits. Measurements by Davy and Conway of the radon emanating power of small oxidised secondary ore stockpiles in the Alligator Rivers region range between 30-70 per cent. In what follows, a 70 per cent radon retention is assumed for the external exposure pathway and a 70 per cent radon loss for the radon daughter exposure route.

The doserate D (rad $hour^{-1}$) at a point located h metres above a disc source with a radial Gaussian distribution of surface activity A_s, (Ci m^{-2}) and at a distance x metres from the centre of the disc is given by

$$D = 5.35 \times 10^5 \mu_{ef} A_s E_{ef} \exp(h^2/r_o^2) \int_{\frac{h^2}{r_o^2}}^{\infty} \frac{e^{-u}}{u} du$$

where $u = x + (\frac{h^2}{r_o^2})$, μ_{ef} (m^{-2} kg^{-1}) is the effective mass energy absorption coefficient and E_{ef} the effective gamma energy with μ_{ef} and E_{ef} being weighted over the gamma spectrum of the radon daughters, r_o is the relaxation radius. Thus for a height of 1 m above the ground in the region of maximum deposition of ore dust, $D = 3 \times 10^{-9}$ rad $hour^{-1}$, i.e. < 0.03 mrem y^{-1} in comparison with the recommended limit of 500 mrem y^{-1}.

7.2.3 Radon daughter exposure resulting from deposited dust

Dwellings constructed by aborigines on their lands are generally well ventilated and thereby limit the approach to equilibrium between radon and its daughters. On the other hand, by sleeping on the ground they are exposed to concentrations of radon that are higher than those averaged through the volume of the dwelling.

In the calculation given below, the average WL concentration in the dwelling is arrived at and multiplied by a factor to account for the vertical profile of radon concentration.

The radon emanating from the dirt floor of the building must equal that lost through ventilation and radioactive decay, i.e.

$$JA = CV (\lambda_v + \lambda_D)$$

where J = emanation rate (pCi m^{-2} s^{-1}), A = floor area (m^2), C = radon concentration (pCi m^{-3}), V = volume of building (m^3), λ_v = ventilation rate (s^{-1}) and λ_D = decay constant (2.1×10^{-6} s^{-1}).

Thirty weeks of dust deposition at the rate of 300 μg U m^{-2} d^{-1} will cause a build-up of 21 000 pCi of U per m^2. Assuming secular equilibrium then the radon production rate is 2.1×10^5 (pCi) $\times$ 2.1×10^{-6} (s^{-1}) and, for an emanation rate, 70 per cent of this is 0.3 pCi m^{-2} s^{-1}.

Assume the height (i.e. $\frac{V}{A}$) to be 1.5 m and the ventilation rate to be three changes per hour (i.e. $\lambda_V = 8.33 \times 10^{-4}$ s^{-1}) then

$$C = 0.24 \text{ pCi L}^{-1} \quad .$$

Air of 20-minute age will have a working level concentration of 0.3 times the equilibrium concentration. Thus the average WL concentration would be approximately 7×10^{-4}.

UNSCEAR [1977] reports radon concentrations measured during the night at various heights (0-3 m) above ground. The concentration at ground level is about twice that at a height of 1 m.

Measurements were made over the Ranger I Number 1 ore body at heights varying from 0.05-2.5 m, using track etch detectors as integrators for night-time radon concentrations, for a period of one month. A value of 2.4 was obtained for the ratio of concentration at a height of 0.05 m to that for a height of 0.75 m.

Thus the added WL exposure to a postulated inhabitant is $< 2 \times 10^{-3}$ WL at the region of heaviest dust deposition. If occupancy of 12 h per day, 365 days per year is assumed, then the integrated exposure is approximately 0.05 WLM* which compares with the recommended limit of 0.4 WLM for members of the general public.

The region of heaviest dust deposition is within the area for which entry is restricted during the operational phase of the mining/milling venture at Nabarlek. After abandonment, no access restrictions will apply and the above calculation demonstrates that, irrespective of other reasons, a general rehabilitation/revegetation restoration of the mine site is desirable from radiological considerations. The environmental conditions imposed on Queensland Mines Ltd for the Nabarlek operation should ensure that exposure resulting from deposited dust will be eliminated before abandonment.

---

* WLM = working level month.

8. ADDITIONAL RADIATION MEASUREMENTS

Table 35 shows surface emanation rates measured using the portable drum, two-filter method, together with simultaneous radon concentrations using Lucas cups, at various locations across the ore body during the initial phase of mining. By clearing the vegetation, emanation rates increased by up to a factor of four. This may have been due to disturbance of the soil texture, changes in soil temperature profiles leading to higher diffusion coefficients, or a multiplicity of other factors. Stripping the dispersed ore, which possibly contained lateritic soil enriched in radium but not uranium, was followed by a decrease in emanation rates. The difference in emanation rates between 28 June and 1 July 1979 at location 9592N, 10101E may reflect either the diurnal variation in emanation rates (discussed more fully in Section 5) or the uncertainty of the exact sampling location as the mine continues to deepen, as well as the specific nature of the ore body. Subsequent stripping of the badly weathered ore led to small increases in the emanation rates at three locations, the fourth being on the edge of the ore body where rates are lower.

The flow-through scintillation cell method (similar to the Eberline continuous radon monitor) was used to measure radon air concentrations at the AAEC tower site and 0.25 m above the ore pit flow when the pit was approximately 3 m deep (4 July 1979). A hose was lowered into the ore pit just before the meal break (2130 to 2145 CST). Temporal variations of the radon concentrations are plotted in Figure 35. Reference to Table 22 indicates wind speeds of 1 to 2 m s^{-1} with light, intermittent turbulence from the north-east-south sector before 2200 CST. After 2200 CST the increase in wind speed could have accounted for decreasing radon concentrations. There was no significant difference between AAEC tower and ore pit locations. There was a slight decrease in radon concentrations during the meal break but again this was not significant.

On 7 July 1979, a secluded sampling site in the north-west corner of the ore pit was chosen to study the nocturnal radon concentrations and working levels (Figure 36). The results indicate a virtually steady working level ratio (age of the air) in the very light wind situation. They also indicate that safe mining conditions can exist in a shallow pit with light winds prevailing. The Rolle method was used to obtain the diurnal variations of working level concentrations which are documented in Table 36.

In addition to these atmospheric measurements, radon activities were measured in the water test bores (Table 37).

9. CONCLUSIONS AND RECOMMENDATIONS

The balloon and AAEC tower meteorological measurements suggest Nabarlek is naturally well ventilated by the north-east to south-east winds which prevail at this time of year. Only occasionally do periods of near calm conditions combine with surface temperature inversion to give radon levels significantly above background. The relationship of the sampling site to the ore body and prevailing wind direction is thought to be important. Wind data from the meteorological station were considered not representative of the mine pit under light wind conditions. It has been recommended that another wind station should be installed near the pit, preferably near the AAEC tower site.

Even a relatively shallow depth of 18 m in the waste rock pit appeared to modify both the natural ventilation and prevailing atmospheric stability. Although the AAEC tests were disrupted by industrial action it was thought that increased turbulence due to vehicular activity, fans and space heaters would have been adequate to lower radon levels as the pit deepened.

Suspension of dust by the wind was observed and attempts were made to measure the downwind deposition patterns.

10. ACKNOWLEDGEMENTS

The assistance of Queensland Mines Ltd personnel, particularly the Radiation Safety Officers, was invaluable and vital to success of this field trip. Mr A. Williams made the calculations reported in Section 6.2.1 and Mr J. Kristo ably performed the essential chart data extractions and also some drafting of diagrams. The excellent typing of Mrs C. Chrimes and Mrs M Lawrence is also gratefully acknowledged.

11. REFERENCES

Clark, G.H. and Bendun, E.O.K. [1974] - Meteorological research studies at Jervis Bay, Australia. AAEC/E309.

Clark, G.H. [1977] - Assessment of the meteorological data and atmospheric dispersion estimates in the Ranger I uranium mining environmental impact statement. AAEC/E407.

Clements, W.E. and Wilkening, M.H. [1974] - Atmospheric pressure effects on ^{222}Rn transport across the earth-air interface. J. Geophys. Res., Vol.79 No.33, pp.5025-5029, 20 November.

Commonwealth Department of Health [1977] - Code of Practice on radiation protection in the mining and milling of radioactive ores - 1975.

Davy, D.R. and Conway, N.F. [1974] - Paper III. The Alligator Rivers Area Fact Finding Study. Four AAEC Reports AAEC/E305.

Davy, D.R., Dudaitis, A., and O'Brien, B.G. 1978 - Radon survey at the Koongarra uranium deposit, Northern Territory. AAEC/E459.

Gera, F. [1975] - Geochemical behaviour of long-lived radioactive wastes. Oak Ridge National Laboratory, Tenn., ORNL-TM-4481.

Healy, J.W. and Rodgers, J.C. [1978] - A preliminary study of radium contaminated soils. LA-7391-MS.

Levins, D.M., Ryan, R.K. and Strong, K.P. [1978] - Leaching of radium from uranium tailings. Proc. Symp. Management Stabilisation and Environmental Impact of Uranium Mill Tailings, Albuquerque, New Mexico, July, OECD-NEA.

Li, Y.T. [1974] - Diurnal variations of radon and meteorological variables near the ground. Boundary Layer Meteor., Vol.7, pp.185-198.

Momeni, M.H., Yuan, Y., Zielen, A.J. [1979] - The uranium dispersion and dosimetry (UDAD) code. Argonne National Laboratory, NUREG (CR0553 ANL/ES-72).

NCRPM [1976] - National Council on Radiation Protection and Measurements. Environmental Radiation Measurements. (UK)Report No.50.

Reiter, E.R. [1978] - Atmospheric transport processes; Part 4: Radioactive tracers. US Dept. of Energy Critical Review Series, TID-27114.

Sherman, C.S. [1978] - MATHEW - A mass-consistent wind field model. Lawrence Livermore Laboratory, UCRL-52479.

Start, G.E. and Wendell, L.L. [1974] - Regional effluent dispersion calculations considering spatial and temporal meteorological variations. NOAA Tech. Memo. ERL ARL-44.

Turner, D.B. [1970] - Workbook of atmospheric dispersion estimates. US Public Health Service Publication No.999-AP-26.

UNSCEAR [1977] - United Nations Scientific Committee on the Effects of Atomic Radiation, Sources and Effects of Ionizing Radiation.

USNRC [1979] - Draft generic environmental impact statement on uranium milling. US Nuclear Regulatory Commission, NUREG-0511 Vol.1.

Williams, A.R. (in preparation) - Environmental dose assessment for ^{226}Ra in the Alligator Rivers uranium province.

TABLE 1
STUDY OF NATURAL VENTILATION IN THE
DEVELOPING WASTE ROCK PIT AT NABARLEK

Date	Times (CST)	Vehicular (?) Activity	Wind Speed ($m\ s^{-1}$)			Comments
			Waste Rock Pit (1.7 m)	AAEC Tower ('Free Air') 1.7 mm	9.8 m	
June 1979						
17	2145-2155	Yes	1.3	2.0	2.5	Pit depth
	2205-2215	No	1.1	1.9	2.4	12 m
23	0540-0550	No	0.3	0.6	1.0	↓
24	0540-0550	D9s only	1.5	1.8	2.3	↓
28	0550-0600	No	0.7	0.5	1.0	↓
	1925-1935	No	0.4	0.8	1.5	Pit depth
30	0550-0600	4xD9s working	0.8	0.5	0.6	19 m
	0625-0635	No	0.8	0.7	1.1	↓
July 1979						
1	0605-0615	No	1.6	2.7	3.5	↓
3	0640-0650	No	0.4	0.4	1.6	↓
	0655-0705	No	0.5	0.8	1.8	↓

TABLES 2-23

A COMPILATION OF HALF-HOURLY AVERAGED METEOROLOGICAL AND RADIATION DATA FROM THE AAEC TOWER AT NABARLEK, 14 JUNE TO 5 JULY 1979

DATE: 140679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	*****	******	******	****	4.1	SE	2	****	****
0030 TO 0100	*****	******	******	****	4.1	SE	2	****	****
0100 TO 0130	*****	******	******	****	4.8	SE	2	****	****
0130 TO 0200	*****	******	******	****	4.8	SE	3	****	****
0200 TO 0230	*****	******	******	****	3.3	SE	3	****	****
0230 TO 0300	*****	******	******	****	3.3	SE	8	****	****
0300 TO 0330	*****	******	******	****	2.0	SE	9	****	****
0330 TO 0400	*****	******	******	****	2.0	S	9	****	****
0400 TO 0430	*****	******	******	****	1.6	SE	9	****	****
0430 TO 0500	*****	******	******	****	1.6	S	9	****	****
0500 TO 0530	*****	******	******	****	1.3	S	9	****	****
0530 TO 0600	*****	******	******	****	1.3	SW	9	****	****
0600 TO 0630	*****	******	******	****	1.6	S	9	****	****
0630 TO 0700	*****	******	******	****	1.6	S	9	****	****
0700 TO 0730	*****	******	******	****	1.1	S	8	****	****
0730 TO 0800	*****	******	******	****	1.1	SE	8	****	****
0800 TO 0830	*****	******	******	****	2.1	SE	3	****	****
0830 TO 0900	*****	******	******	****	2.1	SE	3	****	****
0900 TO 0930	*****	******	******	****	5.4	SE	3	****	****
0930 TO 1000	*****	******	******	****	5.4	SE	3	****	****
1000 TO 1030	*****	******	******	****	7.5	SE	3	****	****
1030 TO 1100	*****	******	******	****	7.5	SE	3	****	****
1100 TO 1130	*****	******	******	****	8.3	SE	3	****	****
1130 TO 1200	*****	******	******	****	8.3	SE	3	****	****
1200 TO 1230	*****	******	******	****	6.6	SE	3	****	****
1230 TO 1300	*****	******	******	****	6.6	SE	3	****	****
1300 TO 1330	*****	******	******	****	6.3	SE	3	****	****
1330 TO 1400	*****	******	******	****	6.3	SE	3	****	****
1400 TO 1430	*****	******	******	****	5.6	SE	3	****	****
1430 TO 1500	*****	******	******	****	5.6	SE	3	****	****
1500 TO 1530	*****	******	******	****	5.2	SE	3	****	****
1530 TO 1600	*****	******	******	****	5.2	SE	3	****	****
1600 TO 1630	*****	******	******	****	4.9	SE	3	****	****
1630 TO 1700	*****	******	******	****	4.9	SE	3	****	****
1700 TO 1730	*****	******	******	****	4.5	S	3	****	****
1730 TO 1800	*****	******	******	****	4.5	SE	3	****	****
1800 TO 1830	*****	******	******	****	2.9	S	2	****	****
1830 TO 1900	*****	******	******	****	2.9	S	2	****	****
1900 TO 1930	*****	******	******	****	2.6	S	2	****	****
1930 TO 2000	26.7	0.36	7.31	3.	2.6	S	2	****	****
2000 TO 2030	26.7	-0.19	7.78	2.	3.2	SE	2	****	****
2030 TO 2100	26.7	-0.26	8.18	2.	3.2	SE	2	****	****
2100 TO 2130	26.6	-0.26	8.50	2.	4.0	SE	2	****	****
2130 TO 2200	26.6	-0.32	8.79	2.	4.0	SE	2	****	****
2200 TO 2230	25.8	-0.43	9.48	3.	3.3	SE	2	****	****
2230 TO 2300	25.0	-0.46	9.95	3.	3.3	SE	2	****	****
2300 TO 2330	24.7	-0.32	10.35	3.	1.5	SE	2	****	****
2330 TO 2400	23.9	0.05	10.85	4.	1.5	E	9	****	****

MINIMUM TEMPERATURE = 23.9 DEG.C

MAXIMUM TEMPERATURE = 26.7 DEG.C

TABLE 2

DATE: 150679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	22.5	0.15	11.65	10.	1.1	SE	9	****	****
0030 TO 0100	22.3	0.22	12.30	12.	1.1	SE	9	****	****
0100 TO 0130	22.0	0.42	12.95	7.	0.8	S	8	****	****
0130 TO 0200	20.9	0.66	13.20	5.	0.8	W	8	****	****
0200 TO 0230	20.9	0.42	14.07	7.	0.8	SW	8	****	****
0230 TO 0300	21.0	0.49	14.28	6.	0.8	SW	8	****	****
0300 TO 0330	20.0	1.75	14.72	8.	0.7	W	8	****	****
0330 TO 0400	20.1	1.11	15.37	9.	0.7	W	8	****	****
0400 TO 0430	20.0	1.41	15.66	10.	0.9	SW	9	****	****
0430 TO 0500	*****	******	******	13.	0.9	SW	9	****	****
0500 TO 0530	*****	******	******	22.	1.2	S	9	****	****
0530 TO 0600	20.3	0.76	16.02	14.	1.2	S	9	****	****
0600 TO 0630	20.1	0.76	16.09	6.	1.1	S	9	****	****
0630 TO 0700	19.2	0.39	16.20	5.	1.1	SE	9	****	****
0700 TO 0730	20.9	-0.53	16.05	8.	1.6	S	9	****	****
0730 TO 0800	23.1	-1.58	14.28	5.	1.6	S	2	****	****
0800 TO 0830	24.8	-0.77	12.01	3.	3.6	S	2	****	****
0830 TO 0900	25.7	-0.60	10.67	2.	3.6	S	2	****	****
0900 TO 0930	25.8	-0.66	9.59	1.	6.0	SE	2	****	****
0930 TO 1000	26.5	-0.77	7.67	2.	6.0	SE	2	****	****
1000 TO 1030	27.5	-0.66	5.79	1.	5.8	SE	3	****	****
1030 TO 1100	28.2	-0.53	3.81	2.	5.8	SE	3	****	****
1100 TO 1130	28.8	-0.49	2.79	2.	6.5	SE	3	****	****
1130 TO 1200	29.2	-0.39	0.73	3.	6.5	SE	3	****	****
1200 TO 1230	29.3	-0.70	-0.06	2.	5.6	SE	3	1.9	3.0
1230 TO 1300	30.1	-0.56	-0.96	1.	5.6	SE	3	****	****
1300 TO 1330	30.7	-0.26	-1.72	2.	4.3	SE	3	****	****
1330 TO 1400	31.0	-0.26	-2.70	2.	4.3	SE	3	1.5	2.3
1400 TO 1430	31.1	-0.19	-3.06	2.	3.8	SE	3	****	****
1430 TO 1500	31.4	-0.43	-3.10	1.	3.8	SE	3	****	****
1500 TO 1530	31.6	-0.02	-2.99	2.	3.6	SE	3	****	****
1530 TO 1600	31.5	-0.43	-2.63	2.	3.6	SE	3	****	****
1600 TO 1630	31.9	0.12	-2.26	2.	4.0	SE	3	****	****
1630 TO 1700	31.6	-0.05	-0.89	3.	4.0	SE	3	****	****
1700 TO 1730	31.4	0.02	0.19	3.	3.0	SE	3	****	****
1730 TO 1800	30.1	-0.09	1.71	2.	3.0	SE	3	****	****
1800 TO 1830	28.8	-0.29	3.01	2.	2.2	S	2	****	****
1830 TO 1900	27.0	-0.19	4.89	3.	2.2	S	2	1.0	2.1
1900 TO 1930	26.5	0.08	5.90	3.	3.0	S	2	1.2	2.4
1930 TO 2000	26.7	-0.19	6.70	3.	3.0	S	2	2.8	3.9
2000 TO 2030	26.6	-0.15	7.24	2.	3.2	S	2	****	****
2030 TO 2100	25.9	-0.19	7.85	2.	3.2	S	2	****	****
2100 TO 2130	26.0	-0.29	8.14	2.	5.1	SE	2	****	****
2130 TO 2200	25.8	-0.39	8.90	2.	5.1	SE	2	****	****
2200 TO 2230	25.1	-0.53	9.51	1.	5.0	SE	2	****	****
2230 TO 2300	24.9	-0.56	9.59	2.	5.0	SE	2	****	****
2300 TO 2330	24.3	-0.56	9.62	2.	4.4	SE	2	****	****
2330 TO 2400	24.0	-0.56	9.95	3.	4.4	SE	2	****	****

MINIMUM TEMPERATURE = 19.2 DEG.C

MAXIMUM TEMPERATURE = 31.9 DEG.C

TABLE 3

DATE: 160679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	24.0	-0.56	10.13	3.	4.1	SE	2	****	****
0030 TO 0100	23.8	-0.56	10.42	3.	4.1	SE	2	****	****
0100 TO 0130	23.5	-0.56	10.74	3.	4.6	SE	2	****	****
0130 TO 0200	23.4	-0.56	10.92	3.	4.6	SE	2	****	****
0200 TO 0230	23.2	-0.56	11.14	6.	4.1	SE	2	****	****
0230 TO 0300	23.1	-0.56	11.47	6.	4.1	SE	2	****	****
0300 TO 0330	23.2	-0.56	11.65	4.	3.9	SE	2	****	****
0330 TO 0400	23.1	-0.56	11.83	3.	3.9	SE	2	****	****
0400 TO 0430	23.3	-0.56	11.93	4.	2.9	SE	2	****	****
0430 TO 0500	23.4	-0.56	12.12	3.	2.9	SE	2	****	****
0500 TO 0530	23.3	-0.56	12.40	4.	4.2	SE	2	****	****
0530 TO 0600	22.6	-0.53	12.48	4.	4.2	SE	2	****	****
0600 TO 0630	22.8	-0.56	12.73	5.	4.3	SE	2	****	****
0630 TO 0700	22.6	-0.56	12.80	5.	4.3	SE	2	****	****
0700 TO 0730	23.8	-0.56	12.12	4.	4.0	SE	2	****	****
0730 TO 0800	24.8	-0.56	11.68	4.	4.0	SE	2	3.9	4.5
0800 TO 0830	25.2	-0.56	10.20	4.	4.8	SE	2	****	****
0830 TO 0900	25.9	-0.56	9.30	3.	4.8	SE	2	****	****
0900 TO 0930	25.9	-0.26	7.78	4.	6.0	SE	2	****	****
0930 TO 1000	26.9	-0.60	6.08	3.	6.0	SE	2	****	****
1000 TO 1030	27.5	-0.53	5.61	2.	5.8	SE	3	****	****
1030 TO 1100	28.7	-0.66	4.06	2.	5.8	SE	3	****	****
1100 TO 1130	29.7	-0.49	0.92	2.	4.9	SE	3	****	****
1130 TO 1200	30.1	-0.32	-0.75	3.	4.9	SE	3	****	****
1200 TO 1230	30.4	-0.36	-2.34	4.	4.5	SE	3	****	****
1230 TO 1300	30.8	-0.56	-2.70	3.	4.5	SE	3	****	****
1300 TO 1330	31.4	-1.28	-4.14	2.	4.7	SE	3	****	****
1330 TO 1400	31.9	-1.48	-4.87	3.	4.7	SE	3	****	****
1400 TO 1430	32.5	-1.28	-5.37	3.	3.9	SE	3	****	****
1430 TO 1500	32.2	-1.35	-5.30	4.	3.9	E	3	****	****
1500 TO 1530	31.9	-1.01	-4.43	3.	3.3	SE	3	****	****
1530 TO 1600	32.0	-0.63	-3.60	4.	3.8	E	3	****	****
1600 TO 1630	31.8	-0.49	-3.13	4.	3.4	E	3	****	****
1630 TO 1700	*****	******	******	4.	3.4	E	3	****	****
1700 TO 1730	*****	******	******	4.	3.4	SE	2	****	****
1730 TO 1800	*****	******	******	4.	3.4	SE	2	****	****
1800 TO 1830	*****	******	******	4.	2.4	SE	2	****	****
1830 TO 1900	*****	******	******	4.	2.4	SE	2	****	****
1900 TO 1930	*****	******	******	4.	2.5	SE	2	****	****
1930 TO 2000	*****	******	******	4.	2.5	SE	2	****	****
2000 TO 2030	27.8	-0.09	4.67	4.	3.0	SE	2	****	****
2030 TO 2100	27.6	-0.12	5.25	4.	3.0	SE	2	2.5	4.4
2100 TO 2130	27.0	-0.49	5.58	4.	3.4	SE	2	****	****
2130 TO 2200	26.9	-0.32	6.48	4.	3.4	SE	2	****	****
2200 TO 2230	26.6	-0.49	6.52	4.	3.5	SE	2	****	****
2230 TO 2300	26.6	-0.53	6.52	4.	3.5	SE	2	****	****
2300 TO 2330	26.5	-0.53	6.62	5.	3.1	SE	2	****	****
2330 TO 2400	26.0	-0.53	6.70	5.	3.1	SE	2	****	****

MINIMUM TEMPERATURE = 22.6 DEG.C

MAXIMUM TEMPERATURE = 32.5 DEG.C

TABLE 4

DATE: 170679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	25.8	-0.53	6.77	6.	2.1	SE	2	****	****
0030 TO 0100	25.6	-0.53	7.67	7.	2.1	E	2	****	****
0100 TO 0130	25.4	-0.53	7.82	9.	2.6	E	2	****	****
0130 TO 0200	25.1	-0.53	8.14	8.	2.6	E	2	****	****
0200 TO 0230	24.7	-0.53	8.57	10.	2.2	SE	2	****	****
0230 TO 0300	24.2	-0.53	8.97	10.	2.2	SE	2	****	****
0300 TO 0330	23.9	-0.53	9.37	9.	1.6	SE	2	****	****
0330 TO 0400	23.9	-0.53	9.51	8.	1.6	SE	2	****	****
0400 TO 0430	23.7	-0.53	9.66	8.	1.0	SE	3	****	****
0430 TO 0500	23.4	-0.43	9.91	7.	1.0	SE	3	****	****
0500 TO 0530	23.3	-0.29	9.98	7.	0.9	SE	3	****	****
0530 TO 0600	23.2	-0.32	10.13	8.	0.9	SE	3	****	****
0600 TO 0630	23.1	-0.49	10.24	6.	1.0	SW	9	****	****
0630 TO 0700	23.0	-0.43	10.35	5.	1.0	S	9	****	****
0700 TO 0730	23.8	-0.60	10.60	4.	2.2	S	9	****	****
0730 TO 0800	25.7	-1.01	9.15	3.	2.2	SE	9	1.6	2.3
0800 TO 0830	26.8	-0.80	7.78	4.	3.4	SE	3	****	****
0830 TO 0900	27.4	-0.73	6.52	4.	3.4	SE	3	****	****
0900 TO 0930	27.6	-0.77	5.07	4.	4.3	E	3	****	****
0930 TO 1000	28.1	-1.11	3.34	4.	4.3	E	3	****	****
1000 TO 1030	29.3	-1.28	1.38	4.	4.7	E	3	****	****
1030 TO 1100	29.8	-1.35	-0.17	5.	4.7	E	3	****	****
1100 TO 1130	30.9	-1.45	-0.86	5.	4.1	E	3	****	****
1130 TO 1200	31.5	-1.21	-1.76	****	4.1	E	3	****	****
1200 TO 1230	31.1	-1.21	-2.63	4.	3.6	E	3	****	****
1230 TO 1300	31.0	-1.24	-3.02	4.	3.6	E	3	****	****
1300 TO 1330	31.1	-1.11	-3.96	4.	3.5	E	3	****	****
1330 TO 1400	31.8	-1.21	-4.36	5.	3.5	E	3	****	****
1400 TO 1430	32.4	-1.28	-4.94	3.	2.9	E	3	****	****
1430 TO 1500	32.2	-0.94	-3.82	3.	2.9	E	3	****	****
1500 TO 1530	32.4	-0.70	-3.28	3.	3.0	E	3	****	****
1530 TO 1600	32.0	-0.56	-2.88	5.	3.0	E	3	****	****
1600 TO 1630	32.1	-0.43	-3.17	5.	2.5	E	3	****	****
1630 TO 1700	31.9	-0.53	-2.70	4.	2.5	E	3	****	****
1700 TO 1730	31.4	-0.43	-0.86	5.	3.6	NE	3	****	****
1730 TO 1800	30.4	-0.53	0.26	4.	3.6	NE	3	****	****
1800 TO 1830	29.3	-0.53	1.46	4.	2.3	NE	3	****	****
1830 TO 1900	28.3	-0.53	2.43	5.	2.3	NE	3	****	****
1900 TO 1930	27.7	-0.53	3.44	5.	2.1	NE	3	****	****
1930 TO 2000	27.5	-0.53	4.35	7.	2.1	NE	3	****	****
2000 TO 2030	27.3	-0.53	4.85	9.	4.6	E	3	****	****
2030 TO 2100	26.7	-0.53	5.14	8.	4.6	E	3	****	****
2100 TO 2130	26.6	-0.53	5.61	7.	1.9	E	3	****	****
2130 TO 2200	26.3	-0.49	5.79	7.	1.9	E	3	****	****
2200 TO 2230	26.1	-0.43	6.05	6.	1.8	E	3	****	****
2230 TO 2300	25.9	-0.43	6.19	11.	1.8	E	3	****	****
2300 TO 2330	25.5	-0.43	6.41	13.	1.4	E	3	****	****
2330 TO 2400	25.5	-0.43	6.84	10.	1.4	E	3	****	****

MINIMUM TEMPERATURE = 23.0 DEG.C

MAXIMUM TEMPERATURE = 32.4 DEG.C

TABLE 5

DATE: 180679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAFC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	25.3	-0.43	7.13	9.	1.8	E	3	****	****
0030 TO 0100	25.4	-0.43	7.24	11.	1.8	E	3	****	****
0100 TO 0130	25.2	-0.43	7.42	12.	1.5	E	3	****	****
0130 TO 0200	25.0	-0.43	7.67	12.	1.5	E	3	****	****
0200 TO 0230	24.9	-0.43	7.85	12.	2.2	E	3	****	****
0230 TO 0300	24.8	-0.43	8.00	10.	2.2	E	3	****	****
0300 TO 0330	24.7	-0.43	8.14	11.	1.8	E	3	****	****
0330 TO 0400	24.6	-0.43	8.43	14.	1.8	E	3	****	****
0400 TO 0430	24.3	-0.43	8.68	22.	1.2	E	3	****	****
0430 TO 0500	24.1	-0.43	8.90	21.	1.2	E	3	****	****
0500 TO 0530	24.0	-0.43	9.15	16.	1.2	E	3	****	****
0530 TO 0600	23.7	-0.36	9.33	14.	1.2	SE	8	****	****
0600 TO 0630	23.8	-0.09	9.41	7.	1.1	SE	8	****	****
0630 TO 0700	24.1	-0.19	9.59	13.	1.1	E	9	****	****
0700 TO 0730	24.2	-0.32	9.15	21.	1.4	E	9	1.0	1.2
0730 TO 0800	27.5	-0.73	7.96	****	1.4	SE	9	****	****
0800 TO 0830	28.5	-1.18	6.55	****	3.0	SE	3	****	****
0830 TO 0900	28.5	-1.11	4.96	****	3.0	SE	3	****	****
0900 TO 0930	28.6	-1.18	3.55	****	3.9	E	3	****	****
0930 TO 1000	29.0	-1.28	2.04	****	3.9	E	3	3.8	4.6
1000 TO 1030	29.7	-1.21	2.04	****	3.5	E	3	****	****
1030 TO 1100	30.9	-1.31	-0.13	****	3.5	E	3	****	****
1100 TO 1130	31.4	-1.28	-1.72	****	4.0	SE	3	****	****
1130 TO 1200	31.9	-1.31	-3.13	****	4.0	E	3	****	****
1200 TO 1230	32.0	-1.24	-3.96	****	3.6	E	3	****	****
1230 TO 1300	32.7	-1.07	-4.29	****	3.6	E	3	****	****
1300 TO 1330	32.9	-0.66	-4.72	****	3.3	SE	3	****	****
1330 TO 1400	32.8	-0.77	-5.23	****	3.3	E	3	****	****
1400 TO 1430	32.4	-0.60	-4.11	****	3.3	E	3	****	****
1430 TO 1500	32.8	-0.60	-3.35	****	3.3	E	3	****	****
1500 TO 1530	32.7	-0.63	-4.22	****	3.2	E	3	****	****
1530 TO 1600	32.8	-0.53	-4.00	****	3.2	E	3	****	****
1600 TO 1630	32.2	-0.60	-3.17	****	2.7	SE	3	****	****
1630 TO 1700	32.7	-0.02	-3.06	****	2.7	E	3	****	****
1700 TO 1730	32.1	0.05	-2.52	****	2.6	E	3	****	****
1730 TO 1800	31.0	-0.12	-1.04	****	2.6	E	3	****	****
1800 TO 1830	30.6	-0.49	0.55	8.	2.0	E	3	****	****
1830 TO 1900	30.2	-0.53	1.64	10.	2.0	NE	3	****	****
1900 TO 1930	28.7	-0.53	2.32	7.	2.2	NE	3	2.0	2.6
1930 TO 2000	28.3	-0.53	2.79	6.	2.2	NE	3	****	****
2000 TO 2030	27.5	-0.53	3.44	6.	2.0	NE	3	****	****
2030 TO 2100	26.8	-0.53	3.95	5.	2.0	E	3	****	****
2100 TO 2130	26.6	-0.53	4.53	5.	2.1	E	3	****	****
2130 TO 2200	26.2	-0.53	4.89	5.	2.1	E	3	****	****
2200 TO 2230	25.8	-0.53	5.43	6.	1.6	E	3	****	****
2230 TO 2300	25.7	-0.53	5.97	9.	1.6	E	3	****	****
2300 TO 2330	25.2	-0.49	6.30	10.	1.7	E	3	****	****
2330 TO 2400	25.3	-0.49	6.70	6.	1.7	SE	3	****	****

