



Drought resistance in barley as related to color and screening tests
by Thomas Conrad Fink

A thesis submitted in partial fulfillment of the requirements for the degree of DOCTOR OF
PHILOSOPHY in Crops and Soil Science
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Abstract:

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Osmotic potential does not appear to be useful as a screening test because of unreliability and inability to differentiate between cultivars.

Soil water use has good potential as a screening test. The best correlations with drought resistance occur at the shallow and deep depths. The less water used the larger the drought resistance.

Water loss after dry-down is also a potentially good screening test. The optimum drying interval was 24 hours, with whole plants being the best sample. The smaller the water loss, the larger the drought resistance.

Modulus of elasticity gave the highest correlations with drought resistance. However, the tediousness of the procedure makes it of questionable value in preliminary screening. The higher the modulus, the larger the drought resistance.

Plant height, percent plump kernels, and 100 kernel weights are all positively correlated with drought resistance.

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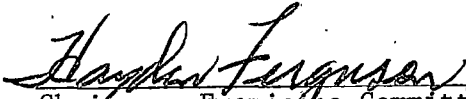
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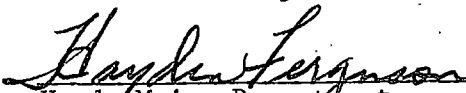
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ABSTRACT

Color as it affects drought resistance in barley isogenes and screening tests for drought resistance in barley cultivars were investigated.

The greater reflection by the light isogene was related to its smaller water use early in the season. From mid-season on the higher stomatal resistances in the dark isogene more than compensated for its smaller reflection with the result being smaller water use by the dark isogene. Seasonal totals showed the light isogene used as much or more water than the dark isogene.

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Plant height, percent plump kernels, and 100 kernel weights are all positively correlated with drought resistance.

Chapter 1

INTRODUCTION

Drought Resistance Theory

The research for this thesis has involved two related, but separate, research problems. The first involved the influence of color as a drought resistance trait in barley isogenes. This is part of an on-going research program at Montana State University in which different plant morphological features, such as color, awn length, and others, are evaluated in relation to drought resistance. The second area of research relates screening techniques to drought resistance of barley cultivars. These two areas will be treated separately throughout the thesis.

A brief introduction to drought resistance theory will follow in order to give a general background to the specific areas of drought resistance that were studied. Since this thesis research involved only plant characteristics and their relation to drought resistance, no discussion will be presented involving environmental factors and their relation to drought resistance.

Probably the simplest drought resistance classification scheme includes two categories, drought tolerance and drought avoidance. Drought tolerators include those plants capable of undergoing water

stress (experiencing lowered water potential)¹ while still functioning normally. This is often referred to as desiccation resistance. Plant physiological characteristics that enhance this drought tolerance include: a) increased cell wall elasticity; b) the ability of the vacuole to gel or solidify; c) the production of sugars, polyols, peptides and proteins; and d) enlargement of cell walls (54). This thesis measured, as a screening test, osmotic potential, which should be a measure of the production of sugars, polyols, and other salts and, thus, of drought tolerance. Another screening technique researched, modulus of elasticity, measures cell wall elasticity and, consequently, also measures drought tolerance.

Drought avoiders are those plants that maintain a favorable internal water status (high water potential) when undergoing water stress or, such as is the case with desert ephemerals, maintain a high water potential by avoiding altogether any stressful situation. In order to maintain high water potential it is necessary that uptake, U ,² of water be equal to or greater than the transpirational water loss.³ Con

¹Throughout this thesis a water potential with a large negative value will be considered low.

²All symbols are defined in the text as well as Appendix Table 31.

³In some instances, such as with succulents, it is not precisely the uptake, but rather the retention of water in various plant organs that must equal or exceed transpiration.

Using an analogy of Ohm's Law it is possible to define the movement of water in soil and plants as

$$q = \Delta\Psi/r \quad (56) \quad (1)$$

where q = water flux,

$\Delta\Psi$ = gradient of water potential across some component,

r = resistance across that component.

In a similar fashion to equation (1) we may write the uptake of water as being proportional to

$$U \propto \frac{\Psi_r - \Psi_s}{r_r + r_s} \quad (2)$$

where U = uptake of water

Ψ_r = root water potential,

Ψ_s = soil water potential,

r_r = root resistance, and

r_s = soil resistance.

Plant morphological features that lower root potential and decrease root and soil resistances would increase uptake of water.

Potentials in the plant, including Ψ_r , consist of three components:

$$(\pm) \Psi = (-) \Psi_m (-) \Psi_o (\pm) \Psi_p \quad (3)$$

where Ψ = total plant potential (root, leaf, etc.),

Ψ_m = matric potential,

Ψ_o = osmotic potential, and

Ψ_p = turgor or pressure potential.

Matric potential is due to the adsorptive qualities of the tissue matrix. Osmotic potential is due to the presence of salts or other solutes. Turgor potential is caused by vacuolar fluid pressure being greater than atmospheric.

Lowered root potential would likely include lowered osmotic potential caused by increased production of salts, sugars, etc. As mentioned above, osmotic potential was one of the screening tests studied. Soil resistances would be decreased by more extensive rooting systems, both deeper as well as more highly branched with finer root hairs. In both the color study and the screening tests study, soil water use was periodically monitored throughout the season. It was hypothesized that soil water use should give an indirect measure of the rooting patterns and, thus, of root resistance.

Again using an analogy to equation (1), we may define transpiration as being proportional to

$$E \propto \frac{\Psi_a - \Psi_l}{r_a + r_l} \quad (4)$$

where E = transpiration,

Ψ_a = air potential,

Ψ_l = leaf potential,

r_a = air resistance, and

r_l = leaf resistance.

Any feature that lowers leaf potential or increases leaf resistance

would decrease transpiration. One factor causing lowered leaf potential is lowered osmotic potential, as described above, which was measured in a screening test. Another plant feature, color, also exerts an influence on the leaf potential. A lighter colored plant reflects more visible radiation and, subsequently, maintains a cooler canopy temperature. This cooler temperature results in a lower leaf potential which in turn means a smaller transpiration rate. In simpler terminology, "cooler water will evaporate more slowly than warmer water". It is interesting to use Gates and Papian's (35) tables on the energy budgets of plant leaves to predict what a difference between plants of 16 percent in visible reflection (a realistic difference between a light and dark colored plant) would do to transpiration rates for a "typical" summer day. If this 16 percent difference in visible reflection results in a 16 percent difference in the radiation load, and if we assume other mean daily values of

leaf dimension along airflow: 5 cm,
 leaf dimension across airflow: 1 cm,
 internal diffusion resistance: 5 sec-cm^{-1} ,
 windspeed: 20 cm-sec^{-1} ,
 radiation absorbed - dark plant: $.86 \text{ ly-min}^{-1}$,
 radiation absorbed - light plant: $.72 \text{ ly-min}^{-1}$,
 relative humidity: 25 percent, and
 air temperature: 20° C ,

we find a predicted transpiration rate of $0.115 \text{ ly-min}^{-1}$ for the dark plant and $0.090 \text{ ly-min}^{-1}$ for the light plant. For a 10 hour day this represents 69.00 ly (1.19 mm) for the dark plant and 54.00 (0.93 mm) for the light plant. This is approximately a 22 percent difference between plants in transpiration rates. Plants can also reduce their temperature by sensible heat advection to the air. Morphological features, related to drought resistance, which accomplish this include thin leaves and stems, tall structures, and the presence of hairs or awns.

Leaf resistance depends upon cuticular resistance and stomatal resistance. Stomatal resistance is sometimes broken down into stomatal, sub-stomatal, and cell wall resistances. Plant morphological structures that would increase leaf resistance include a thick cutin, small density and size of stomata, rapid responsiveness of stomata to water stress, leaf rolling, and others. One screening test studied, dry-down or percent water loss, is probably at least partly a measure of leaf resistance. In the color study, stomatal diffusive resistances were monitored throughout the season.

This discussion on plant morphological features as they relate to drought resistance is not intended to be exhaustive. Rather, it is presented here to elucidate a few important drought resistance traits and, in particular, to show how this thesis research fits into the scope of drought resistance theory and research.

Color as a Drought Resistance Trait in Barley Isogenes

For many years, researchers and growers have pointed out the possible advantages of lighter colored plants in arid regions. The primary advantages they claimed involved cooler plant temperatures and smaller evapotranspiration rates. A review of literature on isogenic barley pairs, differing by color, indicates that the lighter color isogene reflects more radiation and maintains a cooler canopy temperature. Consequently, it was hypothesized that the light isogene would also have smaller evapotranspiration rates, thus making it better adapted to arid regions. Water use in this thesis research was measured by two methods: 1) the Bowen ratio energy balance method which measures transient evapotranspiration fluxes, and 2) the neutron meter method which measures soil water consumption. In addition stomatal diffusive resistance was measured in 1977.

Screening Tests for Drought Resistance in Barley Cultivars

Each year breeders at many places develop many new cultivars of barley. In breeding for a particular trait, such as drought resistance, it would be highly desirable to have rapid screening tests that can reliably differentiate the cultivars as to drought resistance. Several parameters that were researched as potential screening tests include osmotic potential, soil water use, water retention, modulus of elasticity, plant height, percent plump kernels, and 100 kernel weights. In

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order to determine their usefulness, each of these tests were performed on a group of 50 barley cultivars, 25 two-row and 25 six-row, covering the spectrum of drought resistant to drought sensitive; and the results were compared with independent drought resistance ratings of the 50 cultivars.

CHAPTER 2

REVIEW OF LITERATURE

Color as a Drought Resistance Trait in Barley Isogenes

Bowen Ratio Energy Balance Method

According to the conservation of energy theorem, energy cannot be created nor destroyed. Consequently, the simplest statement of the energy balance equation is that the sum of the energy entering a crop canopy must equal the sum of the energy stored, utilized, and leaving the canopy. In symbolic form the equation becomes

$$R_s - (r+t) R_s + R_l - \epsilon R_l - LE - S - A - B_s - P_s - M = 0 \quad (5)$$

where the signs follow the convention of positive entering and negative leaving.⁴ The available incoming short wave radiation, $R_s - (r+t) R_s$, includes the short wave energy which is neither reflected, r , nor transmitted, t . The long wave radiation entering the canopy is R_l ; and that leaving the canopy is denoted by ϵR_l , where ϵ is the emissivity of the particular crop, usually approximately .98 (33), and R_l refers to the fact that only long wavelengths are emitted. Further energy loss can occur by either conduction into the soil, S , termed the soil heat flux, convection into the air, A , termed the sensible

⁴In some instances the signs may differ such as the case when LE is positive during dew formation.

heat flux, or by evaporation of water, LE. The storage term, B_s , is normally neglected since it is a significant factor only for a short period near sunrise and sunset when R_n , A and LE are small and (change in temperature/change in time) is large (62). Photosynthetic, P_s , and metabolic, M, processes are also ignored since their influence is estimated to be less than 2 percent (62).

Normally net radiation, R_n , an easily measured quantity, is included in the energy balance equation. Net radiation is the difference between incoming radiation and outgoing radiation (both short and long waves). In symbolic form, the relation is

$$R_n = R_s - (r + t) R_s + R_1 - \epsilon R_1 \quad (6)$$

Including R_n and neglecting B_s , P_s , and M gives a simplified energy balance equation of

$$R_n - LE - S - A = 0. \quad (7)$$

Application of this equation in field experiments is made easier by inclusion of the Bowen ratio, β , which is defined as A/LE (10).

Utilizing the equation for sensible heat flux and latent heat flux, the Bowen ratio is

$$B = A/LE = \frac{C_p K_h P \partial T / \partial z}{L w K_w \partial e / \partial z} \quad (8)$$

C_p refers to the specific heat of air. L is the latent heat of vaporization. P is the absolute barometric pressure. w is the ratio of mole weight of water vapor to dry air. K_h and K_w refer to the conductivity

terms of heat and water, respectively. $\partial T/\partial z$ is the temperature differential with height (z), $\partial e/\partial z$ is the vapor pressure differential with height.

By replacing the derivatives with finite differences and assuming K_h/K_w to be 1.0,⁵ the ratio becomes

$$\beta = \frac{C P \Delta T}{L_w \Delta e} \quad (9)$$

If we divide equation (7) by LE , substitute β for A/LE , and rearrange we get

$$LE = \frac{R_n - S}{1 + \beta} \quad (10)$$

This is the final form of the energy balance equation which can be readily applied to calculate evapotranspiration fluxes, LE , throughout the day.

Evapotranspiration

Since evapotranspiration flux is ultimately the most important parameter of drought resistance, we will review its relationship to other energy balance factors.

Brown and Rosenberg (12) have found that a greater proportion of the R_n goes into LE at lower values of R_n , particularly at lower vapor

⁵This assumption of equality appears to be good for most situations except strong advective and very stable conditions where the ratio is greater than one (8, 14, 19).

pressures and higher temperatures. Fritschen (28) computed values for LE/R_n and found the ratio to generally exceed 1.0 for irrigated barley in Arizona. A ratio greater than 1.0 indicates advective conditions found frequently in semi-arid and arid regions. Under conditions of very strong advection the energy balance method consistently underestimates LE, sometimes exceeding 20 percent (8).

LE tends to be inversely related to humidity. According to Brown and Rosenberg (12), the influence of humidity is greater at low values of $(R_n - S)$, low temperature, and low values of air resistance. Air resistance is primarily influenced by wind speed or turbulence.

Normally, LE decreases logarithmically with an increase in leaf resistance. Brown and Rosenberg (12) found the dependence of LE on leaf resistance was greatest at low values of $(R_n - S)$, air vapor pressure, and air resistance. This suggests that stomatal control of LE is greater during periods of cloudy weather and during early morning and late afternoon.

Lemon et al. (48) have found LE to decrease with the maturation of the crop, even before physiological maturity.

Reflection

Radiation impinging on a leaf can be either reflected, transmitted, or absorbed. The reflectivity of leaves in the infrared, IR, beyond 2.0μ is small, being less than 10 percent for an angle of

incidence of 65° , and less than five percent for an angle of 20° (36). Reflectivity of visible radiation ($.4$ to $.7\mu$) has been found to vary between six percent and 25 percent (61). Transmissivity of leaves is usually zero in the IR beyond 1.0μ (36). Transmissivity in the visible region ranges from 0 to 10 percent. Consequently, absorptivity will range from 90 percent to nearly 100 percent in the IR and from 65 percent to nearly 100 percent in the visible portion of the spectrum. The maximum visible reflection usually occurs around $.54\mu$, contributing to the characteristic green color of the plant. However, there are usually smaller reflectance peaks at $.57$ and $.64\mu$.

Reflection from leaves is made up of two components. One is the reflection occurring at the first air-cuticle interface, which probably is fairly uniform throughout the spectrum. The other is the reflection occurring at interfaces within the leaf - with the different pigments accounting for the selective absorption (52).

The following statements include some empirically derived relationships between reflectance and plant characteristics. At far IR wavelengths, the upper leaf surface reflects more than the lower, old leaves more than young, and shade leaves more than sun leaves. In each instance the inverse is true in the visible and near IR (34). Billings and Morris (6) found that the drier the habitat, the greater the visible and near IR reflectances. While studying color influences on reflectance, Shull (61) found that the darkest green leaves had six

to eight percent reflectance, whereas the lightest green leaves had 20 to 25 percent reflectance. From a computer simulation model, Seginer (60) predicted that a 15 percent reduction in net radiation, caused by increased short wave reflection, would cause a 30 percent reduction in LE.

Since there appeared to be a relationship between increased reflectivity and lowered crop temperature and decreased evapotranspiration rates, investigators and growers began to look into artificial reflectances (applied chemicals or sprays).

Several growers have used "white-washing" to reduce sunburn in crops (22, 51). Elam (22) reported a decrease in the temperature of tomatoes of 4° F after whitewashing.

Rosenberg and his associates in Nebraska (3, 4, 21, 46, 47) are currently studying the effects of two types of artificial reflectants - Celite and Kaolinite sprays. Their findings include the following:

- a) Reflectant treatment of canopies increased reflectivity by 10 to 20 percent.
- b) Reflectant treatment resulted in a reduction of net radiation from five to 10 percent.
- c) Reflectant treatment resulted in temperature increases of one to 2° C. Normally increased reflection would lower the temperature. The authors concluded that the surprising increase in temperature was caused by reduced emissivities

which decreased long wave radiation, and decreased evapotranspiration rates which decreased evaporative cooling.

- d) Reflectant treatment resulted in increased net radiation at lower levels within the canopy. This was evidently caused by downward reflection.
- e) Evapotranspiration rates were 10 to 15 percent lower in the treated canopies.

Color Influences in Barley Isogenes

Crop breeders have developed isogenic pairs of barley cultivars. These cultivars differ, theoretically, by only one gene or group of genes. Several researchers have studied the characteristics of isogenic pairs that differ only by color (1, 2, 24, 25, 26). Some of their findings are reviewed below.

All evidence shows that the light cultivars reflect more radiation than do the dark cultivars. Aase (1) averaged reflectivity for three pairs (Compana, Liberty, and Betzes) and found the light cultivars to have a six percent higher reflectivity. Furthermore, Aase et al. (2) showed greater light transmission for the lighter cultivars. Greater reflectivity should correspond to lower net radiation. However, Aase et al. (2) discovered little difference in net radiation between the colored isogenes (the light isogene had slightly higher net radiation). This would suggest that some component, other than short wave

reflection, is also influencing the net radiation.

Canopy temperatures in the light isogenes are usually cooler than in the dark isogenes. Ferguson (24) found the light Betzes cultivar to be $.6^{\circ}$ C cooler than the dark cultivar and the light Liberty cultivar to be $.9^{\circ}$ C cooler than the dark cultivar.

Screening Tests for Drought Resistance in Barley Cultivars

Since drought resistance can include a complex array of physiological and morphological features, it is likely that in order to adequately differentiate cultivars as to drought resistance it will be necessary to use a combination of screening tests that measure some facet(s) of both drought tolerance and drought avoidance (50). In the review of each screening test, it is indicated whether the test measures drought tolerance and/or drought avoidance.

Osmotic Potential

A measure of osmotic potential would probably give a measure of drought avoidance since plants that have a lower osmotic potential have a higher absorbing capacity and a smaller transpiring capacity (see equations (2) and (4)), thus maintaining a more favorable internal water condition. A supporting argument states that lower potential decreases vegetative growth throughout the season, thus saving water for the more important later stages of growth (44). It can also be argued, as noted in the introduction, that osmotic potential measures

a form of drought tolerance. Levitt (49), summarizing the work of several investigators, showed an increase in drought resistance with a lowering of osmotic potential. Studying winter wheat in Canada, Kaul (43) also found an increase in drought resistance with a lowering of osmotic potential. Campbell and his associates (15, 16) found, for wheat varieties, an increase in drought resistance with a decrease in (osmotic potential in the afternoon minus the osmotic potential in the morning).

Rooting Patterns/Soil Water Use

A measure of the rooting patterns would probably also give a measure of avoidance, since a more extensive rooting system could extract more soil water. Several investigators have found that as the width, depth, and branching of roots increase, the plant-water stress decreases (5, 63, 64). Levitt (50) reported that deep-rooted plants show greater drought avoidance only if ground water is available. If ground water is not available, the deeper rooted plants show less avoidance. Working with winter wheat, Sandhu and Laude (59) showed that, in general, drought and heat-hardy varieties had higher root/top ratios than nonhardy varieties. Research in Canada shows that the rooting patterns below a certain depth may be an important drought resistance trait (40). Hurd (40) reports that the most important soil depth for the root development of wheat is below 60 cm. He states that

it is advantageous to breed cultivars that have the greatest root mass below 60 cm.

Water Retention/Dry Down

A measure of a plant's ability to retain water is another measure of drought avoidance since a high retention of water would result in a better internal water status. Dedio (19), working with 6 week old spring wheat and durum plants found a significant difference between cultivars on a measure of water content. The ten spring wheat cultivars varied in percent water content from 74.2 percent (least drought resistant) to 83.8 percent (most drought resistant). The five durum cultivars ranged from 76.7 percent to 79.2 percent. Drying at room temperature for a 24 hour period showed the greatest differential among cultivars. Also, the authors found that stage of growth and position of leaf considerably affected the water retention ability. In another study with winter wheat, Sandhu and Laude (59) discovered large differences in water retaining capacity of the plants at the tillering stage. The percent decrease in weight upon drying varied from 25.6 percent (most drought resistant) to 40.4 percent (least drought resistant). The cultivars showed a greater differential water retaining capacity in the tillering stage than in the dormant stage. The shortest drying period for effective differentiation of cultivars was 3 hours. A study on wheat, oats, and barley (58) showed only poor

differentiation between cultivars on water retention of detached leaves. Water retention of intact plants following exposure to low vapor pressure was correlated with survival.

Modulus of Elasticity

In general terms a modulus of elasticity is defined as the ratio of the stress to the corresponding strain. A modulus of elasticity for plants is defined as the ratio of turgor potential to the cell volume (water content) (13). Philip (54) gives its formal definition as

$$e_m = \frac{\psi_p}{V/V_o - 1} \quad , \quad (11)$$

where e_m = modulus of elasticity,

V = cell volume,

V_o = cell volume at zero turgor potential, and

ψ_p = turgor potential.

By knowing the turgid values of osmotic potential and matric potential, turgor potential, and relative water content, it is possible to calculate e_m from Wilson's (66) relation

$$e_m = \psi_{o_t} + \psi_{m_t} - \frac{\psi_{o_t} + \psi_{m_t} + \psi_p}{1 - R} \quad (12)$$

where ψ_{o_t} = turgid osmotic potential,

ψ_{m_t} = turgid matric potential,

ψ_p = turgor potential, and

R = relative water content.

A simpler approach was developed by Campbell (16) in which he calculated e_m as the slope of the relationship of (1/total potential) vs. relative water content. His assumptions include zero matric potential and a linear relationship between water content and turgor potential.

A couple of studies (15, 16) have shown an inverse relationship between modulus of elasticity and drought resistance. However, Cowan and Milthorpe (18) disagree on theoretical grounds because "a combination of large elastic modulus and low osmotic potential provides a mechanism for maintaining the water supply to the metabolic component while sustaining large gradients of potential associated with water flow to the leaf".