MINIMUM TEMPERATURE = 23.7 DEG.C

MAXIMUM TEMPERATURE = 32.9 DEG.C

TABLE 6

DATE: 190679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	25.2	-0.43	6.77	7.	1.3	E	9	****	****
0030 TO 0100	25.0	-0.32	7.06	11.	1.3	E	9	****	****
0100 TO 0130	25.1	-0.32	7.35	14.	1.5	E	9	****	****
0130 TO 0200	25.0	-0.32	7.64	11.	1.5	E	9	****	****
0200 TO 0230	24.9	-0.32	7.89	8.	2.3	SE	2	****	****
0230 TO 0300	25.0	-0.32	8.03	6.	2.3	E	2	****	****
0300 TO 0330	24.9	-0.36	8.14	6.	2.3	E	3	****	****
0330 TO 0400	24.3	-0.36	8.61	7.	2.3	E	3	****	****
0400 TO 0430	24.0	-0.36	8.86	7.	1.5	E	3	****	****
0430 TO 0500	24.0	-0.49	9.12	6.	1.5	SE	8	****	****
0500 TO 0530	23.6	-0.26	9.44	4.	1.3	SW	9	****	****
0530 TO 0600	23.1	-0.26	9.84	3.	1.3	S	9	****	****
0600 TO 0630	22.9	0.25	9.98	3.	1.7	S	9	****	****
0630 TO 0700	22.2	-0.56	10.31	3.	1.7	S	9	****	****
0700 TO 0730	23.9	-1.11	10.13	3.	1.2	S	9	1.5	2.1
0730 TO 0800	27.0	-1.24	9.30	4.	1.2	S	9	****	****
0800 TO 0830	27.7	-1.21	8.50	5.	3.9	SE	3	****	****
0830 TO 0900	27.6	-1.28	6.23	4.	3.9	SE	3	****	****
0900 TO 0930	27.7	-1.45	4.93	4.	4.4	SE	3	****	****
0930 TO 1000	28.3	-1.38	3.16	6.	4.4	SE	3	****	****
1000 TO 1030	29.3	-1.52	1.35	7.	5.0	SE	3	****	****
1030 TO 1100	30.4	-1.45	-0.53	6.	5.0	SE	3	5.2	6.4
1100 TO 1130	31.1	-1.35	-1.58	****	5.6	SE	3	****	****
1130 TO 1200	31.8	-1.21	-2.70	****	5.6	SE	3	****	****
1200 TO 1230	32.3	-1.21	-3.71	****	6.0	SE	3	****	****
1230 TO 1300	32.6	-1.11	-4.25	****	6.0	SE	3	4.2	5.5
1300 TO 1330	32.8	-0.94	-5.05	****	5.5	SE	3	****	****
1330 TO 1400	33.0	-1.07	-5.23	****	5.5	SE	3	****	****
1400 TO 1430	33.5	-1.28	-5.95	****	4.8	SE	3	****	****
1430 TO 1500	33.6	-1.14	-5.34	2.	4.8	SE	3	****	****
1500 TO 1530	33.7	-0.77	-4.87	2.	4.6	SE	3	****	****
1530 TO 1600	33.1	-1.38	-4.14	2.	4.6	S	3	3.1	5.2
1600 TO 1630	32.9	-1.11	-3.13	2.	4.3	SE	3	****	****
1630 TO 1700	32.8	-0.53	-2.95	1.	4.3	S	3	****	****
1700 TO 1730	32.2	-0.49	-2.26	1.	3.5	S	3	****	****
1730 TO 1800	31.2	-0.26	-0.24	1.	3.5	S	3	****	****
1800 TO 1830	29.9	-0.09	1.24	1.	2.9	S	3	****	****
1830 TO 1900	29.2	0.42	2.79	1.	2.9	S	3	****	****
1900 TO 1930	28.0	0.76	3.44	2.	1.5	S	3	****	****
1930 TO 2000	27.9	0.76	4.71	1.	1.5	S	3	1.1	2.0
2000 TO 2030	27.8	0.66	4.96	1.	1.4	SE	9	****	****
2030 TO 2100	27.5	0.08	5.43	2.	1.4	SE	9	****	****
2100 TO 2130	28.3	-0.19	5.54	3.	3.0	SE	3	****	****
2130 TO 2200	27.7	-0.15	5.72	3.	3.0	SE	3	****	****
2200 TO 2230	27.2	-0.26	6.12	3.	4.2	SE	3	****	****
2230 TO 2300	27.0	-0.32	6.37	3.	4.2	SE	3	****	****
2300 TO 2330	26.8	-0.32	6.62	3.	4.1	SE	3	****	****
2330 TO 2400	*****	******	******	3.	4.1	S	3	****	****

MINIMUM TEMPERATURE = 22.2 DEG.C

MAXIMUM TEMPERATURE = 33.7 DEG.C

TABLE 7

DATE: 200679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	25.0	-0.12	7.71	8.	2.6	SE	9	****	****
0030 TO 0100	24.3	-0.05	8.39	10.	2.6	SE	9	****	****
0100 TO 0130	23.9	-0.32	8.86	7.	2.8	SE	9	****	****
0130 TO 0200	24.0	-0.26	9.48	5.	2.8	SE	9	****	****
0200 TO 0230	23.8	-0.05	9.59	4.	2.8	SE	7	****	****
0230 TO 0300	23.0	0.46	10.13	4.	2.8	SE	7	****	****
0300 TO 0330	23.0	1.11	10.53	4.	2.6	SE	7	****	****
0330 TO 0400	22.9	1.00	10.78	3.	2.6	S	7	****	****
0400 TO 0430	22.5	0.87	11.03	2.	2.0	S	7	****	****
0430 TO 0500	22.3	0.70	11.47	3.	2.0	SE	7	****	****
0500 TO 0530	22.1	0.32	11.93	3.	2.9	SE	7	1.1	1.9
0530 TO 0600	22.1	0.87	12.12	3.	2.9	SE	7	1.3	2.3
0600 TO 0630	22.1	0.90	12.15	3.	3.2	S	7	****	****
0630 TO 0700	22.2	0.66	12.12	3.	3.2	S	7	****	****
0700 TO 0730	23.1	-0.26	11.75	2.	4.2	SE	2	****	****
0730 TO 0800	24.8	-0.73	10.96	2.	4.2	SE	2	3.4	4.4
0800 TO 0830	25.7	-1.28	9.22	2.	5.0	SE	2	3.4	4.8
0830 TO 0900	26.7	-1.24	7.53	2.	5.0	SE	2	****	****
0900 TO 0930	26.9	-1.14	6.33	2.	6.0	SE	2	5.2	6.4
0930 TO 1000	27.5	-1.28	4.96	2.	6.0	SE	2	****	****
1000 TO 1030	28.3	-1.28	3.73	2.	7.0	SE	2	****	****
1030 TO 1100	28.8	-1.55	2.07	2.	7.0	SE	2	6.0	7.6
1100 TO 1130	29.2	-1.72	0.63	2.	7.0	SE	2	****	****
1130 TO 1200	29.6	-1.62	-0.53	2.	7.0	SE	2	****	****
1200 TO 1230	30.1	-1.62	-1.54	1.	7.2	SE	2	****	****
1230 TO 1300	30.4	-1.62	-2.26	2.	7.2	SE	2	6.0	7.8
1300 TO 1330	30.7	-1.89	-3.02	1.	6.5	SE	2	5.3	7.8
1330 TO 1400	31.0	-1.65	-3.17	1.	6.5	S	2	****	****
1400 TO 1430	31.2	-1.75	-3.71	1.	6.2	S	2	4.3	6.3
1430 TO 1500	31.5	-1.14	-3.64	1.	6.2	S	2	****	****
1500 TO 1530	31.3	-0.84	-3.06	2.	5.0	S	2	****	****
1530 TO 1600	31.2	-1.21	-2.59	1.	5.0	S	2	4.5	5.8
1600 TO 1630	31.0	-0.80	-1.98	2.	5.2	S	2	****	****
1630 TO 1700	30.6	-0.53	-1.18	1.	5.2	S	2	4.5	5.9
1700 TO 1730	30.1	-0.53	-0.17	1.	4.3	S	2	****	****
1730 TO 1800	29.6	-0.26	1.28	1.	4.3	S	2	****	****
1800 TO 1830	28.1	-0.22	3.08	1.	3.5	S	2	****	****
1830 TO 1900	27.2	-0.09	4.17	2.	3.5	S	2	****	****
1900 TO 1930	27.0	0.08	5.25	1.	2.8	S	2	****	****
1930 TO 2000	26.6	0.05	5.90	2.	2.8	S	2	2.3	3.1
2000 TO 2030	26.2	-0.02	6.59	3.	2.8	S	2	****	****
2030 TO 2100	26.0	0.08	6.73	3.	2.8	S	2	****	****
2100 TO 2130	25.8	0.08	7.27	3.	4.0	S	2	****	****
2130 TO 2200	25.7	0.08	7.92	2.	4.0	S	2	****	****
2200 TO 2230	25.4	0.08	8.47	2.	3.5	S	2	****	****
2230 TO 2300	24.9	0.15	8.79	2.	3.5	S	2	****	****
2300 TO 2330	24.7	0.19	8.94	2.	2.7	S	2	****	****
2330 TO 2400	24.3	0.25	9.22	3.	2.7	S	2	****	****

MINIMUM TEMPERATURE = 22.1 DEG.C

MAXIMUM TEMPERATURE = 31.5 DEG.C

TABLE 8

DATE: 210679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	23.4	0.36	9.73	3.	2.4	SE	2	****	****
0030 TO 0100	23.3	-0.26	10.13	4.	2.4	SE	2	****	****
0100 TO 0130	23.4	-0.12	10.24	3.	3.0	SE	2	****	****
0130 TO 0200	*****	******	******	2.	3.0	SE	2	****	****
0200 TO 0230	23.1	0.08	10.74	2.	3.5	S	4	****	****
0230 TO 0300	23.0	0.02	10.89	2.	3.5	S	4	****	****
0300 TO 0330	22.5	0.08	11.03	2.	3.5	S	4	****	****
0330 TO 0400	22.5	0.02	11.25	2.	3.5	S	4	****	****
0400 TO 0430	22.5	0.05	11.54	2.	3.8	S	4	****	****
0430 TO 0500	22.4	0.02	11.61	2.	3.8	S	4	****	****
0500 TO 0530	22.5	-0.12	11.39	2.	4.0	S	4	****	****
0530 TO 0600	23.3	-0.26	11.03	2.	4.0	S	4	3.8	4.8
0600 TO 0630	23.1	-0.26	10.92	2.	5.2	S	4	****	****
0630 TO 0700	22.5	-0.26	11.39	2.	5.2	S	4	****	****
0700 TO 0730	23.0	-0.60	11.57	2.	4.8	S	4	****	****
0730 TO 0800	23.7	-0.80	10.74	2.	4.8	S	4	****	****
0800 TO 0830	24.3	-0.87	9.88	1.	6.0	S	4	****	****
0830 TO 0900	24.8	-0.87	8.61	1.	6.0	S	4	****	****
0900 TO 0930	25.6	-1.69	6.66	1.	5.6	S	3	4.5	6.9
0930 TO 1000	26.7	-1.55	5.00	2.	5.6	SE	3	****	****
1000 TO 1030	27.0	-1.14	3.73	2.	8.0	SE	3	6.3	7.5
1030 TO 1100	27.4	-1.28	2.54	3.	8.0	SE	3	****	****
1100 TO 1130	27.5	-1.21	1.35	3.	7.2	SE	3	****	****
1130 TO 1200	28.3	-1.11	0.55	2.	7.2	SE	3	****	****
1200 TO 1230	28.9	-1.21	-0.60	2.	5.8	S	3	****	****
1230 TO 1300	29.6	-0.94	-1.90	3.	5.8	SE	3	****	****
1300 TO 1330	29.9	-1.55	-2.08	3.	5.6	SE	3	****	****
1330 TO 1400	30.6	-1.33	-2.59	3.	5.6	SE	3	****	****
1400 TO 1430	31.0	-1.14	-3.85	4.	4.8	SE	3	****	****
1430 TO 1500	31.0	-1.11	-4.07	3.	4.8	SE	3	****	****
1500 TO 1530	31.3	-0.60	-3.78	3.	4.2	SE	3	****	****
1530 TO 1600	31.2	-0.70	-3.42	3.	4.2	SE	3	****	****
1600 TO 1630	31.0	-0.94	-2.84	3.	4.2	S	3	****	****
1630 TO 1700	30.8	-0.60	-2.16	2.	4.2	S	2	****	****
1700 TO 1730	30.1	-0.80	-1.07	2.	3.4	S	2	****	****
1730 TO 1800	29.7	-0.56	0.55	1.	3.4	S	4	****	****
1800 TO 1830	29.2	-0.56	1.53	1.	3.2	S	4	****	****
1830 TO 1900	28.8	-0.49	3.05	1.	3.2	S	4	****	****
1900 TO 1930	27.8	-0.09	3.99	1.	3.6	S	4	3.0	3.9
1930 TO 2000	27.5	-0.26	4.42	1.	3.6	S	4	****	****
2000 TO 2030	26.9	-0.19	5.18	1.	3.9	SE	4	****	****
2030 TO 2100	26.1	-0.26	5.76	2.	3.9	SE	4	****	****
2100 TO 2130	25.5	-0.26	6.55	2.	3.3	SE	4	****	****
2130 TO 2200	25.3	-0.15	7.06	2.	3.3	SE	4	****	****
2200 TO 2230	25.2	0.02	7.24	2.	3.3	SE	4	****	****
2230 TO 2300	24.8	-0.09	7.45	2.	3.3	SE	4	****	****
2300 TO 2330	24.0	-0.26	7.96	2.	3.6	SE	2	****	****
2330 TO 2400	23.6	-0.26	8.61	3.	3.6	SE	2	****	****

MINIMUM TEMPERATURE = 22.4 DEG.C

MAXIMUM TEMPERATURE = 31.3 DEG.C

TABLE 9

DATE: 220679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	23.9	-0.26	8.86	4.	3.5	SE	2	****	****
0030 TO 0100	23.1	-0.26	9.22	4.	3.5	SE	2	****	****
0100 TO 0130	22.8	-0.36	9.59	4.	3.4	SE	2	****	****
0130 TO 0200	23.0	-0.26	9.91	3.	3.4	SE	2	****	****
0200 TO 0230	*****	******	******	3.	3.0	SE	2	****	****
0230 TO 0300	23.4	-0.32	9.98	****	3.0	SE	2	****	****
0300 TO 0330	23.4	-0.26	10.16	****	2.3	SE	2	****	****
0330 TO 0400	22.9	-0.26	10.06	****	2.3	SE	2	****	****
0400 TO 0430	22.6	-0.43	9.66	****	4.5	SE	2	****	****
0430 TO 0500	23.0	-0.53	9.59	4.	4.5	SE	2	****	****
0500 TO 0530	22.8	-0.53	9.51	4.	4.8	SE	2	****	****
0530 TO 0600	22.5	-0.53	9.51	3.	4.8	SE	2	****	****
0600 TO 0630	23.0	-0.49	9.55	3.	4.6	SE	2	****	****
0630 TO 0700	23.2	-0.46	9.55	3.	4.6	SE	2	****	****
0700 TO 0730	23.2	-0.53	9.77	3.	4.8	SE	2	3.0	3.5
0730 TO 0800	23.4	-0.53	9.59	3.	4.8	SE	2	****	****
0800 TO 0830	23.8	-0.60	9.15	3.	5.3	SE	2	****	****
0830 TO 0900	24.4	-0.77	8.29	2.	5.3	SE	2	****	****
0900 TO 0930	25.6	-1.21	6.37	****	6.4	SE	2	****	****
0930 TO 1000	25.9	-1.31	4.89	****	6.4	SE	2	****	****
1000 TO 1030	26.9	-1.45	3.01	****	5.8	SE	3	****	****
1030 TO 1100	28.3	-1.21	1.64	****	5.8	SE	3	****	****
1100 TO 1130	*****	******	******	****	5.6	SE	3	****	****
1130 TO 1200	*****	******	******	****	5.6	SE	3	****	****
1200 TO 1230	30.1	-1.18	-2.41	****	4.8	SE	3	****	****
1230 TO 1300	30.5	-0.94	-3.85	****	4.8	SE	3	****	****
1300 TO 1330	30.9	-1.45	-4.50	****	4.5	SE	3	3.9	4.7
1330 TO 1400	30.6	-1.35	-4.43	****	4.5	SE	3	****	****
1400 TO 1430	31.2	-0.94	-3.96	****	3.9	SE	3	****	****
1430 TO 1500	31.3	-0.77	-4.22	****	3.9	SE	3	****	****
1500 TO 1530	31.7	-0.63	-4.03	****	4.0	SE	3	****	****
1530 TO 1600	31.8	-0.46	-3.67	****	4.0	SE	3	****	****
1600 TO 1630	31.3	-0.39	-2.88	****	3.4	SE	3	****	****
1630 TO 1700	30.1	-0.39	-2.63	****	3.4	SE	3	****	****
1700 TO 1730	29.4	-0.32	-1.51	3.	2.3	SE	3	****	****
1730 TO 1800	29.1	-0.46	0.12	4.	2.3	SE	2	****	****
1800 TO 1830	28.5	-0.26	1.31	4.	2.8	S	2	****	****
1830 TO 1900	27.5	0.02	2.72	4.	2.8	S	2	****	****
1900 TO 1930	27.1	-0.05	3.66	4.	2.6	SE	2	1.8	2.7
1930 TO 2000	26.8	0.02	4.09	5.	2.6	SE	2	****	****
2000 TO 2030	26.5	0.05	5.03	4.	2.4	SE	2	****	****
2030 TO 2100	26.3	0.08	5.58	4.	2.4	SE	2	****	****
2100 TO 2130	26.4	-0.05	6.33	4.	2.1	SE	2	****	****
2130 TO 2200	26.1	0.19	6.70	4.	2.1	SE	2	****	****
2200 TO 2230	25.5	0.32	6.98	4.	1.8	S	2	****	****
2230 TO 2300	24.8	0.56	7.24	5.	1.8	S	2	****	****
2300 TO 2330	24.9	0.76	7.78	6.	2.2	S	7	****	****
2330 TO 2400	24.7	0.87	8.10	5.	2.2	S	7	****	****

MINIMUM TEMPERATURE = 22.5 DEG.C

MAXIMUM TEMPERATURE = 31.8 DEG.C

TABLE 10

DATE: 230679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	24.4	0.76	8.68	4.	2.5	S	7	****	****
0030 TO 0100	24.2	0.73	9.08	5.	2.5	S	7	****	****
0100 TO 0130	23.8	0.76	9.51	4.	2.2	S	7	****	****
0130 TO 0200	23.4	0.70	9.69	4.	2.2	S	7	****	****
0200 TO 0230	23.0	0.56	9.91	4.	1.4	SE	9	****	****
0230 TO 0300	22.4	0.42	10.31	5.	1.4	SE	9	****	****
0300 TO 0330	21.8	0.66	10.78	7.	1.0	SE	8	****	****
0330 TO 0400	21.0	0.25	11.10	9.	1.0	SE	8	****	****
0400 TO 0430	21.2	0.25	11.50	8.	1.2	SE	8	****	****
0430 TO 0500	21.3	0.32	11.57	8.	1.2	SE	8	1.3	1.9
0500 TO 0530	21.3	0.08	11.75	10.	1.4	SE	8	****	****
0530 TO 0600	21.2	0.22	12.04	17.	1.4	SE	2	0.6	1.0
0600 TO 0630	21.1	0.08	12.04	22.	2.5	SE	2	****	****
0630 TO 0700	21.7	0.08	12.08	17.	2.5	SE	2	****	****
0700 TO 0730	22.1	0.02	12.19	12.	2.1	SE	2	****	****
0730 TO 0800	23.5	-0.80	11.07	8.	2.1	SE	2	2.8	3.4
0800 TO 0830	24.6	-1.21	9.84	6.	3.9	SE	2	****	****
0830 TO 0900	25.2	-1.52	7.89	4.	3.9	SE	2	****	****
0900 TO 0930	26.0	-1.35	6.59	4.	5.0	SE	2	****	****
0930 TO 1000	26.5	-1.28	4.78	4.	5.0	SE	2	****	****
1000 TO 1030	26.8	-1.21	3.88	4.	5.3	SE	2	****	****
1030 TO 1100	27.6	-2.23	1.35	3.	5.3	SE	2	****	****
1100 TO 1130	28.4	-1.99	-0.24	3.	4.4	SE	3	****	****
1130 TO 1200	29.2	-1.55	-1.61	3.	4.4	SE	3	****	****
1200 TO 1230	29.7	-1.24	-3.06	****	3.9	SE	1	****	****
1230 TO 1300	30.2	-0.94	-4.40	5.	3.9	SE	1	3.3	3.4
1300 TO 1330	30.7	-0.94	-4.72	5.	3.4	E	1	****	****
1330 TO 1400	31.1	-1.38	-4.94	4.	3.4	SE	1	****	****
1400 TO 1430	31.8	-0.87	-5.34	4.	3.3	E	1	****	****
1430 TO 1500	31.9	-0.60	-5.95	4.	3.3	E	1	****	****
1500 TO 1530	31.5	-0.77	-5.77	5.	3.0	E	1	****	****
1530 TO 1600	31.2	-0.49	-4.87	5.	3.0	E	1	****	****
1600 TO 1630	31.0	-0.43	-4.43	5.	2.5	E	1	****	****
1630 TO 1700	30.9	-0.02	-3.67	7.	2.5	E	1	****	****
1700 TO 1730	30.9	0.05	-2.34	8.	1.7	E	3	****	****
1730 TO 1800	30.1	-0.02	-0.31	12.	1.7	E	3	****	****
1800 TO 1830	28.2	0.02	1.35	19.	0.8	E	9	****	****
1830 TO 1900	27.0	0.36	2.36	17.	0.8	E	10	0.6	0.6
1900 TO 1930	26.7	0.59	3.08	9.	1.5	SW	10	****	****
1930 TO 2000	25.8	-0.32	4.06	11.	1.5	N	2	****	****
2000 TO 2030	25.2	-0.26	4.82	5.	1.3	N	9	****	****
2030 TO 2100	24.7	0.02	5.54	8.	1.3	N	9	****	****
2100 TO 2130	24.2	0.02	5.90	12.	1.1	NE	8	****	****
2130 TO 2200	23.0	0.63	6.73	9.	1.1	SE	8	****	****
2200 TO 2230	22.3	0.12	7.49	7.	0.7	SE	8	****	****
2230 TO 2300	21.6	-0.49	7.92	12.	0.7	E	8	****	****
2300 TO 2330	21.4	-0.15	8.47	12.	0.7	SE	10	****	****
2330 TO 2400	21.2	0.05	8.65	8.	0.7	SE	10	****	****

MINIMUM TEMPERATURE = 21.0 DEG.C

MAXIMUM TEMPERATURE = 31.9 DEG.C

TABLE 11

DATE: 240679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	21.3	0.80	9.30	8.	1.1	E	10	****	****
0030 TO 0100	21.0	-0.26	9.59	11.	1.1	E	8	****	****
0100 TO 0130	20.9	-0.05	9.98	14.	1.1	SE	8	****	****
0130 TO 0200	20.2	0.36	10.24	13.	1.1	SE	8	****	****
0200 TO 0230	20.6	0.73	10.63	11.	2.1	S	7	****	****
0230 TO 0300	21.3	0.15	10.78	9.	2.1	S	7	****	****
0300 TO 0330	21.4	0.15	10.85	5.	2.4	S	7	****	****
0330 TO 0400	21.2	0.08	10.92	4.	2.4	S	7	****	****
0400 TO 0430	21.2	0.05	11.03	4.	1.8	S	7	****	****
0430 TO 0500	21.0	0.19	11.32	4.	1.8	SE	9	1.5	2.0
0500 TO 0530	20.9	0.05	11.50	4.	2.2	SE	9	****	****
0530 TO 0600	20.3	0.08	11.65	3.	2.2	SE	9	1.8	2.3
0600 TO 0630	20.4	-0.02	11.86	3.	0.9	S	8	****	****
0630 TO 0700	19.9	-0.09	12.12	4.	0.9	S	8	****	****
0700 TO 0730	20.5	0.36	12.37	11.	0.7	SW	8	****	****
0730 TO 0800	23.6	-0.97	11.75	14.	0.7	SW	8	1.0	1.0
0800 TO 0830	26.0	-1.72	9.88	10.	1.6	SE	8	****	****
0830 TO 0900	*****	******	******	11.	1.6	SE	3	****	****
0900 TO 0930	26.1	-0.87	5.90	11.	3.0	SE	3	****	****
0930 TO 1000	26.7	-1.35	4.24	6.	3.0	SE	3	****	****
1000 TO 1030	26.4	-0.80	[illegible].76	5.	2.9	SE	3	****	****
1030 TO 1100	27.5	-1.18	1.03	4.	2.9	SE	3	****	****
1100 TO 1130	27.9	-0.70	0.45	****	2.9	SE	3	****	****
1130 TO 1200	28.9	-0.63	-0.82	****	2.9	SE	3	****	****
1200 TO 1230	*****	******	******	****	2.9	SE	3	****	****
1230 TO 1300	30.0	-1.01	-2.70	****	2.9	SE	3	****	****
1300 TO 1330	31.2	-0.80	-4.79	****	2.7	SE	1	****	****
1330 TO 1400	31.5	-1.21	-6.24	****	2.7	SE	1	****	****
1400 TO 1430	32.0	-0.84	-6.71	19.	2.3	SE	1	****	****
1430 TO 1500	32.4	0.05	-6.89	14.	2.3	SE	1	****	****
1500 TO 1530	32.3	-0.02	-6.60	12.	1.8	S	1	****	****
1530 TO 1600	32.0	0.05	-6.06	12.	1.8	S	1	****	****
1600 TO 1630	32.0	0.19	-5.15	12.	2.5	SE	1	****	****
1630 TO 1700	31.5	0.05	-4.47	26.	2.5	E	1	****	****
1700 TO 1730	30.4	0.08	-2.59	28.	1.2	NE	6	****	****
1730 TO 1800	30.2	0.08	-0.60	17.	1.2	NE	6	****	****
1800 TO 1830	28.3	0.02	0.92	13.	2.9	NE	7	****	****
1830 TO 1900	26.2	-0.15	2.61	8.	2.9	NE	4	****	****
1900 TO 1930	25.4	-0.19	3.62	7.	1.2	N	9	****	****
1930 TO 2000	25.0	-0.26	4.38	7.	1.2	NE	9	****	****
2000 TO 2030	24.7	-0.22	5.25	9.	1.1	NE	8	****	****
2030 TO 2100	24.3	0.08	5.86	8.	1.1	N	8	****	****
2100 TO 2130	23.9	0.25	6.98	11.	1.2	NE	8	****	****
2130 TO 2200	23.5	0.70	7.13	13.	1.2	NE	8	****	****
2200 TO 2230	23.0	1.11	7.35	9.	1.3	W	8	****	****
2230 TO 2300	22.1	0.42	7.96	11.	1.3	E	8	****	****
2300 TO 2330	21.4	0.15	8.57	11.	0.9	SW	8	****	****
2330 TO 2400	21.3	1.04	9.15	8.	0.9	E	8	****	****

MINIMUM TEMPERATURE = 19.9 DEG.C

MAXIMUM TEMPERATURE = 32.4 DEG.C

TABLE 12

DATE: 250679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	20.5	0.36	9.51	7.	0.8	S	8	****	****
0030 TO 0100	19.8	0.08	9.91	8.	0.8	SE	8	****	****
0100 TO 0130	20.2	0.12	10.13	10.	1.0	SE	8	****	****
0130 TO 0200	19.6	0.12	10.63	11.	1.0	E	8	****	****
0200 TO 0230	19.5	0.12	10.78	12.	0.6	S	8	****	****
0230 TO 0300	19.3	0.08	10.85	9.	0.6	W	8	****	****
0300 TO 0330	19.4	0.08	10.96	9.	0.8	NE	10	****	****
0330 TO 0400	19.0	-0.12	11.14	9.	0.8	SE	10	****	****
0400 TO 0430	19.3	0.15	11.43	7.	1.1	SE	8	****	****
0430 TO 0500	19.7	0.19	11.61	7.	1.1	SE	8	****	****
0500 TO 0530	20.2	0.08	11.61	7.	0.9	S	8	****	****
0530 TO 0600	20.2	0.15	11.68	8.	0.9	W	8	****	****
0600 TO 0630	20.4	0.87	11.86	8.	1.0	NW	8	****	****
0630 TO 0700	19.6	0.49	12.12	12.	1.0	W	8	****	****
0700 TO 0730	21.9	-0.22	11.75	22.	0.6	E	10	****	****
0730 TO 0800	*****	******	******	19.	0.6	W	8	****	****
0800 TO 0830	27.5	-1.45	8.50	14.	1.8	SE	8	****	****
0830 TO 0900	27.3	-1.24	6.23	34.	1.8	E	2	****	****
0900 TO 0930	27.7	-1.24	4.96	34.	3.5	E	2	****	****
0930 TO 1000	28.4	-1.28	2.72	16.	3.5	E	2	****	****
1000 TO 1030	29.1	-1.28	0.92	23.	2.9	E	3	****	****
1030 TO 1100	30.9	-1.45	-0.89	21.	2.9	E	3	****	****
1100 TO 1130	30.8	-1.28	-2.99	20.	3.7	E	3	****	****
1130 TO 1200	31.0	-1.21	-3.67	29.	3.7	E	3	****	****
1200 TO 1230	31.9	-0.94	-4.79	12.	3.6	E	3	****	****
1230 TO 1300	32.0	-0.97	-4.94	10.	3.6	E	3	****	****
1300 TO 1330	32.3	-0.43	-5.95	11.	3.2	E	3	****	****
1330 TO 1400	32.0	-0.87	-4.76	11.	3.2	E	3	****	****
1400 TO 1430	32.9	-0.63	-6.13	10.	2.9	E	3	****	****
1430 TO 1500	32.7	-0.60	-6.24	9.	2.9	E	3	****	****
1500 TO 1530	32.7	-0.49	-5.23	9.	2.7	E	3	****	****
1530 TO 1600	32.8	-0.32	-4.87	8.	2.7	E	3	****	****
1600 TO 1630	33.0	0.02	-4.50	7.	2.4	E	3	****	****
1630 TO 1700	32.4	-0.05	-4.07	9.	2.4	NE	4	****	****
1700 TO 1730	32.0	-0.19	-3.31	12.	2.5	NE	4	****	****
1730 TO 1800	31.6	0.02	-2.19	8.	2.5	NE	4	****	****
1800 TO 1830	30.7	0.05	-0.75	5.	2.6	NE	4	****	****
1830 TO 1900	29.7	-0.02	0.55	4.	2.6	NE	4	****	****
1900 TO 1930	28.7	-0.02	1.71	4.	3.2	NE	4	****	****
1930 TO 2000	27.7	-0.02	2.65	3.	3.2	NE	4	****	****
2000 TO 2030	27.[illegible]	-0.02	3.26	3.	1.4	NE	2	****	****
2030 TO 2100	26.[illegible]	-0.02	3.81	4.	1.4	NE	2	****	****
2100 TO 2130	26.2	-0.02	4.24	5.	1.1	NE	2	****	****
2130 TO 2200	25.6	0.05	4.89	6.	1.1	NE	7	****	****
2200 TO 2230	25.2	0.15	5.54	7.	1.2	NE	7	****	****
2230 TO 2300	25.0	0.22	5.68	7.	1.2	E	3	****	****
2300 TO 2330	25.5	0.06	6.52	9.	1.0	E	3	****	****
2330 TO 2400	24.9	0.08	6.98	9.	1.0	NE	6	****	****

MINIMUM TEMPERATURE = 19.0 DEG.C

MAXIMUM TEMPERATURE = 33.0 DEG.C

TABLE 13

DATE: 260679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	24.8	0.12	7.24	7.	0.6	E	10	****	****
0030 TO 0100	24.2	0.49	7.27	7.	0.6	SE	10	****	****
0100 TO 0130	24.1	0.25	6.98	6.	0.7	SE	8	****	****
0130 TO 0200	24.0	0.08	7.06	6.	0.7	S	10	****	****
0200 TO 0230	24.0	0.12	7.53	5.	0.9	S	10	****	****
0230 TO 0300	23.8	0.25	7.71	6.	0.9	SW	10	****	****
0300 TO 0330	23.4	0.42	7.78	7.	0.6	W	10	****	****
0330 TO 0400	23.2	0.25	8.14	5.	0.6	S	10	****	****
0400 TO 0430	22.9	0.08	8.50	5.	0.6	W	10	****	****
0430 TO 0500	22.8	0.08	8.97	5.	0.6	NE	8	****	****
0500 TO 0530	23.0	0.56	9.01	7.	0.8	E	8	0.4	1.3
0530 TO 0600	23.0	0.42	9.19	13.	0.8	S	8	****	****
0600 TO 0630	23.8	0.66	9.22	16.	1.7	SE	2	0.4	1.1
0630 TO 0700	24.3	0.08	9.12	13.	1.7	SE	2	2.0	2.6
0700 TO 0730	24.8	-0.02	8.72	8.	1.9	SE	2	****	****
0730 TO 0800	26.1	-0.26	8.21	9.	1.9	E	4	****	****
0800 TO 0830	27.5	-0.60	6.84	9.	2.9	E	3	****	****
0830 TO 0900	27.6	-0.70	5.50	7.	2.9	E	3	****	****
0900 TO 0930	28.0	-0.94	3.88	10.	3.0	E	3	****	****
0930 TO 1000	29.2	-1.07	1.96	16.	3.0	E	3	****	****
1000 TO 1030	*****	******	******	24.	3.3	SE	3	****	****
1030 TO 1100	30.0	-1.24	-1.54	22.	3.3	SE	3	****	****
1100 TO 1130	31.0	-1.11	-3.06	15.	3.2	SE	3	****	****
1130 TO 1200	31.9	-0.94	-4.32	14.	3.2	SE	3	****	****
1200 TO 1230	32.8	-0.77	-5.88	10.	3.2	SE	3	****	****
1230 TO 1300	32.9	-0.66	-6.71	8.	3.2	SE	3	****	****
1300 TO 1330	33.4	-0.66	-6.89	6.	3.4	SE	3	****	****
1330 TO 1400	33.6	-0.60	-6.96	6.	3.4	E	3	****	****
1400 TO 1430	34.0	-0.60	-7.11	6.	3.7	E	3	****	****
1430 TO 1500	33.2	-0.53	-6.71	9.	3.7	E	3	****	****
1500 TO 1530	33.7	-0.19	-5.84	9.	3.2	E	3	****	****
1530 TO 1600	33.6	-0.12	-4.87	7.	3.2	E	3	****	****
1600 TO 1630	33.5	0.02	-4.43	6.	3.4	E	3	****	****
1630 TO 1700	33.8	0.15	-4.32	7.	3.4	E	3	****	****
1700 TO 1730	33.2	0.12	-3.85	10.	3.0	E	3	****	****
1730 TO 1800	32.8	0.25	-2.59	9.	3.0	E	3	****	****
1800 TO 1830	31.8	0.02	-1.25	10.	1.5	E	3	****	****
1830 TO 1900	31.0	0.05	-0.02	9.	1.5	E	8	1.0	1.6
1900 TO 1930	30.3	0.19	0.99	8.	1.2	E	8	****	****
1930 TO 2000	29.3	0.15	1.96	9.	1.2	NE	9	****	****
2000 TO 2030	28.7	0.12	2.65	8.	0.6	E	8	****	****
2030 TO 2100	27.8	0.39	3.48	7.	0.6	SE	8	****	****
2100 TO 2130	27.3	0.66	4.02	5.	1.2	SE	8	****	****
2130 TO 2200	26.9	0.25	4.71	6.	1.2	E	8	****	****
2200 TO 2230	26.3	0.05	5.03	6.	1.1	E	8	****	****
2230 TO 2300	26.5	0.08	5.50	5.	1.1	E	8	****	****
2300 TO 2330	25.9	0.12	5.79	5.	1.5	SE	9	****	****
2330 TO 2400	26.0	0.05	5.97	6.	1.5	SE	3	****	****