Chapter 3

METHODS AND MATERIALS

Color as a Drought Resistance Trait in Barley Isogenes

Physical Location

Both in 1976 and 1977, one acre plots each of Compana, Golden Compana, Liberty and Golden Liberty barley were grown on John Kamp's dryland grain farm located approximately eight miles northwest of Three Forks. This area has an average annual precipitation of 12 inches (30.48 cm). The location consists of deep, well-drained soils on probably a broad fan. These soils formed in strongly calcareous, stratified alluvium. The slopes range from level to two to three percent slope. The soil family classification is a coarse-loamy, mixed borollic calciorthid. The series is Amesha.

Reflection

Reflection was measured with inverted Kipp radiometers. These instruments measure the short wave radiation up to approximately 3 μ . In 1977 a 2 cm high cylindrical shield was placed on the outer edge of the radiometers to reduce the measurement of scattered sky radiation. The instruments were suspended to the south of the support post and elevated, early in the season, approximately 1 m above the crop canopy.

Net Radiation

Net radiation was measured with a Fritschen miniature net radiometer. These instruments were also suspended to the south of the support post and elevated approximately 1 m above the crop canopy. In 1977 the net radiometers were calibrated, using the shading technique (41), before and after the growing season. The mean values agreed reasonably well with the factory calibration values. The factory calibration factors were therefore used in the subsequent calculations.

Soil Heat Flux

A single heat flow transducer (Micromet industries) was buried 10 cm under the surface between two rows in each plot. The factory calibration factors were used to determine soil heat flux.

Brown Ratio Apparatus

In 1976 the Bowen ratio apparatus consisted of thermocouples (.005 inches, matched copper-constantan) for temperature measurements and thermistors (YSI 44005, differential) arranged in a wet-dry bulb manner for the vapor pressure measurements. The recording device was a non-integrating data logger (Multifunction Data Logger, MDL-930) with a separate digital recorder. Readings were taken every 20 minutes. While the temperature measurements appeared close to the .25° C theoretical accuracy, the vapor pressure measurements presented

considerable inaccuracy. The exact cause of the inaccuracy was not ascertained. To correct for this problem, it was decided to discard any data obtained between the hours of 6:00 a.m. and 6:00 p.m. that gave LE rates greater than 0.0 ly-min^{-1} or less than -1.5 ly-min^{-1} . These somewhat arbitrary values were then chosen because typical Bowen ratio LE rates from literature are generally within these limits (8, 12, 62). This resulted in considerable exclusion of data. Furthermore, even the data retained are somewhat questionable.

In 1977 the Bowen ratio apparatus consisted of similar thermocouples; however, the psychrometer sensors were replaced with humidity sensors (Weather Measure Corporation). Although these sensors had a factory rated accuracy of ± 1 percent relative humidity, our laboratory calculations indicated less accuracy. Therefore, it was decided to rotate the sensors every half hour in order to remove individual sensor bias. This resulted in reasonably accurate vapor pressure gradient data; and very little data had to be discarded. A different data logger (CR5 Digital Recorder, Campbell Scientific, Inc.) was used in 1977. This recorder had the capability of integrating signals over a time interval and printing the mean value. Readings were taken every 30 minutes.

In order to develop the energy balance equation to a useable form we assumed: 1) $K_h/K_w = 1.0$, as discussed above, and 2) $C_p P/Lw = 0.642 \text{ mb-deg}^{-1}$. The second assumption is reasonable since diurnal and

season variation in pressure is small and the other constants vary only slightly with temperature. These assumptions reduce the equation to its final useable form

$$LE = \frac{R_n - S}{1 + 0.642 \Delta T / \Delta e} \quad (13)$$

Stomatal Diffusion Resistance

In 1977 stomatal diffusive resistances of Liberty and Golden Liberty were measured at two different locations. First, stomatal resistances of the upper surface were determined, using a Li Cor Autoporemeter, on Liberty and Golden Liberty grown on Kamp's dryland farm. Random samples were taken throughout the day on June 24, July 7, July 11 and 12, and July 20. A randomized complete block design was employed treating time as the block variable.

A second approach involved measuring the stomatal resistances of Liberty and Golden Liberty grown at the Bozeman farm. A randomized complete block design was used with seven replicates. Since it took approximately 3 hours to complete the study, it was performed twice, once in the morning and once in the afternoon. This was accomplished to determine if time of day influenced stomatal resistance.

Soil Water Use

A second means of determining water consumption by the barley isogenes involved the periodical monitoring of soil water consumption

by the neutron meter method. Two inch (5.08 cm) diameter aluminum alloy access tubes were placed 60 inches (152.40 cm) deep, centered between rows, with 3 per plot. Row spacing was 30.5 cm. Readings were taken twice weekly at 6 inch (15.24 cm) intervals down to 60 inches (152.40 cm) throughout the season. Soil water data were obtained for Compana - Golden Compana at the Bozeman station in 1975 and at Kamp's farm in 1976. Data for Liberty - Golden Liberty were obtained at Kamp's farm in 1976 and 1977.

Screening Tests for Drought Resistance in Barley Cultivars

Osmotic Potential

Osmotic potential data were developed from the 50 barley cultivars grown in 4 row x 10 feet (3.05 m) plots. Readings were taken during all three seasons at two different times: 1) prior to heading and 2) after heading. In 1975 the cultivars were grown at the Bozeman farm and readings taken on July 14 and August 12. In 1976 the cultivars were grown at Kamp's farm and readings taken on July 14 and August 10. In 1977 the cultivars were again grown at Kamp's farm. However, two replications were run in a randomized complete block design. Data were taken on June 22 and July 20.

On each sampling day, readings were taken at maximum turgor, defined as just prior to sunrise, and at minimum turgor, defined as 2:00 p.m. Single leaves from 3 plants (the most recent prior to

heading, and the flag leaf after heading) were inserted in 15 cm lengths of surgical tubing with an inner diameter of 1.3 cm. The pieces of surgical tubing with leaves were closed with rubber stoppers and frozen on dry ice. After thawing, the sap was extracted with steel rollers. The sap was absorbed by filter discs and the osmotic potential was determined with a desk model thermocouple psychrometer (C-52, Wescor, Inc.).

Soil Water Use

In 1976 soil water consumption and, indirectly, rooting patterns were measured for the 50 cultivars grown, in 4 row x 10 feet (3.05 m) plots having a 30.5 cm row spacing at the Bozeman farm. These data were taken after the cultivars had been harvested. Soil samples were taken at 6 inch (15.24 cm) intervals down to 60 inches (152.40 cm). The percent soil water remaining was calculated from gravimetric data by taking the ratio of soil water to dry soil mass. In 1977 neutron access tubes were placed in the middle of the 4 row x 10 feet plots with a 30.5 cm row spacing at Kamp's farm and soil water use was monitored once a week throughout the season. Readings were taken at 6 inch intervals down to a maximum of 60 inches (where the gravel permitted).

Water Retention/Dry Down

Water retention of young plants and also plants after heading was

determined in the summer of 1975 at the Bozeman farm. Plant weights were taken at 1 hour, 6 hour, 12 hour, 18 hour, 24 hour, 48 hour, 72 hour, 96 hour, and 10 days. The sample consisted of a single plant in each case which was allowed to dry at room temperature. The percent water loss, on a dry weight basis, was calculated by dividing the water transpired in a given interval by the dry weight and then multiplying by 100. In 1976 the percent water loss of whole plants, grown at the Bozeman farm, was determined at 1 hour, 6 hour, 12 hour, 24 hour, and 48 hours. The percent water loss of leaves was determined at 3 hours and after oven drying. The percent water loss of heads with grain weight included and of heads with grain weight subtracted were determined for one drying interval, that being oven dry. The category of heads with grain weight subtracted was determined by subtracting the weight of the kernels from the total head weight before calculating percent water loss. In each study in 1976, five samples of each cultivar was used. Using a completely randomized design, an analysis of variance was determined for these data.

Modulus of Elasticity

In developing a means for measuring the modulus of elasticity, e_m , an approach somewhat like Campbell's (16) was used. Important modifications included using Wilson's (63) equations for osmotic potential, Ψ_o , matric potential, Ψ_m , and turgor potential, Ψ_p . These

equations are:

$$\Psi_o = \frac{(\Psi_{o_t} + \Psi_{m_t})(1 - B)}{R}, \quad (14)$$

where Ψ_{o_t} = osmotic potential at full turgor,

Ψ_{m_t} = matric potential at full turgor,

B = fraction of bound water,

R = relative water content,

$$\Psi_m = \frac{(\Psi_{o_t} + \Psi_{m_t}) B (1 - B)}{R(R - B)}, \quad (15)$$

and

$$\Psi_p = R[e_m - (\Psi_{o_t} + \Psi_{m_t})] - e_m. \quad (16)$$

Combining the osmotic potential and matric potential, the equation for total water potential becomes

$$\Psi = \frac{(\Psi_{o_t} + \Psi_{m_t})(1 - B)}{R - B} + R[e_m - (\Psi_{o_t} + \Psi_{m_t})] - e_m \quad (17)$$

For $R < R_o$ the turgor potential becomes zero. If we now invert, the equation for total water potential becomes

$$1/\Psi = \frac{R-B}{(\Psi_{o_t} + \Psi_{m_t})(1-B)} = \frac{R}{(\Psi_{o_t} + \Psi_{m_t})(1-B)} - \frac{B}{(\Psi_{o_t} + \Psi_{m_t})(1-B)} \quad (18)$$

It is seen that $B = -\text{intercept/slope}$ and $(\Psi_{o_t} + \Psi_{m_t}) = 1/(\text{slope}(1-B))$

of the regression of $1/\Psi$ on R . Now Ψ_o and Ψ_m are determined (eg. (14)

and (15)) and Ψ_p can be determined by algebraic subtraction (eq. (3)).

From the regression of Ψ_p on R (eq. (16)) it is seen that the intercept

is $-e_m$. Thus, using only two experimental variables, Ψ and R , it is possible to readily determine e_m . The experimental procedure consisted of taking a single leaf, inserting its stem through a rubber stopper, and forcing water into the leaf until a water droplet appeared on the extruding stem. This would correspond to full turgidity. Then the leaf was allowed to dry down at room temperature; while total potential and leaf weights were periodically determined. Total potential was measured with a pressure bomb (PMS Instrument Co.) while R , calculated by fresh weight/turgid weight, was determined with a 3-place Mettler balance. In 1976 data for the relationship of $1/\Psi$ vs. R were obtained for 29 cultivars grown at the Bozeman farm. In 1977 similar data were obtained for 21 cultivars grown in the greenhouse.

Eslick's Drought Resistance Ratings (Table 1)

In order to determine drought resistance ratings for the 50 barley cultivars, Eslick (23) has analyzed yield data from regional nurseries and Montana nurseries including the Northern Great Plains Barley Nursery, Rocky Mountain Barley Nursery, Western 2-Row Barley Nursery, Western Spring Barley Nursery, Western Dryland Spring Barley Nursery, Montana Interstate Nursery and other Montana nurseries. This includes nurseries grown in Oregon, Washington, Idaho, Utah, Colorado, Wyoming, Montana, western North Dakota, western South Dakota, western Nebraska

Table 1. Predicted yields at different yield levels and the slope for 49 barley cultivars.
Data from R.F. Eslick.

Variety	Yield Level, bu/a											Slope-Method E	
	10	20	30	40	50	60	70	80	90	100	110		120
	Predicted Yield, bu/a												
Marie	9.6	19.8	30.0	40.1	50.3	60.4	70.6	80.8	90.9	101.1	111.2	121.4	1.02
Titan	12.2	20.8	29.4	38.0	46.6	52.2	63.8	72.4	81.0	89.6	98.2	106.8	.86
Betzes	10.4	20.2	30.0	39.8	49.6	59.4	69.2	79.0	88.7	98.5	108.3	118.1	.98
Vantage	8.9	19.5	30.0	40.6	51.2	61.7	72.3	82.9	93.4	104.0	114.6	125.2	1.06
Compana	12.5	20.8	29.2	37.5	45.9	54.2	62.6	70.9	79.3	87.6	96.0	104.3	.84
Glacier	10.2	20.1	30.0	39.9	49.8	59.8	69.7	79.6	89.5	99.4	109.3	119.2	.99
Dekap	13.2	21.8	30.4	39.0	47.7	56.3	64.9	73.5	82.1	90.8	99.4	108.0	.86
Traill	10.2	20.1	30.0	39.9	49.8	59.7	69.6	79.5	89.4	99.3	109.3	119.2	.99
Freja	9.1	19.6	30.0	40.5	50.9	61.4	71.8	82.3	92.7	103.2	113.6	124.1	1.05
Trophy	12.0	21.1	30.1	39.2	48.2	57.3	66.3	75.4	84.4	93.5	102.5	111.6	.91
Ingrid	9.1	19.5	30.0	40.5	50.9	61.4	71.8	82.3	92.8	103.2	113.7	124.1	1.05
Larker	12.7	21.3	29.9	38.6	47.2	55.8	64.4	73.0	81.6	90.2	98.8	107.4	.86
New Moravian	14.4	22.1	29.8	37.6	45.3	53.1	60.8	68.5	76.3	84.0	91.8	99.5	.77
Atlas 46	11.1	20.6	30.0	39.5	48.9	58.4	67.8	77.3	86.7	96.2	105.6	115.1	.95
Pirolina	10.5	20.3	30.0	39.8	49.5	59.3	69.0	78.8	88.5	98.3	108.0	117.8	.98
Harlan	6.9	18.4	29.9	41.4	52.9	64.4	75.9	87.4	98.9	110.4	121.9	133.4	1.15
Frontier	11.8	21.0	30.1	39.3	48.5	57.7	66.9	76.0	85.2	94.4	103.6	112.8	.92
Hiland	7.3	18.7	30.0	41.4	52.8	64.2	75.5	86.9	98.3	109.6	121.0	132.4	1.14
Heines Hanna	12.3	21.1	29.9	38.7	47.4	56.2	65.0	73.8	82.6	91.3	100.1	108.9	.88
Otis	10.0	20.0	30.0	40.0	50.0	60.0	69.9	79.9	89.9	99.9	109.8	119.8	1.00
Horn	11.0	19.4	27.9	36.4	44.8	53.3	61.7	70.2	78.7	87.1	95.6	104.0	.85
Trebi	12.5	21.4	30.3	39.2	48.0	56.9	65.8	74.7	83.6	92.4	101.3	110.2	.89
Haisa II	9.7	19.9	30.0	40.2	50.3	60.5	70.6	80.8	90.9	101.1	111.2	121.4	1.02
Gem	9.8	19.9	30.0	40.1	50.1	60.2	70.3	80.4	90.5	100.5	110.6	120.7	1.01
Hannchen	13.9	21.9	29.9	37.9	45.8	53.7	61.7	69.7	77.6	85.6	93.5	101.5	.80
Bonneville	9.2	19.6	30.0	40.4	50.9	61.3	71.7	82.1	92.5	103.0	113.4	123.8	1.04
Munsing	11.9	21.1	30.2	39.3	48.4	57.5	66.6	75.7	84.8	93.9	103.0	112.2	.91
Liberty	12.6	21.2	29.8	38.4	47.1	55.7	64.3	72.9	81.5	90.2	98.8	107.4	.86
Spartan	15.3	22.0	28.7	35.4	42.1	48.8	55.5	62.2	69.0	75.7	82.4	89.1	.67
Galt	8.3	19.1	29.8	40.6	51.4	62.2	73.0	83.7	94.5	105.3	116.1	126.9	1.08

Table 1. Predicted yields at different yield levels and the slope for 49 barley cultivars.
Data from R.F. Eslick. Cont.

Variety	Yield Level, bu/a												Slope-Method E
	10	20	30	40	50	60	70	80	90	100	110	120	
	Predicted Yield, bu/a												
Firlbeck III	9.5	19.7	30.0	40.2	50.4	60.7	70.9	81.2	91.4	101.6	111.9	122.1	1.02
Steptoe	3.3	15.9	28.6	41.3	54.0	66.6	79.3	92.0	104.6	117.3	130.0	142.6	1.27
Vanguard	9.5	19.7	30.0	40.2	50.4	60.7	70.9	81.2	91.4	101.6	111.9	122.1	1.02
Beecher	12.3	20.9	29.4	38.0	46.6	55.2	63.8	72.3	80.9	89.5	98.1	106.7	.86
Hector	9.1	19.5	29.9	40.3	50.8	61.2	71.6	82.1	92.5	102.9	113.4	123.8	1.04
CM67													
Klages	9.3	19.7	30.2	40.6	51.0	61.5	71.9	82.3	92.8	103.2	113.6	124.0	1.04
Steveland	8.0	18.9	29.8	40.7	51.6	62.5	73.4	84.3	95.2	106.1	117.0	127.9	1.09
Erbet	12.3	21.0	29.8	38.5	47.2	56.0	64.7	73.4	82.2	90.9	99.6	108.3	.87
Dickson	11.4	20.7	30.1	39.4	48.8	58.1	67.4	76.8	86.1	95.5	104.8	114.1	.93
Maris Mink	-0.5	14.5	29.4	44.4	59.4	74.4	89.3	104.3	119.3	134.2	149.2	164.2	1.50
Montcalm	11.8	20.5	29.2	37.8	46.5	55.2	63.8	72.5	81.2	89.9	98.5	107.2	.87
Vireo	20.5	27.7	35.0	42.2	49.4	56.7	63.9	71.2	78.4	85.6	92.9	100.1	.72
Primus II	9.2	19.6	30.0	40.4	50.9	61.3	71.7	82.2	92.6	103.0	113.5	123.9	1.04
Zephyr	7.2	18.5	29.7	40.9	52.2	63.4	74.7	85.9	97.1	108.4	119.6	130.9	1.12
Nordic	22.3	27.3	32.3	37.3	42.3	47.2	52.2	57.2	62.2	67.2	72.1	77.1	.50
Georgie	8.5	19.2	30.0	40.8	51.6	62.4	73.2	84.0	94.8	105.6	116.4	127.1	1.08
Briggs	14.2	21.8	29.3	36.9	44.4	52.0	59.5	67.1	74.6	82.2	89.7	97.3	.76
Herta	9.7	19.8	30.0	40.1	50.2	60.4	70.5	80.7	90.8	100.9	111.1	121.2	1.01
Unitan	8.0	18.9	29.7	40.6	51.5	62.3	73.2	84.0	94.9	105.8	116.6	127.5	1.09

and southern Alberta. Drought is frequently encountered in these areas. The data used were from the 40 year period 1936 through 1976. The cultivars, which are typically grown in these regions, are equally divided between 2-row and 6-row cultivars. California Mariout 67 was not tested in the area which resulted in the ratings of only 49 cultivars.

Whenever two cultivars were grown in the same nursery the paired values were used in a regression analysis. Thus, if all 49 cultivars were grown in a given nursery there are a possible 48 equations to predict the yield of a selected cultivar. However, not all 49 cultivars were grown in every nursery which resulted in fewer regression equations. Since the regression equations had different reliabilities based on n , the values were weighted in accordance with the value of n . Weighted means, weighted regression coefficients and weighted standard errors were calculated for each cultivar and used to predict the yields (dependent values) of each cultivar by 10 bushel yield increments from 10 to 120 bu/a (independent values). These independent values of 10 to 120 bu/a will be referred to as yield levels. The dependent values will be referred to as predicted yields. The predicted yields were weighted and averaged to give the values listed in the first 12 columns of Table 1. Several methods of calculating slopes were employed to summarize these 12 data points for each cultivar. Only Method E was used in this thesis. Method E consisted of taking all predicted yields for yield levels of 80 and above, determining a

regression for these values, and from this regression predict a yield for a yield level of 90. The same was accomplished for yield levels of 40 and lower to obtain a predicted yield for a yield level of 30. The slope was then determined from these two yield levels of 30 and 90 and their predicted yields. These values are given in the last column of Table 1. The twelve columns of yield levels and their predicted yields plus the thirteenth column measuring the slope (Method E) will be referred to as Eslick's drought resistance ratings (Table 1). These ratings (Table 1) were used as the standard to compare the effectiveness of the potential screening tests that were researched in this thesis.⁶

Probably the most ideal drought resistant cultivar would yield high under drought conditions and continue to yield high under wetter conditions. This means that the predicted yield would be greater than 10 bu/a for a yield level of 10 bu/a and also greater than 120 bu/a for a yield level of 120 bu/a. A cultivar that has high predicted yields (> 10 bu/a) for a yield level of 10 bu/a and has low predicted yields (< 120 bu/a) for a yield level of 120 bu/a would also be considered a drought resistant cultivar, although less ideal than the

⁶Table 1 is currently being revised at Montana State University. Since maturity dates may have an important influence on drought resistance, it was decided to remove any maturity differences. This may have an important influence on the analysis given below.

above. Using the same reasoning as above, it is expected that the more drought resistant a cultivar is, the smaller the slope.

In order to determine the effectiveness of a particular screening technique, comparisons using Pearson product moment correlation coefficients, were made between Eslick's drought resistance ratings and the data of an individual screening test. For example, a correlation coefficient was calculated for percent water loss at 24 hours for the 50 cultivars vs. predicted yield at a yield level of 10 bu/a. Then another correlation coefficient was calculated for percent water loss at 24 hours for the 50 cultivars vs. predicted yield at a yield level of 20 bu/a. This procedure was continued for all yield levels and the slope (Method E). The analysis of these correlation coefficients determines the effectiveness of a given screening technique.

A screening technique which would be in good agreement with Eslick's ratings of drought resistance (Table 1) would at least show high correlations at low yield levels. What consists of a "high" correlation when considering drought resistance is difficult to say. However, it seems reasonable to assume that coefficients of around $\pm .20$ at low yield levels may indicate a useful screening test. It is more difficult to theorize what sort of correlations should occur at intermediate and high yield levels for high drought resistance. A screening test that resulted in high correlations at low as well as

intermediate and high yield levels would imply that cultivars high (low) in the measured trait yielded well under both drought and wet conditions. (In some cases plants high in the measured trait, such as water retention, were more drought resistant; whereas in other cases plants low in the measured trait, such as soil water use, were more drought resistant.) Whereas, a screening test that had high correlations at low yield levels and low correlations at intermediate and high yield levels implies that those cultivars high (low) in the measured trait yielded well only under drought conditions. Finally, a screening test that had high correlations at low yield levels, low correlations at intermediate yield levels and high correlation, but with opposite algebraic sign, at high yield levels implies that plants high (low) in the measured trait yielded well under drought conditions, but yielded poorly under wet conditions. In comparing the screening tests with the slope (Method E), high correlations implies that plants high (low) in the measured trait yielded relatively high under drought conditions and relatively low under wet conditions.

Chapter 4

RESULTS AND DISCUSSION

Color as a Drought Resistance Trait in Barley Isogenes

Appendix Table 2 gives the daily energy balance values for the 1976 season. Appendix Table 3 gives the daily energy balance values for the 1977 season. Rather than analyze each day's table of values, the approach will be to analyze trends within the tables giving the daily totals for each season (Tables 2 and 3). Most of the analysis will concentrate on the 1977 data since very few measurements had to be discarded and certain trends are more evident.

Reflection

Summaries of the daily totals for the various energy balance factors, stage of development as determined by the Feeke's scale (44), and the solar time period of measurement are given for the 1976 and 1977 data in Tables 2 and 3, respectively. Columns in these tables giving reflected radiation for the light isogene, R_r-L , and reflected radiation for the dark isogene, R_r-D , reveal the anticipated greater reflectivity for the light isogene. This holds true until the heads began to turn on August 3, 1976 and July 20, 1977, after which the dark isogene reflects more. This reversal in trend is caused by the earlier heading of the dark isogene, which increases the reflectivity.

Table 2. Daily and seasonal totals of energy balance factors involving Compana and Golden Compana barley, 1976 (1y).

Month/day	LE-D	LE-L	R _n -D	R _n -L	R _r -D	R _r -L	S-D	S-L	A-D	A-L	R _t	Time period of measurement	Feekes D	Scale* L
July 4	16	20	42	35	25	26	2	1	28	16	104	11:20 AM- 4:20 PM	10.1	10
5	1	37	192	181	71	79	14	11	177	133	415	6:20 AM-11:00 PM		
6	2	38	110	94	34	35	7	5	101	52	166	3:40 AM- 4:40 PM	10-5.2	10.1
7	27	21	166	141	53	59	8	5	130	115	261	11:20 PM-10:40 PM		
8	1	4	44	36	16	17	3	2	40	31	78	9:40 AM- 7:20 PM		
9	0	0	23	21	0	0	3	1	20	20	6	11:20 PM- 4:00 AM		
13	2	31	211	178	121	126	7	5	202	142	342	10:30 AM-10:40 PM	10-5.6	10-5.4
14	0	3	257	242	80	90	20	11	237	227	401	10:20 AM- 8:00 PM		
15	3	11	69	62	30	34	4	5	62	46	135	11:40 AM-10:40 PM	11.1	11.1
28	2	2	208	181	78	88	16	15	191	164	360	9:40 AM-11:00 PM	11.1.1	11.1.1
29	2	10	98	76	42	46	3	3	92	64	188	11:00 PM-11:00 PM		
Aug 3	0	14	93	78	42	41	5	2	88	62	87	10:00 AM-11:40 PM	11.1.3	11.1.3
4	6	2	94	82	65	64	10	10	78	70	148	11:20 AM- 8:20 PM		
5	3	4	146	128	121	119	9	9	134	115	230	10:40 AM-11:00 PM	11.1.3	11.1.2
Total	65	197	1753	1535	778	824	111	85	1580	1257	2921			

D = Dark Isogene
 L = Light Isogene
 LE = Evapotranspiration
 R_n = Net Radiation
 R_r = Reflected Radiation
 S = Soil Heat Flux
 A = Sensible Heat Flux
 R_t = Total Radiation

* Appendix Table 32 gives a description of the stages of development associated with the numerical categories.

Table 3. Daily and seasonal totals of energy balance factors involving Liberty and Golden Liberty barley, 1977 (1y).

Month/day	LE-D	LE-L	R _n -D	R _n -L	R _r -D	R _r -L	S-D	S-L	A-D	A-L	R _t	Time period of measurement	Feekes D	Scale* L
June 24	258	196	183	136	--	--	49	48	24	12	417	7:30 AM- 1:00 PM	8-9	4
27	144	110	111	96	--	--	24	24	9	11	246	11:30 AM- 2:30 PM	10	
30	150	121	209	179	65	78	11	8	48	50	329	11:00 AM- 3:00 PM	10.1	
July 1	139	121	222	191	74	86	10	8	73	62	350	9:00 AM- 1:30 PM		
5	172	168	225	206	70	82	10	8	43	30	362	10:00 AM- 7:00 PM	10.2	4-9
6	72	79	146	135	42	51	6	4	69	52	220	9:00 AM- 1:00 PM		
7	57	64	129	111	38	46	6	4	66	43	203	10:00 AM-12:00 PM	10.2	4-10
11	155	177	269	222	82	97	13	12	102	33	418	10:00 AM- 5:00 PM	10.3	4-10.1
12	88	79	159	130	51	58	4	4	66	46	244	6:30 AM-11:00 AM		
14	187	172	328	273	98	114	14	12	127	89	509	8:30 AM- 3:30 PM	10.4	4-10.1
15	61	78	185	153	53	62	9	8	116	67	277	10:00 AM- 1:00 PM		
18	32	24	119	103	40	45	3	3	84	76	198	8:30 AM-11:30 AM	11.1.1	5-10.2
20	56	59	166	144	84	67	7	7	103	84	303	7:00 AM- 7:00 PM		
27	34	71	168	152	75	71	8	9	126	71	320	7:00 AM- 7:00 PM	11.1.1	5-11.1
29	57	39	137	130	53	50	6	7	74	84	235	9:00 AM- 1:30 PM		
Aug 1	34	42	185	155	77	71	7	8	144	105	314	8:00 AM- 1:00 PM		
2	72	71	159	155	74	68	8	9	79	75	293	9:00 AM- 3:00 PM	11.1.1	5-11.1
Total	1768	1671	3100	2676	976	1046	195	183	1353	990	5238			

D = Dark Isogene
 L = Light Isogene
 LE = Evapotranspiration
 R_n = Net Radiation
 R_r = Reflected Radiation
 S = Soil Heat Flux
 A = Sensible Heat Flux
 R_t = Total Radiation

* Appendix Table 32 gives a description of the stages of development associated with the numerical categories.

Appendix Tables 4 and 5 give the ratio reflected radiation/total radiation X 100. This represents the percent of total radiation that is reflected. In 1976, the mean values for the season were 28 percent reflectivity for the dark isogene and 30 percent reflectivity for the light isogene. In 1977, the mean values for the season were 22 percent reflectivity for the dark isogene and 23 percent reflectivity for the light isogene. Early in the season the light isogene commonly has 15 to 20 percent greater reflectivity than the dark isogene. As noted in the introduction, a 16 percent reduction in reflectivity should cause a 22 percent reduction in transpiration for a "typical" day. This appears to hold true early in the season. For example, on June 30 the light isogene had a 19 percent smaller LE rate. Early in the season the differences in LE rates are probably caused by differences in reflectivity. However, by July 5, 1977 the differences in LE rates had decreased substantially and by July 6, 1977 the trend had reversed, since the light isogene was then using more water. This is certainly not explained in the reflectivity data since on July 6, 1977 the light isogene still had 20 percent greater reflectivity. The explanation for this reversal in water use pattern will be discussed later.

Net Radiation

Net radiation is a measure of incoming radiation minus outgoing radiation. Since the incoming radiation for both isogenes is the

same, the important differentiating term is likely the outgoing radiation, both short and long wavelengths. Reflectivity differences were measured with a Kipp radiometer which measures only the short wave radiation (up to approximately 3μ). This, as we have seen, showed higher reflectivity by the light isogene. Since the light isogene maintained cooler temperatures, it would be expected to have smaller long wave radiation losses. Thus, the short wave reflectivity values indicate increased outgoing radiation by the light isogene, whereas the long wave emitted radiation indicates decreased outgoing radiation. Consequently, the influence of color on net radiation is dependent upon whether the short wave radiation term or the long wave emitted radiation term is more significant. Using Stefan's Law,

$$R_L = \epsilon \sigma T^4 \quad (19)$$

where R_L = long wave emitted radiation,

ϵ = emissivity,

σ = Stephan-Boltzmann constant,

T = absolute temperature,

with an emissivity equal to 0.90, we can calculate the influence of a 1° C difference between isogenes (which is a typical midday difference for Liberty and Golden Liberty). The calculated thermal radiation at 26° C is $0.588 \text{ ly-min}^{-1}$; while at 25° C it is $0.580 \text{ ly-min}^{-1}$. This represents a 1.4 percent difference which is considerably less than the 15 to 20 percent differences in reflectivity that are commonly

encountered at midday. Thus, the increased reflection of short wave radiation by Golden Liberty is likely larger than the decreased long wave radiation. This results in a potentially smaller net radiation for the light isogene. If we turn our attention to actual data, we will see in columns 4 and 5 of Tables 2 and 3 that, as expected, the light isogene has lower net radiation for all days throughout the entire season. (It should be noted that Aase (2) found no significant difference in net radiation between the isogenes.) Although the dark isogene has a larger net radiation throughout the season, the difference becomes quite small late in the season, as we observe in the 1977 data.

If we plot net radiation vs. reflection, see Figure 1, we observe a relationship that is best described as linear. Therefore, a linear regression was determined for all days and both seasons. Appendix Tables 6 and 7 list the r^2 , intercept and slope for 1976 and 1977. The r^2 values were mostly in the high .80's and .90's, indicating that most of the net radiation variation is associated with reflection variation. The mean seasonal value for the slope of the light isogene in 1976 is 2.95. Its value for the dark isogene is 3.86. Likewise, the mean seasonal value for the slope of the light isogene in 1977 is 3.20; whereas, the dark is 4.32. The steeper slope for the dark isogene implies a larger net radiation for an equivalent reflection. This implies a smaller outgoing long wave radiation term

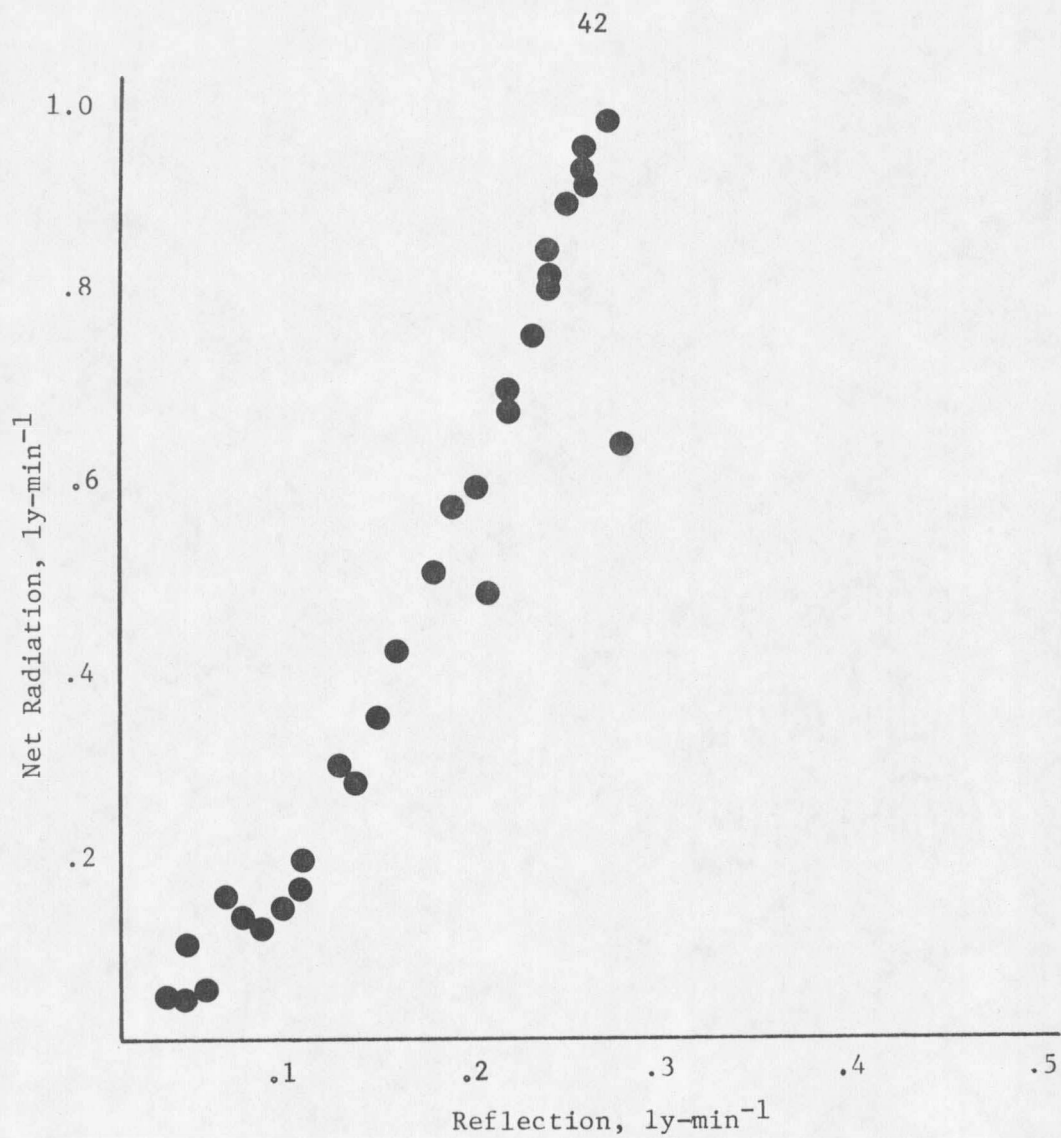


Fig. 1. Net radiation vs. reflection for Compana on July 3, 1976.

for the dark isogene. The only explanation for this pattern is that the dark isogene has a lower emissivity which results in less outgoing long wave radiation [see eq. (19)].

Sensible Heat Flux

Columns 10 and 11 in Tables 2 and 3 give information on the sensible heat flux to the air. Previous literature (24) as well as Table 4 indicate that the dark isogene maintains a higher canopy temperature (almost 1° C greater) at least during portions of the season. Since sensible heat flux is directly proportional to the temperature gradient, it is anticipated that the dark isogene will have a higher sensible heat loss. This is what we find for the greater part of the season. However, during the early part of and toward the end of the growing season, the difference between the isogenes is much smaller. We shall see later that these findings are highly correlated with the stomatal diffusive resistance data. Early in the season, when resistances are small and there is little difference between isogenes, most of the net energy is dissipated by evapotranspiration, and very little by sensible heat flux. Consequently, the sensible heat loss is small with little difference between isogenes. As the season progresses, the dark isogene experiences rising resistances more rapidly than the light isogene (this will be shown in data below). This results in the dark isogene's evapotranspiration rates decreasing

Table 4. Canopy temperatures for Liberty and Golden Liberty, July 20, 1977.

Time	Temp (°C)	
	Golden Liberty	Liberty
6:40 AM	15.0	16.0
7:00 AM	15.5	17.0
7:30 AM	17.0	18.0
8:00 AM	18.0	18.5
8:30 AM	19.5	21.5
9:00 AM	21.0	22.5
9:30 AM	22.0	23.0
10:00 AM	24.0	24.0
10:30 AM	23.5	25.5
11:00 AM	24.0	25.5
11:30 AM	26.5	27.0
12:00 Noon	26.0	28.0
12:30 PM	27.5	29.5
1:00 PM	28.0	31.0
1:30 PM	28.5	32.0
2:00 PM	30.0	32.0
2:30 PM	30.5	31.5
3:00 PM	30.5	32.0
4:00 PM	31.0	33.0
5:00 PM	28.0	30.0
5:30 PM	25.5	25.5
6:00 PM	25.5	25.5
Mean	24.4	25.9

more rapidly while its sensible heat fluxes are increasing more rapidly than the light isogene. At the end of the season, it is speculated that the stomatal resistances in the light isogene become comparable to that of the dark isogene, thus resulting in comparable sensible heat losses.

Soil Heat Flux

Columns 8 and 9 of Tables 2 and 3 give the soil heat flux for the 1976 and 1977 seasons. In Table 3, the soil heat fluxes are equivalent early in the season. From June 30 to July 15, the dark isogene generally has higher fluxes. The remainder of the season, the fluxes are again equivalent. This trend is similar to the sensible heat and stomatal resistance data discussed above and below. Soil heat flux results from either solar radiation passing through the canopy, re-radiation being emitted downward from the canopy, or sensible heat flux downward from the canopy. The higher reflectivity of the light isogene should result in a greater proportion of the solar radiation reaching the soil surface in the light isogene. However, the lower canopy temperature and lower stomatal resistances in the light isogene should result in less energy reaching the soil surface. From the data it appears that the canopy temperature and stomatal resistance influences are the more important, resulting in smaller soil heat fluxes in the light isogene for the majority of the season.

Evapotranspiration

The dependent variable of the energy balance equation, which is calculated from the other measured variables, is evapotranspiration, LE (see eq. (13)). The LE data are found in columns 2 and 3 of Tables 2 and 3. The dark isogene appears to use more water early in the season (24 percent greater on June 24, 1977). This early trend was probably missed in the 1976 season. By about July 6, for the 1977 data, the light isogene had a higher LE rate which continued until approximately June 15 (July 28 for the 1976 season). Following this the isogenes were fairly equivalent in LE rates. As noted above, this pattern resembles the pattern found in the sensible heat flux data and the stomatal diffusive resistance data. Early in the season, with small equivalent resistances in both isogenes, the LE rates are high with the light isogene being smaller because of its greater reflectivity and slower growth rate. During the middle portion of the season the high resistances of the dark isogene and slower growth rate more than compensate for its greater net radiation load resulting in smaller LE rates. Finally, at the end of the season, where reflectivities are comparable and resistances probably comparable, the LE rates are comparable.

Appendix Tables 8 and 9 give data on the ratio LE/R_n . A ratio greater than one would indicate advection was taking place. Considerable advection, as noted in the literature review, causes some error

in the Bowen ratio energy balance method. In 1976 the area west of the experimental plots was planted in winter grain. Since winds in this area are predominantly westerly, it was speculated that little advection would occur. This was the case in 1976, where the ratios are primarily less than one. In 1977 a different situation occurred, where the area immediately west was summer fallow. Advection was noticed early in the season (June 24, 1977 and June 27, 1977), where the ratios are greater than one. However, for the remainder of the season advection only infrequently occurred in the early morning and late evening hours.

Stomatal Diffusive Resistance

Table 5 gives the stomatal diffusive resistances for four different periods in the 1977 season. Early in the season, June 24, the resistances are small with little difference between the isogenes. By July 11 and 12 the dark isogene had slightly higher resistances, with the mean for the dark being 8.7 sec-cm^{-1} (both days included) and the mean for the light being 7.1 sec-cm^{-1} . Late in the season, July 20, the mean for the dark isogene was 41.7 sec-cm^{-1} while that for the light was 19.4 sec-cm^{-1} . This was a statistically significant difference. Consequently, as the season progresses and the stored soil water is decreasing, the stomatal resistances are increasing with the dark isogene apparently undergoing a larger increase. This trend is

Table 5. Stomatal diffusive resistance for Liberty and Golden Liberty (sec/cm). Kamp's farm (1977).

	8:00	9:00	10:00	11:00	12:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	F-Stat
June 24:													
Liberty			2.3	2.7	2.3	3.6	3.1	2.8					
Golden			1.6	2.2	2.5	3.9	3.1	3.1					.22
Liberty													
July 7:													
Liberty					6.3		14.4		12.3				
Golden					8.3		17.9		10.6				.67
Liberty													
July 11:													
Liberty					8.5	11.7		12.4		7.3		7.4	
Golden					5.5	9.9		14.8		6.0		5.7	1.40
Liberty													48
July 12:													
Liberty	5.7		3.5		13.2								
Golden	1.5		7.0		6.6								.64
Liberty													
July 20:													
Liberty	17.8		23.4	20.8		69.3		82.2		36.9			
Golden	11.6		6.7	8.4		33.1		38.3		18.1			14.15*
Liberty													

*Significant at $p = .025$.

probably associated with more rapid maturation rate of the dark cultivar, since resistances are dependent upon age. If it were strictly a response to the differences in canopy temperature or chlorophyll concentration, then there should have been differences in resistances early in the season. This was not observed.

The replicated resistance studies performed on plots at the Bozeman station are summarized in Table 6. The study performed in the morning revealed no significant differences between isogenes with the mean for the dark being 4.7 sec-cm^{-1} and that for the light 5.2 sec-cm^{-1} . The afternoon study showed a statistically significant difference, with the dark isogene having larger resistances (13.8 sec-cm^{-1} compared to 10.3 sec-cm^{-1} for the light isogene). When the isogenes are grown at the Bozeman farm (where the annual precipitation is 5 in. more than at Kamp's farm), the differences in growth rates are not as noticeable. It is possible that the higher LE rates in the Bozeman area, because of more available soil water, would result in smaller temperature differences between the isogenes. If the temperature differences and/or the growth rate differences are related to stomatal resistances, then it is reasonable for the differences in stomatal resistances to be smaller at the Bozeman farm. These data appear to indicate a daily pattern in stomatal resistances, with the dark isogene increasing its resistances more rapidly than the light isogene. This daily trend is likely associated with canopy temperature.

Table 6. Stomatal diffusive resistance (sec/cm). Bozeman farm (1977).