MINIMUM TEMPERATURE = 22.8 DEG.C

MAXIMUM TEMPERATURE = 34.0 DEG.C

TABLE 14

DATE: 270679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	25.8	0.05	6.33	6.	1.3	SE	3	****	****
0030 TO 0100	25.7	0.12	6.55	5.	1.3	SE	3	****	****
0100 TO 0130	25.5	0.12	6.77	5.	1.2	SE	3	****	****
0130 TO 0200	25.4	0.15	7.09	4.	1.2	SE	3	****	****
0200 TO 0230	25.2	0.19	7.35	3.	1.1	S	3	****	****
0230 TO 0300	24.7	0.63	7.71	4.	1.1	S	3	****	****
0300 TO 0330	24.8	0.49	7.85	3.	2.0	SE	2	****	****
0330 TO 0400	24.8	0.12	7.96	3.	2.0	S	2	****	****
0400 TO 0430	24.8	0.08	8.03	3.	2.0	S	2	****	****
0430 TO 0500	24.7	0.08	8.25	3.	2.0	SE	2	****	****
0500 TO 0530	24.4	-0.09	8.39	6.	2.1	SE	2	****	****
0530 TO 0600	24.3	-0.19	8.43	10.	2.1	SE	2	****	****
0600 TO 0630	24.4	0.29	8.61	6.	1.8	S	2	****	****
0630 TO 0700	24.5	0.70	8.94	3.	1.8	S	9	****	****
0700 TO 0730	25.7	-0.02	9.01	2.	2.4	S	9	****	****
0730 TO 0800	27.4	-0.87	7.67	2.	2.4	SE	2	****	****
0800 TO 0830	*****	******	******	****	3.2	SE	3	****	****
0830 TO 0900	*****	******	******	****	3.2	SE	3	****	****
0900 TO 0930	*****	******	******	****	4.8	SE	3	****	****
0930 TO 1000	*****	******	******	****	4.8	E	3	****	****
1000 TO 1030	*****	******	******	****	4.4	E	3	3.2	4.2
1030 TO 1100	*****	******	******	****	4.4	E	3	****	****
1100 TO 1130	*****	******	******	****	4.5	E	3	****	****
1130 TO 1200	*****	******	******	****	4.5	E	3	****	****
1200 TO 1230	33.2	-0.66	-4.94	6.	3.9	E	3	****	****
1230 TO 1300	32.8	-0.77	-6.02	4.	3.9	E	3	****	****
1300 TO 1330	32.6	-0.77	-6.60	4.	3.7	SE	3	****	****
1330 TO 1400	33.8	-1.01	-6.82	3.	3.7	SE	3	****	****
1400 TO 1430	34.3	-0.94	-6.56	3.	3.6	E	3	****	****
1430 TO 1500	34.0	-0.73	-6.78	3.	3.6	E	3	****	****
1500 TO 1530	34.2	-0.02	-6.24	4.	3.1	E	3	****	****
1530 TO 1600	34.1	0.05	-5.48	4.	3.1	E	3	****	****
1600 TO 1630	34.1	0.12	-4.25	4.	2.8	E	3	****	****
1630 TO 1700	33.1	0.08	-2.70	5.	2.8	SE	3	****	****
1700 TO 1730	30.7	-0.19	-0.46	5.	2.3	SE	2	****	****
1730 TO 1800	*****	******	******	4.	2.3	E	2	****	****
1800 TO 1830	*****	******	******	5.	3.1	NE	3	****	****
1830 TO 1900	*****	******	******	4.	3.1	NE	3	2.8	3.3
1900 TO 1930	28.4	-0.15	1.38	2.	2.5	NE	3	****	****
1930 TO 2000	27.9	-0.12	2.36	2.	2.5	NE	3	****	****
2000 TO 2030	27.5	-0.09	3.08	4.	2.2	NE	3	****	****
2030 TO 2100	26.9	-0.09	3.88	6.	2.2	NE	3	****	****
2100 TO 2130	26.5	-0.09	4.64	6.	2.1	E	3	****	****
2130 TO 2200	26.0	-0.09	4.96	7.	2.1	E	3	****	****
2200 TO 2230	25.8	-0.09	5.54	6.	2.3	E	3	****	****
2230 TO 2300	25.7	-0.09	5.61	7.	2.3	E	3	****	****
2300 TO 2330	25.6	0.02	5.79	8.	1.5	E	3	****	****
2330 TO 2400	25.1	-0.02	5.97	8.	1.5	E	3	****	****

MINIMUM TEMPERATURE = 24.3 DEG.C

MAXIMUM TEMPERATURE = 34.3 DEG.C

TABLE 15

DATE: 280679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	25.0	0.02	6.33	7.	1.3	NE	2	****	****
0030 TO 0100	24.9	-0.12	6.59	6.	1.3	E	2	****	****
0100 TO 0130	24.8	-0.09	6.73	7.	1.7	E	2	****	****
0130 TO 0200	24.2	0.05	7.35	7.	1.7	SE	2	****	****
0200 TO 0230	*****	******	******	6.	2.0	SE	2	****	****
0230 TO 0300	*****	******	******	****	2.0	SE	2	****	****
0300 TO 0330	*****	******	******	****	1.9	SE	2	****	****
0330 TO 0400	*****	******	******	****	1.9	SE	2	****	****
0400 TO 0430	23.9	0.12	8.68	5.	1.6	SE	2	****	****
0430 TO 0500	24.6	0.12	9.04	8.	1.6	SE	8	****	****
0500 TO 0530	24.5	0.12	9.30	7.	1.2	E	8	1.3	1.9
0530 TO 0600	24.0	0.25	9.37	8.	1.2	E	8	0.5	1.0
0600 TO 0630	24.2	0.29	9.59	9.	1.9	SE	2	****	****
0630 TO 0700	23.8	0.36	9.91	9.	1.9	SE	2	****	****
0700 TO 0730	24.8	-0.05	9.91	8.	2.2	SE	2	****	****
0730 TO 0800	*****	******	******	****	2.2	E	2	****	****
0800 TO 0830	*****	******	******	****	1.8	E	2	****	****
0830 TO 0900	*****	******	******	****	1.8	E	3	****	****
0900 TO 0930	30.0	-0.46	4.53	7.	3.5	E	3	****	****
0930 TO 1000	30.4	-0.53	2.58	6.	3.5	E	3	****	****
1000 TO 1030	30.9	-0.77	0.92	5.	5.1	E	3	****	****
1030 TO 1100	31.5	-0.87	-0.64	4.	5.1	E	3	****	****
1100 TO 1130	31.5	-1.07	-2.70	2.	5.7	E	3	****	****
1130 TO 1200	32.2	-0.94	-3.46	3.	5.7	E	3	****	****
1200 TO 1230	32.1	-0.73	-3.78	2.	6.6	E	3	****	****
1230 TO 1300	32.7	-0.80	-4.79	3.	6.6	SE	3	5.1	6.4
1300 TO 1330	32.9	-0.73	-5.23	3.	5.7	SE	3	****	****
1330 TO 1400	*****	******	******	2.	5.7	SE	3	****	****
1400 TO 1430	*****	******	******	2.	5.8	SE	3	****	****
1430 TO 1500	*****	******	******	2.	5.8	SE	3	****	****
1500 TO 1530	33.7	-0.49	-4.76	2.	5.1	SE	3	****	****
1530 TO 1600	33.7	-0.43	-4.50	2.	5.1	SE	3	****	****
1600 TO 1630	33.6	-0.36	-4.03	2.	4.2	SE	3	****	****
1630 TO 1700	33.3	-0.19	-2.88	1.	4.2	SE	3	****	****
1700 TO 1730	32.9	0.02	-1.61	1.	3.4	SE	3	****	****
1730 TO 1800	32.6	0.08	-0.53	2.	3.4	SE	2	****	****
1800 TO 1830	31.6	0.08	0.19	3.	2.1	SE	2	****	****
1830 TO 1900	29.7	0.25	1.46	3.	2.1	SE	2	****	****
1900 TO 1930	28.4	0.87	2.83	4.	1.6	E	8	0.7	1.5
1930 TO 2000	27.7	0.25	3.81	8.	1.6	NE	4	****	****
2000 TO 2030	26.9	-0.02	4.31	7.	2.0	NE	4	****	****
2030 TO 2100	26.1	-0.15	4.78	4.	2.0	NE	4	****	****
2100 TO 2130	25.4	0.02	5.43	7.	0.8	NE	6	****	****
2130 TO 2200	25.1	0.19	5.90	10.	0.8	NE	6	****	****
2200 TO 2230	24.7	0.36	6.37	13.	1.0	E	6	****	****
2230 TO 2300	24.5	0.32	6.62	10.	1.0	SE	6	****	****
2300 TO 2330	24.2	0.15	7.13	9.	1.0	SE	6	****	****
2330 TO 2400	23.9	0.08	7.71	8.	1.0	E	6	****	****

MINIMUM TEMPERATURE = 23.8 DEG.C

MAXIMUM TEMPERATURE = 33.7 DEG.C

TABLE 16

DATE: 290679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	23.3	0.19	7.92	8.	0.9	E	6	****	****
0030 TO 0100	*****	******	******	6.	0.9	E	6	****	****
0100 TO 0130	23.1	0.08	8.76	5.	2.0	E	9	****	****
0130 TO 0200	23.1	0.12	9.22	6.	2.0	E	4	****	****
0200 TO 0230	22.9	0.22	9.51	4.	1.1	SE	9	****	****
0230 TO 0300	23.1	0.15	9.91	3.	1.1	S	9	****	****
0300 TO 0330	*****	******	******	5.	1.2	S	9	****	****
0330 TO 0400	22.8	0.29	10.16	6.	1.2	S	7	****	****
0400 TO 0430	22.5	0.80	10.56	7.	0.7	W	5	****	****
0430 TO 0500	22.0	1.00	10.85	8.	0.7	W	10	****	****
0500 TO 0530	21.9	0.90	11.25	8.	1.0	W	10	0.5	0.7
0530 TO 0600	21.7	1.11	11.43	****	1.0	W	10	****	****
0600 TO 0630	22.0	1.48	11.65	****	1.0	W	10	0.7	1.6
0630 TO 0700	21.2	1.94	11.75	****	1.0	SW	8	0.5	0.8
0700 TO 0730	23.9	0.32	11.68	****	0.8	SW	8	0.3	0.3
0730 TO 0800	*****	******	******	****	0.8	SE	8	****	****
0800 TO 0830	*****	******	******	****	3.2	SE	2	****	****
0830 TO 0900	*****	******	******	****	3.2	SE	2	****	****
0900 TO 0930	*****	******	******	****	4.9	SE	2	****	****
0930 TO 1000	*****	******	******	****	4.9	SE	3	****	****
1000 TO 1030	*****	******	******	****	5.9	SE	3	****	****
1030 TO 1100	*****	******	******	****	5.9	SE	3	****	****
1100 TO 1130	*****	******	******	****	6.5	SE	3	****	****
1130 TO 1200	*****	******	******	****	6.5	SE	3	****	****
1200 TO 1230	*****	******	******	****	5.4	SE	3	****	****
1230 TO 1300	*****	******	******	****	5.4	SE	3	****	****
1300 TO 1330	*****	******	******	****	5.0	SE	3	****	****
1330 TO 1400	*****	******	******	****	5.0	SE	3	4.0	5.3
1400 TO 1430	32.0	-0.60	-4.72	****	4.6	SE	3	****	****
1430 TO 1500	31.9	-0.53	-4.61	****	4.6	SE	3	****	****
1500 TO 1530	31.9	-0.32	-4.14	****	4.3	SE	3	****	****
1530 TO 1600	31.8	0.05	-3.75	****	4.3	SE	3	****	****
1600 TO 1630	31.5	0.08	-3.06	****	3.9	SE	3	****	****
1630 TO 1700	31.6	0.08	-2.63	****	3.9	SE	3	****	****
1700 TO 1730	31.0	0.05	-1.07	****	3.7	SE	2	****	****
1730 TO 1800	29.4	-0.02	-0.17	****	3.7	SE	2	****	****
1800 TO 1830	29.2	0.08	1.82	****	2.9	SE	2	****	****
1830 TO 1900	28.3	0.05	2.72	****	2.9	SE	2	****	****
1900 TO 1930	27.8	0.19	3.91	****	2.2	S	7	1.3	2.3
1930 TO 2000	27.3	0.80	4.96	****	2.2	S	7	****	****
2000 TO 2030	26.8	0.90	5.50	2.	1.3	NE	8	****	****
2030 TO 2100	26.2	0.73	5.90	3.	1.3	NE	8	****	****
2100 TO 2130	25.8	0.42	6.30	5.	1.0	NE	8	****	****
2130 TO 2200	25.0	0.08	6.52	5.	1.0	NE	10	****	****
2200 TO 2230	24.8	0.22	6.62	5.	1.4	S	8	****	****
2230 TO 2300	25.0	0.36	6.77	4.	1.4	SE	8	****	****
2300 TO 2330	24.9	0.12	7.06	3.	2.7	SE	8	****	****
2330 TO 2400	25.2	0.08	7.24	2.	2.7	SE	2	****	****

MINIMUM TEMPERATURE = 21.2 DEG.C

MAXIMUM TEMPERATURE = 32.0 DEG.C

TABLE 17

DATE: 300679

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	25.7	0.08	7.35	1.	3.7	SE	2	****	****
0030 TO 0100	25.6	0.08	7.60	1.	3.7	SE	2	****	****
0100 TO 0130	24.7	0.08	7.89	1.	3.6	SE	2	****	****
0130 TO 0200	24.3	-0.02	8.32	1.	3.6	SE	2	****	****
0200 TO 0230	23.9	0.02	8.50	1.	3.0	SE	2	****	****
0230 TO 0300	23.9	0.08	8.61	2.	3.0	SE	2	****	****
0300 TO 0330	23.8	0.08	9.15	2.	2.0	S	7	****	****
0330 TO 0400	23.7	0.08	9.37	2.	2.0	S	7	****	****
0400 TO 0430	23.4	0.08	9.88	2.	2.0	SE	7	****	****
0430 TO 0500	23.2	0.36	10.02	2.	2.0	SE	9	****	****
0500 TO 0530	23.1	0.83	10.63	2.	1.3	SE	9	1.1	1.7
0530 TO 0600	22.8	0.87	11.10	2.	1.3	S	9	0.5	0.6
0600 TO 0630	22.5	0.29	11.75	4.	0.9	S	9	0.7	1.1
0630 TO 0700	21.6	0.90	12.22	3.	0.9	S	9	0.5	0.9
0700 TO 0730	23.9	0.70	12.30	4.	1.4	S	9	0.4	1.0
0730 TO 0800	27.0	-1.28	11.93	3.	1.4	SE	9	****	****
0800 TO 0830	27.4	-1.01	9.77	3.	4.2	E	3	****	****
0830 TO 0900	27.4	-0.63	7.67	3.	4.2	E	3	****	****
0900 TO 0930	28.2	-0.66	5.68	2.	4.9	E	3	****	****
0930 TO 1000	28.4	-1.11	3.73	2.	4.9	E	3	****	****
1000 TO 1030	28.9	-1.11	2.36	2.	6.1	E	3	****	****
1030 TO 1100	29.5	-1.21	0.73	2.	6.1	E	3	****	****
1100 TO 1130	30.0	-1.01	-0.64	2.	5.7	SE	3	****	****
1130 TO 1200	30.1	-1.07	-1.51	1.	5.7	SE	3	****	****
1200 TO 1230	30.5	-0.94	-2.59	2.	4.9	SE	3	****	****
1230 TO 1300	31.3	-0.77	-3.71	3.	4.9	E	3	****	****
1300 TO 1330	*****	******	******	4.	5.0	E	3	****	****
1330 TO 1400	31.5	-1.01	-5.88	4.	5.0	SE	3	3.4	4.4
1400 TO 1430	31.9	-0.63	-5.95	3.	4.1	E	3	****	****
1430 TO 1500	31.9	-0.60	-6.09	2.	4.1	SE	3	****	****
1500 TO 1530	31.8	-0.60	-5.26	2.	4.1	SE	3	****	****
1530 TO 1600	31.7	-0.46	-4.87	3.	4.1	E	3	****	****
1600 TO 1630	31.8	0.02	-4.14	6.	3.2	E	3	****	****
1630 TO 1700	31.6	0.15	-2.99	5.	3.2	E	3	****	****
1700 TO 1730	31.3	0.29	-1.72	5.	2.3	E	3	****	****
1730 TO 1800	30.6	0.25	-0.53	5.	2.3	E	3	****	****
1800 TO 1830	29.5	0.08	1.28	5.	1.1	E	9	****	****
1830 TO 1900	*****	******	******	6.	1.1	E	10	****	****
1900 TO 1930	26.9	0.12	3.41	7.	2.2	NE	2	1.3	2.0
1930 TO 2000	26.6	0.15	4.24	9.	2.2	NE	2	****	****
2000 TO 2030	25.7	0.08	4.93	8.	1.5	NE	2	****	****
2030 TO 2100	25.4	0.12	5.61	8.	1.5	NE	2	****	****
2100 TO 2130	24.8	0.15	6.26	12.	0.7	N	10	****	****
2130 TO 2200	24.4	0.36	6.48	8.	0.7	NW	10	****	****
2200 TO 2230	23.9	0.76	7.35	7.	0.6	S	8	****	****
2230 TO 2300	23.5	0.90	8.03	18.	0.6	NE	10	****	****
2300 TO 2330	23.2	0.80	8.32	15.	0.8	W	8	****	****
2330 TO 2400	22.8	1.11	8.61	9.	0.8	SW	8	****	****

MINIMUM TEMPERATURE = 21.6 DEG.C

MAXIMUM TEMPERATURE = 31.9 DEG.C

TABLE 18

DATE: 10779

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	21.7	0.73	9.15	7.	1.0	SW	10	****	****
0030 TO 0100	21.8	0.83	9.55	5.	1.0	S	8	****	****
0100 TO 0130	23.0	0.42	9.51	****	1.2	SE	8	****	****
0130 TO 0200	22.9	0.12	9.91	****	1.2	W	8	****	****
0200 TO 0230	22.3	1.34	10.16	****	0.8	SW	8	****	****
0230 TO 0300	*****	******	******	****	0.8	SW	8	****	****
0300 TO 0330	*****	******	******	****	2.2	SE	9	****	****
0330 TO 0400	*****	******	******	****	2.2	SE	2	****	****
0400 TO 0430	*****	******	******	****	2.5	SE	2	****	****
0430 TO 0500	*****	******	******	****	2.5	SE	2	****	****
0500 TO 0530	22.1	0.08	10.92	****	3.4	SE	2	****	****
0530 TO 0600	21.7	0.05	10.92	6.	3.4	SE	2	****	****
0600 TO 0630	21.9	0.05	10.85	5.	2.6	SE	2	2.7	3.5
0630 TO 0700	21.7	0.08	11.03	4.	2.6	S	2	****	****
0700 TO 0730	22.9	-0.53	11.03	3.	1.5	S	2	****	****
0730 TO 0800	24.5	-1.45	10.38	3.	1.5	S	2	****	****
0800 TO 0830	26.7	-1.31	8.68	3.	4.7	SE	3	****	****
0830 TO 0900	26.6	-1.24	7.06	3.	4.7	SE	3	****	****
0900 TO 0930	26.1	-1.28	5.61	3.	5.8	SE	3	****	****
0930 TO 1000	26.6	-1.28	4.06	3.	5.8	SE	3	****	****
1000 TO 1030	27.5	-1.28	2.11	3.	6.0	SE	3	****	****
1030 TO 1100	28.3	-1.28	0.92	3.	6.0	SE	3	****	****
1100 TO 1130	29.1	-1.28	-0.35	****	9.9	**	3	****	****
1130 TO 1200	29.5	-1.24	-1.72	****	9.9	**	**	****	****
1200 TO 1230	30.1	-1.01	-2.99	3.	4.4	**	**	****	****
1230 TO 1300	31.0	-0.94	-4.25	4.	4.4	**	**	****	****
1300 TO 1330	30.9	-0.80	-4.79	3.	4.9	**	**	****	****
1330 TO 1400	30.8	-0.87	-5.12	****	4.9	**	**	****	****
1400 TO 1430	*****	******	******	****	4.3	**	**	****	****
1430 TO 1500	31.0	-0.84	-5.23	****	4.3	**	**	****	****
1500 TO 1530	31.2	-0.26	-4.87	6.	3.6	**	**	****	****
1530 TO 1600	31.1	-0.15	-4.50	7.	3.6	**	**	****	****
1600 TO 1630	31.0	-0.19	-4.14	7.	3.6	**	**	****	****
1630 TO 1700	30.9	-0.02	-2.88	5.	3.6	**	**	****	****
1700 TO 1730	30.4	0.08	-1.51	6.	2.0	**	**	****	****
1730 TO 1800	29.7	0.15	0.37	7.	2.0	**	**	****	****
1800 TO 1830	28.9	0.22	1.93	6.	1.5	**	**	****	****
1830 TO 1900	*****	******	******	8.	1.5	**	**	0.9	1.4
1900 TO 1930	26.8	0.25	3.81	9.	1.0	**	**	0.6	1.1
1930 TO 2000	25.8	0.25	4.60	8.	1.0	**	**	0.8	0.4
2000 TO 2030	25.3	0.70	5.61	5.	0.7	**	**	****	****
2030 TO 2100	24.9	0.90	6.23	7.	0.7	**	**	****	****
2100 TO 2130	24.3	0.93	7.31	9.	0.7	**	**	0.8	0.6
2130 TO 2200	24.2	0.93	7.71	5.	0.7	**	**	****	****
2200 TO 2230	23.7	0.76	7.96	7.	0.8	**	**	****	****
2230 TO 2300	23.1	0.87	8.21	7.	0.8	**	**	****	****
2300 TO 2330	22.9	0.76	8.68	4.	0.7	**	**	****	****
2330 TO 2400	22.2	0.36	8.97	3.	0.7	**	**	****	****

MINIMUM TEMPERATURE = 21.7 DEG.C

MAXIMUM TEMPERATURE = 31.2 DEG.C

TABLE 19

DATE: 20779

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	21.9	0.29	9.30	2.	0.9	**	**	****	****
0030 TO 0100	22.1	0.49	9.59	2.	0.9	**	**	****	****
0100 TO 0130	22.3	0.42	9.88	4.	1.4	**	**	****	****
0130 TO 0200	22.5	0.36	9.95	6.	1.4	**	**	****	****
0200 TO 0230	22.7	0.32	9.95	5.	2.7	**	**	****	****
0230 TO 0300	23.0	0.32	10.13	4.	2.7	**	**	****	****
0300 TO 0330	23.0	0.22	10.31	4.	2.1	**	**	****	****
0330 TO 0400	22.9	0.08	10.45	3.	2.1	**	**	****	****
0400 TO 0430	22.1	0.08	10.63	3.	0.8	**	**	****	****
0430 TO 0500	21.9	0.08	10.89	3.	0.8	**	**	****	****
0500 TO 0530	21.8	0.29	11.03	4.	0.7	**	**	****	****
0530 TO 0600	22.0	0.25	11.28	5.	0.7	**	**	****	****
0600 TO 0630	21.3	0.66	11.50	12.	0.7	**	**	****	****
0630 TO 0700	20.8	1.28	11.75	19.	0.7	**	**	****	****
0700 TO 0730	21.9	0.70	11.97	16.	1.0	**	**	****	****
0730 TO 0800	25.2	-1.11	11.36	20.	1.0	**	**	****	****
0800 TO 0830	26.5	-1.45	10.56	25.	3.0	**	**	****	****
0830 TO 0900	26.3	-1.21	8.14	20.	3.0	**	**	****	****
0900 TO 0930	26.9	-1.21	6.33	26.	4.4	E	3	****	****
0930 TO 1000	27.7	-1.35	3.81	28.	4.4	E	3	****	****
1000 TO 1030	27.5	-1.41	2.07	24.	4.2	SE	3	****	****
1030 TO 1100	26.9	-1.11	1.31	22.	4.2	E	3	****	****
1100 TO 1130	28.8	-1.21	0.34	17.	3.9	E	3	****	****
1130 TO 1200	29.8	-1.18	-2.26	13.	3.9	SE	3	****	****
1200 TO 1230	29.7	-0.77	-2.12	11.	4.1	SE	3	****	****
1230 TO 1300	30.6	-0.70	-3.06	9.	4.1	SE	3	****	****
1300 TO 1330	31.2	-0.87	-4.43	12.	4.3	SE	3	****	****
1330 TO 1400	31.2	-0.66	-5.05	21.	4.3	E	3	****	****
1400 TO 1430	31.4	-0.94	-5.23	12.	4.6	SE	3	****	****
1430 TO 1500	31.8	-0.43	-5.30	10.	4.6	SE	3	****	****
1500 TO 1530	31.8	-0.19	-4.69	8.	3.8	SE	3	****	****
1530 TO 1600	31.9	-0.09	-4.47	8.	3.8	E	3	****	****
1600 TO 1630	31.9	0.02	-4.07	11.	3.8	SE	3	****	****
1630 TO 1700	31.9	0.05	-3.28	10.	3.8	E	2	****	****
1700 TO 1730	31.5	0.15	-2.41	10.	2.5	E	2	****	****
1730 TO 1800	30.7	0.39	-0.75	10.	2.5	E	2	****	****
1800 TO 1830	29.2	0.08	1.28	9.	2.7	NE	2	****	****
1830 TO 1900	27.7	-0.15	2.61	8.	2.7	NE	2	****	****
1900 TO 1930	26.6	-0.19	3.44	7.	1.5	NE	2	1.9	2.2
1930 TO 2000	25.9	-0.09	4.24	7.	1.5	N	2	****	****
2000 TO 2030	25.7	0.19	5.18	12.	1.4	NE	8	****	****
2030 TO 2100	25.0	0.08	5.68	17.	1.4	E	2	1.2	1.3
2100 TO 2130	*****	******	******	14.	1.0	E	6	****	****
2130 TO 2200	23.4	0.12	7.35	10.	1.0	E	6	****	****
2200 TO 2230	23.0	0.19	7.53	7.	0.8	SE	6	****	****
2230 TO 2300	22.8	0.29	8.03	6.	0.8	SW	8	****	****
2300 TO 2330	22.9	0.19	8.29	7.	1.4	SE	3	****	****
2330 TO 2400	22.9	-0.32	8.50	8.	1.4	SE	3	****	****

MINIMUM TEMPERATURE = 20.8 DEG.C

MAXIMUM TEMPERATURE = 31.9 DEG.C

TABLE 20

DATE: 30779

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	WIND (MET. STATION (10M)) DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	WIND SPEED (AAEC TOWER) (M/S) (9.8M)
0000 TO 0030	22.5	-0.32	8.72	4.	2.0	SE	3	****	****
0030 TO 0100	22.8	-0.22	9.04	3.	2.0	E	2	****	****
0100 TO 0130	23.0	-0.05	9.19	5.	2.4	E	2	****	****
0130 TO 0200	23.3	-0.12	9.41	****	2.4	SE	2	****	****
0200 TO 0230	23.2	-0.09	9.55	****	2.5	SE	7	****	****
0230 TO 0300	23.0	-0.15	9.69	****	2.5	SE	7	****	****
0300 TO 0330	22.5	0.08	10.16	****	1.6	SE	7	****	****
0330 TO 0400	22.2	0.29	10.60	****	1.6	W	10	****	****
0400 TO 0430	21.7	0.36	11.00	****	1.1	NW	8	****	****
0430 TO 0500	20.8	0.93	11.47	****	1.1	W	9	****	****
0500 TO 0530	20.5	1.17	11.75	****	0.8	SW	9	****	0.4
0530 TO 0600	20.4	1.28	11.90	12.	0.8	W	9	0.6	0.7
0600 TO 0630	20.7	1.65	12.04	11.	0.8	W	9	0.6	1.3
0630 TO 0700	20.2	1.72	12.22	9.	0.8	SW	9	0.6	1.7
0700 TO 0730	21.0	0.73	12.12	7.	1.2	S	9	****	****
0730 TO 0800	23.3	-1.72	11.75	5.	1.2	SE	2	****	****
0800 TO 0830	26.5	-2.03	10.78	5.	2.9	SE	2	****	****
0830 TO 0900	27.2	-1.21	9.04	7.	2.9	SE	2	****	****
0900 TO 0930	27.5	-1.23	6.59	12.	3.8	E	2	****	****
0930 TO 1000	27.9	-1.41	4.24	14.	3.8	E	2	****	****
1000 TO 1030	28.4	-1.38	2.50	10.	4.1	E	3	****	****
1030 TO 1100	29.2	-1.48	0.63	8.	4.1	SE	3	****	****
1100 TO 1130	*****	******	******	6.	5.2	SE	3	****	****
1130 TO 1200	30.4	-1.31	-2.08	5.	5.2	E	3	****	****
1200 TO 1230	31.3	-1.18	-3.35	4.	4.6	SE	3	****	****
1230 TO 1300	31.4	-1.35	-4.14	4.	4.6	SE	3	****	****
1300 TO 1330	31.5	-0.70	-4.76	5.	4.5	SE	3	****	****
1330 TO 1400	31.6	-0.60	-4.97	6.	4.5	E	3	****	****
1400 TO 1430	31.8	-0.60	-5.23	13.	3.7	SE	3	****	****
1430 TO 1500	31.9	-0.53	-5.52	23.	3.7	E	3	****	****
1500 TO 1530	31.9	0.02	-5.08	18.	3.6	E	3	****	****
1530 TO 1600	32.1	0.05	-4.50	12.	3.6	E	3	****	****
1600 TO 1630	31.9	0.08	-4.03	16.	3.6	E	3	****	****
1630 TO 1700	31.9	0.36	-3.49	21.	3.6	SE	3	****	****
1700 TO 1730	31.5	0.42	-2.34	14.	2.4	SE	2	****	****
1730 TO 1800	31.0	0.73	-0.89	9.	2.4	SE	2	****	****
1800 TO 1830	29.9	0.49	0.45	7.	1.7	E	2	****	****
1830 TO 1900	29.3	-0.02	1.71	6.	1.7	N	2	****	****
1900 TO 1930	27.8	0.08	2.72	9.	1.6	N	2	****	****
1930 TO 2000	26.9	-0.02	3.91	6.	1.6	N	2	****	****
2000 TO 2030	26.1	-0.12	4.09	4.	1.2	NE	8	1.3	1.8
2030 TO 2100	25.6	-0.22	4.78	5.	1.2	E	7	****	****
2100 TO 2130	25.0	-0.09	5.25	7.	1.4	E	2	****	****
2130 TO 2200	24.1	0.08	6.15	8.	1.4	E	2	****	****
2200 TO 2230	23.8	0.08	6.62	7.	1.0	E	8	****	****
2230 TO 2300	23.8	-0.09	6.95	5.	1.0	SE	8	****	****
2300 TO 2330	23.7	0.02	7.24	5.	0.9	E	8	****	****
2330 TO 2400	23.4	-0.05	7.42	6.	0.9	SE	10	****	****

MINIMUM TEMPERATURE = 20.2 DEG.C

MAXIMUM TEMPERATURE = 32.1 DEG.C

TABLE 21

DATE: 40779

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	22.8	0.02	7.89	8.	0.8	S	10	****	****
0030 TO 0100	22.5	0.36	8.14	5.	0.8	SW	10	****	****
0100 TO 0130	22.5	0.29	8.50	4.	1.0	SW	10	****	****
0130 TO 0200	22.5	0.73	8.83	3.	1.0	W	5	****	****
0200 TO 0230	22.2	0.73	9.30	4.	0.8	W	10	****	****
0230 TO 0300	21.9	0.76	9.59	5.	0.8	W	10	****	****
0300 TO 0330	21.7	0.87	9.98	6.	0.6	W	6	****	****
0330 TO 0400	21.5	0.70	10.24	8.	0.6	SW	10	****	****
0400 TO 0430	20.5	0.63	10.56	8.	0.7	W	5	****	****
0430 TO 0500	20.4	0.49	10.96	****	0.7	W	5	****	****
0500 TO 0530	20.1	0.49	11.21	****	0.6	SW	6	****	****
0530 TO 0600	19.4	0.36	11.50	****	0.6	W	10	****	****
0600 TO 0630	18.6	0.08	11.68	****	0.6	SW	5	****	****
0630 TO 0700	18.3	0.15	12.01	****	0.6	SW	6	****	****
0700 TO 0730	21.3	0.32	12.12	****	1.0	SW	6	****	****
0730 TO 0800	23.9	-1.28	11.68	****	1.0	S	9	****	****
0800 TO 0830	26.1	-2.64	10.74	****	2.5	SE	3	****	****
0830 TO 0900	28.0	-2.47	8.07	****	2.5	SE	3	****	****
0900 TO 0930	28.2	-2.06	6.52	****	4.4	SE	3	****	****
0930 TO 1000	28.9	-1.69	3.99	****	4.4	E	3	****	****
1000 TO 1030	30.1	-1.31	2.43	****	6.4	SE	3	****	****
1030 TO 1100	30.2	-1.28	0.77	****	6.4	E	3	****	****
1100 TO 1130	30.1	-1.01	-0.10	****	6.6	SE	3	****	****
1130 TO 1200	30.7	-0.94	-0.89	****	6.6	E	3	****	****
1200 TO 1230	*****	******	******	****	6.5	SE	3	****	****
1230 TO 1300	*****	******	******	****	6.5	SE	3	****	****
1300 TO 1330	32.2	-0.80	-4.14	****	5.4	E	3	****	****
1330 TO 1400	32.4	-0.26	-3.89	****	5.4	SE	3	****	****
1400 TO 1430	32.4	-0.15	-3.71	****	5.3	SE	3	****	****
1430 TO 1500	32.4	-0.05	-3.78	****	5.3	E	3	****	****
1500 TO 1530	32.3	0.02	-3.60	****	4.5	E	3	****	****
1530 TO 1600	32.2	0.08	-2.99	****	4.5	SE	3	****	****
1600 TO 1630	32.0	0.08	-2.34	****	4.9	SE	3	****	****
1630 TO 1700	31.9	0.36	-1.00	****	4.9	E	3	****	****
1700 TO 1730	31.3	0.70	0.12	****	3.2	SE	2	****	****
1730 TO 1800	30.1	0.42	1.13	****	3.2	SE	2	****	****
1800 TO 1830	29.1	0.02	2.00	****	1.7	SE	2	****	****
1830 TO 1900	28.5	0.02	2.65	****	1.7	SE	2	****	****
1900 TO 1930	27.9	0.05	3.34	****	1.4	N	9	0.9	1.1
1930 TO 2000	27.7	0.05	3.62	****	1.4	NE	8	1.9	2.3
2000 TO 2030	27.5	0.36	4.24	****	1.3	E	8	****	****
2030 TO 2100	27.2	0.42	4.89	****	1.3	SE	8	****	****
2100 TO 2130	26.4	0.49	5.61	****	1.4	S	8	1.4	1.8
2130 TO 2200	25.7	0.70	5.90	****	1.4	SE	9	****	****
2200 TO 2230	25.2	0.59	6.33	****	2.8	SE	2	1.5	2.2
2230 TO 2300	25.6	0.25	6.48	****	2.8	SE	2	****	****
2300 TO 2330	26.3	0.25	6.62	****	2.0	SE	2	****	****
2330 TO 2400	25.7	0.25	6.95	2.	2.0	SE	9	****	****