	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	F-stat
9:00 AM-12:00 --								
Liberty	5.5	4.0	3.9	3.8	4.3	4.6	6.9	1.4
Golden Liberty	6.7	5.9	4.2	4.5	5.7	4.4	5.3	
12:00- 3:30 PM --								
Liberty	33.8	12.3	8.6	11.3	9.6	10.2	10.7	6.5*
Golden Liberty	23.3	7.0	9.1	7.1	8.4	7.9	9.1	

* Significant at $p = .05$

Soil Water Use

Soil water use data obtained with the neutron meter are given in Table 7. This table gives the usage by 6 inch (15.24 cm) soil depth intervals for the Compana lines in 1975 and 1976 and the Liberty lines in 1976 and 1977. No definitive use-by-depth patterns are visible. In analyzing total consumption, we find Compana using 0.41 in. (1.04 cm) more water than Golden Compana in 1975. In 1975 these isogenes were grown at the Bozeman station where the wetter conditions probably lessen the influence of growth rate and diffusive resistance differences. In 1976 these isogenes were grown under drier conditions at Kamp's farm and the result was Golden Compana used 0.40 inches (1.02 cm) more water than Compana. In 1976 Liberty used 0.05 inches (0.13 cm) more water than Golden Liberty which was probably due to the influence of a cold, wet growing season. A much drier year occurred in 1977 and the result was that Golden Liberty used 0.36 inches (0.91 cm) more water than Liberty.

Figures 2-5 give the cumulative soil water use for the two lines in 1975-1977. In all four cases the dark isogene initially used more water. As mentioned previously, this correlates well with the higher net radiation load and the faster growth rate of the dark isogene. Figure 2 presents data obtained at the Bozeman farm with the Compana line. In this case the dark isogene appears to maintain an equivalent or larger LE rate throughout the season. As mentioned earlier, the

Table 7. Soil water use by depth.

	Inches									Total
	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	
1976:										
Liberty	.71*	.69	.62	.54	.46	.32	.35	.16		3.85
Golden Liberty	.76	.72	.71	.58	.44	.29	.21	.11		3.80
1977:										
Liberty	.95	.91	.89	.72	.56	.42	.26	.12	.07	4.90
Golden Liberty	.94	.90	.90	.79	.69	.57	.35	.12	.00	5.26
1975:										
Compana	.48	.66	.71	.70	.70	.66	.52	.41	.30	5.56
Golden Compana	.50	.65	.72	.66	.65	.60	.47	.36	.24	5.15
1976:										
Compana	.69	.64	.62	.56	.45	.39	.17	.08		3.60
Golden Compana	.64	.69	.72	.63	.54	.43	.27	.08		4.00

*The addition of the rain factor is not included.

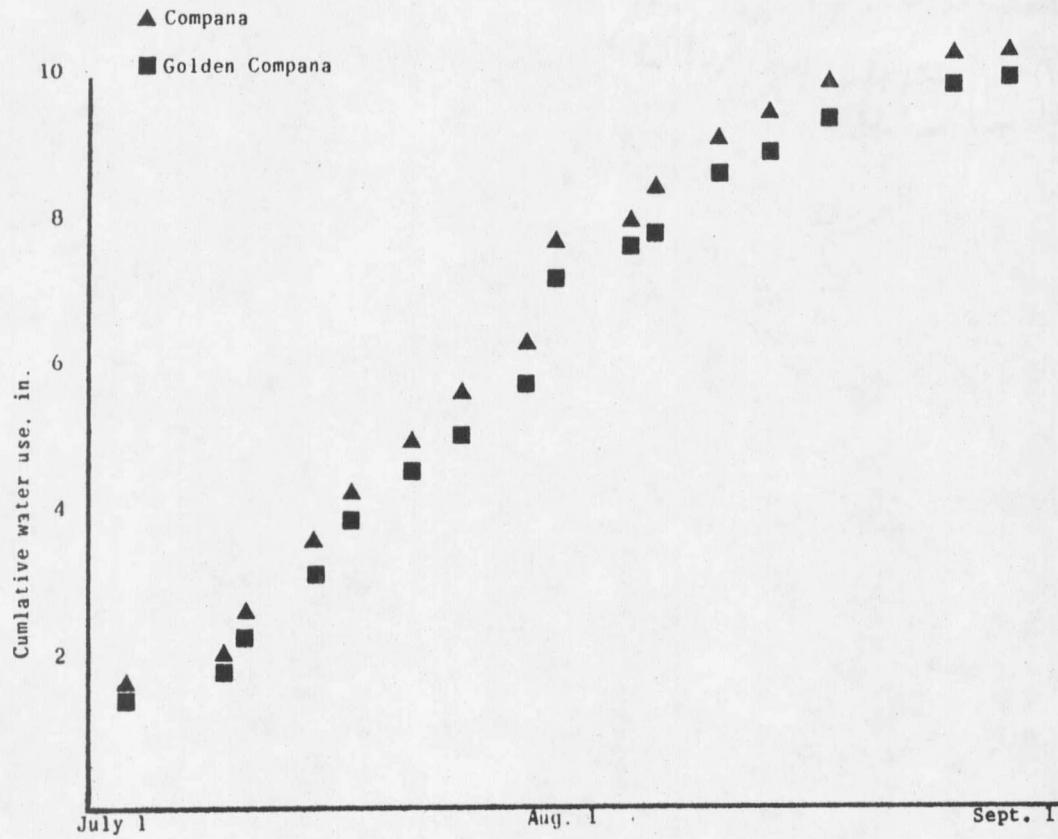


Figure 2. Cumulative soil water use by Compana and Golden Compana. Bozeman farm (1975).

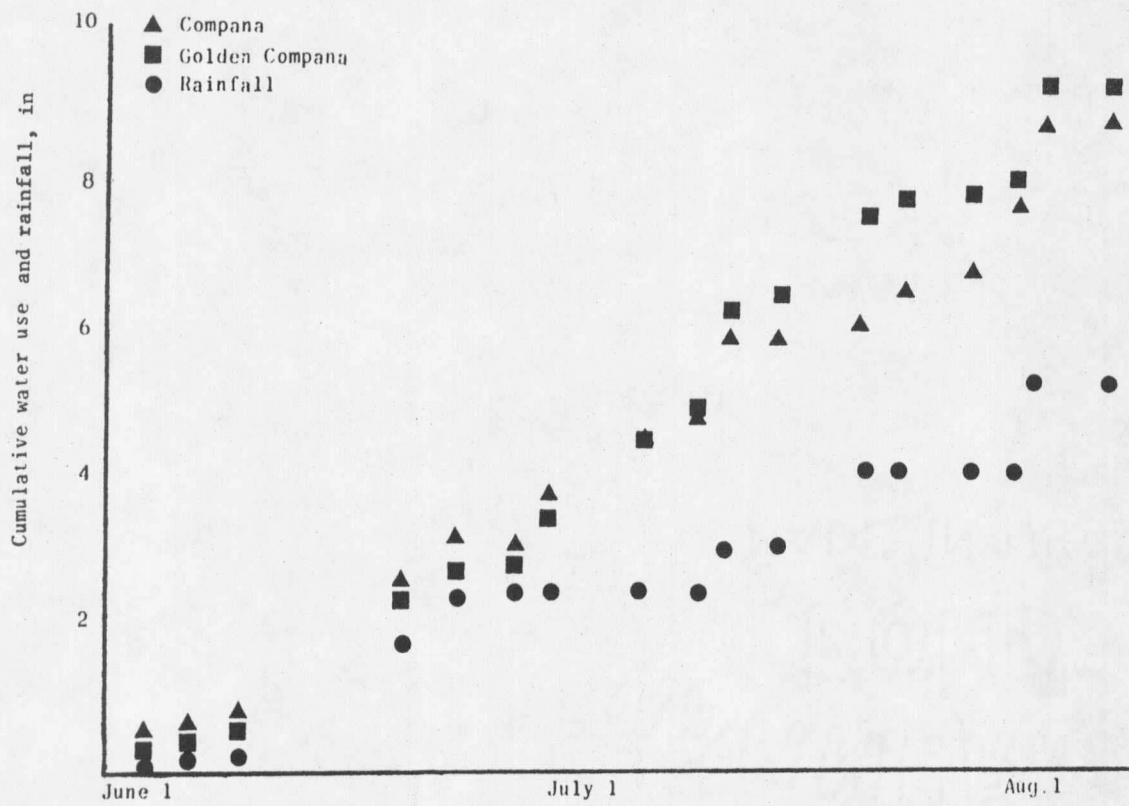


Figure 3. Cumulative soil water use by Compana and Golden Compana. Kamp's farm (1976).

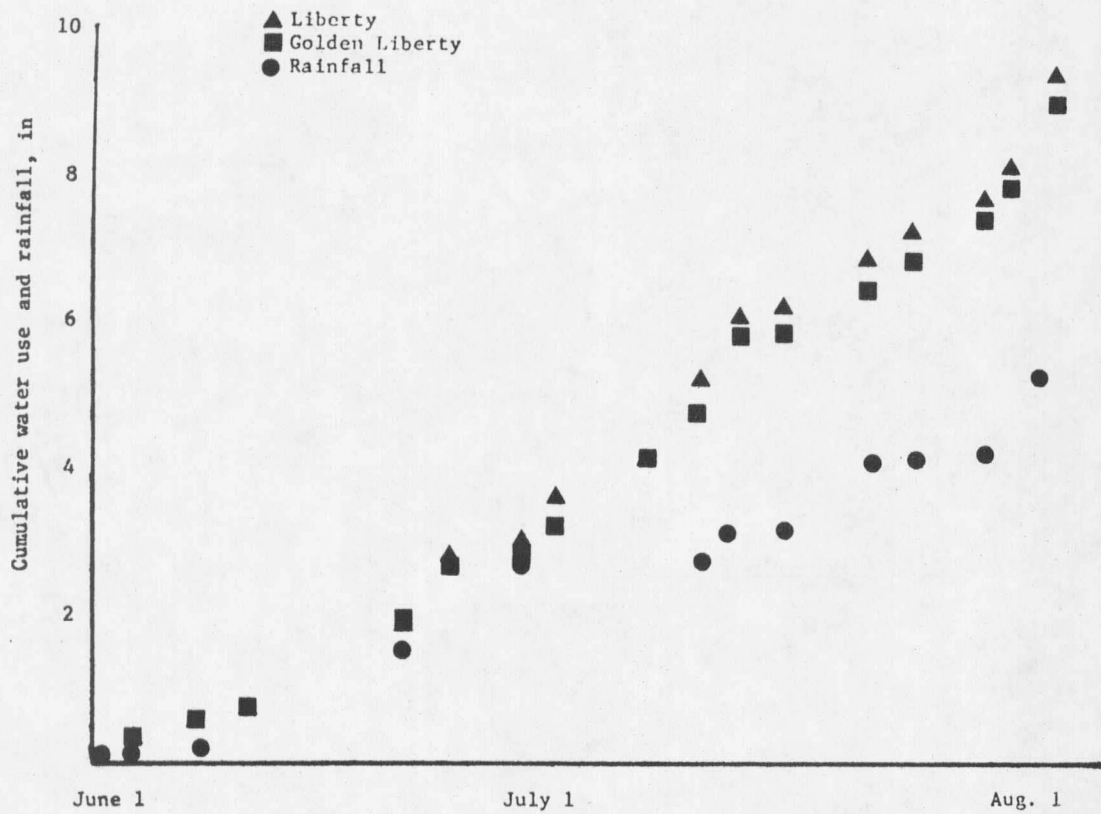


Figure 4. Cumulative soil water use by Liberty and Golden Liberty. Kamp's farm (1976).

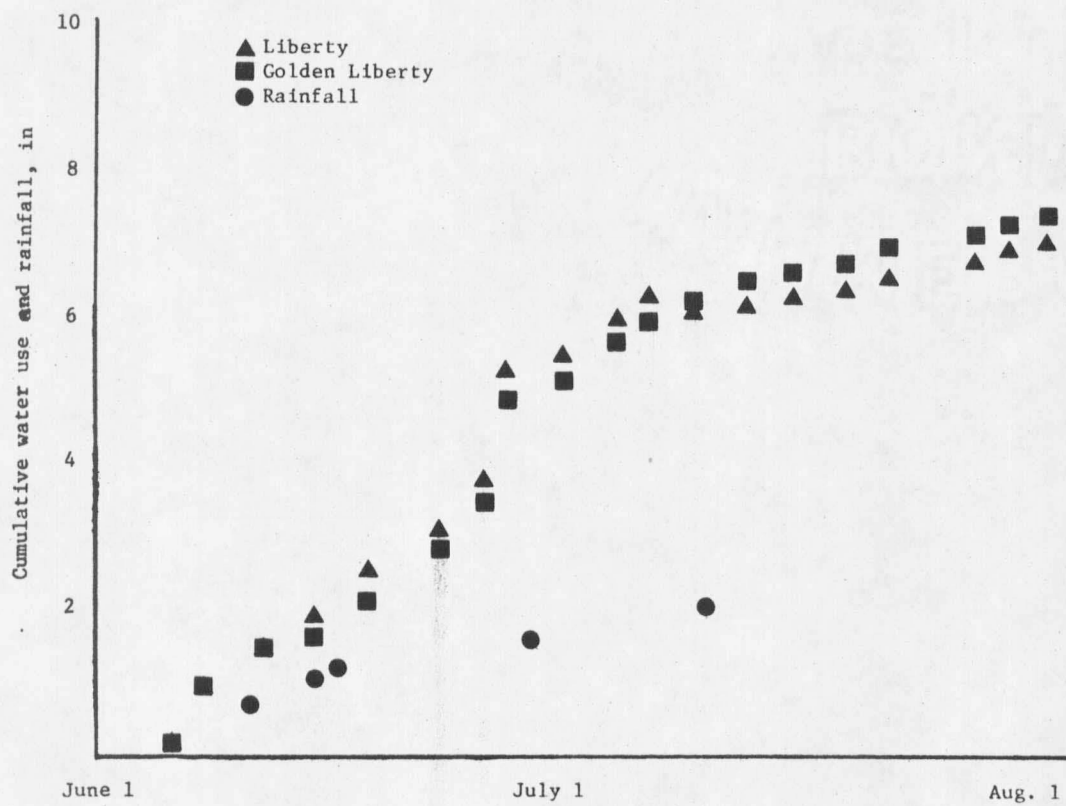


Figure 5. Cumulative soil water use by Liberty and Golden Liberty. Kamp's farm (1977).

higher precipitation at the Bozeman farm appears to lessen the differences in stomatal resistances and growth rates which result in the reflectivity differences being more important in determining LE rates. The 1976 data on Compana - Golden Compana, Figure 3, show the expected crossover where the light isogene uses more water later in the season. This crop was grown at Kamp's farm, which is much drier. The crossover, as mentioned above, is apparently caused by higher stomatal resistances in the eark isogene more than compensating for the lower reflectivity in the dark isogene. Figure 4 gives the data for Liberty - Golden Liberty in 1976. There is no crossover point with the final seasonal total indicating equivalent LE rates. This season there was considerable more rainfall (5.2 inches compared to 1.8 inches in 1977) which probably accounts for the light isogene not crossing over as in 1977. Finally, Figure 5 gives the data for Liberty - Golden Liberty in 1977 and indicates the expected crossover with the light isogene using 0.50 inches (1.27 cm) more water. Figures 3 and 5 appear to correlate well with the water use data obtained from the energy balance method in 1976 and 1977.

Screening Tests for Drought Resistance in Barley Cultivars

Osmotic Potential

Morning osmotic potentials, afternoon osmotic potentials, and (afternoon minus morning osmotic potentials) were determined for the 50

cultivars over three seasons. These readings are given in Appendix Tables 15 through 18. In each year samples were taken twice: 1) sometime prior to heading and 2) sometime after heading. Two approaches were used in determining the reliability and the differentiating ability of these measurements: 1) a table of linear correlations comparing one season with the next was constructed and 2) a replicated study and its associated analysis of variance was run in 1977.

Table 8 lists the coefficients obtained by correlating the morning and afternoon osmotic potentials for a particular measuring time in one season with a comparable time in another season. Other than two values above $r = .30$, the values are generally low and indicate little repeatability across seasons.

Using two replicates, an analysis of variance was determined on the morning and afternoon values on June 22, 1977 and July 20, 1977. Table 9 summarized this analysis. The only F-ratio which approaches significance occurred on July 20 morning. Its ratio of 1.75 is significant at $p = .10$. The lack of significant differences between cultivars in this study indicates it may not be possible to differentiate cultivars on a measure of osmotic potential.

Table 10 gives the correlation coefficients from correlating Eslick's drought resistance ratings with osmotic potential in 1975. The readings on July 14 give little indication of any correlation. However, on August 12, there are two conflicting patterns. In the morning,

Table 8. Correlation coefficients comparing osmotic potentials over three seasons.

	<u>July 14, 1975</u>		<u>Aug. 12, 1975</u>		<u>July 14, 1976</u>		<u>Aug. 10, 1976</u>	
	AM	PM	AM	PM	AM	PM	AM	PM
July 14, 1976								
AM		.37*						
PM				.33*				
Aug. 10, 1976								
AM				.10				
PM						.21		
June 22, 1977								
AM		.04				.06		
PM				.14			.15	
July 20, 1977								
AM				.17			.04	
PM						.25		.01

*Significant at $p = .05$.

Table 9. ANOVA for osmotic potentials in 1977.

	df	SS	MS	F
<u>June 22, 1977--</u>				
AM: Treatments	46	56.17	1.22	.99
Error	47	58.20	1.24	
Total	93	114.37		
PM: Treatments	47	90.07	1.92	1.32
Error	48	69.56	1.45	
Total	95	159.63		
<u>July 20, 1977--</u>				
AM: Treatments	33	160.13	4.85	1.75*
Error	34	94.06	2.77	
Total	67	254.19		
PM: Treatments	16	96.32	6.02	.89
Error	17	114.82	6.75	
Total	33	211.14		

*Significant at $p = .10$.

Table 10. Correlation coefficients from correlating Eslick's drought resistance ratings with osmotic potential. 1975.

Yield Level	July 14, 1975			Aug. 12, 1975		
	AM	PM	Δ	AM	PM	Δ
bu/A						
10	.07	.04	-.02	.07	-.14	-.19
20	-.03	.07	.08	.17	-.04	-.15
30	.03	.27	.20	.15	-.08	-.19
40	.08	.23	.13	-.04	-.06	-.03
50	.07	.15	.08	-.10	-.03	.03
60	.08	.12	.04	-.09	-.01	.05
70	.06	.11	.05	-.12	-.02	.06
80	.07	.10	.04	-.12	-.01	.06
90	.06	.09	.03	-.13	-.01	.07
100	.06	.09	.03	-.13	-.01	.07
110	.06	.09	.03	-.13	-.01	.07
120	.06	.08	.03	-.13	-.01	.07
Slope-Method E	.06	.06	.01	-.14	.00	.08

p (.05) = .28

the coefficients are reasonably high (e.g., .07 and .17) at low yield levels and then reaches reasonably high negative values (e.g., -.13 and -.14) at high yield levels. This indicates a positive correlation with drought resistance. However, the afternoon values and difference values on August 12 have reasonably high negative values (e.g., -.14 and -.19 at 10 bu/a) at low yield levels and approach low values (e.g., -.01 and .07 at 120 bu/a) at high yield levels. This indicates a negative correlation with drought resistance. Table 11 gives comparable data for 1976. Here we see osmotic potentials for the morning of July 14, the afternoon of August 10, and the osmotic potential differences of August 10 showing reasonably good correlations with drought resistance. Again, the correlations are primarily negative (e.g., -.17, -.23, and -.34) at low yield levels with comparably high positive values (e.g., .11, .27 and .13) at high yield levels. The correlations with the slope (.09 to .27) imply that the plants with low osmotic potentials yielded better under drought conditions and poorer under wet conditions. Table 12 gives comparable data for June 22, 1977. Both replicates in the morning indicate negative correlations with drought resistance, with negative values (e.g., -.27 and -.06 at 10 bu/a) at low yield levels and positive values (e.g., .19 and .11 at 120 bu/a) at high yield levels. The potential difference for replicate 1 shows a conflicting positive correlation again, with positive values (e.g., .12 at 10 bu/a) at low yield levels and negative values (e.g., -.14 at 120 bu/a) at

Table 11. Correlation coefficients from correlating Eslick's drought resistance ratings with osmotic potential. 1976.

Yield Level	July 14, 1976			August 10, 1976		
	AM	PM	Δ	AM	PM	Δ
<u>bu/A</u>						
10	-.17	-.06	-.06	.26	-.23	-.34
20	-.14	.05	-.02	.04	-.16	-.17
30	-.12	.27	.13	.30	.12	-.15
40	.04	.25	.18	.30	.34	.03
50	.08	.18	.15	.22	.33	.09
60	.10	.15	.13	.20	.31	.09
70	.10	.14	.13	.17	.31	.11
80	.10	.13	.12	.16	.30	.11
90	.10	.12	.12	.15	.30	.12
100	.11	.12	.12	.15	.29	.12
110	.11	.12	.12	.14	.29	.12
120	.11	.11	.12	.14	.29	.12
Slope-Method E	.11	.09	.11	.12	.27	.13

$p (.05) = .28$

Table 12. Correlation coefficients from correlating Eslick's drought resistance ratings with osmotic potential. June 22, 1977.

Yield Level	AM-1	AM-2	PM-1	PM-2	Δ -1	Δ -2
<u>bu/A</u>						
10	-.27	-.06	-.08	-.02	.12	.02
20	-.09	-.10	.10	-.04	.13	.02
30	.10	-.04	.15	.03	.04	.04
40	.24	.08	.06	.09	-.11	.02
50	.22	.10	.01	.08	-.13	.01
60	.19	.12	.01	.08	-.11	.01
70	.20	.10	-.01	.08	-.14	.00
80	.19	.11	-.01	.08	-.14	.00
90	.19	.11	-.02	.08	-.14	.00
100	.19	.11	-.02	.08	-.14	.00
110	.19	.11	-.02	.08	-.14	.00
120	.19	.11	-.02	.07	-.14	.00
Slope-Method E	.18	.11	-.03	.07	-.14	.00

p (.05) = .28

high yield levels. Table 13 gives comparable data for July 20, 1977. The afternoon osmotic potentials and the potential differences for replicate 2 give fairly good negative correlations (e.g., $-.19$ and $-.23$ at 10 bu/a) at low yield levels and comparable positive correlations (e.g., $.26$ and $.30$ at 120 bu/a) at high yield levels. The potential difference for replicate 1 again has a conflicting positive correlation with drought resistance, with positive values (e.g., $.14$ and $.41$) at low yield levels and negative values (e.g., $-.26$ and $-.29$) at high yield levels.

In summary, the correlations across years and the replicated study do not give much credence to the reliability of this technique or its ability to differentiate cultivars on a measure of osmotic potential or osmotic potential difference. However, there is some evidence to support several conclusions. Morning osmotic potentials early in the season and afternoon osmotic potentials late in the season appear to be correlated with drought resistance. The best differentiator as to drought resistance is the osmotic potential difference late in the season. Finally, in nearly all cases, the lower the potential, the larger the drought resistance. Generally, the crossover from negative correlations at low yield levels to comparable positive correlations at high yield levels, as well as the positive correlation with the slope (Method E), indicates that the plants with low osmotic potentials yielded better under drought conditions and poorer under wet

Table 13. Correlation coefficients from correlating Eslick's drought resistance ratings with osmotic potential. July 20, 1977.

Yield Level	AM-1	AM-2	PM-1	PM-2	A-1	A-2
<u>bu/A</u>						
10	-.05	.02	.21	-.19	.14	-.23
20	-.30	-.09	.14	-.14	.41	-.17
30	-.14	-.04	.22	.06	.36	.04
40	.19	.06	.13	.29	.02	.31
50	.26	.09	.06	.29	-.13	.32
60	.25	.10	.03	.25	-.14	.27
70	.29	.09	.02	.27	-.22	.31
80	.29	.09	.01	.27	-.23	.31
90	.29	.09	.01	.26	-.24	.30
100	.29	.09	.00	.26	-.25	.30
110	.30	.09	.00	.26	-.26	.30
120	.30	.09	.00	.26	-.26	.30
Slope-Method E	.30	.09	-.02	.24	-.29	.28

p (.05) = .28

conditions.

Soil Water Use/Rooting Patterns

Appendix Table 19 gives the soil water content measurements at 6 inches (15.24 cm) increments for 1976. Table 14 gives the correlation coefficients from correlating Eslick's drought resistance ratings with soil water remaining at various depths. Three trends are noticeable.

In the upper profile, 6 to 18 inches (15.24-45.72 cm), the correlation coefficients are positive (e.g., .13, .06 and .10 at 10 bu/a) at low yield levels and negative or small (e.g., .02, -.14 and -.21 at 120 bu/a) at high yield levels. The correlations with the slope (Method E) of $r = -.16$ and $-.24$ imply that plants with a high soil water content yielded better under drought conditions and poorer under wet conditions.

The middle depths, 24 to 42 inches (60.96-106.68 cm), show the reverse trend. The correlation coefficients are reasonably high negative (e.g., -.20, -.23, -.11, and -.07 at 10 bu/a) at low yield levels and crossover to high positive values (e.g., .14, .23, .15, and .06 at 120 bu/a) at high yield levels. The correlations with the slope (Method E) give values from $r = .12$ to $.24$. These correlations mean that, at intermediate depths, the more drought resistance cultivars have a lower soil water content.

Table 14. Correlation coefficients from correlating Eslick's drought resistance ratings with water remaining in soil. 1976.

Yield Level	Inches											
	6	12	18	24	30	36	42	48	54	60	66	72
<u>bu/A</u>												
10	.13	.06	.10	-.20	-.23	-.11	-.07	.09	.17	.15	.28	.07
20	.06	.25	.38	-.02	-.26	-.14	-.08	.12	.25	.21	.14	.00
30	.14	.29	.44	.16	-.17	-.07	-.09	.00	.18	.08	.00	.02
40	.08	.01	.02	.22	.13	.11	.01	-.15	-.11	-.18	-.18	.02
50	.05	-.08	-.11	.18	.19	.14	.04	-.15	-.17	-.21	-.19	.01
60	.02	-.08	-.13	.19	.21	.14	.04	-.17	-.20	-.24	-.20	-.01
70	.03	-.12	-.18	.15	.22	.15	.05	-.15	-.19	-.22	-.19	.01
80	.02	-.13	-.19	.15	.22	.15	.06	-.15	-.20	-.22	-.18	.01
90	.02	-.13	-.20	.14	.22	.15	.06	-.15	-.20	-.23	-.18	.01
100	.02	-.14	-.20	.14	.23	.15	.06	-.15	-.20	-.23	-.18	.01
110	.02	-.14	0.21	.14	.23	.15	.06	-.15	-.20	-.23	-.18	.01
120	.02	-.14	-.21	.14	.23	.15	.06	-.15	-.21	-.23	-.18	.01
Slope- Method E	.01	-.16	-.24	.12	.24	.15	.06	-.15	-.22	-.23	-.18	.00

p (.05) = .28

Finally, from 48 - 72 inches (121.92 - 182.88 cm), the drought resistant cultivars are once again positively correlated with water remaining in the soil. The coefficients are positive (e.g., .09, .17, .15, and .28 at 10 bu/a) at low yield levels and cross over to negative values (e.g., -.15, -.21, -.23, and -.18 at 120 bu/a) at high yield levels. Similarly, the correlations with the slope again give negative values (-.15 to -.23).

The soil water use data obtained from the neutron meter in 1977 is presented in four forms: 1) soil water use for a given depth and a given date; 2) cumulative soil water use at a given depth; 3) soil water use as a logarithmic relation of time; and 4) water use efficiency.

Appendix Table 20 gives the data for soil water use for a given depth and a given date. These data were correlated with Eslick's ratings on drought resistance and the result is given in Table 15. At 6 inches (15.24 cm) and 12 inches (30.48 cm) the negative correlations at low yield levels indicate that the drought resistant cultivars use less water at these depths. At both depths there is generally a cross over to comparable positive values at high yield levels. The correlations with the slope (Method E) give values ranging from the positive mid-teens to positive mid-twenties. At the 18 inch (45.72 cm) depth the coefficients are mostly small indicating no detectable pattern of water use. From 24 inches (60.96 cm) through 42 inches (106.68 cm)

we again find the pattern of negative correlations at low yield levels and positive correlations at high yield levels. The correlations with the slope (Method E) give values in the positive low-teens. These correlations imply that resistant cultivars use less water at these depths. This pattern is most noticeable later in the season. At the 48 inch (121.92 cm) depth there again is no detectable pattern. These data generally agree with the 1976 data except for the middle depths. In 1976, Table 14, the intermediate depths, as noted above, actually showed a reverse trend with the drought resistant cultivars using more water. This trend for the drought resistant cultivars to use relatively more water at the intermediate depths is visible in the 1977 data (Table 15) in that at the 18 inch (45.72 cm) depth there was no detectable pattern and at 24 inches (60.96 cm) the negative correlations were smaller than at shallower and deeper depths. Nevertheless, in an absolute sense, the drought resistant cultivars continued to use less water at these depths, as at other depths, in 1977. Other than this exception, the data in 1977 agree with that of 1976. The exception noted may be related to the fact that the drought line in 1976 was grown at the Bozeman station, while in 1977 the line was grown at Kamp's farm (where the annual precipitation is 5 inches (12.70 cm) less and the water holding capacity is less).

Total seasonal water use, Appendix Table 21, was also correlated with Eslick's ratings on drought resistance. These coefficients are

Table 15. Correlation coefficients from correlating Eslick's drought resistance ratings with soil water use at a given date.

Depth: 6-12 in

Yield Level (bu/a)	June 13	20	27	July 5	11	18	25	Aug. 1	8	16
10	-.16	-.03	-.02	-.09	-.12	-.22	-.13	-.22	-.14	-.19
20	-.03	-.02	-.11	.00	-.05	-.20	-.05	-.18	-.14	-.09
30	-.16	-.19	-.02	.18	.01	-.02	.12	.02	.04	.07
40	-.15	-.19	.13	.21	.07	.25	.21	.26	.23	.21
50	-.11	-.14	.15	.17	.08	.27	.18	.27	.23	.20
60	-.09	-.13	.14	.13	.07	.26	.17	.26	.23	.19
70	-.09	-.11	.14	.14	.07	.27	.16	.26	.22	.18
80	-.08	-.10	.14	.13	.07	.27	.16	.26	.22	.18
90	-.08	-.10	.14	.12	.07	.27	.15	.26	.22	.18
100	-.07	-.10	.14	.12	.07	.27	.15	.25	.22	.18
110	-.07	-.09	.14	.12	.07	.26	.15	.25	.21	.17
120	-.07	-.09	.14	.12	.07	.26	.15	.25	.21	.17
Slope	-.06	-.08	.15	.10	.07	.26	.14	.25	.21	.17

Depth: 12-18 in

Yield Level (bu/a)	June 13	20	27	July 5	11	18	25	Aug. 1	8	16
10	-.28	-.15	-.28	-.16	-.16	-.18	-.17	-.28	-.31	-.26
20	-.29	-.10	.08	-.03	-.07	-.08	-.04	-.14	-.09	-.10
30	-.28	-.15	-.02	.02	-.04	.01	.07	.00	.07	.05
40	.04	-.04	-.12	.08	.05	.12	.14	.18	.20	.20
50	.13	.00	-.12	.07	.06	.13	.13	.19	.19	.19
60	.14	.00	-.18	.07	.06	.13	.13	.20	.19	.19
70	.17	.02	-.11	.07	.07	.12	.11	.19	.17	.18
80	.18	.02	-.11	.07	.07	.12	.11	.19	.17	.18
90	.19	.03	-.11	.07	.07	.12	.11	.19	.17	.18
100	.19	.03	-.11	.06	.07	.12	.11	.19	.17	.17
110	.19	.03	-.11	.06	.07	.12	.10	.18	.16	.17
120	.20	.03	-.11	.06	.07	.12	.10	.19	.16	.17
Slope	.21	.04	-.10	.07	.07	.12	.10	.18	.16	.17

p (.05) = .28

Table 15. Correlation coefficients from correlating Eslick's drought resistance ratings with soil water use at a given date. Cont.

Depth: 18-24 in

Yield Level (bu/a)	June 13	20	27	July 5	11	18	25	Aug. 1	8	16
10	-.02	.08	-.07	.00	-.04	-.03	.10	-.02	.03	-.03
20	-.02	.04	.02	-.05	-.07	-.12	-.04	-.13	-.05	-.11
30	-.12	-.08	-.12	-.14	-.13	-.17	-.15	-.13	-.09	-.17
40	-.11	-.15	-.16	-.10	-.05	-.04	-.11	.02	-.04	-.05
50	-.08	-.13	-.13	-.06	-.01	.02	-.06	.07	-.01	.01
60	-.03	-.12	-.12	-.04	.02	.04	-.04	.09	.01	.03
70	-.06	-.12	-.11	-.04	.01	.04	-.05	.08	.01	.03
80	-.06	-.12	-.11	-.03	.01	.04	-.04	.09	.01	.03
90	-.05	-.11	-.11	-.03	.01	.05	-.04	.09	.01	.04
100	-.05	-.11	-.11	-.03	.02	.05	-.04	.09	.01	.04
110	-.05	-.11	-.10	-.03	.02	.05	-.04	.09	.01	.00
120	-.05	-.11	-.10	-.02	.02	.05	-.03	.09	.01	.04
Slope	-.04	-.10	-.09	-.01	.03	.07	-.02	-.10	.02	.05

Depth: 24-30 in

Yield Level (bu/a)	June 13	20	27	July 5	11	18	25	Aug. 1	8	16
10	.16	.01	-.11	-.15	-.09	-.12	-.04	-.09	-.07	-.06
20	.14	.05	-.14	-.15	-.14	-.19	-.16	-.19	-.17	-.20
30	.04	-.05	-.20	-.22	-.23	-.24	-.15	-.18	-.19	-.19
40	-.12	-.12	-.05	-.06	-.07	-.03	.04	.06	.01	.06
50	-.15	-.11	.01	.01	.00	.04	.09	.11	.06	.12
60	-.15	-.11	.03	.03	.02	.08	.12	.15	.10	.15
70	-.15	-.10	.04	.04	.03	.08	.11	.14	.09	.14
80	-.15	-.10	.04	.05	.03	.08	.12	.14	.09	.15
90	-.15	-.10	.05	.05	.04	.09	.12	.14	.10	.15
100	-.15	-.10	.05	.05	.04	.09	.12	.15	.10	.15
110	-.15	-.10	.05	.06	.04	.09	.12	.15	.10	.15
120	-.15	-.09	.05	.06	.05	.10	.12	.15	.10	.15
Slope	-.16	-.09	.07	.08	.07	.11	.13	.16	.12	.16

p (.05) = .28

Table 15. Correlation coefficients from correlating Eslick's drought resistance ratings with soil water use at a given date. Cont.

Depth: 30-36 in

Yield Level (bu/a)	June 13	20	27	July 5	11	18	25	Aug. 1	8	16
10	.04	.09	.04	-.05	.01	-.12	-.10	-.14	-.13	-.18
20	-.05	-.04	-.10	.00	-.07	-.14	-.14	-.22	-.17	-.21
30	.15	-.08	-.06	-.05	-.21	-.24	-.21	-.25	-.18	-.22
40	.24	-.03	.08	-.04	-.14	-.09	-.05	.00	.02	.02
50	.21	-.01	.10	-.03	-.09	-.02	.01	.08	.07	.09
60	.21	.00	.12	-.02	-.05	.02	.06	.13	.12	.14
70	.18	.00	.11	-.03	-.05	.02	.04	.12	.10	.12
80	.18	.00	.11	-.03	-.04	.02	.05	.12	.10	.13
90	.17	.01	.11	-.03	-.04	.03	.05	.13	.10	.13
100	.17	.01	.11	-.03	-.04	.03	.05	.13	.11	.14
110	.17	.01	.11	-.03	-.04	.03	.05	.13	.11	.14
120	.17	.01	.11	-.02	-.04	.04	.06	.14	.11	.14
Slope	.16	.02	.11	-.02	-.02	.06	.07	.15	.12	.15

Depth: 36-42 in

Yield Level (bu/a)	June 13	20	27	July 5	11	18	25	Aug. 1	8	16
10	.00	.01	-.01	-.02	.01	-.06	-.19	-.13	-.15	-.06
20	-.15	-.01	-.03	.01	.13	.07	.04	-.03	-.02	-.02
30	.21	.26	.24	.25	.13	.10	.14	.08	.14	.12
40	.26	.24	.21	.18	-.04	.01	.07	.11	.13	.12
50	.24	.19	.17	.13	-.07	-.01	.04	.09	.10	.09
60	.24	.17	.15	.12	-.07	-.01	.05	.10	.10	.10
70	.23	.16	.14	.11	-.09	-.02	.03	.08	.09	.08
80	.23	.15	.14	.10	-.09	-.02	.03	.08	.09	.08
90	.23	.15	.14	.10	-.09	-.03	.02	.08	.08	.08
100	.23	.15	.13	.10	-.09	-.03	.02	.08	.08	.08
110	.23	.14	.13	.09	-.09	-.03	.02	.08	.08	.07
120	.23	.14	.13	.09	-.09	-.03	.02	.08	.08	.07
Slope	.21	.13	.12	.09	-.09	-.03	.02	.08	.07	.07

p (.05) = .28

Table 15. Correlation coefficients from correlating Eslick's drought resistance ratings with soil water use at a given date. Cont.

Depth: 42-48 in

Yield Level (bu/a)	June 13	20	27	July 5	11	18	25	Aug. 1	8	16
10	.03	-.06	-.11	-.13	-.11	-.14	-.18	-.10	-.23	-.14
20	.10	.22	.04	-.08	.14	-.01	.00	-.04	-.05	-.05
30	.12	.25	.11	.10	.10	.02	-.01	.05	.07	.03
40	-.03	-.06	.04	.16	-.09	.02	-.01	.09	.11	.09
50	-.05	-.11	.01	.14	-.11	.02	-.01	.07	.09	.08
60	-.05	-.12	.01	.11	-.13	.02	.00	.08	.11	.10
70	-.06	-.14	.01	.13	-.12	.02	-.01	.07	.09	.08
80	-.06	-.14	.00	.13	-.12	.02	-.01	.07	.08	.08
90	-.06	-.14	.00	.13	-.13	.02	-.01	.07	.08	.09
100	-.06	-.14	.00	.12	-.13	.02	-.01	.07	.08	.08
110	-.06	-.15	.00	.12	-.13	.02	-.01	.07	.08	.08
120	-.07	-.15	.00	.12	-.13	.02	.00	.07	.08	.08
Slope	-.07	-.16	-.01	.12	-.13	.02	-.01	.07	.08	.08

Depth: 48-54 in

Yield Level (bu/a)	June 13	20	27	July 5	11	18	25	Aug. 1	8	16
10	-.07	.23	.10	.04	.04	-.09	-.03	.00	.09	-.19
20	.00	-.02	.06	-.01	.04	-.07	.01	-.17	.00	-.18
30	.07	.01	-.09	.07	.06	.06	-.07	-.12	-.03	-.11
40	.07	.03	-.15	.06	.00	.13	-.05	.11	-.03	.12
50	.06	.03	-.12	.04	-.01	.12	-.04	.13	-.03	.14
60	.07	-.01	-.14	.03	-.02	.11	-.03	.15	.00	.15
70	.04	.03	-.12	.03	-.02	.11	-.04	.14	-.02	.16
80	.04	.03	-.11	.03	-.02	.11	-.04	.14	-.02	.16
90	.04	.03	-.11	.03	-.02	.11	-.03	.14	-.02	.16
100	.04	.03	-.11	.03	-.02	.10	-.03	.14	-.02	.16
110	.04	.03	-.11	.03	-.02	.10	-.03	.14	-.02	.16
120	.04	.03	-.11	.03	-.02	.10	-.03	.14	-.02	.16
Slope	.04	.02	-.11	.03	-.02	.10	-.03	.15	-.02	.16

P (.05) = .28

given in Table 16. Generally these reflect the same trends that were seen above in water use for a given depth and date. The coefficients depict negative correlations at low yield levels with a smooth transition to positive correlations at high yield levels. The correlations with slope range from .00 to .17. The technique appears to give better correlations at the shallow and deep depths.

Figure 6 is an illustration of the "logarithmic" relationships of water use vs. time, which was typical for all 50 cultivars. Water use vs. ln time was determined for each cultivar and the values for the intercept, a, and slope, b, are listed in Appendix Table 22. Since the slope gives a measure of the rapidity of water consumption, it was correlated with Eslick's drought resistance rating. These correlation coefficients are given in Table 17. The generally negative correlations at low yield levels and positive correlations at high yield levels indicate that the drought resistant cultivars have smaller slopes. Thus, drought resistant cultivars use water more slowly. The depth that shows the greatest differentiation (highest correlation) of drought resistance is 24 to 30 inches (60.96 - 76.20 cm). Here the values range from -.13 at 10 bu/a to .24 at 120 bu/a.

Water use efficiency is given in Appendix Table 23. Its correlations with Eslick's drought resistance ratings are given in Table 18. This comparison indicates good positive correlation (e.g., .27 at 10 bu/a) between water use efficiency and drought resistance. This can

Table 16. Correlation coefficients from correlating Eslick's drought resistance ratings with total water use. 1977.

Yield Level	Inches							
	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54
<u>bu/A</u>								
10	-.17	-.26	-.01	-.08	-.09	-.09	-.15	-.02
20	-.11	-.08	-.06	-.15	-.15	.02	.03	-.10
30	.03	-.01	-.15	-.20	-.20	.17	.10	-.05
40	.18	.10	-.09	-.03	-.03	.11	.04	.08
50	.18	.11	-.04	.03	.03	.08	.02	.09
60	.17	.12	-.02	.06	.07	.08	.02	.10
70	.17	.11	-.02	.06	.06	.06	.01	.10
80	.17	.11	-.02	.07	.06	.06	.01	.10
90	.17	.11	-.01	.07	.06	.06	.01	.10
100	.17	.11	-.01	.07	.07	.06	.01	.10
110	.17	.10	-.01	.07	.07	.06	.01	.10
120	.17	.11	-.01	.08	.07	.06	.01	.10
Slope-Method E	.17	.11	.00	.09	.09	.05	.00	.10

p (.05) = .28

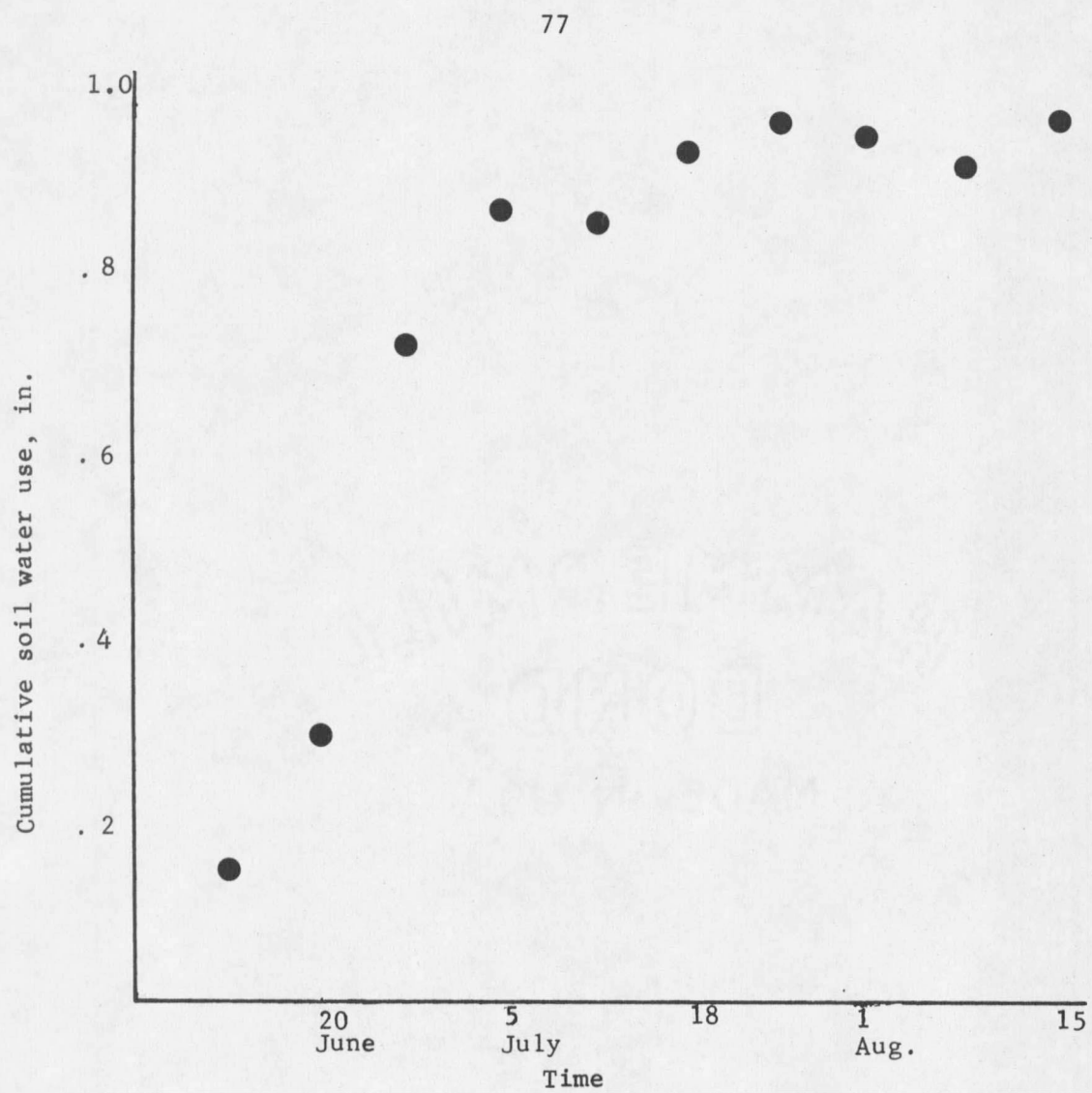


Fig. 6. Cumulative soil water use for the cultivar Betzes at the 6 - 12 in depth.