MINIMUM TEMPERATURE = 18.3 DEG.C

MAXIMUM TEMPERATURE = 32.4 DEG.C

TABLE 22

DATE: 50779

TIME CST.	AMBIENT TEMP DEG.C.	DIFFERENTIAL AIR TEMP. DEG.C.	DIFFERENTIAL SOIL TEMP. DEG.C.	RADON (PCI/L)	WIND (MET. STATION (10M)) SPEED(M/S)	DIRECTION	TURB.	WIND SPEED (AAEC TOWER) (M/S) (1.7M)	(9.8M)
0000 TO 0030	25.3	0.15	7.17	4.	2.0	SE	7	****	****
0030 TO 0100	24.8	0.25	7.74	5.	2.0	SE	7	****	****
0100 TO 0130	24.3	0.70	7.96	4.	1.2	SE	7	****	****
0130 TO 0200	23.7	0.59	8.61	7.	1.2	E	8	****	****
0200 TO 0230	23.0	0.39	8.94	8.	1.7	S	8	****	****
0230 TO 0300	22.7	0.25	9.41	9.	1.7	SE	7	****	****
0300 TO 0330	22.5	0.36	9.84	7.	1.9	SE	7	****	****
0330 TO 0400	22.6	0.36	9.95	9.	1.9	SE	7	****	****
0400 TO 0430	22.4	0.32	10.09	7.	2.4	S	7	****	****
0430 TO 0500	22.3	0.08	10.24	7.	2.4	S	7	****	****
0500 TO 0530	22.0	0.19	10.49	3.	2.1	SE	3	****	****
0530 TO 0600	22.1	0.39	10.67	3.	2.1	SE	3	****	****
0600 TO 0630	21.5	0.15	10.78	4.	2.4	SE	3	****	****
0630 TO 0700	21.6	0.12	11.10	3.	2.4	SE	2	****	****
0700 TO 0730	22.9	0.08	10.96	3.	4.2	SE	2	****	****
0730 TO 0800	23.9	0.15	10.85	2.	4.2	SE	2	****	****
0800 TO 0830	25.7	-0.70	9.51	2.	5.3	SE	2	****	****
0830 TO 0900	27.0	-0.73	8.50	2.	5.3	SE	4	****	****
0900 TO 0930	27.8	-1.11	5.94	2.	6.9	SE	4	****	****
0930 TO 1000	28.3	-1.24	4.89	2.	6.9	SE	4	****	****
1000 TO 1030	28.8	-0.94	3.34	5.	8.2	SE	4	****	****
1030 TO 1100	29.3	-1.11	2.07	6.	8.2	SE	4	****	****
1100 TO 1130	29.8	-0.94	0.92	2.	7.5	SE	4	****	****
1130 TO 1200	30.4	-1.04	-0.42	1.	7.5	SE	3	****	****
1200 TO 1230	*****	******	******	****	7.2	E	3	****	****
1230 TO 1300	*****	******	******	****	7.2	SE	3	****	****
1300 TO 1330	*****	******	******	****	6.5	E	3	****	****
1330 TO 1400	*****	******	******	****	6.5	SE	3	****	****
1400 TO 1430	*****	******	******	****	6.0	SE	3	****	****
1430 TO 1500	*****	******	******	****	6.0	E	3	****	****
1500 TO 1530	*****	******	******	****	6.5	SE	3	****	****
1530 TO 1600	*****	******	******	****	6.5	SE	3	****	****
1600 TO 1630	*****	******	******	****	5.5	E	3	****	****
1630 TO 1700	31.4	0.08	-1.72	****	5.5	SE	2	****	****
1700 TO 1730	31.1	0.08	-1.11	****	4.4	SE	2	****	****
1730 TO 1800	30.7	0.05	-0.31	****	4.4	SE	2	****	****
1800 TO 1830	30.2	-0.15	1.28	****	2.9	SE	2	****	****
1830 TO 1900	29.2	-0.26	2.22	****	2.9	S	2	****	****
1900 TO 1930	27.8	0.70	3.44	****	2.9	S	2	0.9	1.6
1930 TO 2000	27.5	0.83	4.20	****	2.9	SE	2	****	****
2000 TO 2030	27.3	0.59	4.89	****	5.6	SE	2	****	****
2030 TO 2100	27.6	0.15	5.07	****	5.6	SE	2	****	****
2100 TO 2130	27.7	0.08	5.25	****	5.6	SE	2	****	****
2130 TO 2200	27.0	0.02	5.36	****	5.6	SE	2	****	****
2200 TO 2230	26.8	0.02	5.54	****	4.0	SE	2	****	****
2230 TO 2300	26.6	-0.02	5.61	****	4.0	SE	2	****	****
2300 TO 2330	25.8	-0.09	5.90	****	3.5	SE	2	****	****
2330 TO 2400	25.6	-0.02	6.08	****	3.5	SE	2	****	****

MINIMUM TEMPERATURE = 21.5 DEG.C

MAXIMUM TEMPERATURE = 31.4 DEG.C

TABLE 23

TABLE 24
COMPARISON OF WIND DATA FROM AAEC TOWER AND
QML METEOROLOGICAL STATION

Date	Times	AAEC Tower Wind Speed (m s^{-1})		QML Met. Station (10 m) Wind		Turbulence
		1.7 m	9.8 m	Speed (m s^{-1})	Direction	Index
June 1979						
15	1145-1300	1.9	3.0	6.0	SE	3
	1300-1455	1.5	2.3	4.0	SE	3
	1845-1900	1.0	2.1	2.0	SE	4
	1900-1915	1.1	2.3	1.6	SE	3
	1915-1930	1.3	2.6	3.6	S	3
	1930-1945	2.9	4.0	3.5	S	3
	1945-2000	2.7	3.8	3.5	S	3
16	0730-0745	3.9	4.5	4.6	SE	2
	2030-2100	2.5	4.4	2.6	SE	2
17	0720-0740	1.6	2.3	1.6	SE	3
18	0720-0730	1.0	1.2	1.4	E	3
	0935-0945	3.8	4.6	4.0	E	2
	1905-1915	2.0	2.6	2.5	NE	2
19	0718-0728	1.5	2.1	1.1	S	3
	1035-1045	5.2	6.4	3.4	SE	3
	1240-1250	4.2	5.5	5.5	S	3
	1545-1555	3.1	5.2	4.5	SE	2
	1930-1940	1.1	2.0	1.0	SE	3
20	0520-0530	1.1	1.9	3.0	SE	2
	0555-0605	1.3	2.3	2.5	SE	2
	0735-0745	3.4	4.4	4.5	SE	2
	0815-0825	3.4	4.8	4.5	SE	2
	0910-0920	5.2	6.4	5.0	SE	2
	1043-1053	6.0	7.6	9.0	SE	2
	1156-1242	6.0	7.8	7.0	SE	2
	1325-1335	5.3	7.8	6.8	SE	2
	1420-1430	4.3	6.3	6.0	SE	2
	1501-1541	4.5	5.8	6.5	SE	2
	1634-1654	4.5	5.9	5.0	SE	3
	1940-1951	2.3	3.1	2.5	SE	3
21	0538-0548	3.8	4.8	5.0	SE	3
	0905-0915	4.5	6.9	5.0	SE	3

(Continued)

Date	Times	AAEC Tower Wind Speed ($m\ s^{-1}$)		QML Met. Station (10 m) Wind		Turbulence
		1.7 m	9.8 m	Speed ($m\ s^{-1}$)	Direction	Index
	1022-1032	6.3	7.5	10.0	SE	3
	1910-1920	3.0	3.9	3.5	SE	2
22	0710-0720	3.0	3.5	5.0	SE	2
	1301-1311	3.9	4.7	4.0	SE	3
	1900-1910	1.8	2.7	2.5	SE	2
23	0455-0504	1.3	1.9	1.2	E	8
	0540-0550	0.6	1.0	1.6	SE	2
	0730-0740	2.8	3.4	1.6	SE	2
	1247-1257	3.3	3.4	3.7	SE	1
	1855-1905	0.6	0.6	0.7	S	10
24	0443-0453	1.5	2.0	2.0	SE	9
	0540-0550	1.8	2.3	1.8	SE	9
	0730-0740	1.0	1.0	0.8	SW	8
25	0704-0714	0.4	0.3	0.0	NE	10
	0718-0728	0.4	0.5	0.6	NW	10
	0729-0739	0.7	0.4	0.6	W	8
	1853-1903	2.3	2.5	2.0	NE	4
26	0524-0534	0.4	1.3	0.7	S	8
	0603-0613	0.4	1.1	1.6	SE	2
	0639-0649	2.0	2.6	1.9	SE	2
	1848-1858	1.0	1.6	0.9	E	8
27	1013-1023	3.2	4.2	4.0	SE	3
	1836-1846	2.8	3.3	2.3	NE	4
28	0522-0532	1.3	1.9	1.2	NE	10
	0550-0600	0.5	1.0	1.2	SE	9
	1236-1246	5.1	6.4	6.5	SE	3
	1900-1910	0.6	1.5	1.0	SE	1
	1925-1935	0.8	1.5	1.8	NE	3
29	0520-0530	0.5	0.7	1.2	SW	10
	0612-0622	0.7	1.6	0.8	SW	10
	0641-0651	0.5	0.8	0.9	S	9
	0714-0720	0.3	0.3	0.9	SE	1
	1334-1344	4.0	5.3	4.4	SE	2
	1912-1921	1.3	2.3	2.3	S	2
30	0523-0533	1.1	1.7	1.5	SE	9
	0550-0600	0.5	0.6	0.8	N	1

(Continued)

Date	Times	AAEC Tower Wind Speed (m s^{-1}) 1.7 m	9.8 m	QML Met. Station (10 m) Wind Speed (m s^{-1})	Direction	Turbulence Index
30	0625-0635	0.7	1.1	1.0	SW	3
	0650-0655	0.5	0.9	1.0	S	3
	0705-0708	0.4	1.0	1.2	S	2
	1342-1352	3.4	4.4	4.0	SE	2
	1909-1919	1.3	2.0	2.5	NE	4
July 1979						
1	0605-0615	2.7	3.5	3.5	SE	3
	1835-1847	0.9	1.4	1.4		
	1905-1915	0.6	1.0			
	1920-1930	0.7	1.2			
	1945-1955	0.8	0.4			
	2112-2122	0.8	0.6			
2	1900-1910	1.9	2.2	2.0	NE	2
	2030-2040	1.2	1.3	1.2	E	2
3	0505-0515	-	0.4	0.8	SW	8
	0530-0540	0.5	0.5	0.8	SW	8
	0545-0555	0.7	0.9			
	0600-0610	0.6	1.3			
	0640-0650	0.4	1.6			
	0655-0705	0.8	1.8			
	2010-2020	1.3	1.8	1.2	E	8
4	1920-1930	0.9	1.1	1.2	NE	9
	1945-1955	1.9	2.3	1.2	NE	9
	2100-2110	1.4	1.8	1.0	S	8
	2200-2210	1.5	2.2	3.0	SE	2
5	1910-1920	0.9	1.6	2.0	SE	2
6	0815-0825	4.0	4.4			

TABLE 25
WIND DIRECTION AND SPEED MEASUREMENTS FROM
THE BALLOON AND METEOROLOGICAL STATION

Date	Times (CST)	Balloon Wind Direction	Balloon Wind Speed (m s^{-1})	QML Met. Station Wind Direction	QML Met. Station Wind Speed (m s^{-1})
June 1979					
16	2017-2036	SE	3.5	SE	3.5
20	0507-0525	SE	2.4	SSE	3.0
	0602-0620	SE	3.5	SE	3.0
21	0510-0525	SSE	2.7	SSE	3.5
	0556-0619	SSE	7.0	SSE	5.0
23	0445-0510	SSE	1.0 to 4.0	S to E	1.1
	0603-0621	SE to ENE	2.4 to 4.0	SE	2.5
24	0437-0459	SE	2.3	SE	1.6
	0602-0628	SE to E	2.5	SE to S	1.0
July 1979					
2	0607-9999*	NE	1.0	-	0.9
	1940-2002	ENE to NE	2.2	NNE	1.4
	2051-2105	E	1.0	ENE	0.8
4	0619-0640	E	0.4	WSW	0.7
	0651-0710	E	0.5	WSW to SW	0.8
5	0604-0618	SE	1.3	SE	2.0
	0653-0712	SE	3.0	SE	4.0

* No descent profile because of battery failure.

Note: Where two wind directions (or speeds) are indicated, there was a difference between the ascent and descent profiles.

TABLE 26

COMPARISON OF CONTINUOUS RADON MONITOR AIR CONCENTRATION AND METEOROLOGICAL DATA

Air Temperature Difference (°C) 1.7 to 9.8 m	Radon Conc. Wind Direction	AAEC Tower (1.7 m) Wind Speeds ($m\ s^{-1}$) 0 - 1	1 - 2	2 - 3
0 to 0.2	[Rn]	2	4,3,7,7,3,9,17	2,5,13
	Direction	S	SE,SE,E,NE,S,E,E	S,SE,SE
0.2 to 0.4	[Rn]	17,17,8,4,9,8,9,8	3,8	
	Direction	SE,E,E,S,-,-,-,-	SE,SE	
0.4 to 0.8	[Rn]	4,7,16	1	
	Direction	S,E,SE	S	
0.8 to 1.2	[Rn]	4,8,2,2,	3	
	Direction	E,W,SE,S,	SE	
1.2 to 1.6	[Rn]	12		
	Direction	W		
> 1.6	[Rn]	11,9		
	Direction	W,SW		

Note: Wind directions taken from meteorological station anemometer at 10 m.

[Rn] = Radon air concentration in pCi L^{-1}.

\- = No wind direction data available.

TABLE 27
WORKING LEVEL (WL) CONCENTRATIONS (USING THE ROLLE METHOD) AND METEOROLOGICAL DATA

Site: AAEC Tower (9605N 10081E)

Date	Time (CST)	WL	QML Met. Station Wind Speed (m s^{-1})	QML Met. Station Wind Direction	AAEC Tower Wind Speed (m s^{-1}) 1.7 m	AAEC Tower Wind Speed (m s^{-1}) 9.8 m	Balloon Wind Speed (m s^{-1})	Balloon Wind Direction
July 1979								
1	1810	0.002	1.6					
	1830	0.004	1.4		0.9	1.4		
	1850	0.006	1.4					
	1900	0.004	1.2					
	1910	0.007	1.2		0.6	1.0		
	1920	0.008	1.0					
	1930	0.012	1.0		0.7	1.2		
	1940	0.016	0.8					
	1955	0.008	0.8		0.8	0.4		
	2005	0.008	0.8					
	2015	0.008	0.8					
	2030	0.011	0.8					
	2040	0.019	0.8					
	2050	0.050	0.8					
	2115	0.007	0.8		0.8	0.6		
2	0600	0.027	0.8					
	0612	0.034	0.9				1.0	NE
	0624	0.084	0.8					
	0635	0.051	0.8					
	1945	0.002	1.6	NNE				
	2012	0.003	1.4	NE			2.2	NE to ENE
	2030	0.007	0.8	ENE	1.2	1.3		
	2125	0.007	1.0	E			1.0	E
3	0440	0.024	1.4	W				
	0500	0.009	0.9	WSW				
	0520	0.034	0.8	SW				
	0540	0.058	0.8	SW	0.5	0.5		
	0610	0.008	0.7	WSW	0.6	1.3		
	0630	0.011	0.8	WSW	0.4	1.6		

(Continued)

Date	Time (CST)	WL	QML Met. Station		AAEC Tower		Balloon	
			Wind		Wind Speed ($m\ s^{-1}$)		Wind	
			Speed ($m\ s^{-1}$)	Direction	1.7 m	9.8 m	Speed ($m\ s^{-1}$)	Direction
3	1910	0.007	2.0	ESE				
	1920	0.007	1.6	NNE				
	1935	0.004	1.4	NNE				
	1940	0.004	1.4	NNE				
	1950	0.002	1.4	NNE				
	2000	0.002	1.4	NE				
	2010	0.001	1.2	NNE	1.3	1.8		
4	1923	0.006	1.4	E	0.9	1.1		
	1937	0.003	1.2	NE				
	1948	0.002	1.2	NE	1.9	2.3		
	2002	0.005	1.2	E				
	2020	0.010	1.6	SE				
	2035	0.010	1.4	SE				
	2155	0.002	2.5	SE	1.5	2.2		

TABLE 28

VERTICAL RADON PROFILES - AAEC TOWER (9605N, 10081E)

mBq L^{-1} (pCi L^{-1})

			Above Ground			AAEC Tower Wind Speed ($m\ s^{-1}$)		QML Met. Station (9.8 m)		
Date	Time	Within Pit [Height (m)]	1 m	4.6 m	9.8 m	1.7 m	9.8 m	Wind Speed ($m\ s^{-1}$)	Wind Direction	Turb. Index
June 1979										
23	0545		2000±111(54±3)	1481±93(40±2.5)	6630±185(179±5)	0.6	1.0	1.6	SE	2
	0720		204±30(5.5±0.8)			2.8	3.4	1.6	SE	2
24	0638		159±30(4.3±0.8)	159±30(4.3±0.8	167±30(4.5±0.8)	-	-			
25	0704		1185±111(32±3)	593±74(16±2)	593±74(16±2)	0.4	0.3	0.0	NE	10
	0717		363±74(26±2)	889±74(24±2)	741±74(20±2)	0.4	0.5	0.6	NW	10
	0730	1444±111(39±111)* 4407±185(119±5) [-1.2] [0.0]				0.7	0.4	0.6	W	
26	0532		370±41(10±1.1)	407±52(11±1.4)	704±56(19±1.5)	0.4	1.3	0.7	S	8
28	1909		126±33(3.4±0.9)			0.6	1.5	1.0	SE	1
	1918		70±26(1.9±0.7)			0.8	1.5	1.8	NE	3
29	0545		37±19(1±0.5)			0.5	0.7	1.2	SW	10
	0640		2148±148(58±4)	326±56(8.8±1.5)	311±52(8.4±1.4)	0.5	0.8	0.9	S	9
	0700		370±59(10±1.6)	281±52(7.6±1.4)	230±48(6.2±1.3)	-	-			
	0718		319±52(8.6±1.4)	211±44(5.7±1.2)	237±44(6.4±1.2)	0.3	0.3	0.9	SE	
30	0637	593±111(16±3) 1296±148(35±4) [-1.5] [-0.5]	104±30(2.8±0.8)			0.7	1.1	1.0	SW	3
	0650		296±52(8±1.4)	85±30(2.3±0.8)	196±41(5.3±1.1)	0.5	0.9	1.0	S	3
	0705		226±48(6.1±1.3)	19±11(0.5±0.3)	30±15(0.8±0.4)	0.4	1.0	1.2	S	2
July 1979										
1	2130		189±26(5.1±0.7)	119±19(3.2±0.5)	111±22(3±0.6)	0.8	0.6	0.8	-	-
2	0715		6222±185(168±5)	2370±148(64±4)		-	-	0.0-1.2	-	-
	2120		1296±74(35±2)	344±30(9.3±0.8)	852±37(23±1)	-	-	1.4	E	8
4	0700	556±37(15±1) 407±26(11±0.7) [-2.0] [-1.0]	519±30(14±0.8)	481±37(13±1)	444±30) (12±0.8)	-	-	0.8	SW	6
3	0601		256±30(6.9±0.8)	222±33(6.0±0.9)	215±26(5.8±0.7)	0.6	1.3	0.7	W	8

*Spot samples - not taken via manifold

TABLE 29
DIURNAL RADON EMANATION MEASUREMENTS
20 JUNE 1979

Drum Installed (CST)	Cup A			Cup B			Two Filter Method			Cup Average	ΔT_{air}	Wind Speed ($m\ s^{-1}$)	
	Sampled (CST)	Mns	pCi/L/min	Sampled (CST)	Mns	pCi/L/min	Sampled (CST)	Mns	pCi/L/min	pCi/L/min	(°C)	1.7 m	9.8 m
0542	0612	30	9.6	0615	33	9.2				9.4	0.87	1.3	2.3
0635	0733	58	8.5	0734	59	9.4	0755	85	8.9	9.0	0.90	-	-
0810	0840	30	8.7	0841	31	7.8	0844	39	11.6	8.3	-1.28	3.4	4.8
0900	0932	32	7.3	0933	33	6.3	0933	38	6.8	6.8	-1.14	5.2	6.4
1032	1109	37	3.0	1110	38	3.1	1112	45	4.9	3.1	-1.55	6.0	7.6
1200	1242	42	2.2	1243	43	2.7	1245	50	2.9	2.5	-1.62	-	-
1310	1340	30	4.8	1341	31	5.0	1342	37	5.2	4.9	-1.89	5.3	7.8
1400	1447	47	5.5	1448	48	4.8	1435	40	6.5	5.2	-1.75	4.3	6.3
1500	1536	36	4.7	1537	37	5.5	1539	44	7.1	5.1	-0.84	-	-
1630	1700	30	3.2	1701	31	3.0	1701	36	4.4	3.1	-0.53	4.5	5.9

Mns = Sampling interval in minutes

NABARLEK.... FREQUENCY OF OCCURRENCE (%) OF WIND SPEED VERSUS DIRECTION
DATES : 140679 TO 050779

NO DATA OBSERVED FOR 44 HALF HOUR PERIODS

	WIND SPEED (M/S)					
DIRECTION	0-1	1-2	2-4	4-8	>8	TOTAL
N	0.10	0.99	0.0	0.0	0.0	1.09
NE	0.49	2.57	3.06	0.0	0.0	6.13
E	1.09	6.42	10.87	4.64	0.0	23.02
SE	1.28	7.11	19.47	20.75	0.59	49.21
S	1.38	3.95	6.72	2.67	0.0	14.72
SW	1.98	0.79	0.0	0.0	0.0	2.77
W	1.88	0.89	0.0	0.0	0.0	2.77
NW	0.10	0.20	0.0	0.0	0.0	0.30
TOTAL	8.30	22.92	40.12	28.06	0.59	1012.

TABLE 30

NABARLEK.... FREQUENCY OF OCCURRENCE (%) OF WIND SPEED VERSUS TURBULENCE INDEX
DATES : 140679 TO 050779

NO DATA OBSERVED FOR 44 HALF PERIODS

	WIND SPEED (M/S)					
TURB.INDEX	0-1	1-2	2-4	4-8	>8	TOTAL
1	0.0	0.20	1.58	0.0	0.0	1.78
2	0.0	4.15	14.62	8.20	0.0	26.98
3	0.20	4.15	16.30	18.68	0.40	39.72
4	0.0	0.20	2.77	1.19	0.20	4.35
5	0.40	0.10	0.0	0.0	0.0	0.49
6	0.79	0.99	0.0	0.0	0.0	1.78
7	0.0	0.99	3.16	0.0	0.0	4.15
8	3.56	5.83	0.20	0.0	0.0	9.58
9	0.89	5.34	1.48	0.0	0.0	7.71
10	2.47	0.99	0.0	0.0	0.0	3.46
TOTAL	8.30	22.92	40.12	28.06	0.59	1012.

TABLE 31

TABLE 32

DUST DEPOSITION AT NABARLEK

Sampler	Location	Dates and Times (CST)		Sample	Dust		Sampler	Distance
		Installed	Removed	Interval (days)	Uranium ($\mu g\ m^{-2} d^{-1}$)	Aluminium ($mg\ m^{-2}\ d^{-1}$)	Height (m)	from Pit (m)
		15 June 1979	6 July 1979					
1	9600N 10081E	0830	1050	21.097	214	9.0	3	40
2	9841N 9876E	1050	1125	21.024	45	3.8	3	320
3	10411N 10418E	1130	1200	21.021	4	8.2	3	850
4	9964N 10150E	1200	1145	20.990	27	6.7	3	350
5	8962N 9891E	1320	1015	20.872	0.5	0.8	3	690
6	9499N 10093E	1400	1030	20.854	111	7.8	3	120
		1 July	6 July					
7	9499N 10093E	1310	1035	4.892	236	18.1	1.6	120
8	9600N 10001E	1325	1110	4.906	131	18.7	3	110
9	9964N 10150E	1335	1150	4.927	86	28.9	1.6	350
10	10029N 9910E	1345	1130	4.906	41	9.2	3	540
11	11180N 9590E	1405	1210	4.920	4	28.4	3	1630
12	10788N 10645E	1420	1220	4.917	3	4.8	3	1280

TABLE 33

COMPARISON OF CALCULATED URANIUM AND THORIUM-230 DUST AIR CONCENTRATIONS WITH THE MAXIMUM PERMISSIBLE CONCENTRATIONS

Contaminant	Air Concentration ($pCi\ m^{-3}$)			Maximum Permissible Concentration ($pCi\ m^{-3}$)	
	Employee	Public A	Public B	Employee	Public
Uranium (soluble)	0.162	1.52×10^{-3}	1.77×10^{-4}	100	5
Uranium (insoluble)	0.162	1.52×10^{-3}	1.77×10^{-4}	100	4
Thorium-230 (soluble)	0.162	1.52×10^{-3}	1.77×10^{-4}	2	0.08
Thorium-230 (insoluble)	0.162	1.52×10^{-3}	1.77×10^{-4}	10	0.3

A = non-radiation worker situated at the construction camp.

B = person at the Aboriginal camp on Coopers Creek, 3.2 km to the west-south-west from the mine pit

TABLE 34*

SUMMARY OF RADIUM LIMITS FOR INFINITE DEPTH OF CONTAMINATION AND SANDY SOIL

Condition	Dose Used	Derived Level (pCi/g Radium)
Radium resuspension	0.01 μCi - bone	7 000
	0.5 rem/y - lung	2 000
Radium in foods	0.01 μCi - bone	
Home gardener		300-700
All foods		80
External dose	0.17 rem/y	11
Rn downwind	0.01 WL	
Small area (35 000 m^2)		490
Large area (6.6×10^7 m^2)		5
Rn in home	0.01 WL	3
^{210}Pb-^{210}Po downwind	0.5 rem/y - kidney	
Small area (35 000 m^2)		
Inhalation		300 000
Food - home gardens		120 000
Food - all		13 000
Large area		
Inhalation		2 300
Food - home		840
Food - all		90

(1 pCi = 37 mBq)

* From Healy and Rodgers [1978]

TABLE 35

SURFACE EMANATION RATES ACROSS THE ORE BODY, NABARLEK

μBq cm^{-2} s^{-1} [pCi cm^{-2} s^{-1}]

Location Mine Coordinates	Pre-Mining 20.9.78	Cleared of Vegetation 15.6.79	Dispersion Zone Stripped 28.6.79	Dispersion Zone Stripped 1.7.79	Badly Weather Ore Strippe 5.7.79
9603N 10088E	370 [10]	1150 [31]	220 [6]		30 [0.9]
9592N 10101E	1100 [30]	4070 [110]	310 [8.5]	590* [16]	1000 [27]
9587N 10119E	4440 [120]	16400 [443]	2100 [57]		3000 [81]
9583N 10132E	2600 [70]	5300 [144]	220 [6]		260 [7]

* Night (2100 CST) measurement
All others taken in daytime.

TABLE 36
WORKING LEVEL CONCENTRATIONS USING THE ROLLE METHOD

Location	Date	Time(CST)	WL
July 1979			
Waste Rock	3	2045	0.008
Section of Pit	4	0525	0.008
SW Section		0540	0.006
		0550	0.015
		0605	0.049
		0615	0.041
		0630	0.027
		0640	0.025
		0650	0.027
Mid Section	5	0515	0.001
		0525	0.001
		0535	0.001
		0545	0.001
		0555	0.001
		0605	0.003
		0615	0.002
		0625	0.001
		0635	0.001
		0645	0.001
NW section of Ore Pit	7	0230	0.012
		0240	0.013
		0255	0.008
		0305	0.007
		0315	0.007
		0325	0.009
		0335	0.006
		0345	0.005
		0355	0.011
		0405	0.006
		0415	0.005

(Continued)

Location	Date	Time(CST)	WL
	7	0425	0.004
		0435	0.004
		0445	0.008
		0455	0.006
		0505	0.006
		0515	0.006
		0530	0.005
		0540	0.004
		0550	0.004
		0600	0.005
		0610	0.008
		0620	0.010
		0630	0.006
		0640	0.006
		0650	0.007
	8	0600	0.006
		0610	0.007
		0620	0.008
		0630	0.005

TABLE 37

RADON ACTIVITY MEASUREMENTS IN WATER TEST BORES
AT QML NABARLEK MINESITE
kBq/L [pCi/L]

Date	Water Test Bores No.	Rn Activity
June 1979		
26	SB19	34.6 [934]
	SB23	51.5 [1392]
	SB22	8.0 [217]
	SB21	15.6 [421]
21	SB20	25.9 [7009]
26	SB18	59.4 [1606]
21	SB17	173 [4666]
26	SB16	68.5 [1851]
	OB1	6.2 [167]
	OB2	10.5 [283]
21	OB3	4.5 [122]