Table 17. Correlation coefficients from correlating Eslick's drought resistance ratings with the slope of the relationship, $w = a + b \ln t$.

	Inches							
	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54
<u>bu/A</u>								
10	-.12	-.08	.01	-.13	-.18	-.13	-.15	-.13
20	-.09	-.01	-.12	-.27	-.19	.02	-.06	-.13
30	.19	.20	-.06	-.19	-.28	.05	-.02	-.08
40	.34	.25	.09	.14	-.07	.02	.07	.09
50	.30	.20	.12	.20	.01	.01	.07	.10
60	.28	.20	.12	.20	.01	.01	.07	.10
70	.27	.17	.13	.23	.05	.01	.07	.11
80	.26	.16	.13	.23	.06	.01	.07	.11
90	.25	.16	.13	.24	.06	.01	.07	.11
100	.25	.15	.13	.24	.07	.00	.07	.11
110	.25	.15	.13	.24	.07	.00	.07	.11
120	.24	.15	.13	.24	.07	.01	.07	.11
Slope-Method E	.22	.13	.13	.25	.09	.01	.07	.12

Table 18. Correlation coefficients from correlating Eslick's drought resistance ratings with water use efficiency.

Yield Level (bu/a)	Water Use Efficiency (bu/in)
10	.27
20	.09
30	.08
40	-.03
50	-.06
60	-.08
70	-.07
80	-.07
90	-.07
100	-.07
110	-.07
120	-.07
Slope	-.08

$p (.05) = .28$

result from drought resistant cultivars either using less water or having a higher yield for a given water consumption, or some combination of the two. In the analysis above, it was observed that drought resistant cultivars definitely tend to use less water.

In summary, drought resistant cultivars use considerably less water at shallow and deep depths. At the intermediate depths, the drought resistant cultivars use only slightly less water in a dry area such as Kamp's farm or use more water than drought sensitive cultivars in a wetter area, such as the Bozeman farm. The better correlation coefficients ranged from .13 to .23. There is evidence that the drought resistant cultivars use water more slowly. The generally smaller and slower water use by drought resistant cultivars may be caused by different rooting systems, such as extensive rooting only at intermediate depths, or, possibly, some characteristic that decreases transpiration, such as rapid maturation or high resistances to water movement through the plant. Finally, a single measurement of water content after crop removal appears to give as good an indication of drought resistance as does weekly measurements.

Water Retention/Dry-Down

The percent water loss data for young plants (not headed) and old plants (headed) in 1975 are given in Appendix Tables 24 and 25. Tables 19 and 20 give the correlation coefficients from correlating water loss

Table 19. Correlation coefficients from correlating Eslick's drought resistance ratings with percent water loss of young plants. 1975.

Yield Level (bu/a)	1 hr	6 hr	12 hr	18 hr	24 hr	48 hr	72 hr	96 hr	240 hr
10	-.17	-.13	-.19	-.25	-.30	-.35	-.34	-.33	-.30
20	.06	.12	.08	.03	-.01	-.09	-.11	-.13	-.14
30	.02	.16	.16	.16	.13	.05	-.01	-.05	-.13
40	-.06	.03	.10	.15	.17	.18	.14	.11	.03
50	-.07	-.03	.04	.10	.13	.16	.14	.13	.07
60	-.08	-.05	.03	.09	.13	.17	.16	.15	.10
70	-.07	-.05	.02	.07	.11	.15	.14	.13	.09
80	-.07	-.06	.01	.07	.10	.15	.14	.13	.10
90	-.07	-.06	.01	.06	.10	.15	.14	.14	.10
100	-.07	-.06	.01	.06	.10	.15	.14	.13	.10
110	-.07	-.07	.01	.06	.10	.15	.14	.13	.10
120	-.07	-.07	.00	.06	.09	.15	.14	.13	.10
Slope	-.07	-.08	-.01	.05	.08	.14	.14	.14	.11

p (.05) = .28

Table 20. Correlation coefficients from correlating Eslick's drought resistance ratings with percent water loss of headed plants. 1975.

Yield Level (bu/a)	1 hr	6 hr	12 hr	24 hr	48 hr	72 hr	96 hr	240 hr
10	-.07	-.10	-.17	-.23	-.23	-.23	-.24	-.27
20	-.07	-.21	-.25	-.23	-.20	-.20	-.19	-.20
30	-.10	-.07	-.05	-.01	.00	-.01	-.01	-.01
40	-.04	.18	.26	.30	.26	.24	.23	.24
50	-.01	.21	.29	.31	.27	.25	.24	.25
60	.01	.24	.31	.33	.29	.28	.27	.28
70	.01	.22	.29	.31	.26	.25	.24	.25
80	.01	.22	.29	.31	.26	.25	.24	.25
90	.02	.22	.29	.31	.26	.25	.24	.25
100	.02	.22	.29	.31	.26	.25	.24	.25
110	.02	.22	.29	.30	.26	.25	.24	.25
120	.02	.22	.29	.30	.26	.25	.24	.25
Slope	.03	.22	.29	.30	.25	.24	.24	.24

p (.05) = .28

with Eslick's drought resistance ratings. It is apparent that percent water loss gives good negative correlations with drought resistance, with negative values at low yield levels (e.g., $-.30$ and $-.23$ at 10 bu/a for young and old plants, respectively) and low to high positive values at high yield levels. Good differentiation, in both cases, occurs by approximately 24 hours. This is in good agreement with Dedio (19). Correlations with the slope give reasonable values (around $r = .14$) at 48 hours for young plants. However, for old plants the correlations become high ($r = .22$) for a drying interval of 6 hours.

The dry-down data for whole plants, leaves, and heads in 1976 are given in Appendix Tables 26, 27, and 28, respectively. Table 21 lists the correlation coefficients comparing percent water loss for whole plants with Eslick's drought resistance ratings. The result is in agreement with the 1975 data in that percent water loss is negatively correlated with drought resistance. However, the coefficients are not as large and, furthermore, optimum differentiation has occurred by 6 hours (e.g., $-.16$ at 10 bu/a and $.18$ at 120 bu/a). The correlations with the slope give positive values in the mid-teens with a maximum correlation of $r = .18$ at 6 hours. Table 22, which gives the correlation coefficients from correlating percent water loss with Eslick's drought resistance ratings for leaves only, does not appear to differentiate between cultivars as to drought resistance. Table 23 gives comparable data for heads with grain weight included and with grain

Table 21. Correlation coefficients from correlating Eslick's drought resistance ratings with water loss for whole plants. 1976.

Yield Level	1 hr.	6 hrs.	12 hrs.	24 hrs.	48 hrs.
<u>bu/A</u>					
10	-.05	-.16	-.16	-.13	-.09
20	-.09	-.10	-.08	-.06	-.04
30	.03	.07	.07	.09	.06
40	.16	.22	.19	.17	.12
50	.16	.21	.18	.16	.11
60	.15	.20	.18	.15	.11
70	.15	.20	.17	.14	.10
80	.15	.19	.17	.14	.10
90	.15	.19	.16	.14	.09
100	.15	.19	.16	.14	.09
110	.15	.19	.16	.13	.09
120	.14	.19	.16	.13	.09
Slope-Method E	.14	.18	.15	.12	.08

p (.05) = .28

Table 22. Correlation coefficients from correlating Eslick's drought resistance ratings with water loss for leaves. 1976.

Yield Level	0-3 hrs.	0-oven dry
<u>bu/A</u>		
10	.01	.17
20	.16	.16
30	.20	.30
40	.03	.14
50	-.03	.05
60	-.06	.02
70	-.06	.01
80	-.07	.00
90	-.07	-.01
100	-.08	-.01
110	-.08	-.02
120	.08	-.02
Slope-Method E	-.09	-.04

p (.05) = .28

Table 23. Correlation coefficients from correlating Eslick's drought resistance ratings with water loss for heads with grain and without grain. 1976.

Yield Level	With grain	Without grain
<u>bu/A</u>		
10	-.23	.06
20	.03	-.06
30	.14	.02
40	.14	.09
50	.10	.09
60	.08	.09
70	.08	.09
80	.07	.09
90	.07	.09
100	.06	.09
110	.06	.09
120	.06	.09
Slope-Method E	.05	.08

p (.05) = .28

weight subtracted. Heads with grain weight included have reasonably good negative correlations with drought resistance, with negative correlations (e.g., $-.23$ at 10 bu/a) at low yield levels.

An analysis of variance was determined for the samples in 1976. This summary is given in Tables 24, 25, and 26. In all cases the differences between cultivars is significant ($p = .01$). Also, in all cases the variation within cultivars was non-significant. This indicates that the method does differentiate between cultivars.

In summary, a measure of water retention, or loss, appears to 1) differentiate between cultivars, and 2) give repeatable measurements, at least with whole plants. A drying interval of 24 hours appears sufficient to give good correlations with drought resistance. In all instances, percent water loss is negatively correlated with drought resistance with the better correlations giving values from $.15$ to $.35$. Finally, in most cases, the generally smooth transition from negative correlations at low yield levels to comparable positive correlations at high yield levels, as well as the positive correlations with the slope (Method E), indicates that the plants that had high water retention yielded better under drought conditions and poorer under wet conditions.

Modulus of Elasticity

Values for the modulus of elasticity in 1976 and 1977 are given

Table 24. Analysis of variance summaries for whole plant dry-down, 1976.

Drying interval: 1.5 hr

Source of Var.	DF	SS	MS	F	Source of Var.	DF	SS	MS	F
Between Cult.	49	22616.6	461.6	5.7*	Within Cult.	4	226.9	56.7	.4
Error	186	15046.9	80.9		Error	231	37436.6	162.1	
Total	235	37663.5			Total	235	37663.5		

Drying interval: 6 hr

Source of Var.	DF	SS	MS	F	Source of Var.	DF	SS	MS	F
Between Cult.	49	152049.0	3103.0	7.6*	Within Cult.	4	3561.1	890.3	.9
Error	192	78479.2	408.7		Error	237	226967.0	957.7	
Total	241	230528.0			Total	241	230528.0		

Drying interval: 12 hr

Source of Var.	DF	SS	MS	F	Source of Var.	DF	SS	MS	F
Between Cult.	49	281208.0	5738.9	8.5*	Within Cult.	4	2666.2	666.5	.4
Error	193	131045.0	679.0		Error	238	409586.0	1721.0	
Total	242	412253.0			Total	242	412253.0		

Drying interval: 24 hr

Source of Var.	DF	SS	MS	F	Source of Var.	DF	SS	MS	F
Between Cult.	49	352648.0	7196.9	6.9*	Within Cult.	4	4501.0	1125.3	.5
Error	192	200428.0	1043.9		Error	237	548574.0	2314.7	
Total	241	553075.0			Total	241	553075.0		

Drying interval: 48 hr

Source of Var.	DF	SS	MS	F	Source of Var.	DF	SS	MS	F
Between Cult.	49	402392.0	8212.1	6.3*	Within Cult.	4	6685.8	1671.4	.6
Error	192	249669.0	1300.4		Error	237	645375.0	2723.1	
Total	241	652061.0			Total	241	652061.0		

*Significant at $p = .01$

Table 25. Analysis of variance summaries for leaf dry-down: 1976.

Drying interval: 0-3hr

Source of Var.	DF	SS	MS	F
Between Cult.	49	137819.0	2812.6	10.9*
Error	145	37266.4	257.0	
Total	194	175085.0		
Within Cult.	3	802.9	267.6	.3
Error	191	174282.0	912.5	
Total	194	175085.0		

Drying interval: 0-oven dry

Between Cult.	49	72366.7	1476.9	5.4*
Error	147	39968.4	271.9	
Total	196	112335.0		
Within Cult.	3	668.4	222.8	.4
Error	193	111667.0	578.6	
Total	196	112335.0		

*Significant at $p = .01$

Table 26. Analysis of variance summaries for head dry-down. 1976.

Grain weight included

Source of Var.	DF	SS	MS	F
Between Cult.	49	7679.8	156.7	11.0*
Error	199	2850.8	14.3	
Total	248	10530.6		
Within Cult.	4	5.8	1.4	.03
Error	244	10524.8	43.1	
Total	248	10530.6		

Grain weight subtracted

Between Cult.	49	111518.0	2275.9	7.1*
Error	194	62255.7	320.9	
Total	243	173774.0		
Within Cult.	4	493.2	123.3	.2
Error	239	173281.0	725.0	
Total	243	173774.0		

*Significant at $p = .01$

in Appendix Table 29. In analyzing these data, it should be remembered that the values in 1976 were derived from field grown plants, whereas, those in 1977 were from greenhouse grown plants. Table 27 lists the correlation coefficients from correlating modulus of elasticity with Eslick's drought resistance ratings for 1976 and 1977. The values for the various yield levels in 1976 range from .33 at 10 bu/a to -.35 at 120 bu/a. This appears to do a very good job of differentiating cultivars as to drought resistance. The positive correlations at low yield levels mean that drought resistant cultivars have high moduli of elasticity, or are very inelastic. This is in agreement with Cowan and Milthorpe (18). The correlation with slope gives a value of $r = -.35$. This implies that plants with high moduli yielded better under drought conditions and poorer under wet conditions. Although the correlation coefficients for 1977 begin with .32, the lack of a smooth transition to low correlation at intermediate yield levels, as well as the low correlation with the slope ($r = .10$), indicate that calculating moduli of elasticity for greenhouse plants is much less effective in differentiating cultivars as to drought resistance.

Plant Height, Percent Plump Kernels, 100 Kernel Weights

Several miscellaneous measures were taken in the drought line grown at Kamp's farm in 1977. These included plant height, percent plump kernels, and 100 kernel weight. Appendix Table 30 gives the

Table 27. Correlation coefficients from correlating Eslick's drought resistance ratings with modulus of elasticity. 1976 & 1977.

Yield Level	e - 1976	e - 1977
<u>bu/A</u>		
10	.33	.32
20	.28	-.11
30	-.19	-.08
40	-.34	.05
50	-.35	.08
60	-.37	.09
70	-.35	.09
80	-.35	.09
90	-.35	.09
100	-.35	.10
110	-.35	.09
120	-.35	.10
Slope-Method E	-.35	.10

p (.05) = .28

original data for these measures. The correlation coefficients from correlating these measures with Eslick's drought resistance ratings are given in Table 28. There is some indication that both percent plump kernels and 100 kernel weight are positively correlated with drought resistance. That is, both begin with positive correlation (e.g., .15 and .12 at 10 bu/a) and drop to low correlations at the higher yield levels. Both plant height A, which includes the height to bottom of head, and plant height B, which includes the height to the top of the awns, give good positive correlations with drought resistance (e.g., .19 and .16 at 20 bu/a). The correlations with the slope (Method E) of $r = -.34$ and $-.32$ imply that the taller plants yielded better under drought conditions and poorer under wet conditions.

Multiple Correlation

Drought resistance is a complex phenomenon involving potentially many facets of drought tolerance and/or many facets of drought avoidance. Consequently, it is likely that in order to adequately differentiate cultivars as to drought resistance it will be necessary to use some combination of screening tests. Therefore, five screening tests that showed reasonably good simple correlation with drought resistance were taken in all possible combinations and multiple correlation coefficients computed between Eslick's drought resistance ratings and

Table 28. Correlation coefficients from correlating Eslick's drought resistance ratings with % plump kernels, 100 kernel weight, plant height A and B.

Yield Level	% plump kernels	100 kernel weight	Plant height	
			A	B
<u>bu/A</u>				
10	.15	.12	.18	.13
20	-.04	-.03	.19	.16
30	-.15	-.16	-.18	-.19
40	-.12	-.15	-.44	-.42
50	-.09	-.11	-.41	-.39
60	-.07	-.09	-.38	-.35
70	-.06	-.08	-.38	-.36
80	-.06	-.08	-.38	-.35
90	.05	-.07	-.37	-.34
100	-.05	-.07	-.37	-.34
110	-.05	-.07	-.37	-.34
120	-.05	-.07	-.36	-.33
Slope-Method E	-.04	-.06	-.34	-.32

p (.05) = .28

these combinations of screening tests. These coefficients are listed in Table 29. Multiple correlation coefficients are always positive; thus the trend from positive to negative or vice versa will not be visible in these data.

As one would expect, the best correlations occur when all five tests are correlated with Eslick's drought resistance ratings. The values range from .62 at 10 bu/a to .51 at 120 bu/a and .51 for the correlation with the slope (Method E).

With combinations of four tests, there are three combinations that resulted in significant correlations at a yield level of 10 bu/a. These are (osmotic potential, soil water use, modulus of elasticity, and plant height with a value of .61), (osmotic potential, soil water use, water loss, and plant height with a value of .62), and (osmotic potential, soil water use, modulus of elasticity, and water loss with a value of .62).

With combinations of three tests, there are five combinations that resulted in significant correlations at a yield level of 10 bu/a. These are (osmotic potential, water loss, and modulus of elasticity with a value of .56), (osmotic potential, soil water use, and modulus of elasticity with a value of .61), (osmotic potential, water loss, and plant height with a value of .45), (osmotic potential, water loss, and soil water loss with a value of .49), and (osmotic potential, soil water use, and plant height with a value of .44).

Table 29. Multiple correlation coefficients from correlating Eslick's drought resistance ratings with various combinations of 5 screening tests.

Yield Level (bu/a)	O.P., W.L., S.W.U., M.E., P.H. ***	O.P., M.E., S.W.U., P.H.	O.P., W.L., S.W.U., P.H.	O.P., M.E., S.W.U., W.L.	M.E., P.H., S.W.U., W.L.	O.P., W.L., M.E., P.H.
10	.62	.61*	.62*	.62*	.50	.56
20	.41	.39	.39	.39	.36	.37
30	.34	.33	.26	.26	.28	.34
40	.56	.56	.39	.39	.56	.54
50	.54	.54	.44	.41	.54	.52
60	.54	.54	.42	.44	.54	.51
70	.53	.52	.42	.42	.52	.50
80	.52	.52	.42	.42	.52	.49
90	.52	.52	.42	.42	.51	.49
100	.52	.52	.42	.42	.51	.49
110	.52	.51	.42	.42	.51	.49
120	.51	.51	.42	.42	.51	.48
Slope	.51	.51	.43	.43	.50	.48

Yield Level (bu/a)	O.P., M.E., P.H.	O.P., W.L., M.E.	O.P., M.E., S.W.U.	W.L., M.E., P.H.	W.L., M.E., S.W.U.	O.P., W.L., P.H.
10	.51	.56*	.61*	.43	.40	.45*
20	.37	.36	.38	.33	.32	.21
30	.33	.26	.23	.28	.22	.31
40	.54*	.37	.38	.54	.38	.45*
50	.51	.38	.41	.51	.38	.40
60	.51	.41	.44	.51	.41	.36
70	.50	.39	.42	.49	.39	.36
80	.49	.39	.42	.49	.38	.35
90	.49	.40	.42	.48	.38	.35
100	.49	.39	.42	.48	.38	.35
110	.48	.39	.42	.48	.38	.34
120	.48	.39	.42	.48	.38	.34
Slope	.48	.40	.43	.47	.39	.32

* Significant at $p = .05$

** Significant at $p = .01$

*** O.P. = Osmotic potential difference on Aug. 10, 1976.

W.L. = Percent water loss of young plants, 1975.

S.W.U. = Total soil water use at 6-12 in, 1977.

M.E. = Modulus of elasticity, 1976.

P.H. = Plant height to tip of awns, 1977.

Table 29. Multiple correlation coefficients from correlating Eslick's drought resistance ratings with various combinations of 5 screening tests. Cont.