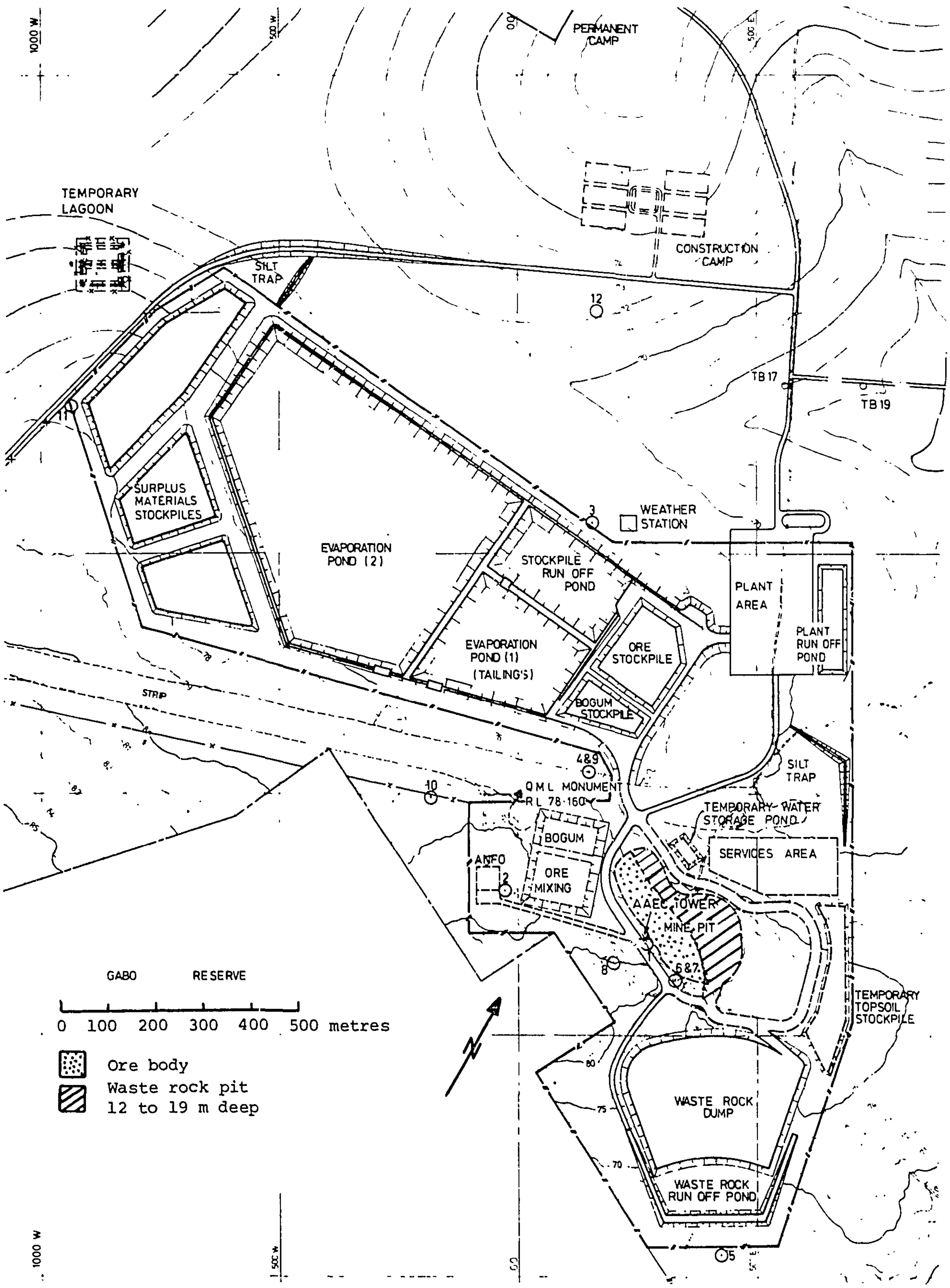


FIGURE 1. TEMPORARY LOCATIONS OF AAEC TOWER AND DUST SAMPLERS AT NABARLEK, JUNE TO JULY 1981

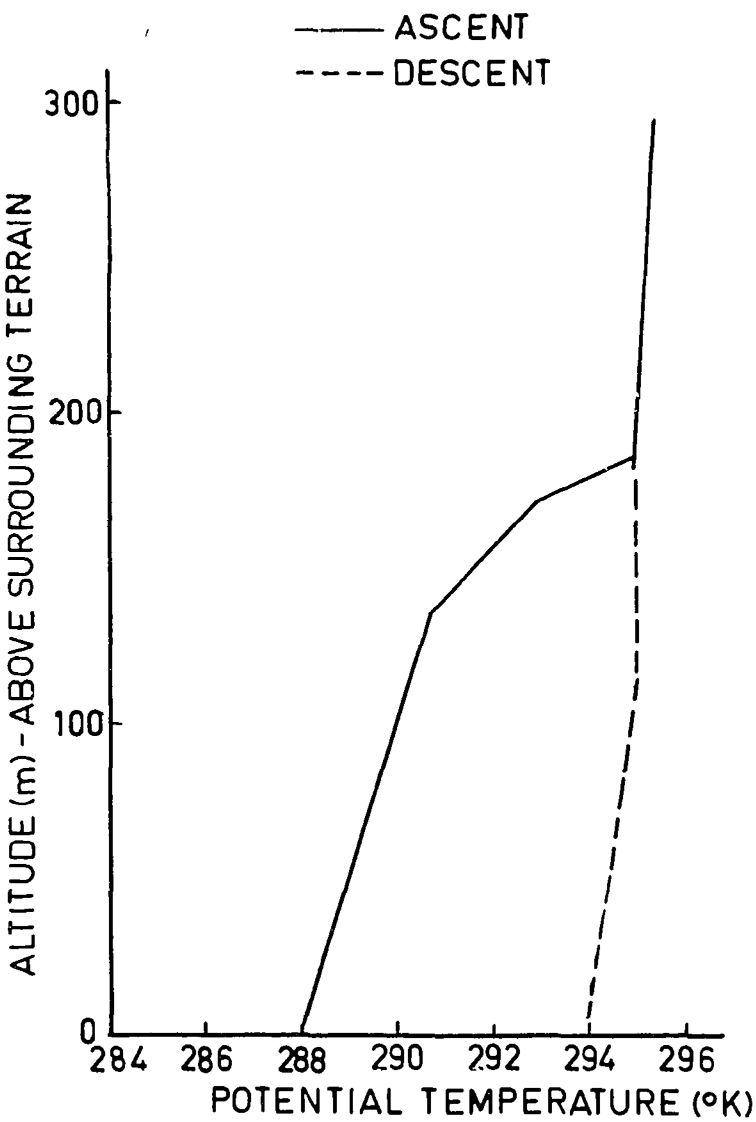


FIGURE 2. BALLOON POTENTIAL TEMPERATURE PROFILE JUNE 23, 1979
0603 TO 0621 CST

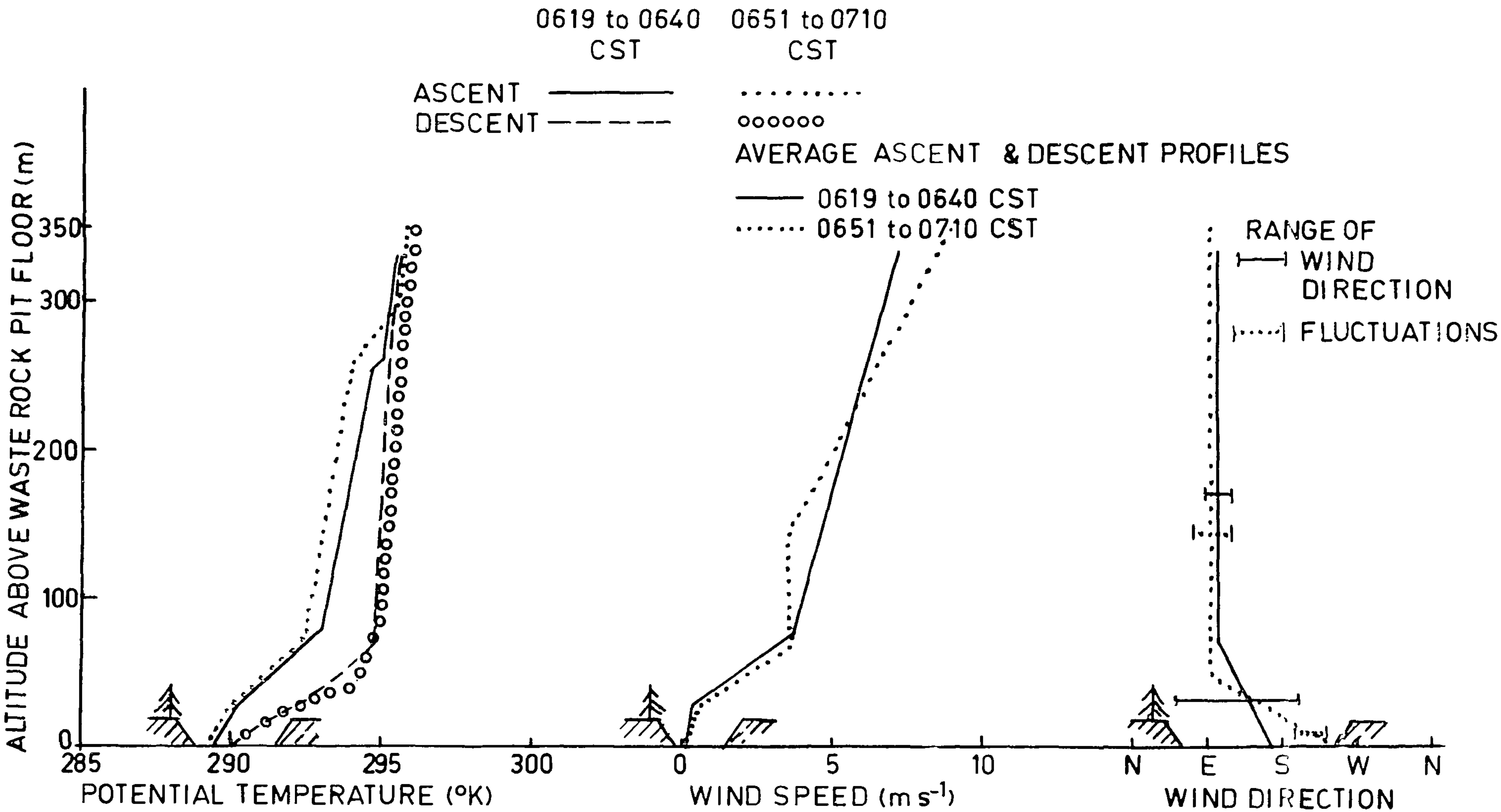


FIGURE 3. BALLOON PROFILES FROM THE WASTE ROCK PIT, JULY 4, 1979

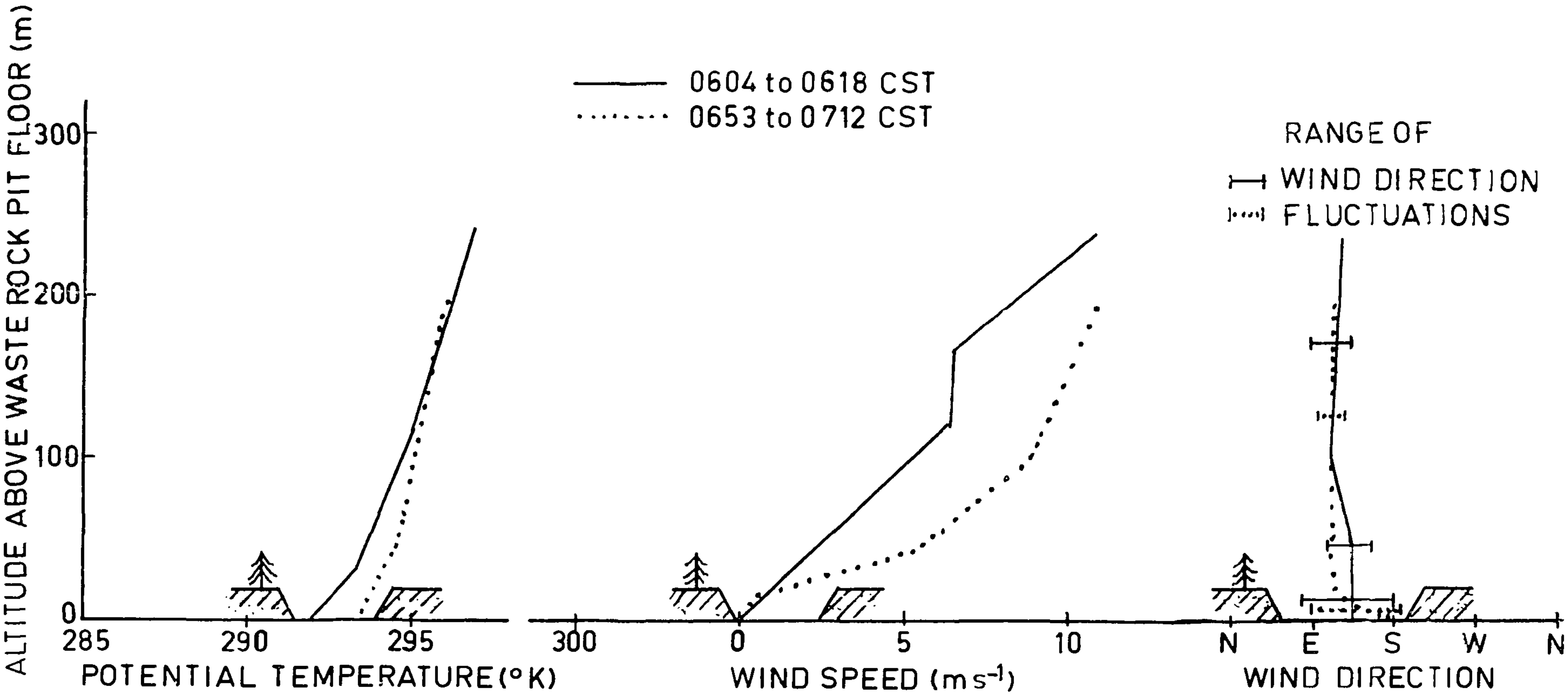


FIGURE 4. BALLOON PROFILES FROM THE WASTE ROCK PIT, JULY 5, 1979

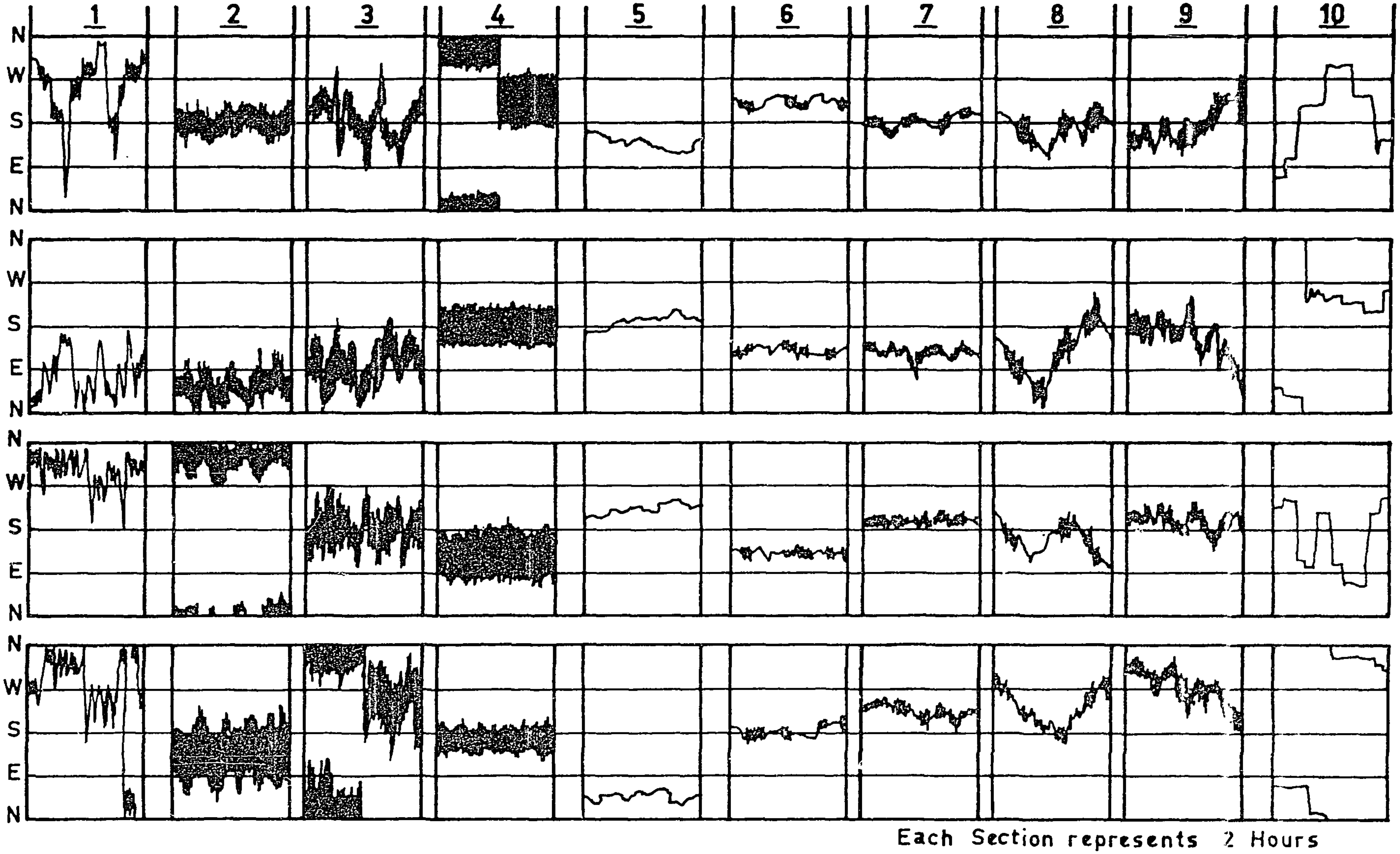


FIGURE 5. WIND DIRECTION TURBULENCE TRACE TYPES

FIGURES 6-27

PLOTS OF TEMPORAL VARIATIONS OF AMBIENT TEMPERATURE, DIFFERENTIAL AIR AND SOIL TEMPERATURES, RADON AIR CONCENTRATIONS, WIND SPEED AND DIRECTION AT NABARLEK FROM 14 JUNE TO 5 JULY 1979

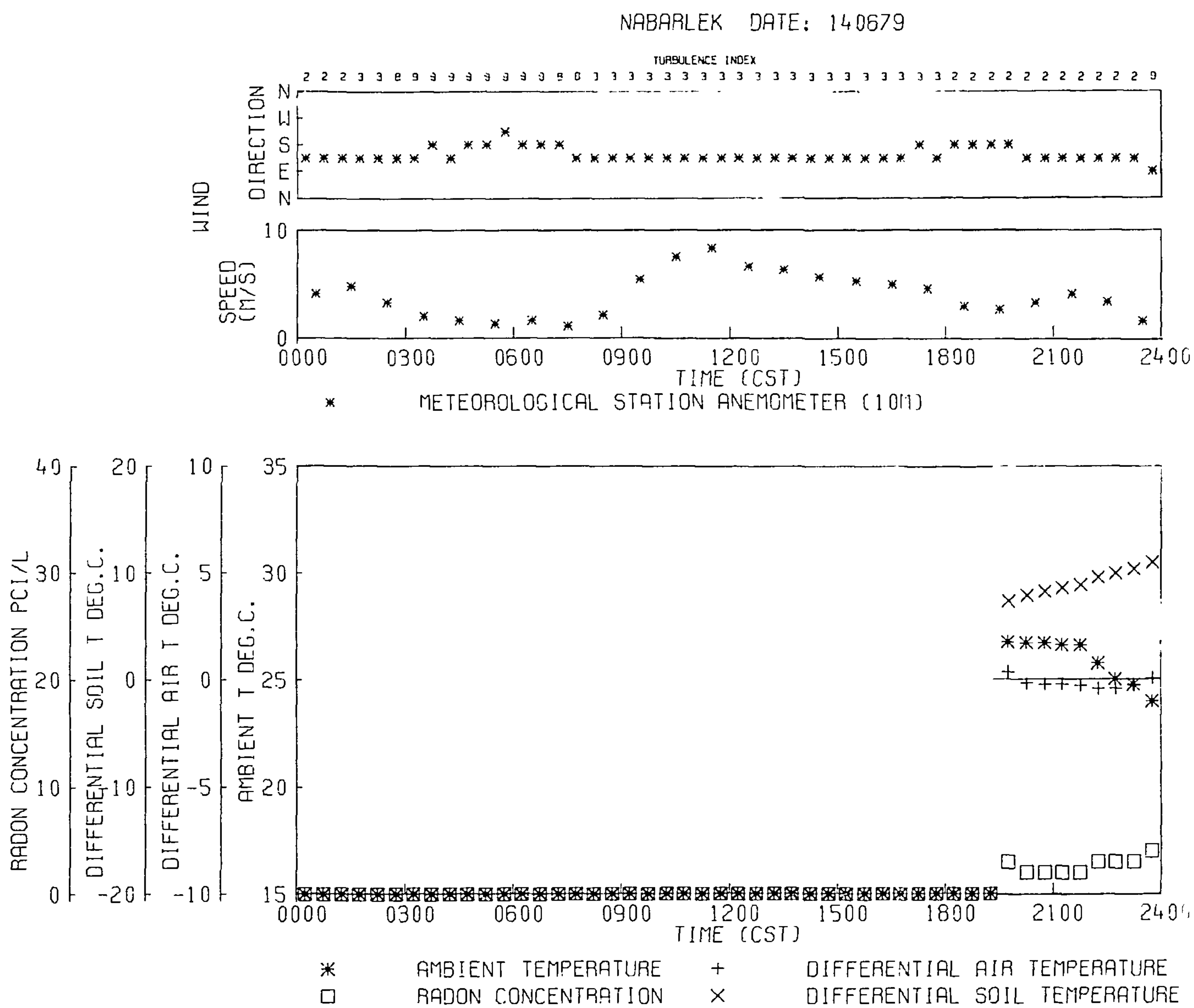

NABARLEK DATE: 140679
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
TIME (CST)
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 6.

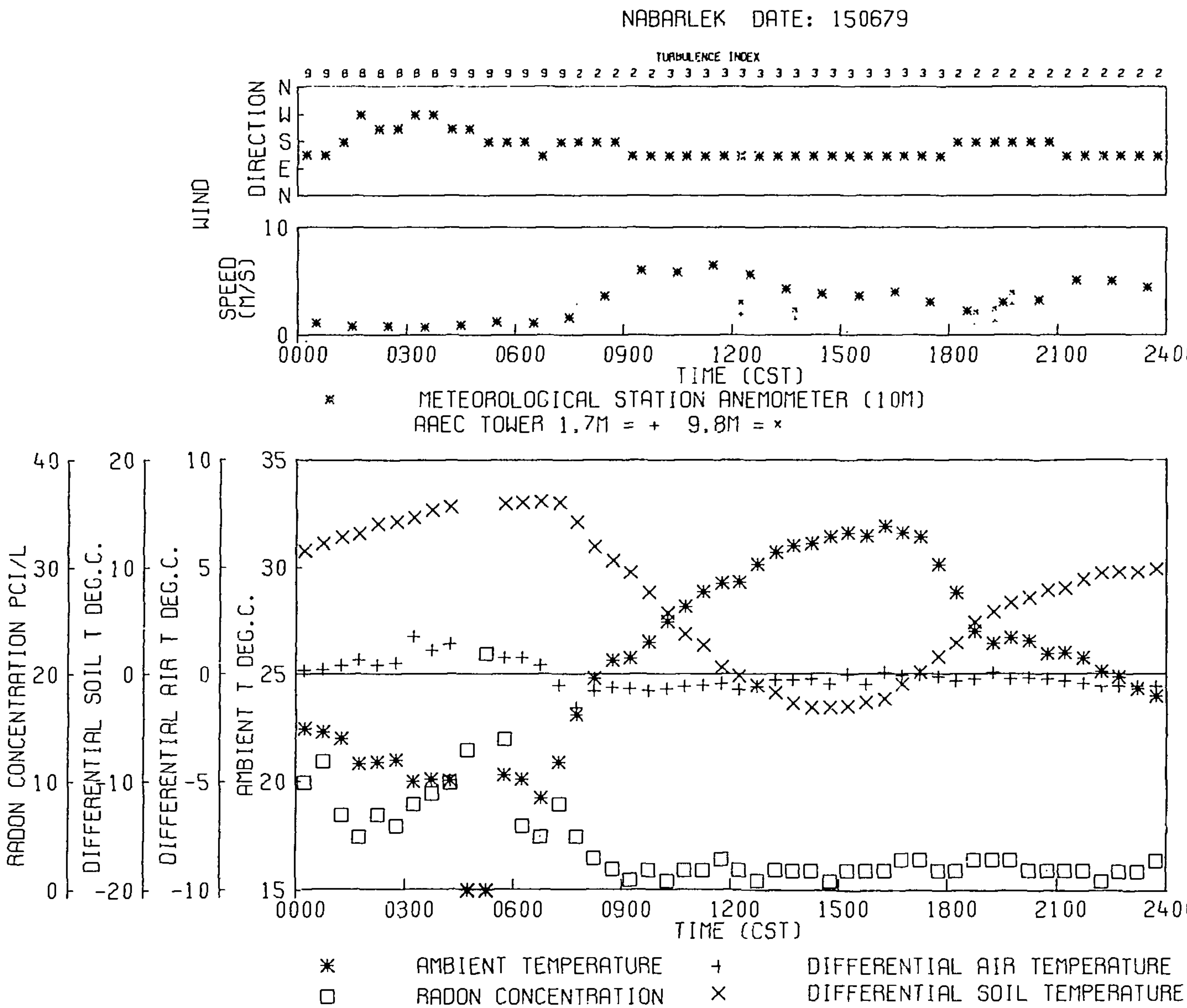

NABARLEK DATE: 150679
TURBULENCE INDEX
9 9 8 8 8 8 8 8 8 9 9 9 9 9 9 9 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
40 30 20 10 0
20 10 0 -10 -20
10 5 0 -5 -10
35 30 25 20 15
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 7.

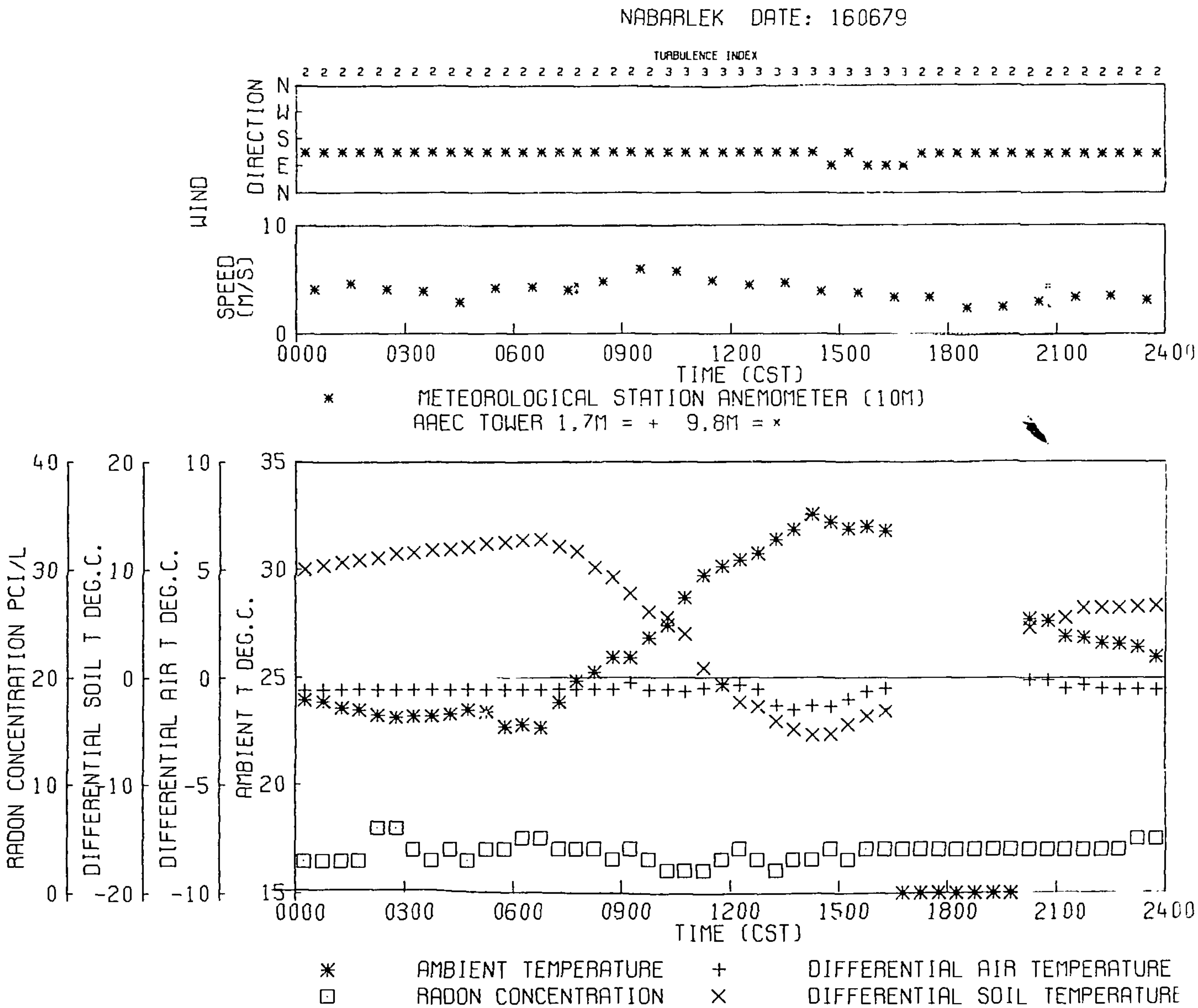

NABARLEK DATE: 160679
TURBULENCE INDEX
WIND
DIRECTION
N W S E N
SPEED (M/S)
0 10
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
0 10 20 30 40
DIFFERENTIAL SOIL T DEG.C.
-20 -10 0 10 20
DIFFERENTIAL AIR T DEG.C.
-10 -5 0 5 10
AMBIENT T DEG.C.
15 20 25 30 35
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
AMBIENT TEMPERATURE
+ DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
× DIFFERENTIAL SOIL TEMPERATURE

FIGURE 8.

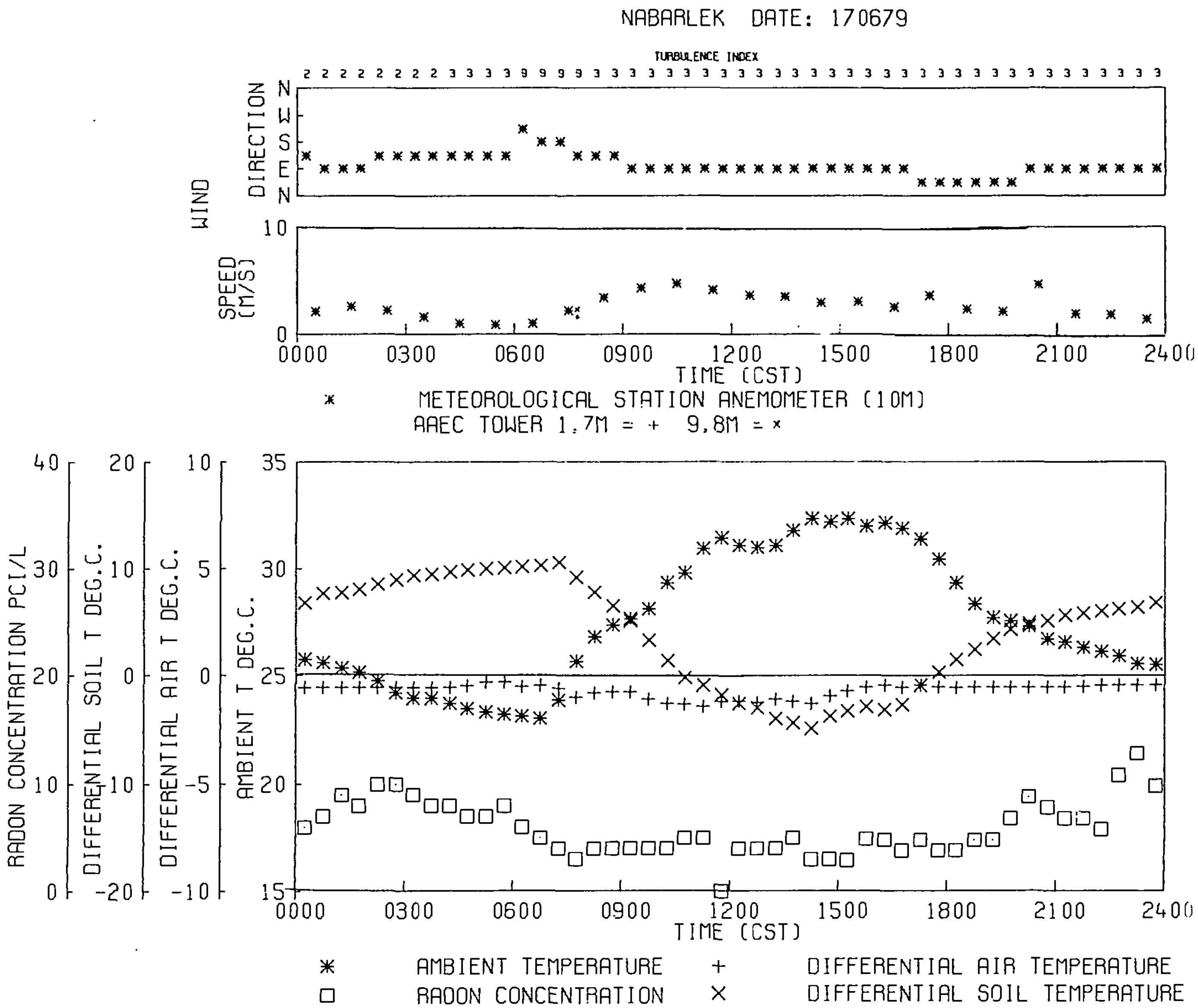

NABARLEK DATE: 170679
TURBULENCE INDEX
WIND
DIRECTION
N W S E N
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
TIME (CST)
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 9.

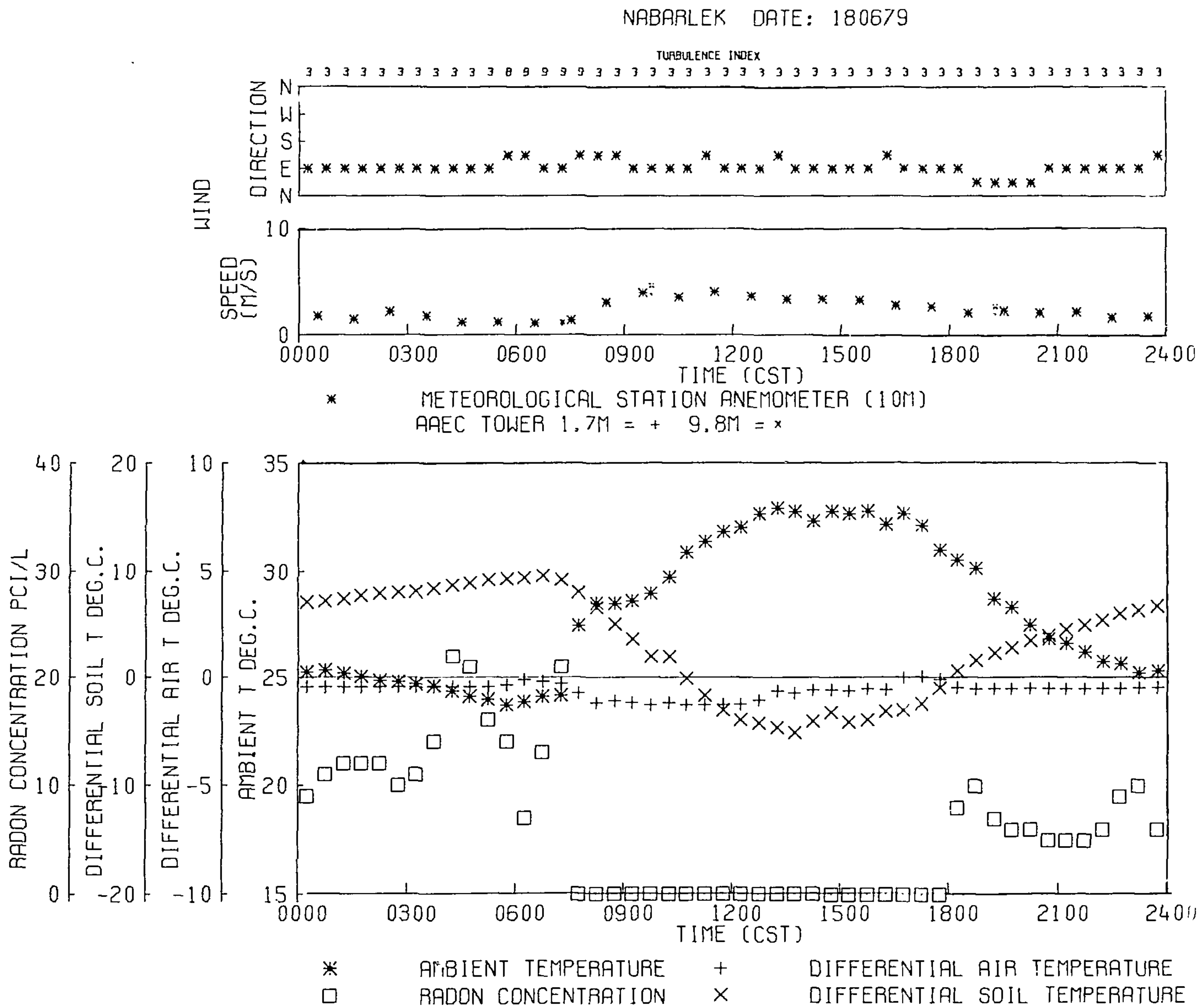

NABARLEK DATE: 180679
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 10.

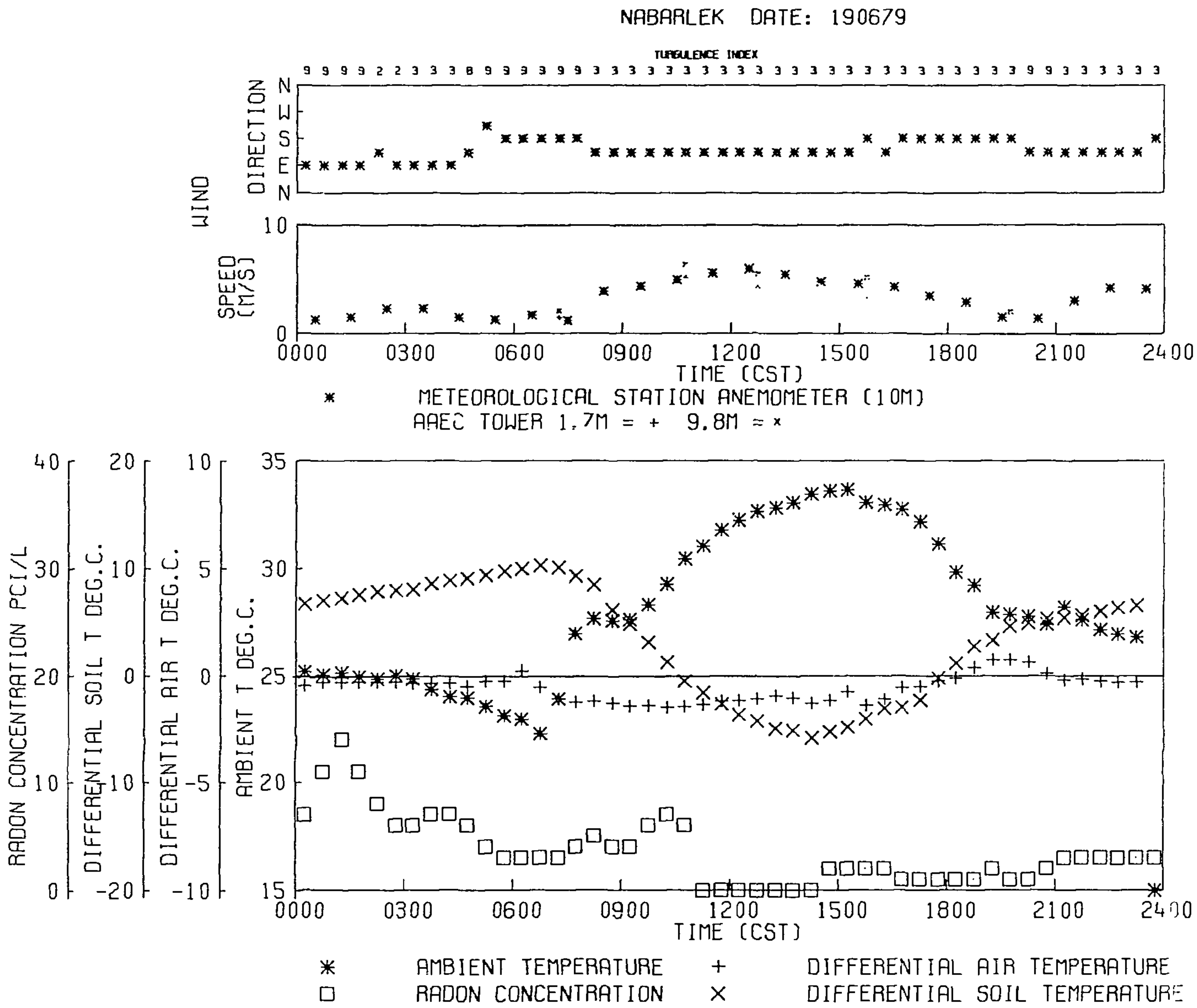

NABARLEK DATE: 190679
TURBULENCE INDEX
WIND
DIRECTION
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
TIME (CST)
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 11.

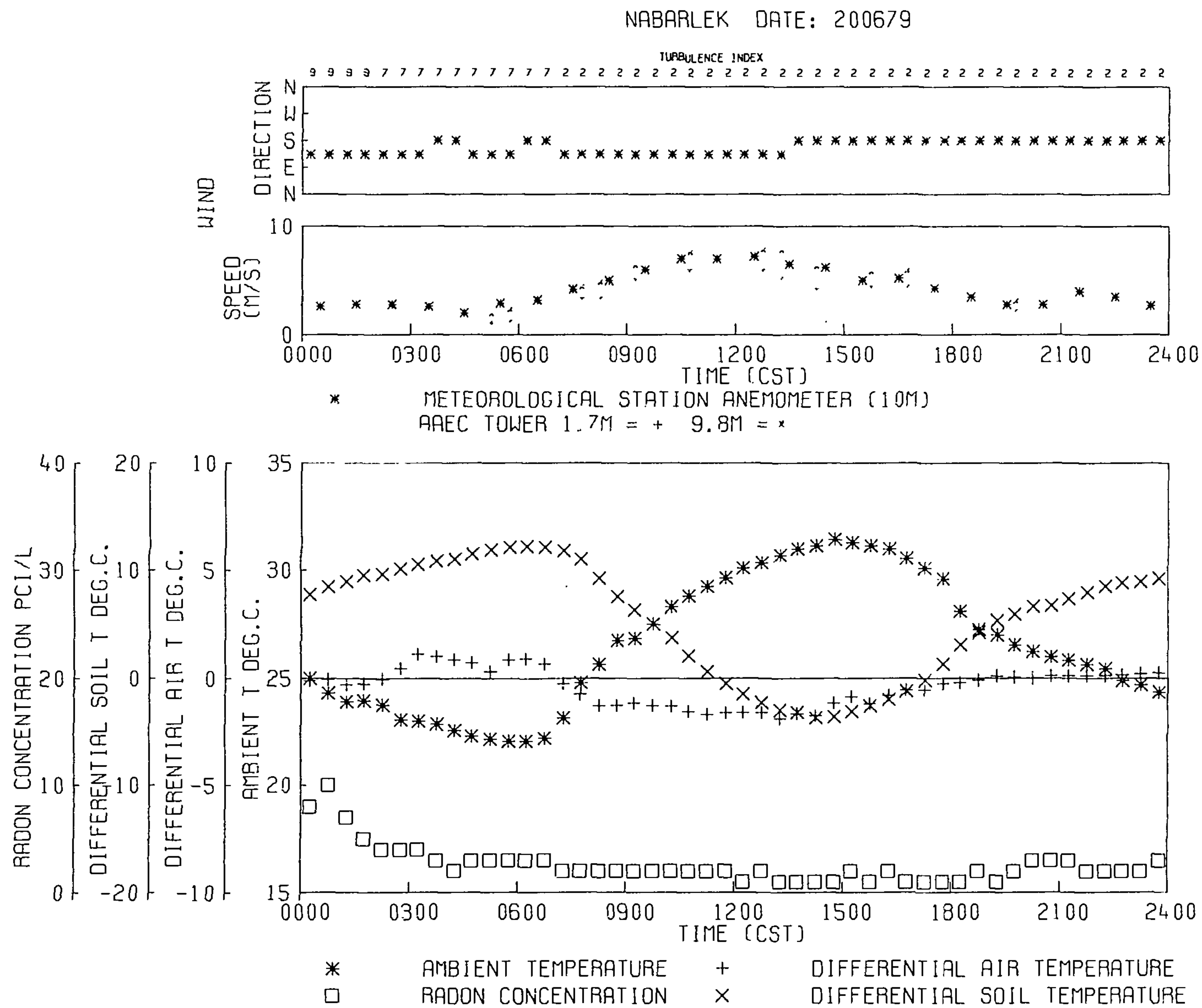

NABARLEK DATE: 200679
TURBULENCE INDEX
WIND
DIRECTION
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 12.

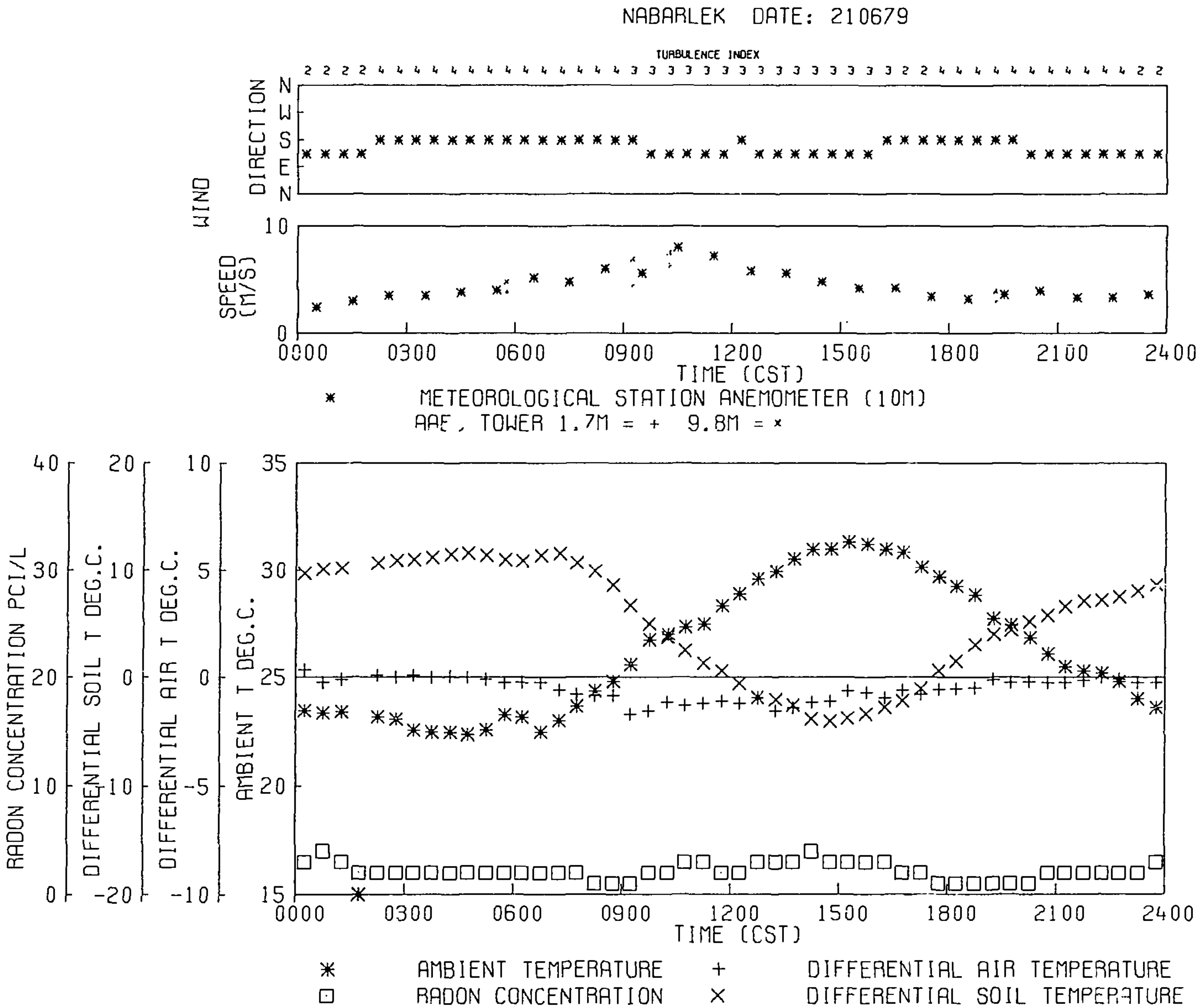

NABARLEK DATE: 210679
TURBULENCE INDEX
WIND
DIRECTION
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAE, TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
TIME (CST)
AMBIENT TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL AIR TEMPERATURE
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 13.

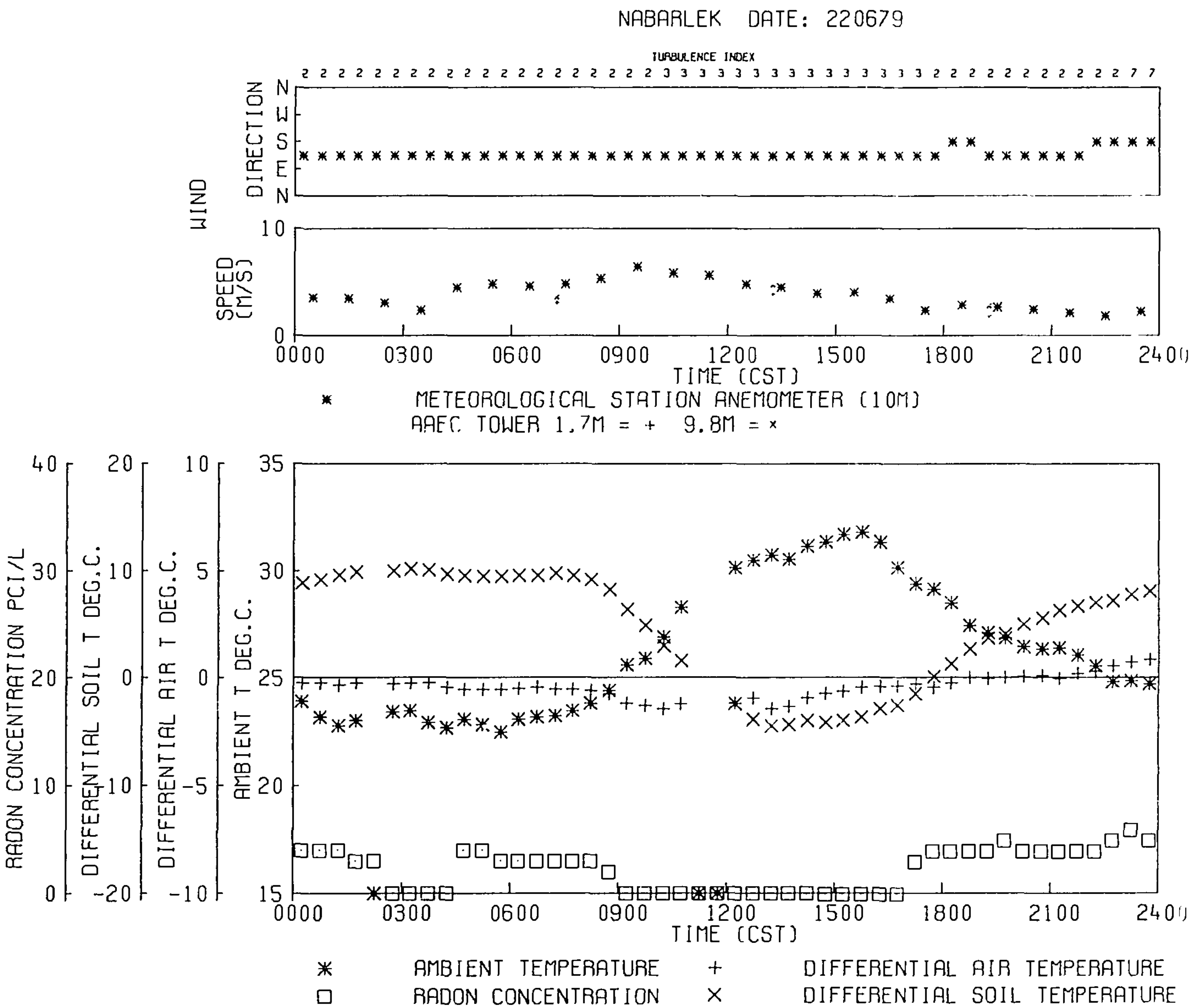

NABARLEK DATE: 220679
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
AMBIENT TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL AIR TEMPERATURE
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 14.

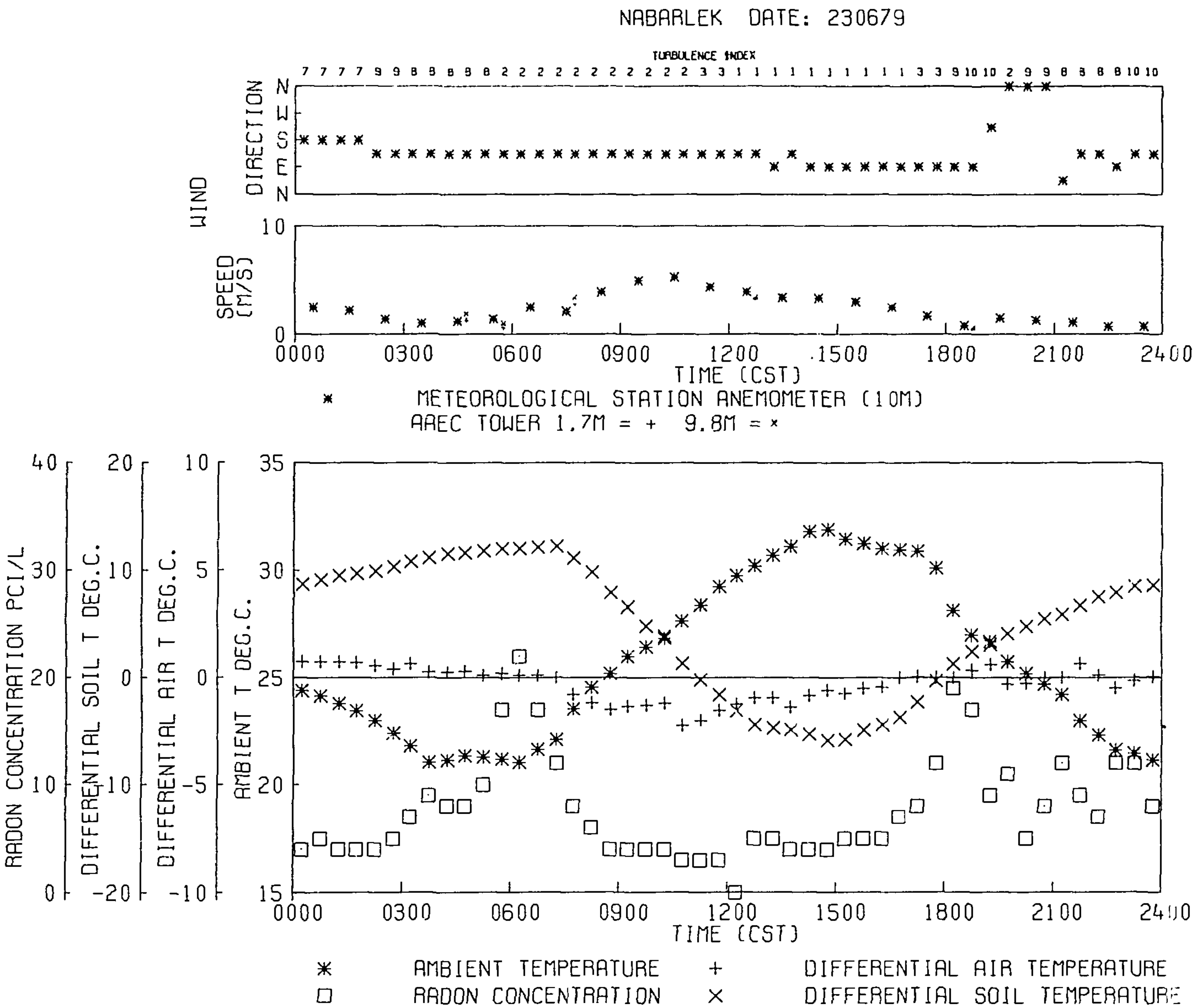

NABARLEK DATE: 230679
TURBULENCE INDEX
WIND
DIRECTION
N W S E N
SPEED (M/S)
0 10
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
0 10 20 30 40
DIFFERENTIAL SOIL T DEG.C.
-20 -10 0 10 20
DIFFERENTIAL AIR T DEG.C.
-10 -5 0 5 10
AMBIENT T DEG.C.
15 20 25 30 35
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
✳ AMBIENT TEMPERATURE
+ DIFFERENTIAL AIR TEMPERATURE
□ RADON CONCENTRATION
× DIFFERENTIAL SOIL TEMPERATURE

FIGURE 15.

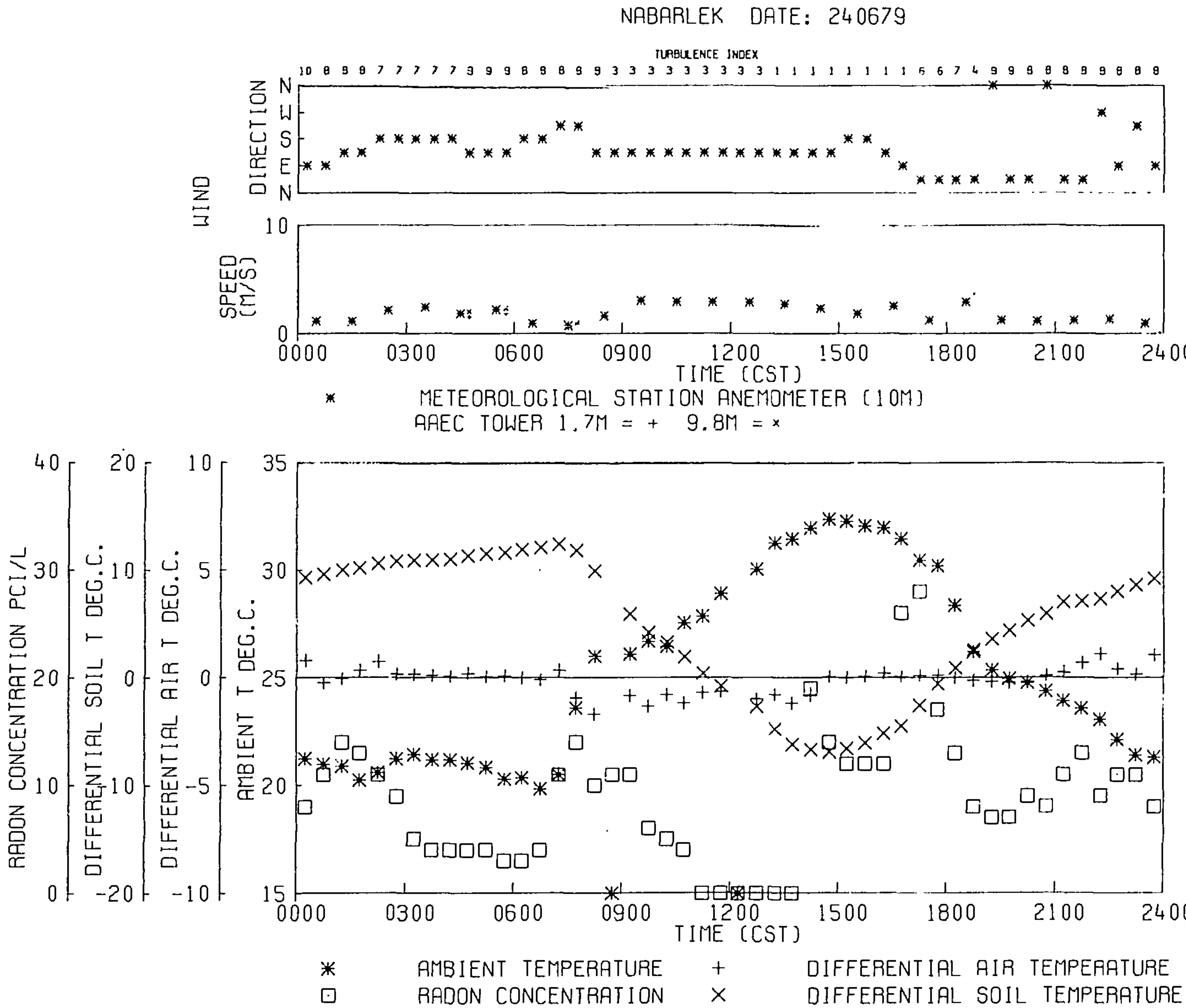

NABARLEK DATE: 240679
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
40 30 20 10 0
DIFFERENTIAL SOIL T DEG.C.
20 10 0 -10 -20
DIFFERENTIAL AIR T DEG.C.
10 5 0 -5 -10
AMBIENT T DEG.C.
35 30 25 20 15
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* AMBIENT TEMPERATURE
+ DIFFERENTIAL AIR TEMPERATURE
□ RADON CONCENTRATION
× DIFFERENTIAL SOIL TEMPERATURE

FIGURE 16.

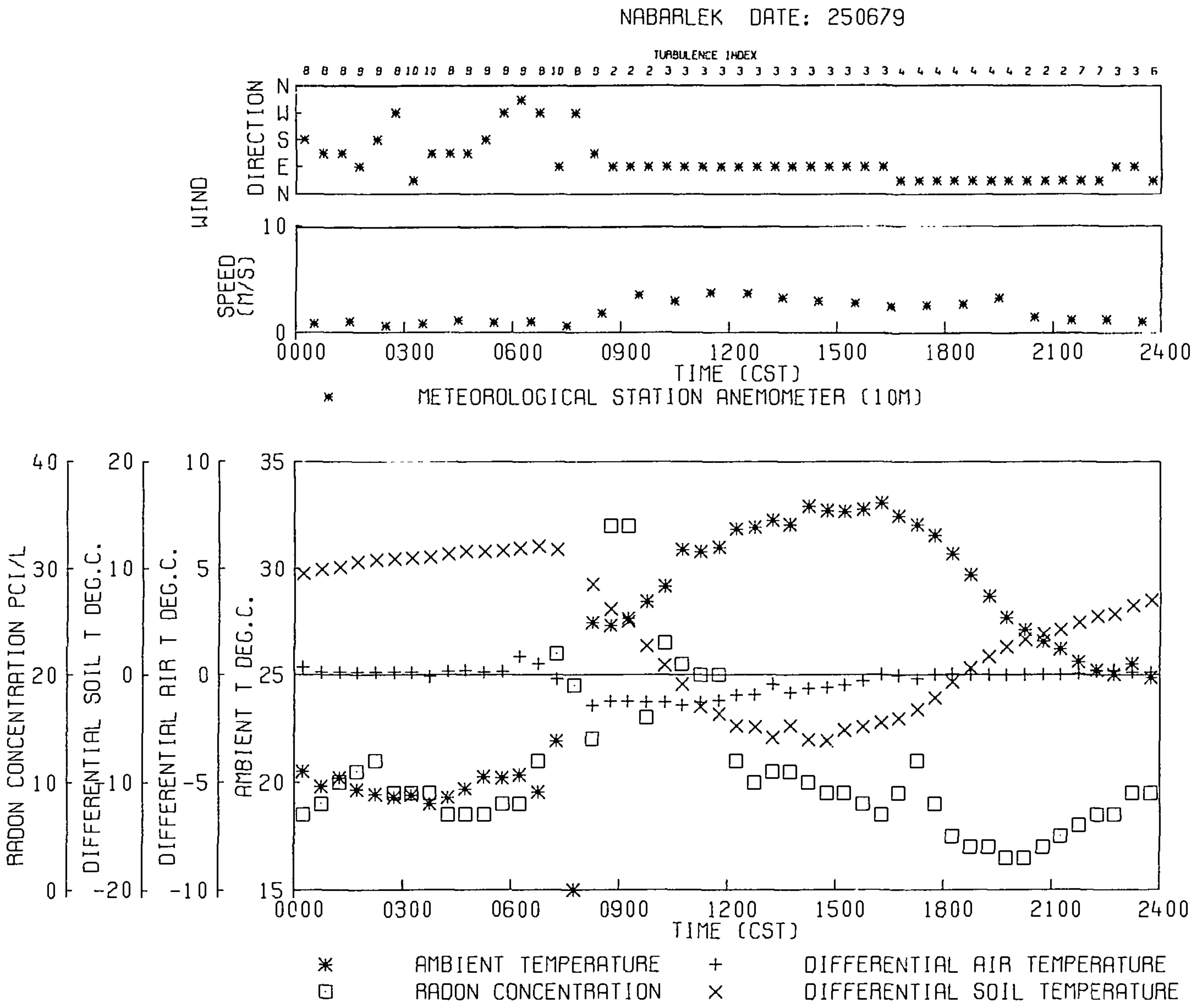

NABARLEK DATE: 250679
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000
0300
0600
0900
1200
1500
1800
2100
2400
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
40
30
20
10
0
20
10
0
-10
-20
10
5
0
-5
-10
35
30
25
20
15
0000
0300
0600
0900
1200
1500
1800
2100
2400
TIME (CST)
* AMBIENT TEMPERATURE
+ DIFFERENTIAL AIR TEMPERATURE
□ RADON CONCENTRATION
× DIFFERENTIAL SOIL TEMPERATURE

FIGURE 17.

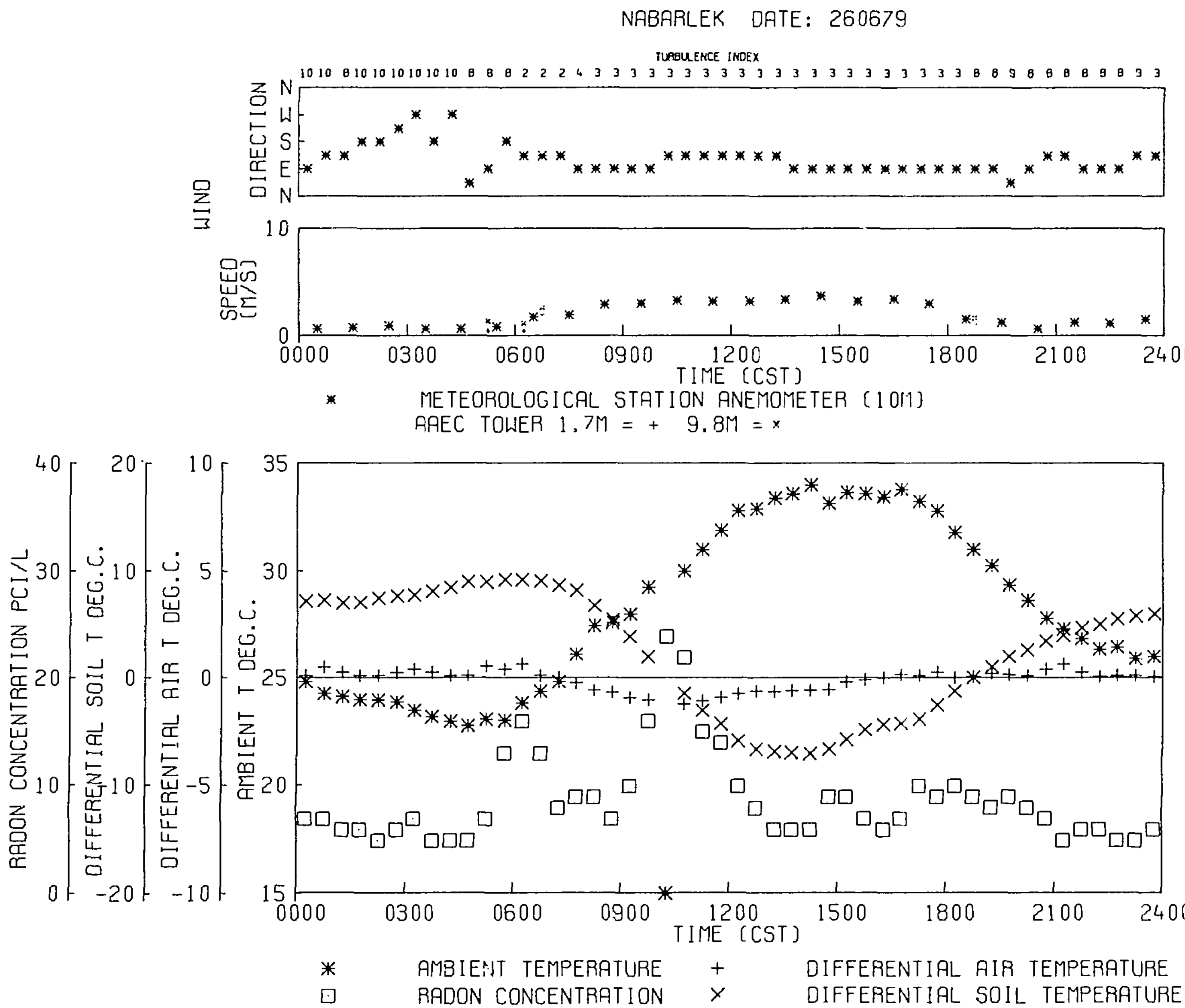

NABARLEK DATE: 260679
TURBULENCE INDEX
WIND
DIRECTION
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 18.