Yield Level (bu/a)	O.P., W.L., S.W.U.***	O.P., P.H., S.W.U.	W.L., P.H., S.W.U.	P.H., M.E., S.W.U.	O.P., P.H.	O.P., W.L.	O.P., M.E.
10	.49**	.44*	.37	.48	.35*	.45*	.51*
20	.20	.23	.18	.35	.21	.18	.36
30	.21	.28	.22	.26	.28	.20	.23
40	.18	.44*	.45*	.56*	.43**	.17	.35
50	.17	.40*	.41	.54*	.39*	.16	.37
60	.18	.37	.38	.54*	.35*	.16	.40
70	.18	.37	.37	.52	.35*	.16	.38
90	.18	.36	.37	.51	.35*	.16	.39
90	.18	.36	.36	.51	.34*	.16	.39
100	.18	.36	.36	.51	.34*	.16	.39
110	.18	.35	.35	.51	.34*	.16	.39
120	.18	.35	.35	.50	.33	.16	.39
Slope	.18	.34	.33	.50	.32	.16	.40

Yield Level (bu/a)	O.P., S.W.U.	W.L., P.H.	M.E., P.H.	P.H., S.W.U.	W.L., M.E.	W.L., S.W.U.	M.E., S.W.U.
10	.44*	.31	.35	.30	.41	.35*	.46*
20	.20	.16	.32	.18	.29	.08	.31
30	.15	.22	.26	.19	.22	.14	.19
40	.11	.44**	.54**	.43**	.36	.18	.37
50	.15	.40*	.51*	.40*	.35	.15	.38
60	.16	.36*	.51*	.37*	.38	.16	.41
70	.16	.36*	.49*	.37*	.35	.13	.38
80	.16	.35*	.49*	.36*	.35	.13	.38
90	.17	.35*	.48*	.36*	.35	.13	.38
100	.17	.34*	.48*	.35*	.35	.13	.38
110	.17	.34*	.48*	.35*	.35	.12	.38
120	.17	.34*	.48*	.35*	.35	.12	.38
Slope	.17	.32	.47*	.33	.35	.12	.39

*Significant at $p = .05$

**Significant at $p = .01$

***O.P.: Osmotic potential difference on Aug. 10, 1976.

W.L.: Percent water loss of young plants, 1975.

S.W.U.: Total soil water use at 6-12 in, 1977.

M.E.: Modulus of elasticity, 1976.

P.H.: Plant height to tip of awns, 1977.

With combinations of two tests, there are six combinations that resulted in significant correlations at a yield level of 10 bu/a. These are (osmotic potential and plant height with a value of .35), (osmotic potential and water loss with a value of .45), (osmotic potential and modulus of elasticity with a value of .51), (osmotic potential and soil water use with a value of .44), (water loss and soil water use with a value of .35), and (modulus of elasticity and soil water use with a value of .46).

As noted in the discussion under osmotic potential, the usefulness of osmotic potential as a screening test is questionable. Furthermore, the tediousness of the modulus of elasticity test makes it questionable in initial screening processes. Therefore, if we delete these two tests we find the one remaining combination of three tests to give a correlation of .37 at 10 bu/a and .35 at 120 bu/a. Neither of these values are statistically significant. With combinations of two tests, there is one combination that gives significant correlation at 10 bu/a. This is (water loss and soil water use) with a value of .35 at 10 bu/a. These values for multiple correlation are slight improvements over the typical correlation values in the .20's found when employing simple correlation. The inclusion of modulus of elasticity with these three tests results in values increasing to the high .40's and low .50's.

Chapter 5

SUMMARY AND CONCLUSION

Color as a Drought Resistance Trait in Barley Isogenes

Reflection data showed that the light isogene has greater reflection than the dark isogene for the majority of the season. Seasonal averages were one to two percent greater for the light isogene. Early in the season the greater reflectivity of the light isogene is apparently related to its smaller water consumption. However, from mid-season on, the light isogene consumes more water than the dark isogene. In fact, for seasonal totals, the light isogene uses as much or more water than the dark isogene. This surprising finding is apparently related to the higher stomatal resistances of the dark isogene from mid-season on. These higher stomatal resistances of the dark isogene are in turn related to the faster growth rate and higher canopy temperature of the dark isogene. In this instance, a dominant drought resistance trait(s), stomatal resistance and/or maturation rate, has more than compensated for a less influential drought resistance trait, high reflection. The result is that with the two isogenic pairs studied, the dark isogene is better adapted to arid regions.

Screening Tests for Drought Resistance in Barley Cultivars

Osmotic potential does not appear to be a promising test because of its unreliability and inability to significantly differentiate

between cultivars. However, morning potentials early in the season and afternoon osmotic potentials late in the season appear to be correlated with drought resistance. The best differentiator as to drought resistance is the osmotic potential difference late in the season which gave correlations coefficients up to the high teens. In nearly all cases, the lower the potential, the larger the drought resistance. CJ

Soil water use has good potential as a screening test. The best correlations with drought resistance occur at the shallow and deep depths. The better correlation coefficients ranged from .15 to .25. The best method is a single determination of soil water content after the crop has been harvested. Generally, the less water used at the shallow and deep depths, the larger the drought resistance. Water use at the intermediate depths indicate that while drought resistant cultivars use more water than drought sensitive cultivars at a wet site (Bozeman farm), they use less water at a dry site (Kamp's farm).

Another potentially good screening test is the measure of water loss after dry-down. Optimum differentiation occurs for a drying interval of 24 hours, with whole plants being the best sample. The better correlation coefficients ranged from .15 to .35. The smaller the water loss, the larger the drought resistance.

Probably the best screening test was a measure of the modulus of elasticity. This gave correlation coefficients mostly in the

mid-thirties. However, the tediousness of the procedure makes it of questionable value in preliminary screening. The higher the modulus (the less the elasticity), the larger the drought resistance.

Plant height, percent plump kernels, and 100 kernel weight are all positively correlated with drought resistance. However, plant height gives far better correlations with the better coefficients reaching the low thirties. Its ease of determination makes it a good candidate for a screening test.

If we look at combinations of tests (with the exclusion of the osmotic potential test), we find that while simple correlation gave coefficient values in the .20's, multiple correlations of two tests gave values in the .30's, multiple correlations of three tests gave values in the .40's, and multiple correlations of four tests gave values in the .50's.

Screening tests such as plant height and soil water use are likely dependent on environmental conditions. In fact, we noted that while drought resistant cultivars used more water than drought sensitive cultivars at a wet site (intermediate depths), they used less water at a dry site. This dependence on environment limits any interpretation of this thesis data since the plants were grown in only one or two locations. Further experimentation, involving growing the plants in various locations, and thus environments, should be done before any conclusive generalizations be drawn.

Plant water loss upon dry-down, as well as the modulus of elasticity, are probably independent of environment. This makes them potentially more useful screening tests.

APPENDIX

Appendix Table 1. Key to symbols used in Appendix Table 2.
and 3.

Time: Data in minutes

ETPD: Evapotranspiration - dark isogene, ly-min^{-1}

ETPL: Evapotranspiration - light isogene, ly-min^{-1}

ARADND: Net radiation - dark isogene, ly-min^{-1}

ARADRD: Reflected radiation - dark isogene, ly-min^{-1}

ARADNL: Net radiation - light isogene, ly-min^{-1}

ARADRL: Reflected radiation - light isogene, ly-min^{-1}

ASOIHD: Soil heat flux - dark isogene, ly-min^{-1}

ASOIHL: Soil heat flux - light isogene, ly-min^{-1}

BRL: Bowen ratio - light isogene

BRD: Bowen ratio - dark isogene

ARADT: Solar radiation, ly-min^{-1}

CETPD: Cumulative evapotranspiration - dark isogene, ly

CETPL: Cumulative evapotranspiration - light isogene, ly

CRADND: Cumulative net radiation - dark isogene, ly

CRADRD: Cumulative reflected radiation - dark isogene, ly

CRADNL: Cumulative net radiation - light isogene, ly

CRADRL: Cumulative reflected radiation - light isogene, ly

CSOIHD: Cumulative soil heat flux - dark isogene, ly

Appendix Table 1. Key to symbols used in Appendix Table 2.
and 3. cont.

CSOIHL: Cumulative soil heat flux - light isogene, ly

CSENHD: Cumulative sensible heat flux - dark isogene, ly

CSENHL: Cumulative sensible heat flux - light isogene, ly

CRADT: Cumulative solar radiation, ly

Appendix Table 2. Energy balance values for Compana - Golden Compana. July 4, 1976. This table will be continued through August 5, 1976.

TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
20	.00	.01	.07	.00	.06	.00	.01	.01	-9.56	151.38	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
20	.01	.14	-1.43	.04	-1.27	.02	.28	.10	-1.14	-1.31	.35
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
40	.00	.00	.06	.00	.06	.00	.02	.01	-37.40	190.95	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
40	.01	.16	-2.58	.01	-2.38	.02	.61	.23	-1.96	-2.32	.71
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
60	.00	.01	.07	.00	.06	.00	.02	.01	-8.49	222.41	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
60	.02	.31	-4.02	.03	-3.62	.06	.95	.40	-3.05	-3.83	-1.08
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
80	.00	.00	.07	.00	.06	.00	.02	.01	-26.49	146.69	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
80	.02	.35	-5.32	.01	-4.86	.03	1.30	.60	-4.00	-4.81	-1.44
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
100	.00	.01	.08	.00	.07	.00	.02	.01	-8.49	234.68	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
100	.03	.22	-7.01	.04	-6.23	.07	1.66	.79	-5.32	-5.66	-1.79
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
120	.00	.00	.08	.00	.07	.00	.02	.01	17.08	287.78	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
120	.03	.16	-8.56	.04	-7.63	.08	2.02	.98	-6.51	-6.81	-2.14
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
140	.00	.02	.07	.00	.07	.00	.02	.01	-3.49	143.33	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
140	.04	.60	-10.06	.02	-9.34	.02	2.41	1.17	-7.61	-8.37	-2.44
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
200	.00	.04	.07	.00	.08	.00	.02	.01	.00	168.29	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
200	.05	.23	-11.40	.00	-10.02	.06	2.83	1.42	-8.53	-8.37	-2.80
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
220	.00	.00	.05	.00	.00	.01	.01	.03	-163.07	-16.83	.24
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
220	.01	.23	-12.49	.03	-10.07	.09	3.07	1.99	-9.43	-7.84	-7.52
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
240	.00	.00	.07	.00	.06	.00	.02	.01	11.14	221.62	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
240	.00	.30	-13.79	.08	-11.18	.10	3.52	2.27	-10.27	-8.61	-7.87
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
260	.00	.01	.07	.00	.06	.00	.02	.01	-8.96	179.18	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
260	.00	.19	-15.22	.03	-12.32	.08	4.01	2.55	-11.22	-9.58	-8.18
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
280	.00	.01	.07	.00	.06	.12	.02	.01	-8.88	216.14	.01
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
280	.01	.08	-16.53	.04	-13.47	.24	4.49	2.84	-12.04	-10.55	-8.46
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
300	.00	.02	.07	.00	.06	.00	.02	.02	-3.58	211.27	.02
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
300	.01	.22	-17.87	.07	-14.88	.24	4.99	3.17	-12.87	-11.63	-8.76
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
340	.00	.01	.07	.00	.05	.00	.03	.02	3.65	181.62	.01
TIME	CETPD	CETPL	CRAHD	CRAHD	CRADNL	CRADRL	CSBHD	CSBHL	CSEHD	CSEHL	CRAUT
340	.01	.06	-19.18	.05	-16.66	.27	5.51	3.49	-13.65	-12.23	-8.99
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
360	.00	.00	.06	.00	.04	.00	.02	.02	-16.29	193.22	.00

Appendix Table 2. Energy balance values for Compana - Golden Compana. July 4, 1976. Cont.

TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
360.	.02	.09	.20.36	.01	.16.54	.2.29	.6.01	.3.82	.14.33	.12.82	.4.91
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
380.	.00	.01	.05	.02	.03	.02	.03	.02	.3.79	.178.16	.05
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
380.	.02	.22	.21.35	.33	.17.24	.1.91	.6.52	.4.16	.14.81	.13.30	.7.89
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
400.	.00	.14	.14	.10	.12	.10	.02	.02	.00	.65.77	.36
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
440.	.03	.2.94	.18.48	.2.24	.14.82	.17	.6.90	.4.46	.11.61	.13.30	.7.73
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
460.	.00	.01	.20	.11	.17	.12	.02	.01	.16.93	.52.63	.44
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
460.	.06	.14.42	.4.52	.11.50	.2.65	.7.21	.4.74	.7.16	.9.90	.7.99	
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
480.	.00	.00	.23	.14	.25	.15	.01	.01	.291.59	.50.02	.57
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
480.	.15	.3.16	.9.88	.7.38	.6.87	.5.74	.7.42	.4.98	.2.31	.4.78	.19.42
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
520.	.01	.00	.17	.10	.14	.12	.00	.01	.37.92	.13.44	.51
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
520.	.08	.3.08	.6.57	.9.30	.3.80	.8.11	.7.45	.5.11	.80	.1.77	.29.67
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
560.	.00	.00	.17	.07	.13	.07	.01	.00	.87.89	.37.15	.31
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
560.	.01	.3.11	.3.26	.10.63	.1.25	.2.52	.7.31	.5.09	.4.06	.73	.35.88
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
700.	.54	.45	.58	.17	.48	.19	.05	.02	.00	.00	.82
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
700.	.10.74	.12.20	.8.41	.14.09	.8.27	.13.28	.6.40	.4.65	.4.06	.73	.52.19
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
760.	.20	.04	.72	.19	.56	.25	.05	.03	.13.68	.24.41	.1.11
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
760.	.14.70	.12.92	.22.84	.17.89	.19.46	.18.19	.8.48	.4.11	.13.61	.10.65	.74.46
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
940.	.02	.34	.41	.13	.37	.12	.05	.03	.00	.15.55	.62
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
940.	.10.14	.19.81	.31.05	.20.56	.24.96	.20.43	.4.82	.3.50	.20.43	.10.65	.86.78
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
960.	.01	.01	.25	.09	.23	.10	.04	.03	.14.25	.29.81	.42
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
960.	.15.28	.20.07	.36.02	.22.41	.31.53	.22.67	.3.73	.2.94	.24.47	.14.40	.95.12
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
980.	.02	.02	.25	.10	.17	.10	.03	.03	.7.91	.8.52	.43
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
980.	.10.74	.20.39	.41.09	.24.24	.34.88	.24.75	.3.07	.2.44	.28.42	.16.93	.103.63
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
1000.	.00	.00	.08	.04	.07	.04	.03	.02	.13.40	.17.88	.16
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
1000.	.15.80	.20.31	.42.77	.28.08	.36.34	.28.88	.2.82	.2.02	.29.49	.18.05	.106.85
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
1010.	.00	.00	.02	.00	.03	.00	.02	.02	.9.40	.15.34	.12
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
1010.	.10.74	.20.22	.42.28	.25.11	.34.84	.25.61	.2.07	.1.65	.28.60	.17.27	.104.54
TIME	ETPU	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASOIH0	ASOIML	BRL	HRD	ARADT
1040.	.00	.00	.03	.00	.02	.00	.02	.02	.125.13	.17.19	.01
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRADRL	CSOIH0	CSOIML	CSENHD	CSENL	CRAUT
1040.	.10.70	.20.23	.41.76	.25.08	.35.37	.25.89	.1.76	.1.35	.27.82	.16.49	.104.36

Appendix Table 2. Energy balance values for Compana - Golden Compana. July 5, 1976. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	PRL	HRD	ARADT
480+	00	00	12	09	14	10	02	02	22.24	289.21	35
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
480+	00	00	231	143	271	200	73	70	26.4	234	703
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	RRL	HRD	ARADT
480+	00	00	17	11	19	12	01	01	80.86	289.71	44
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
480+	01	12	77	402	648	438	60	55	6.36	632	1774
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	RRL	HRD	ARADT
480+	00	00	23	13	24	14	01	01	121.64	2141.46	45
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
480+	01	04	1040	655	1128	714	40	76	11.19	11.34	2613
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	PRL	HRD	ARADT
500+	00	03	31	14	28	15	01	01	10.31	156.11	60
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
500+	05	48	1670	930	1678	1017	44	43	17.59	17.14	3409
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	PRL	HRD	ARADT
520+	00	00	42	15	32	17	00	00	93.32	270.98	69
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
520+	03	41	2503	1233	2325	1349	01	02	25.96	23.76	5196
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	PRL	HRD	ARADT
540+	00	39	49	17	39	18	00	00	00	*****	72
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
540+	04	33	3448	1568	3107	1717	46	43	35.76	23.76	6756
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	RRL	HRD	ARADT
680+	00	03	53	23	73	26	06	03	21.60	169.36	122
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
680+	01	05	5138	2035	4563	2229	21	05	51.18	37.19	9174
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	RRL	HRD	ARADT
700+	00	03	46	25	78	27	06	03	27.28	*****	127
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
700+	03	49	6451	2530	6122	2760	40	06	67.04	51.64	11710
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	RRL	HRD	ARADT
760+	00	02	47	25	81	27	06	04	38.02	*****	135
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
760+	03	44	8800	3029	7738	3308	47	87	85.26	66.64	14418
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	RRL	HRD	ARADT
780+	00	13	47	24	80	26	07	05	4.59	29.38	129
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
780+	04	57	10344	3519	9336	3835	40	40	99.29	78.99	14095
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	PRL	HRD	ARADT
800+	00	27	45	25	82	27	07	04	1.89	213.02	133
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
800+	05	17.98	122.86	40.16	109.84	63.77	5.46	2.64	116.87	89.22	196.52
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	PRL	HRD	ARADT
820+	00	76	98	24	80	26	07	04	00	353.69	129
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
820+	048	33.24	142.47	44.99	195.88	68.96	6.79	3.42	135.20	89.27	222.36
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMH	ASBIML	RRL	HRD	ARADT
840+	00	05	93	25	79	27	07	04	13.62	305.43	130
TIME	CEPM	CEPL	CRAUND	CRAORD	CRAUNL	CRAORDL	CSBIMH	CSBIML	CSENHD	CSENLH	CRAUT
840+	053	34.27	161.11	49.96	141.76	64.36	8.14	4.26	152.43	103.23	244.25

Appendix Table 2. Energy balance values for Compana - Golden Compana. July 5, 1976. Cont.

TIME 850*	ETPU +70	ETPL +110	ARAUND +90	ARADRD +24	ARAONL +75	AMADRL +26	ASBIMD +07	ASBIML +04	BRL 8+02	HRD 246+27	ARADT 1+26
TIME 880*	CEPM +46	CEPL +36+28	CRAUND 179+15	CRAORD 54+78	CHAONL 156+77	CHADRL 49+59	CSBIMD 9+51	CSBIML 5+11	CSENH 169+18	CSENL 115+38	CRAAT 273+55
TIME 960*	ETPU +00	ETPL +07	ARAUND +10	ARADRD +22	ARAONL +73	AMADRL +22	ASBIMD +06	ASBIML +06	BRL 9+08	HRD 23+63	ARADT +48
TIME 960*	CEPM +43	CEPL +37+61	CRAUND 181+14	CRAORD 59+20	CHAONL 171+36	CHADRL 63+89	CSBIMD 10+77	CSBIML 6+35	CSENH 169+94	CSENL 127+40	CRAAT 283+12
TIME 980*	ETPU +02	ETPL +13	ARAUND +45	ARADRD +21	ARAONL +54	AMADRL +23	ASBIMD +06	ASBIML +04	BRL 2+79	HRD 24+37	ARADT 1+00
TIME 980*	CEPM +90	CEPL +40+27	CRAUND 194+22	CRAORD 63+32	CHAONL 182+26	CHADRL 68+41	CSBIMD 11+93	CSBIML 7+10	CSENH 181+09	CSENL 134+83	CRAAT 303+02
TIME 1000*	ETPU +00	ETPL +00	ARAUND +08	ARADRD +03	ARAONL +07	AMADRL +03	ASBIMD +05	ASBIML +04	BRL +10+59	HRD 190+40	ARADT 1+40
TIME 1000*	CEPM +90	CEPL +40+21	CRAUND 194+77	CRAORD 63+91	CHAONL 183+59	CHADRL 69+01	CSBIMD 12+84	CSBIML 7+88	CSENH 182+02	CSENL 135+01	CRAAT 331+11
TIME 1020*	ETPU +00	ETPL +03	ARAUND +07	ARADRD +03	ARAONL +06	AMADRL +04	ASBIMD +04	ASBIML +03	BRL +00	HRD 68+00	ARADT 1+40
TIME 1020*	CEPM +91	CEPL +40+83	CRAUND 197+23	CRAORD 64+58	CHAONL 184+89	CHADRL 69+75	CSBIMD 13+60	CSBIML 8+86	CSENH 182+72	CSENL 135+01	CRAAT 359+10
TIME 1040*	ETPU +00	ETPL +01	ARAUND +13	ARADRD +05	ARAONL +10	AMADRL +04	ASBIMD +03	ASBIML +03	BRL 7+44	HRD 321+73	ARADT +21
TIME 1040*	CEPM +92	CEPL +40+99	CRAUND 199+82	CRAORD 65+58	CHAONL 186+80	CHADRL 70+61	CSBIMD 14+18	CSBIML 9+11	CSENH 184+75	CSENL 136+10	CRAAT 363+39
TIME 1100*	ETPU +00	ETPL +00	ARAUND +03	ARADRD +03	ARAONL +03	AMADRL +03	ASBIMD +02	ASBIML +02	BRL 29+57	HRD 121+49	ARADT 1+35
TIME 1100*	CEPM +92	CEPL +40+99	CRAUND 200+43	CRAORD 66+09	CHAONL 187+32	CHADRL 71+20	CSBIMD 14+50	CSBIML 9+49	CSENH 185+00	CSENL 136+44	CRAAT 390+46
TIME 1120*	ETPU +00	ETPL +02	ARAUND +18	ARADRD +11	ARAONL +19	AMADRL +12	ASBIMD +01	ASBIML +02	BRL 9+02	HRD 161+27	ARADT +44
TIME 1120*	CEPM +94	CEPL +41+31	CRAUND 201+02	CRAORD 68+31	CHAONL 191+13	CHADRL 73+67	CSBIMD 14+79	CSBIML 9+82	CSENH 188+28	CSENL 139+99	CRAAT 399+23
TIME 1140*	ETPU +00	ETPL +01	ARAUND +11	ARADRD +08	ARAONL +12	AMADRL +09	ASBIMD +01	ASBIML +01	BRL 5+90	HRD 159+42	ARADT +33
TIME 1140*	CEPM +96	CEPL +41+60	CRAUND 206+26	CRAORD 69+94	CHAONL 193+45	CHADRL 75+53	CSBIMD 15+05	CSBIML 10+11	CSENH 190+26	CSENL 141+74	CRAAT 405+76
TIME 1160*	ETPU +00	ETPL +00	ARAUND +07	ARADRD +08	ARAONL +08	AMADRL +08	ASBIMD +01	ASBIML +01	BRL 16+41	HRD 173+70	ARADT +28
TIME 1160*	CEPM +96	CEPL +41+69	CRAUND 207+75	CRAORD 71+45	CHAONL 195+10	CHADRL 77+20	CSBIMD 15+24	CSBIML 10+36	CSENH 191+05	CSENL 143+06	CRAAT 411+37
TIME 1180*	ETPU +00	ETPL +00	ARAUND +02	ARADRD +05	ARAONL +03	AMADRL +06	ASBIMD +01	ASBIML +01	BRL 24+52	HRD 228+49	ARADT +19
TIME 1180*	CEPM +96	CEPL +41+67	CRAUND 208+11	CRAORD 72+53	CHAONL 195+69	CHADRL 78+33	CSBIMD 15+41	CSBIML 10+58	CSENH 191+73	CSENL 143+45	CRAAT 415+25
TIME 1200*	ETPU +00	ETPL +00	ARAUND +03	ARADRD +04	ARAONL +01	AMADRL +04	ASBIMD +01	ASBIML +01	BRL 16+71	HRD 268+19	ARADT +14
TIME 1200*	CEPM +96	CEPL +41+64	CRAUND 207+46	CRAORD 73+31	CHAONL 195+41	CHADRL 79+17	CSBIMD 15+52	CSBIML 10+77	CSENH 190+98	CSENL 143+00	CRAAT 418+01
TIME 1220*	ETPU +00	ETPL +00	ARAUND +08	ARADRD +02	ARAONL +06	AMADRL +02	ASBIMD +00	ASBIML +01	BRL 21+89	HRD 153+52	ARADT +06
TIME 1220*	CEPM +98	CEPL +41+84	CRAUND 208+84	CRAORD 73+66	CHAONL 194+24	CHADRL 79+53	CSBIMD 15+60	CSBIML 10+92	CSENH 189+29	CSENL 141+73	CRAAT 419+22

Appendix Table 2. Energy balance values for Compana - Golden Compana. July 5, 1976. Cont.