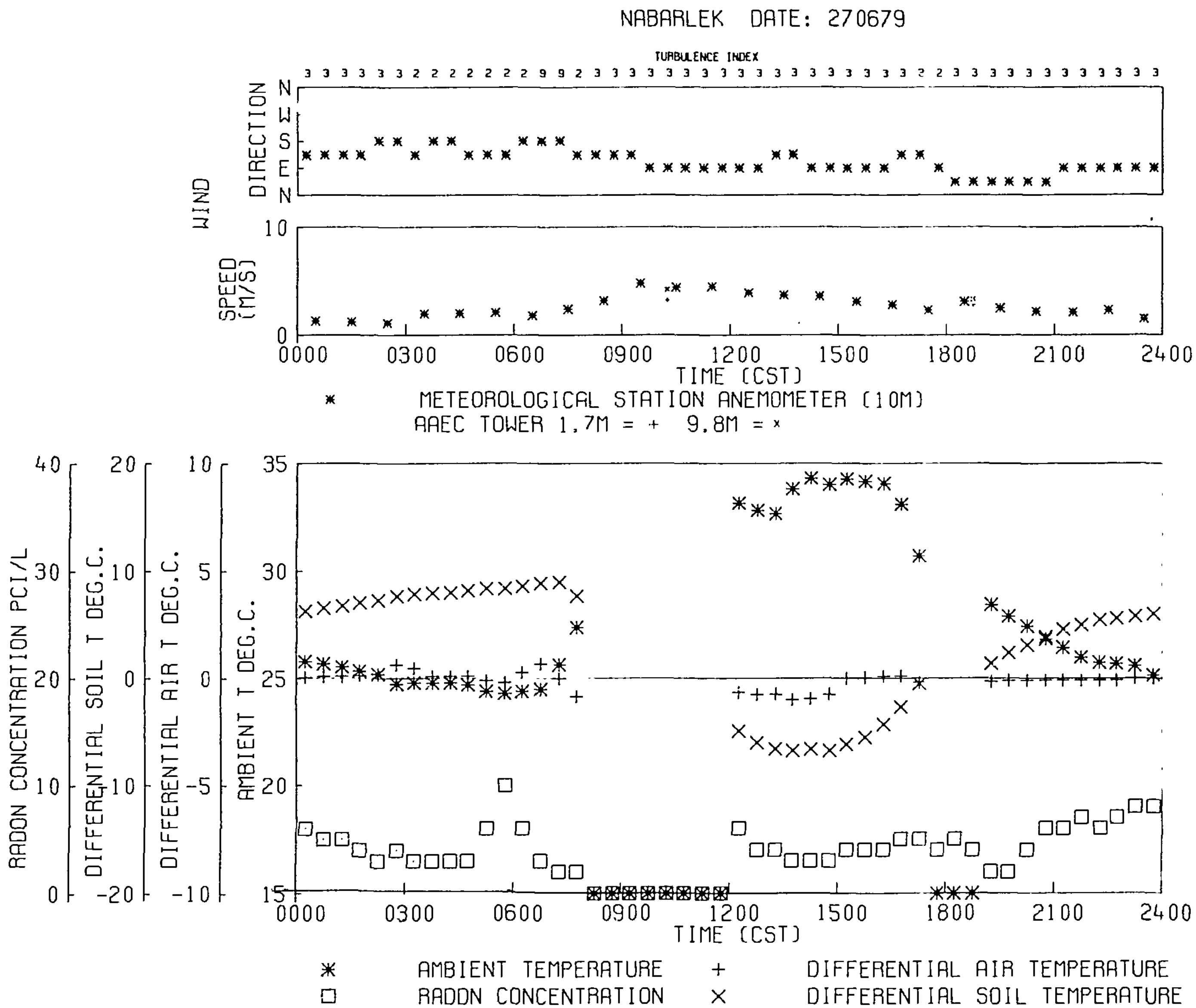

NABARLEK DATE: 270679
TURBULENCE INDEX
3 3 3 3 3 3 2 2 2 2 2 2 2 2 9 9 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 ? 2 3 3 3 3 3 3 3 3 3 3 3
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = x
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
40 30 20 10 0
20 10 0 -10 -20
10 5 0 -5 -10
35 30 25 20 15
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* AMBIENT TEMPERATURE
+ DIFFERENTIAL AIR TEMPERATURE
□ RADON CONCENTRATION
x DIFFERENTIAL SOIL TEMPERATURE

FIGURE 19.

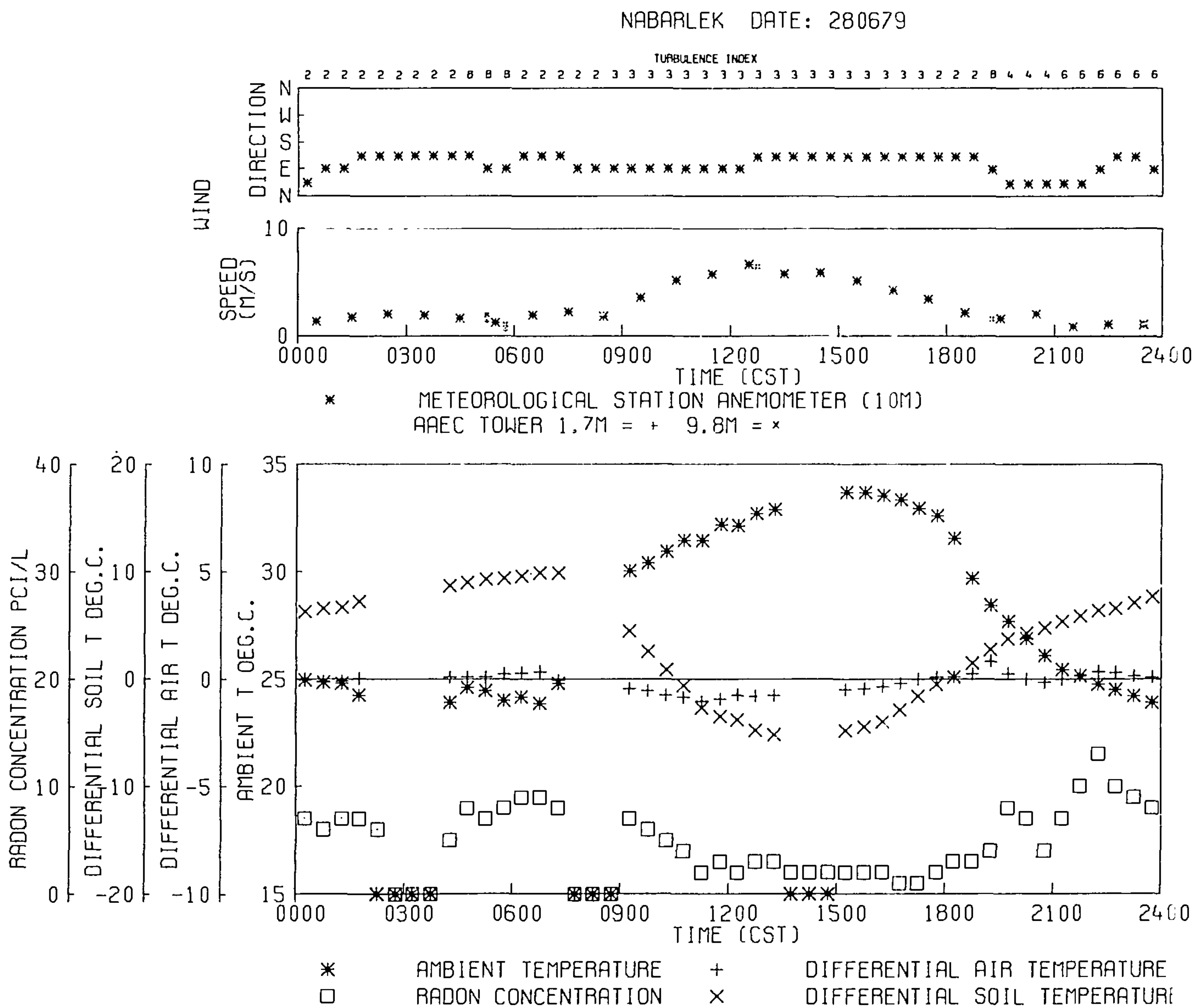

NABARLEK DATE: 280679
TURBULENCE INDEX
WIND
DIRECTION
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
TIME (CST)
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 20.

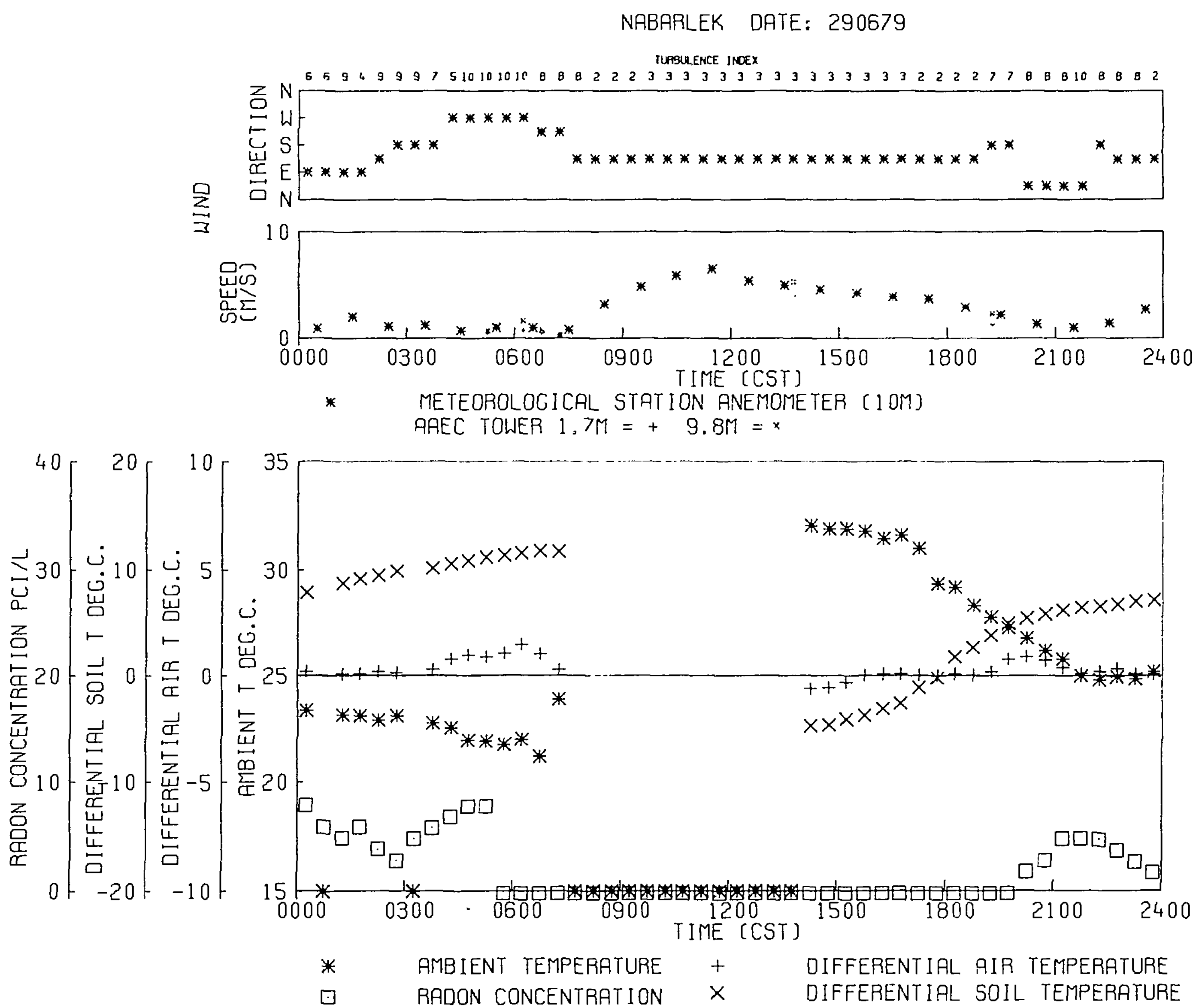
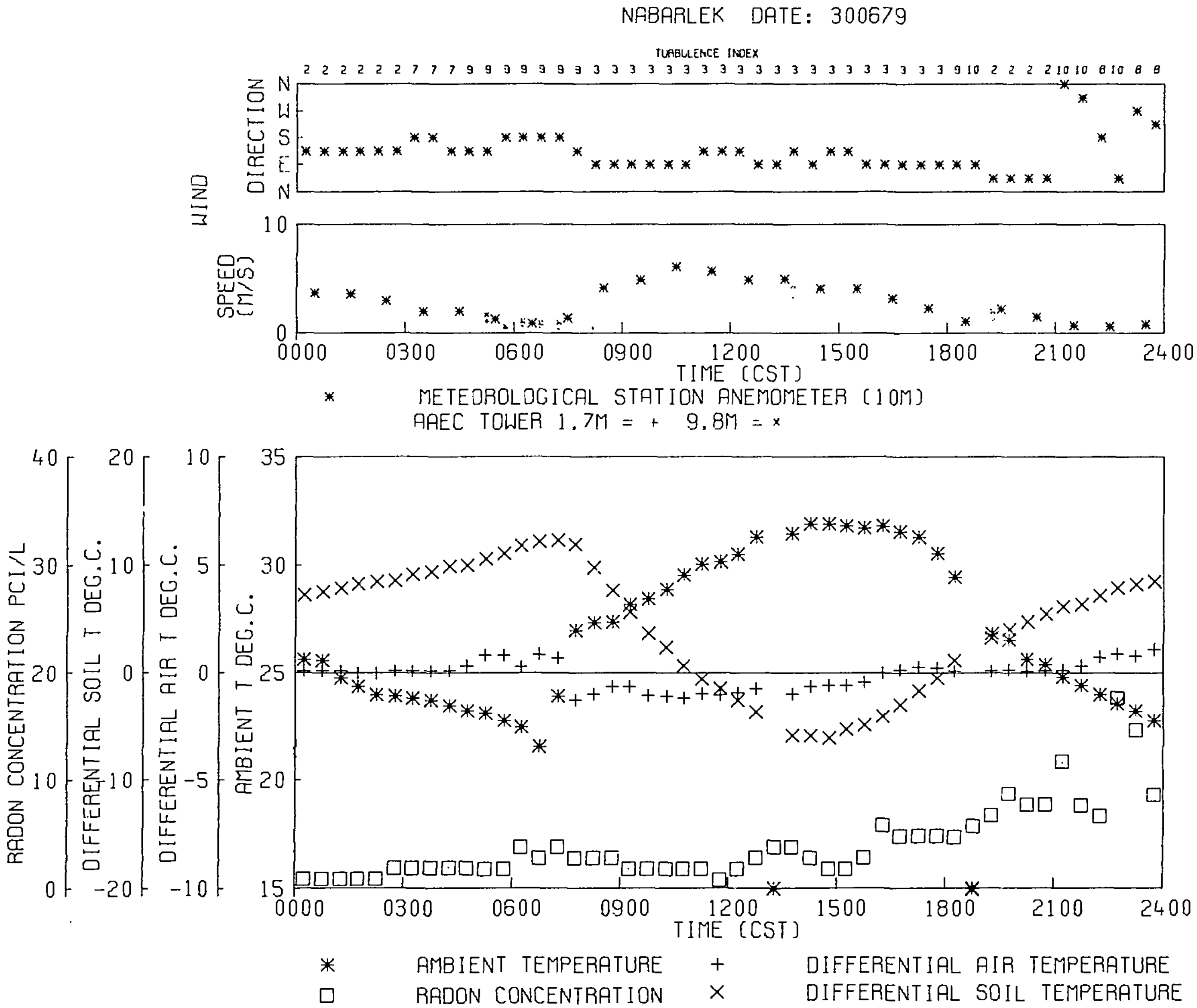

NABARLEK DATE: 290679
TURBULENCE INDEX
WIND
DIRECTION
SPEED (M/S)
N W S E N
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 21.



NABARLEK DATE: 300679
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
40 30 20 10 0
20 10 0 -10 -20
10 5 0 -5 -10
35 30 25 20 15
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* AMBIENT TEMPERATURE
+ DIFFERENTIAL AIR TEMPERATURE
□ RADON CONCENTRATION
× DIFFERENTIAL SOIL TEMPERATURE

FIGURE 22.

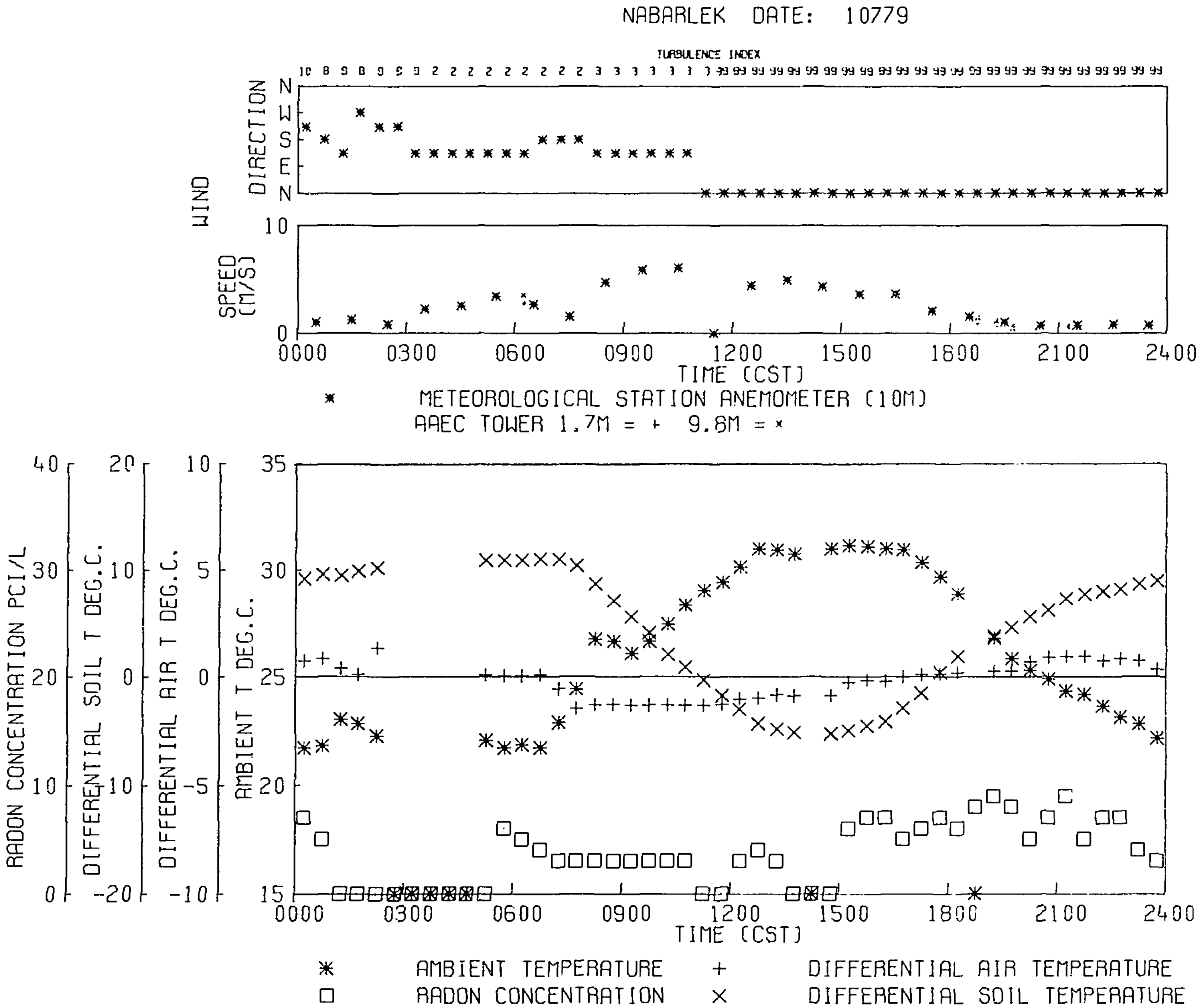

NABARLEK DATE: 10779
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
40 30 20 10 0
DIFFERENTIAL SOIL T DEG.C.
20 10 0 -10 -20
DIFFERENTIAL AIR T DEG.C.
10 5 0 -5 -10
AMBIENT T DEG.C.
35 30 25 20 15
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
✳ AMBIENT TEMPERATURE
+ DIFFERENTIAL AIR TEMPERATURE
□ RADON CONCENTRATION
× DIFFERENTIAL SOIL TEMPERATURE

FIGURE 23.

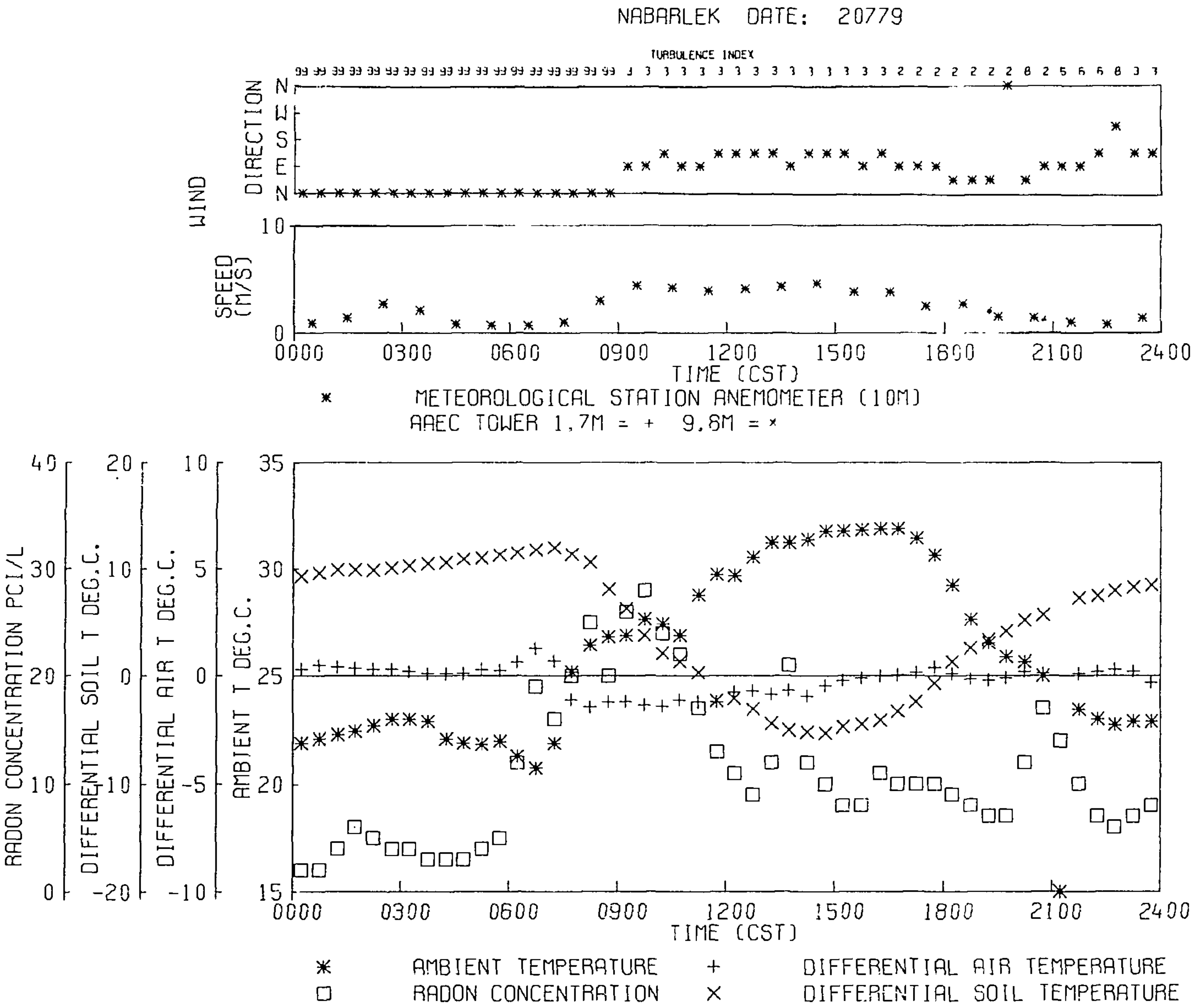
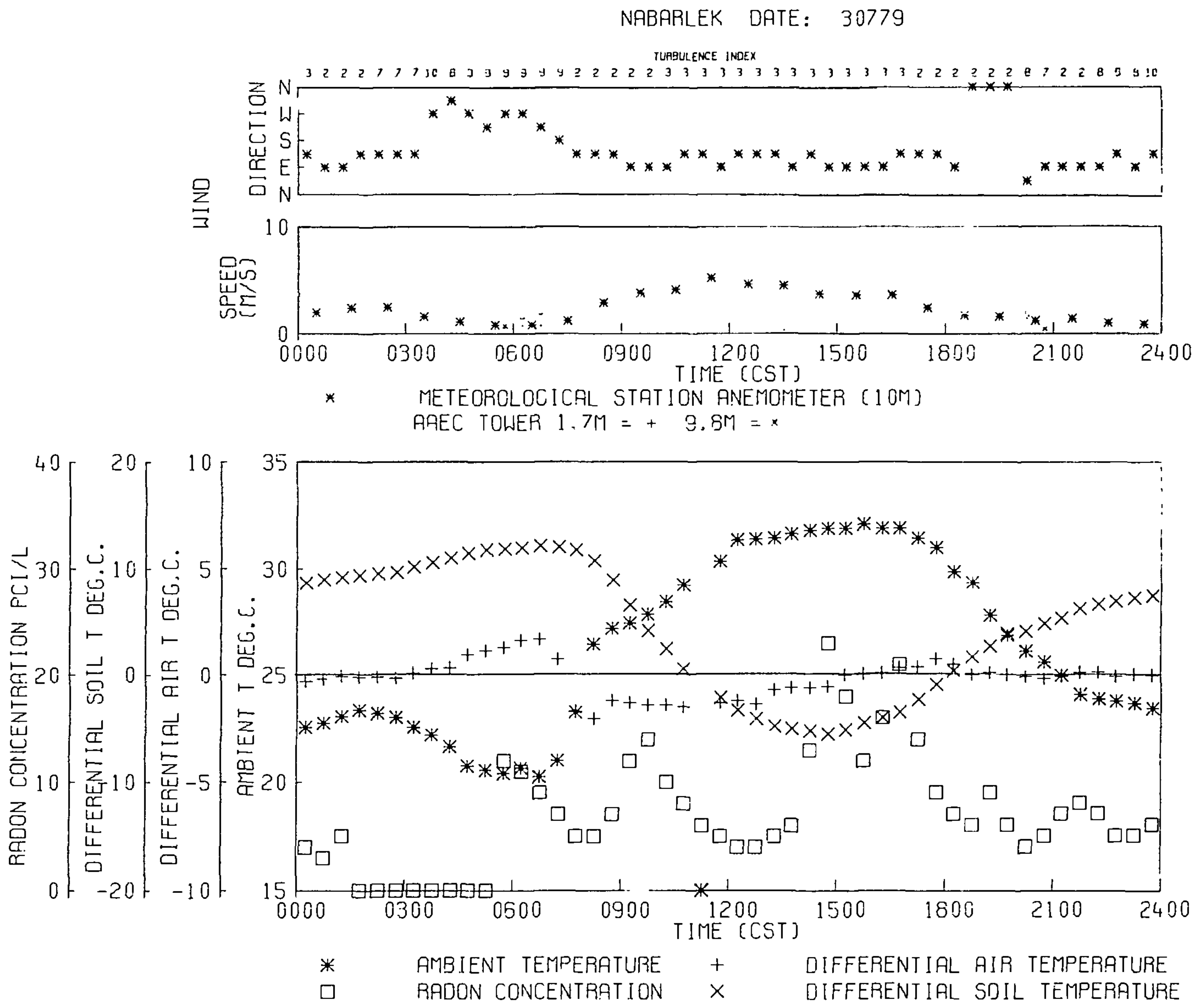

NABARLEK DATE: 20779
TURBULENCE INDEX
WIND
DIRECTION
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 24.



NABARLEK DATE: 30779
TURBULENCE INDEX
WIND
DIRECTION
SPEED (M/S)
TIME (CST)
METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
AMBIENT TEMPERATURE
DIFFERENTIAL AIR TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 25.

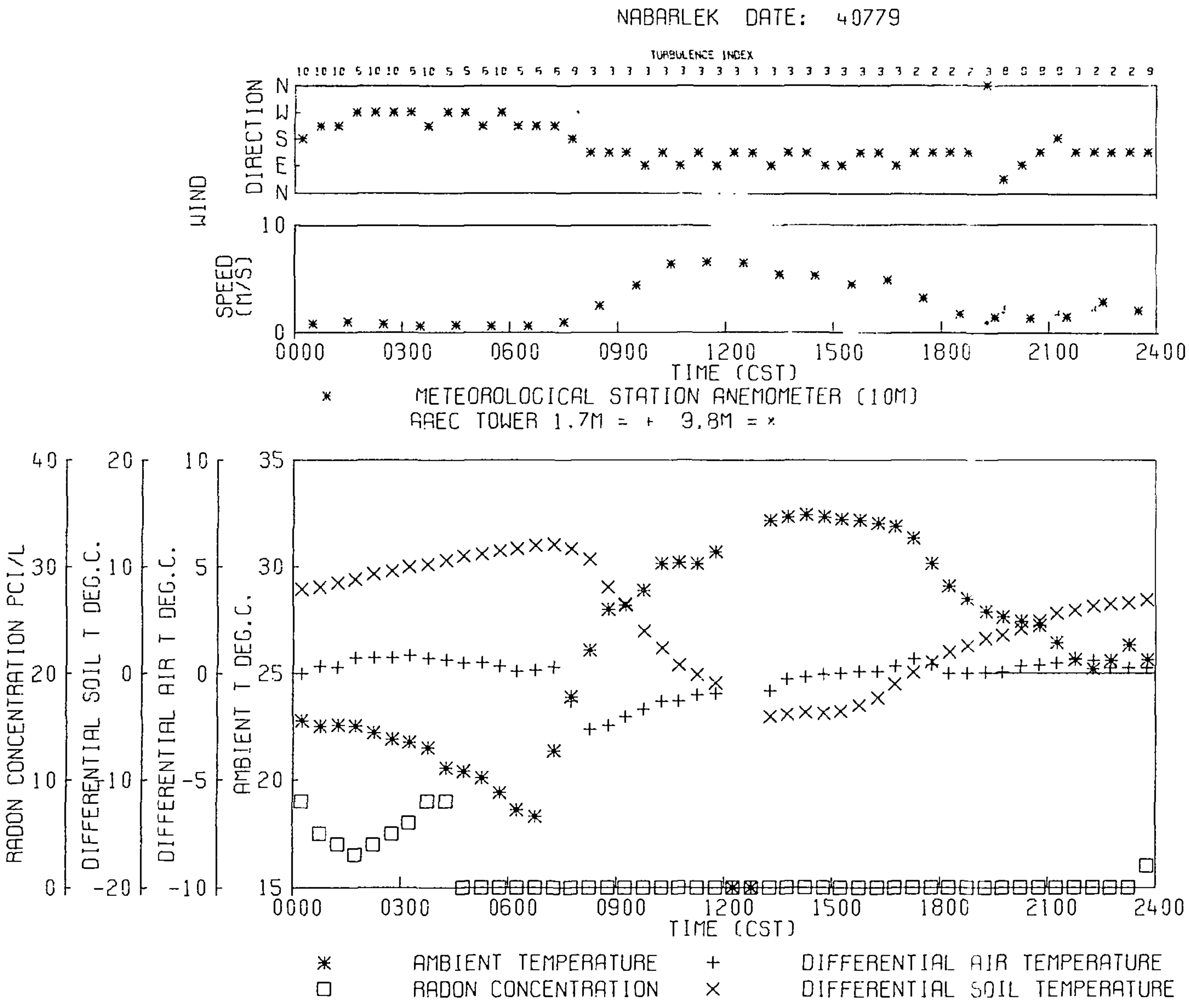

NABARLEK DATE: 40779
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
10
0
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.8M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
40 30 20 10 0
20 10 0 -10 -20
10 5 0 -5 -10
35 30 25 20 15
0000 0300 0600 0900 1200 1500 1800 2100 2400
TIME (CST)
* AMBIENT TEMPERATURE
+ DIFFERENTIAL AIR TEMPERATURE
□ RADON CONCENTRATION
× DIFFERENTIAL SOIL TEMPERATURE

FIGURE 26.

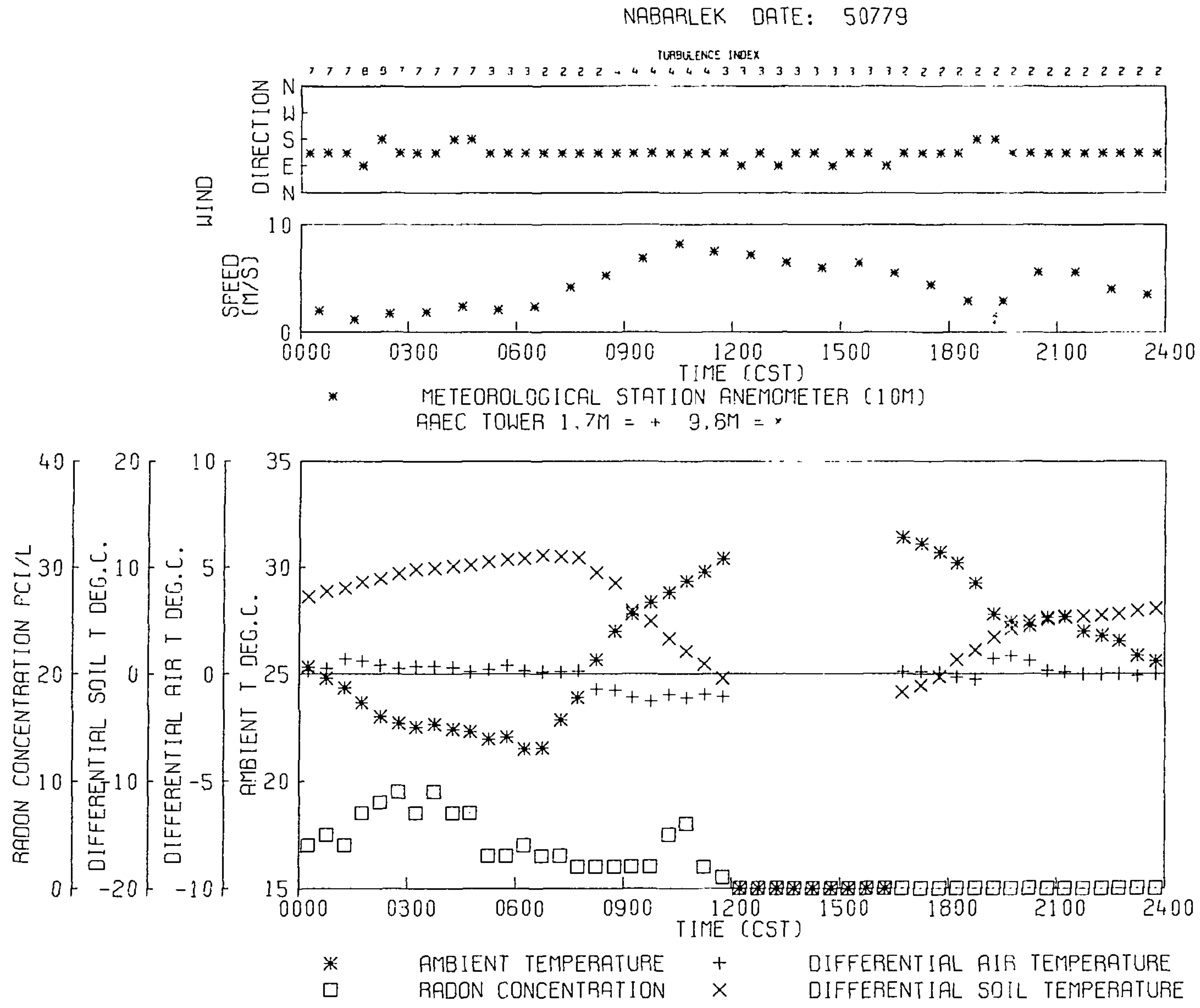

NABARLEK DATE: 50779
TURBULENCE INDEX
WIND
DIRECTION
N
W
S
E
N
SPEED (M/S)
TIME (CST)
* METEOROLOGICAL STATION ANEMOMETER (10M)
AAEC TOWER 1.7M = + 9.6M = ×
RADON CONCENTRATION PCI/L
DIFFERENTIAL SOIL T DEG.C.
DIFFERENTIAL AIR T DEG.C.
AMBIENT T DEG.C.
TIME (CST)
AMBIENT TEMPERATURE
RADON CONCENTRATION
DIFFERENTIAL AIR TEMPERATURE
DIFFERENTIAL SOIL TEMPERATURE

FIGURE 27.

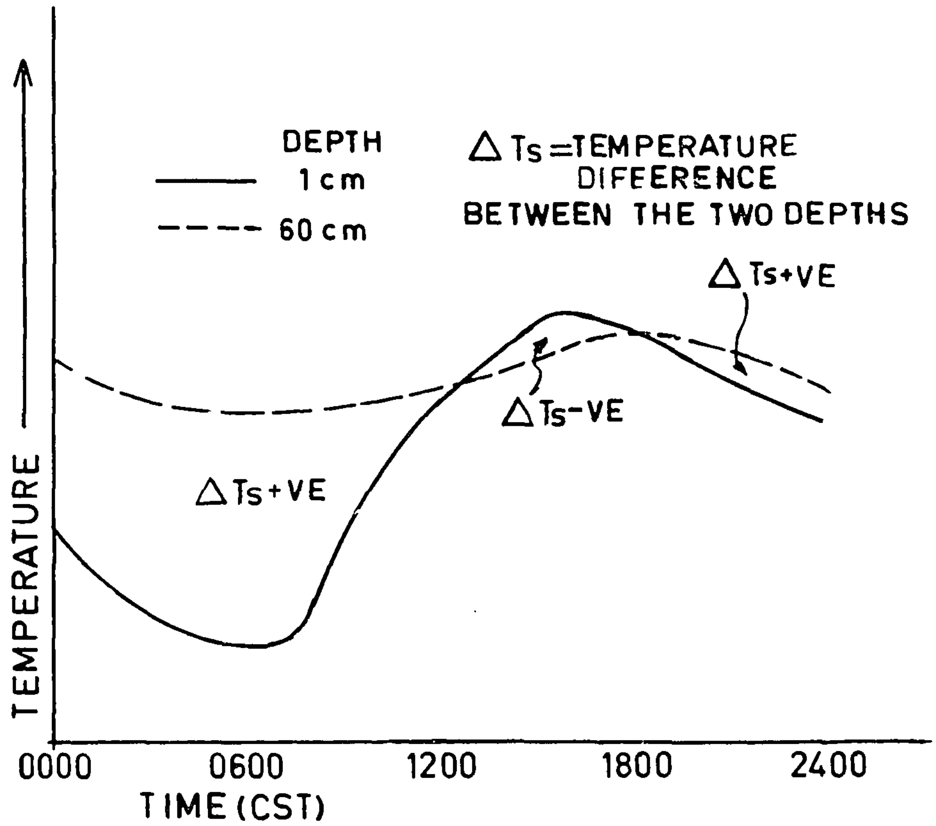


FIGURE 28. A SCHEMATIC REPRESENTATION OF THE DIURNAL VARIATION OF SOIL TEMPERATURES

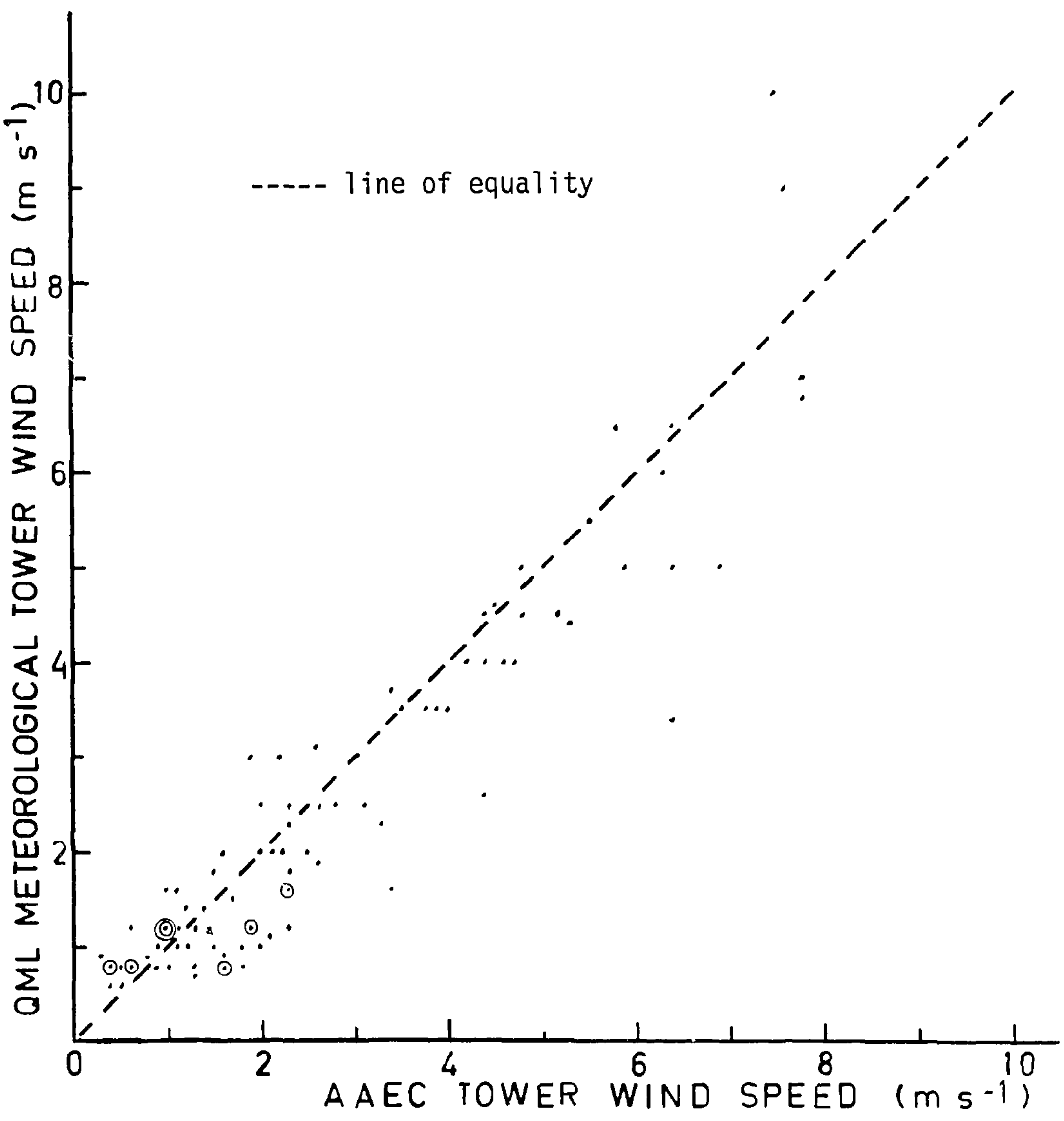


FIGURE 29. COMPARISON OF AAEC AND QML ANEMOMETER 10-MINUTE AVERAGE WIND SPEEDS AT 10 m ELEVATION

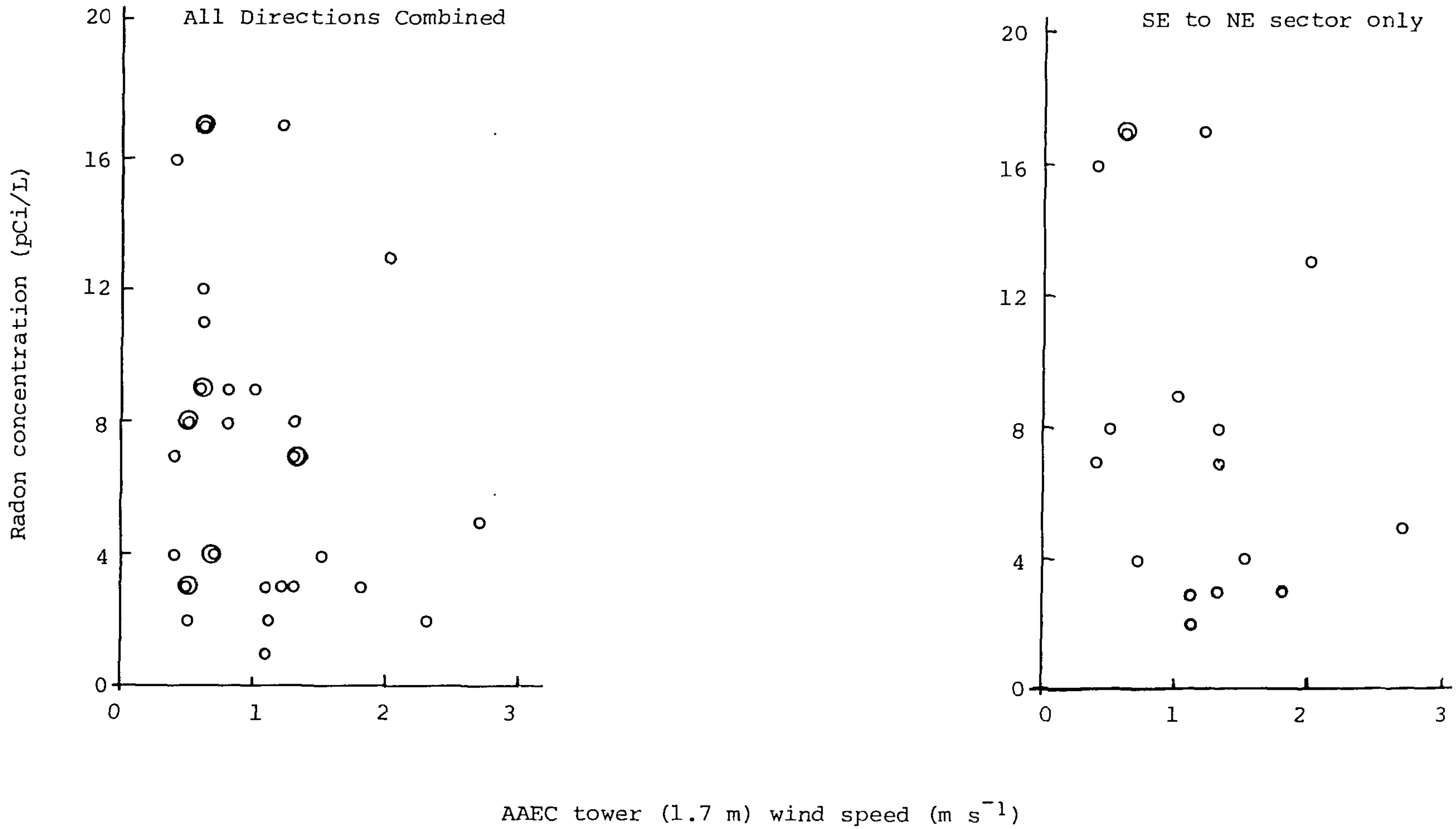


FIGURE 30. RADON CONCENTRATIONS VERSUS AAEC TOWER (1.7 m) WIND SPEEDS

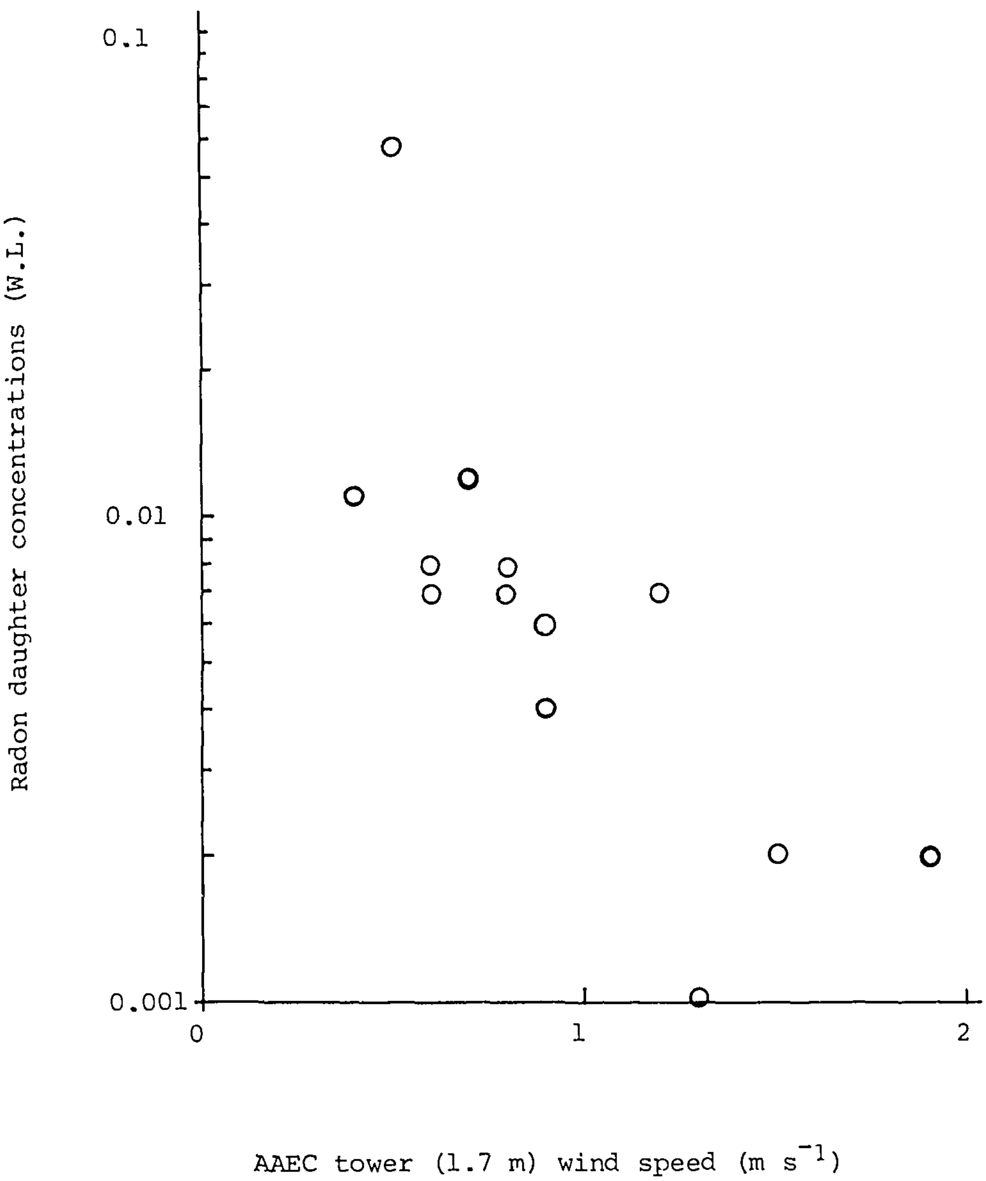


FIGURE 31. RADON DAUGHTER CONCENTRATIONS VERSUS AAEC TOWER (1.7 m) WIND SPEEDS

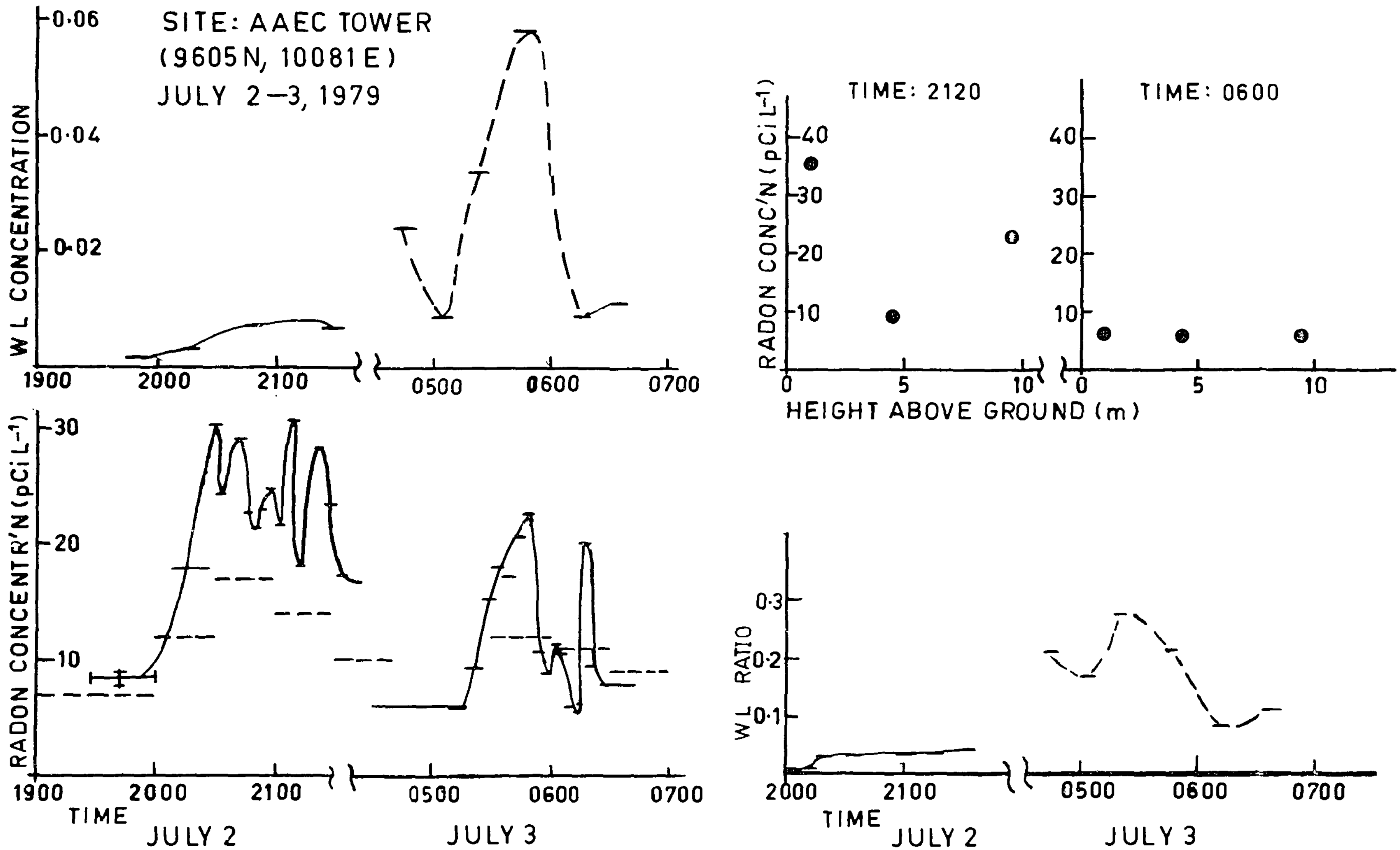


FIGURE 32. TEMPORAL AND HEIGHT VARIATIONS OF RADON AIR CONCENTRATIONS, WL CONCENTRATIONS AND RATIOS ON JULY 2 AND 3, 1979

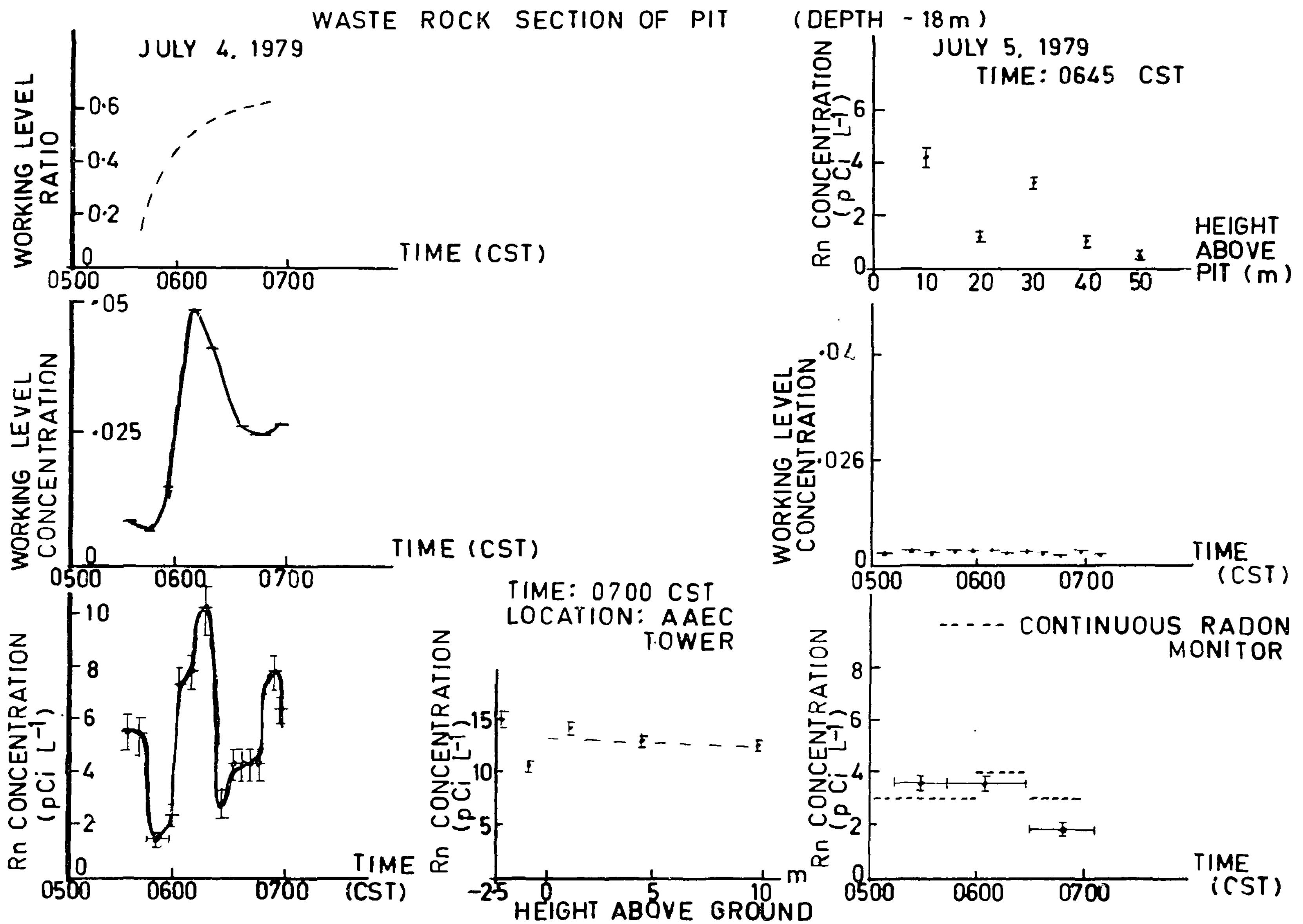


FIGURE 33. TEMPORAL AND HEIGHT VARIATIONS OF RADON AIR CONCENTRATIONS, WL CONCENTRATIONS AND RATIOS ON JULY 4 AND 5, 1979

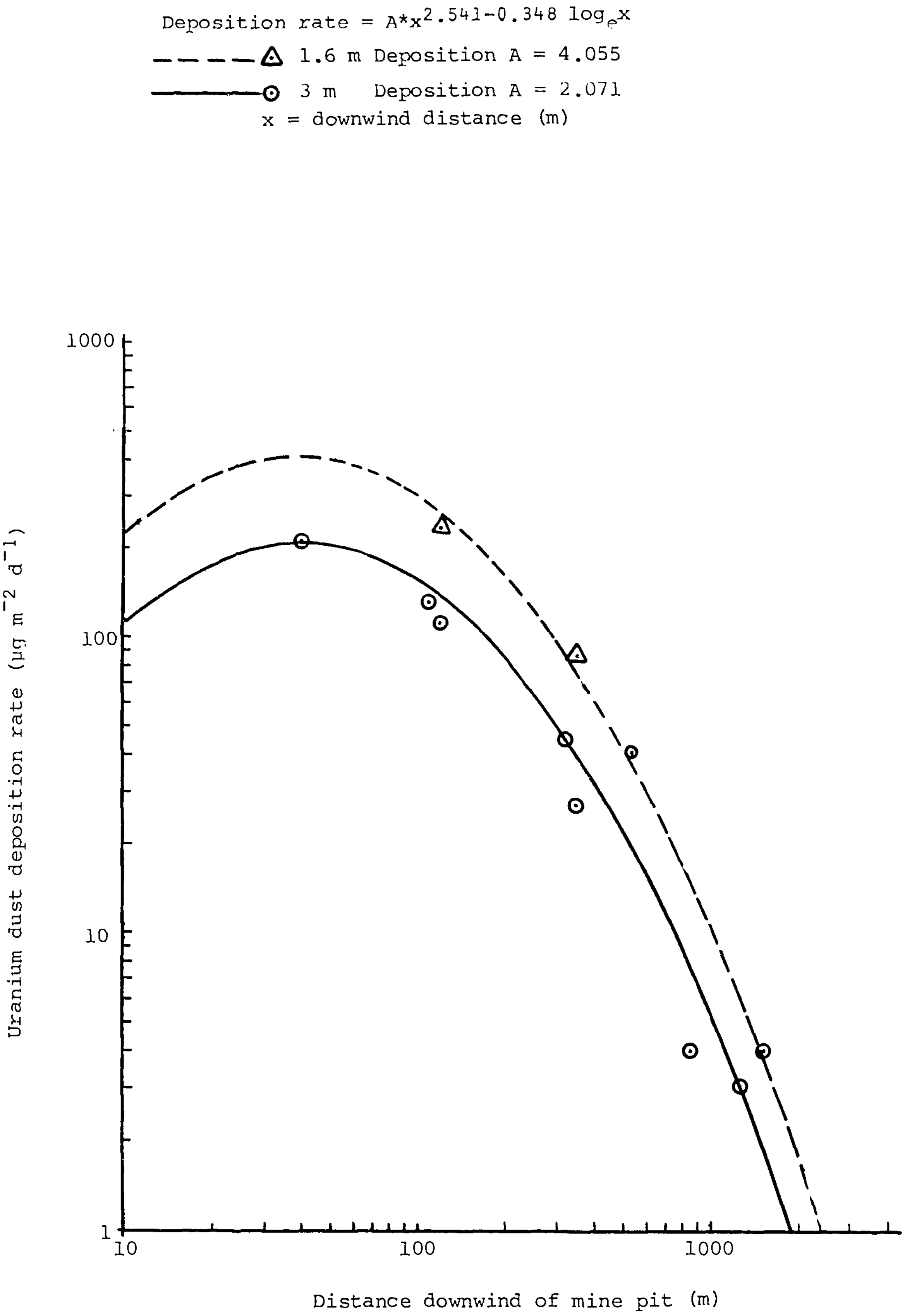


FIGURE 34. DEPOSITION RATE OF URANIUM IN DUST AS A FUNCTION OF DISTANCE DOWNWIND FROM THE PIT

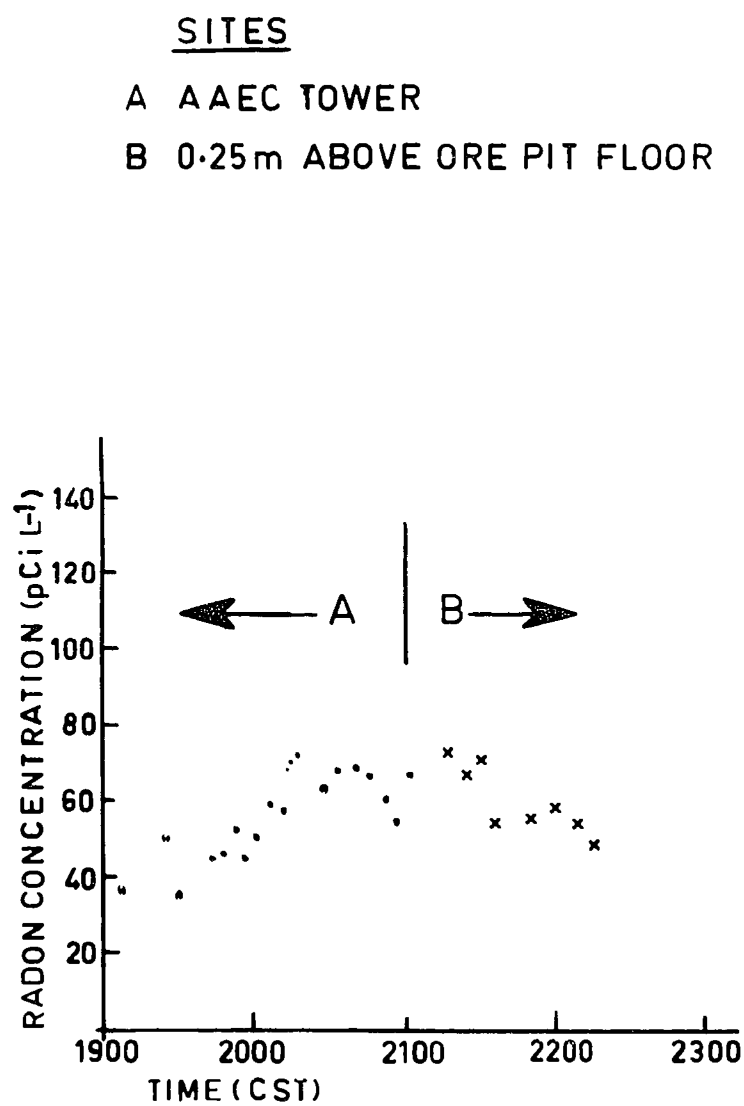


FIGURE 35. TEMPORAL VARIATION OF RADON AIR CONCENTRATION AT THE AAEC TOWER AND 0.25 m ABOVE THE ORE PIT FLOOR, 1900 TO 2230 CST, JULY 4, 1979

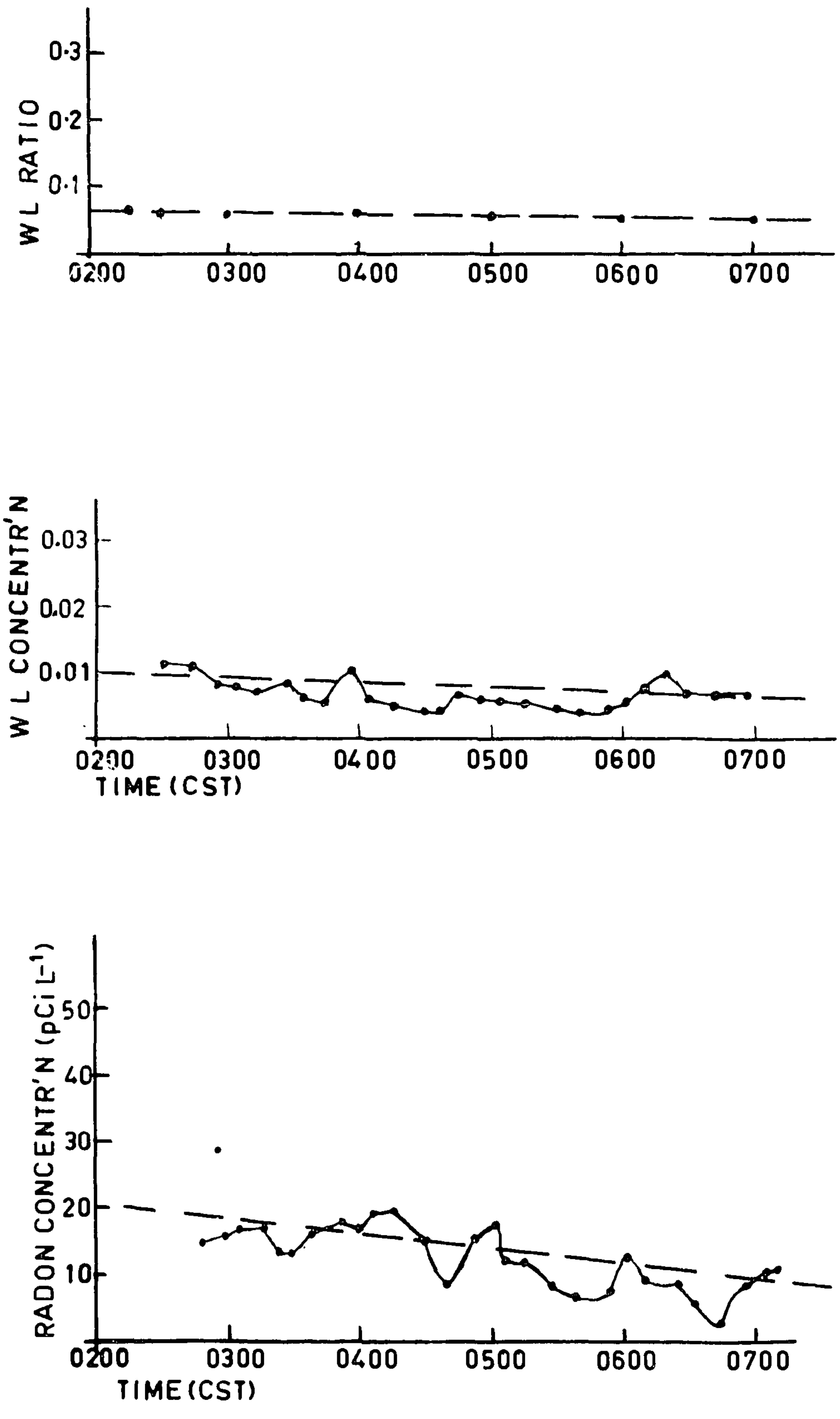


FIGURE 36. TEMPORAL VARIATION OF RADON AIR CONCENTRATION, WL CONCENTRATIONS AND RATIOS IN THE NW CORNER ORE SECTION OF PIT, 0200 TO 0700 CST, JULY 7, 1979.

Printed by the AAEC Research Establishment