[illegible]

Appendix Table 2. Energy balance values for Compana - Golden Compana. July 6, 1976. Cont.

TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
280°	.00	.00	.05	.00	.06	.00	.02	.01	63.10	26.99	.01
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
280°	.02	.01	1.09	.03	1.11	.04	.42	.26	.65	.86	.28
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
300°	.00	.01	.06	.00	.06	.00	.02	.01	8.58	29.55	.02
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
300°	.05	.13	2.30	.03	2.29	.04	.81	.53	1.44	1.89	.58
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
320°	.00	.04	.06	.00	.05	.00	.02	.01	.00	30.70	.01
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
320°	.07	.65	3.45	.00	3.33	.02	1.19	.79	2.18	1.89	.79
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
340°	.00	.03	.05	.00	.05	.00	.02	.01	.00	20.71	.01
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
340°	.10	1.34	4.47	.09	4.29	.07	1.57	1.05	2.80	1.89	.69
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
360°	.00	.00	.05	.02	.03	.02	.02	.01	30.43	29.68	.05
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
360°	.08	1.35	5.53	.39	4.92	.39	1.94	1.30	3.50	2.26	.34
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
680°	.00	.05	.83	.23	.67	.25	.05	.02	12.11	878.83	1.17
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
680°	.10	.36	11.13	5.00	8.52	5.41	.97	.84	12.20	9.72	23.77
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
840°	.01	.02	1.00	.25	.85	.27	.07	.04	49.78	94.38	1.34
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
840°	.30	.69	31.06	9.98	25.49	10.84	.43	.07	30.92	26.25	50.58
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
880°	.01	.77	.97	.25	.81	.27	.07	.04	.00	125.27	1.32
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
880°	.44	14.64	50.42	14.94	41.66	16.30	1.84	.77	49.02	26.25	77.07
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
900°	.00	.33	.94	.25	.78	.27	.07	.04	1.21	316.99	1.30
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
900°	.50	21.33	69.12	19.93	57.34	21.73	3.27	1.65	66.35	34.37	103.16
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
980°	.01	.63	.74	.22	.67	.25	.07	.04	.00	49.57	1.11
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
980°	.23	33.91	83.93	24.42	70.81	26.65	4.68	2.54	79.48	34.37	125.45
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
1000°	.08	.08	.72	.22	.63	.24	.06	.04	6.17	7.73	1.06
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
1000°	.127	35.55	98.32	28.78	83.41	31.42	5.97	3.38	91.08	44.49	146.66
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
1020°	.03	.10	.65	.21	.56	.21	.06	.04	4.03	17.22	1.00
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
1020°	.192	37.61	111.37	32.94	94.63	35.54	7.13	4.19	102.32	52.83	164.57
TIME	ETPU	ETPL	ARAND	ARARD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	APADT
1140°	.00	.00	.06	.04	.04	.00	.02	.02	14.41	35.68	.02
TIME	CETPD	CETPL	CRAWD	CRAWD	CRAIDL	CHADRL	CGBIMD	CGBIML	CSEHND	CSEHNL	CRAUT
1140°	.188	37.71	110.25	33.77	93.78	35.49	7.49	4.57	100.88	51.50	166.19

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 7, 1976. Cont.

TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
20	.00	.00	.05	.00	.05	.00	.01	.00	23.33	178.77	.02
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
20	.00	.00	.09	.01	.05	.02	.20	.06	.88	.94	.35
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
30	.00	.00	.05	.00	.05	.00	.01	.01	185.75	142.49	.07
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
30	.01	.00	.08	.03	.20	.06	.45	.18	.62	.78	.70
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
100	.00	.01	.06	.00	.05	.01	.02	.01	6.10	172.93	.12
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
100	.01	.13	.20	.09	.08	.24	.76	.33	.42	.57	.00
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
300	.00	.00	.06	.00	.05	.00	.02	.01	55.31	162.51	.02
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
300	.02	.19	.38	.15	.06	.27	.18	.58	.19	.29	.33
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
320	.00	.00	.05	.00	.05	.00	.02	.01	80.82	193.73	.02
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
320	.02	.20	.44	.12	.01	.24	.55	.85	.66	.97	.44
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
340	.00	.00	.05	.00	.05	.00	.02	.01	210.48	148.97	.01
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
340	.03	.20	.52	.09	.03	.22	.95	.12	.54	.70	.92
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
360	.00	.00	.05	.00	.04	.00	.02	.01	94.88	202.21	.00
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
380	.03	.21	.45	.05	.45	.13	.37	.40	.55	.24	.86
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
420	.00	.00	.06	.06	.06	.06	.02	.02	33.05	114.24	.00
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
420	.02	.16	.25	.10	.71	.13	.80	.70	.43	.84	.91
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
500	.00	.00	.56	.21	.47	.23	.00	.01	4.26	203.29	.88
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
500	.04	.164	.98	.31	.65	.83	.86	.81	.80	.82	.77
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
560	.00	.01	.18	.06	.14	.06	.00	.00	11.96	81.39	.28
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
560	.08	.185	.54	.51	.42	.06	.83	.85	.29	.42	.38
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
580	.00	.10	.48	.17	.39	.20	.01	.00	2.73	2435.19	.79
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
580	.09	.395	.13	.00	.27	.98	.70	.84	.75	.15	.18
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
620	.00	.01	.05	.03	.05	.03	.01	.00	3.34	39.30	.11
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
620	.10	.416	.08	.54	.21	.56	.46	.76	.42	.82	.41
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
660	.00	.06	.66	.19	.52	.22	.02	.01	7.63	608.05	.06
TIME	CETP	CETPL	CRAUND	CRAORD	CHANDL	CHADRL	CSBHD	CSBHL	CSEHD	CSEHL	CPADT
660	.12	.536	.32	.39	.70	.02	.11	.65	.31	.99	.93
TIME	ETPU	ETPL	ARAND	ARARD	ARANDL	ARADRL	ASBHD	ASBHL	BRL	HRD	ARADT
720	.02	.06	.92	.25	.76	.27	.05	.02	10.67	55.47	.22

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 7, 1976. Cont.

TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
720	-1.43	-6.62	50.71	19.35	40.87	21.42	-1.08	-1.36	51.36	35.50	87.77
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
740	-1.04	-1.10	.95	.25	.79	.27	.06	.02	6.57	23.46	1.29
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
760	-1.16	-8.65	62.66	24.42	56.68	26.87	.09	-1.78	68.41	48.81	113.09
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
800	-1.02	-1.06	.89	.18	.84	.26	.06	.04	13.11	36.14	1.19
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
820	-1.60	-9.78	87.39	28.05	73.42	32.11	1.38	.04	84.41	63.60	136.83
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
840	-1.03	-1.15	.99	.27	.92	.29	.07	.05	4.80	30.05	1.40
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
860	-2.20	-12.78	107.26	33.34	91.74	37.90	2.74	.95	102.32	78.01	164.75
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
880	-1.25	-1.07	1.00	.26	.86	.27	.07	.04	11.52	2.73	1.28
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
900	-1.16	-14.09	127.18	38.67	108.94	43.37	4.13	1.73	115.89	93.11	190.33
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
920	-1.31	-1.11	.46	.15	.37	.16	.07	.04	2.01	71.31	.73
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
940	-1.72	-16.29	130.43	41.61	116.34	46.55	5.47	2.54	123.69	97.51	204.88
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
960	-1.31	-1.09	.84	.24	.73	.27	.06	.04	6.69	1.52	1.23
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
980	-1.44	-18.07	153.22	46.45	130.93	51.86	6.74	3.34	133.04	109.51	229.49
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
1000	-1.70	-1.25	.73	.24	.68	.26	.03	.03	1.65	.00	1.08
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
1020	-2.17	-22.99	167.90	51.20	144.49	57.06	7.39	3.87	133.04	117.63	251.16
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
1040	-1.00	.00	.02	.02	.02	.02	.04	.02	7.42	40.78	.08
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
1060	-2.47	-22.98	168.38	51.54	144.86	57.36	8.10	4.31	132.81	117.57	252.69
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
1080	-1.00	.00	.02	.01	.01	.01	.02	.01	7.73	116.93	.04
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
1100	-2.47	-22.98	168.71	51.69	145.10	57.56	8.44	4.87	132.80	117.55	253.52
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
1120	-1.00	.00	.00	.01	.01	.01	.01	.01	6.34	33.06	.04
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
1140	-2.46	-23.08	168.62	51.94	144.82	57.85	8.71	4.80	132.46	116.94	254.35
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
1160	-1.00	.03	.08	.04	.08	.08	.01	.01	-3.32	32.00	.16
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
1180	-2.50	-22.50	170.30	52.66	146.34	58.65	8.90	4.99	133.90	118.85	257.57
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
1200	-1.00	.00	.08	.05	.07	.00	.01	.01	24.99	40.71	.22
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
1220	-2.54	-22.55	171.88	53.73	147.83	58.70	9.06	5.17	135.29	120.11	262.04
TIME	ETPU	ETPL	ARAQND	ARAQRD	ARAQNL	AMADRL	ASQIHD	ASQIHL	RRL	HRC	ARADTY
1240	-1.00	.00	.06	.00	.06	.00	.00	.00	17.76	122.68	.01
TIME	CETPL	LETPL	CRAQND	CRAQRD	CRAQNL	CHADRL	CSEIHD	CSEIHL	CSENHQ	CSENLH	CRAQTY
1260	-2.53	-22.49	170.70	53.71	146.72	58.72	9.09	5.23	134.09	119.00	262.25

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 7, 1976. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	BRL	BRD	ARADT
1260.	.00	.00	.007	.00	.006	.00	.00	.00	16.10	54.15	.01
TIME	CETPN	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIND	CSOIML	CSENND	CSENL	CRAOT
1260.	.27.00	.22.41	169.40	53.68	144.45	48.69	9.05	5.30	132.44	117.73	262.01
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	BRL	BRD	ARADT
1280.	.00	.00	.006	.00	.006	.00	.00	.00	15.34	138.75	.02
TIME	CETPN	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIND	CSOIML	CSENND	CSENL	CRAOT
1280.	.27.50	.22.34	168.18	53.65	144.27	48.64	8.96	5.34	131.72	116.60	261.41
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	BRL	BRD	ARADT
1300.	.00	.06	.006	.00	.006	.00	.01	.00	.00	128.22	.02
TIME	CETPN	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIND	CSOIML	CSENND	CSENL	CRAOT
1300.	.27.49	.21.19	167.00	53.62	143.13	48.57	8.83	5.34	130.68	116.60	261.16
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	BRL	BRD	ARADT
1320.	.00	.00	.005	.00	.005	.00	.01	.01	69.43	135.57	.02
TIME	CETPN	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIND	CSOIML	CSENND	CSENL	CRAOT
1320.	.27.48	.21.18	165.91	53.58	142.11	48.56	8.54	5.24	129.69	115.70	260.79
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	BRL	BRD	ARADT
1420.	.00	.00	.002	.01	.004	.00	.02	.01	8.14	132.05	.00
TIME	CETPN	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIND	CSOIML	CSENND	CSENL	CRAOT
1420.	.27.48	.21.10	165.52	53.29	141.26	48.54	8.21	5.07	129.83	115.09	260.82

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 8, 1976. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	BRD	ARADT
640	*.00	*.01	.78	.23	.63	.25	.03	.02	54.64	1395.25	1.12
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBHD	CSBHL	CSENHD	CSENHL	CRAOT
640	*.01	*.22	15.53	6.62	12.54	5.10	.60	.30	14.91	12.02	22.42
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	BRD	ARADT
960	*.02	*.01	.79	.23	.69	.15	.06	.04	30.70	44.28	.74
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBHD	CSBHL	CSENHD	CSENHL	CRAOT
960	*.34	*.50	31.40	9.30	22.28	8.06	1.76	1.04	29.30	20.73	37.13
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	BRD	ARADT
980	*.00	*.05	.26	.16	.32	.28	.05	.03	5.16	64.44	1.36
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBHD	CSBHL	CSENHD	CSENHL	CRAOT
980	*.40	*1.45	36.66	12.60	28.78	13.56	2.78	1.74	33.49	25.60	64.42
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBHD	ASBHL	BRL	BRD	ARADT
1220	*.01	*.10	.39	.17	.38	.19	.03	.02	2.39	30.31	.67
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBHD	CSBHL	CSENHD	CSENHL	CRAOT
1220	*.63	*3.54	44.43	15.94	36.37	17.28	3.46	2.22	40.34	30.61	77.86

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 9, 1976. Cont.

TIME	ETPD	ETPL	ARAUND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
20*	00	00	008	000	008	000	000	000	25.55	711.35	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
20*	00	06	068	002	053	001	008	002	061	049	043
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
40*	00	00	008	000	008	000	000	000	572.36	238.25	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH7	CSENL	CRAOT
40*	01	06	037	009	006	003	017	004	021	004	005
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
60*	00	00	008	000	007	000	001	000	205.50	967.22	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
60*	01	06	055	009	055	007	027	003	079	052	025
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
80*	00	00	009	000	007	000	001	000	76.98	682.84	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
80*	01	08	0677	008	005	008	041	002	036	095	065
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
100*	00	01	008	000	007	000	001	000	6.40	298.81	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
100*	01	08	033	011	052	008	060	008	073	061	001
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
120*	00	00	008	000	007	000	001	000	140.02	9409.15	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
120*	00	07	088	012	098	014	078	014	010	001	041
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
140*	00	00	008	000	007	000	001	000	17.66	415.80	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
140*	00	10	044	013	038	013	096	022	049	026	076
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
160*	00	00	008	000	007	000	001	001	#####	#####	007
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
160*	00	10	000	015	085	013	015	033	085	061	010
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
180*	00	00	008	000	007	000	001	001	41.19	397.43	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
180*	00	07	059	016	028	015	037	044	022	091	043
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
200*	00	00	008	000	007	000	001	001	23.21	#####	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
200*	00	01	018	016	071	014	061	058	0457	015	072
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
220*	00	00	008	000	007	000	001	001	49.26	360.11	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
220*	01	004	077	021	018	018	083	072	093	050	014
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
240*	00	00	007	000	007	000	001	001	37.52	295.89	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
240*	01	007	026	024	051	022	006	086	020	072	046
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
260*	00	00	007	000	007	000	001	001	70.13	469.43	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
260*	01	006	063	026	082	025	031	003	031	086	002
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
280*	00	00	007	000	006	000	001	001	#####	604.64	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
280*	01	006	097	030	006	028	056	020	040	091	012
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
300*	00	00	006	000	005	000	001	001	12.91	182.17	002
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSEIMD	CSEIML	CSENH0	CSENL	CRAOT
300*	02	014	012	036	014	031	084	036	026	091	047

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 13, 1976. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
680°	.02	.22	.88	.44	.71	.47	.04	.01	2.26	-51.59	1.11
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
680°	.33	.431	17.60	8.88	14.24	9.44	.78	.19	17.15	4.73	22.20
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
700°	.01	.13	.92	.48	.74	.47	.05	.01	4.44	-124.63	1.17
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
700°	.47	.701	38.96	17.91	29.12	18.92	1.75	.43	34.68	21.69	45.63
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
760°	.00	.17	1.01	.48	.84	.50	.06	.02	3.76	-58.08	1.28
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
760°	.51	.10.44	88.23	27.86	45.96	28.82	3.05	.92	53.69	34.61	71.30
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
800°	.00	.84	1.08	.50	.87	.51	.07	.03	.00	-998.26	1.49
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
800°	.53	.27.24	77.13	37.61	63.38	39.10	4.39	1.54	73.27	34.61	101.03
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
860°	.00	.02	1.02	.84	.85	.56	.06	.04	44.36	-562.88	1.37
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
860°	.56	.26.86	97.56	48.32	80.42	50.33	5.66	2.30	92.46	51.26	125.42
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
880°	.00	.05	1.00	.84	.82	.56	.06	.04	14.01	-307.84	1.32
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
880°	.62	.27.90	117.49	59.11	96.84	61.83	6.94	3.09	111.17	65.84	154.80
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
900°	.01	.01	.93	.80	.79	.44	.06	.04	-130.01	-163.79	1.32
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
900°	.73	.27.79	136.16	69.06	112.62	70.28	8.19	3.89	128.69	80.94	181.20
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
920°	.01	.02	.92	.84	.76	.57	.06	.04	44.92	-61.76	1.32
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
920°	1.01	.27.46	184.61	79.88	127.73	81.62	9.48	4.72	146.14	95.55	207.57
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
940°	.00	.02	.87	.83	.74	.56	.06	.04	28.97	3667.28	1.24
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
940°	1.01	.27.93	172.02	90.44	142.81	92.79	10.69	5.56	162.33	109.03	232.28
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
980°	.03	.06	.76	.82	.62	.48	.05	.04	9.32	19.35	1.11
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
980°	.31	.29.06	187.20	100.80	184.99	102.43	11.78	6.28	175.77	119.64	254.58
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
1000°	.11	.01	.48	.18	.42	.21	.03	.02	30.07	3.07	.85
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
1000°	1.91	.29.32	196.89	104.38	163.32	106.68	12.38	6.75	182.60	127.25	271.56
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
1060°	.01	.02	.41	.17	.41	.21	.03	.02	19.10	-59.38	.77
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
1080°	.178	.29.71	205.04	107.83	171.55	110.80	12.93	7.17	190.33	134.68	287.05
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
1100°	.00	.01	.34	.15	.33	.18	.02	.02	39.51	256.86	.68
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
1100°	.181	.29.55	211.93	110.84	178.08	114.41	13.32	7.55	196.80	140.99	300.60
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
1120°	.00	.00	.27	.14	.26	.16	.01	.02	61.85	-224.48	.59
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIHD	CSSIHL	CSENHD	CSENHL	CRADT
1120°	1.78	.29.47	217.31	113.58	183.27	117.66	13.87	7.85	201.95	145.95	312.42
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIHD	ASSIHL	BRL	BRD	ARADT
1140°	.00	.00	.20	.12	.19	.14	.01	.01	71.53	-119.67	.50

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 13, 1976. Cont.

TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1100	1.75	29.42	221.41	118.98	187.07	120.52	13.72	8.08	205.94	149.87	322.40
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1160	.00	.00	.14	.10	.13	.06	.00	.01	52.22	34.93	.41
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1160	1.67	29.37	224.28	118.07	189.68	121.77	13.78	8.26	208.86	152.02	330.67
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1180	.01	.00	.07	.08	.06	.10	.00	.00	51.84	12.02	.32
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1180	1.53	29.39	226.74	119.75	190.98	123.69	13.71	8.36	210.49	153.19	337.02
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1200	.00	.00	.02	.06	.02	.07	.01	.00	11.01	21.74	.23
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1200	1.51	29.41	226.19	121.03	191.28	125.11	13.61	8.42	211.07	153.44	341.55
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1220	.00	.00	.04	.05	.04	.08	.01	.00	30.51	28.31	.15
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1220	1.53	29.39	226.35	121.94	190.49	124.09	13.41	8.43	210.41	152.67	344.62
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1260	.01	.01	.10	.01	.08	.01	.01	.00	6.63	11.20	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1260	1.70	29.66	223.32	122.07	188.90	124.23	13.12	8.38	208.51	150.85	345.09
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1260	.00	.01	.08	.00	.07	.00	.02	.01	9.35	36.88	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1280	1.73	29.82	221.67	122.01	187.90	124.15	12.77	8.28	207.17	149.40	344.79
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1300	.00	.00	.08	.00	.07	.00	.02	.01	23.97	33.89	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1300	1.77	29.88	220.08	121.98	186.00	124.12	12.31	8.13	206.00	147.99	344.36
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1320	.00	.01	.08	.00	.07	.00	.03	.01	6.13	9.38	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1320	1.78	29.72	216.82	122.01	184.87	124.12	11.67	7.86	205.08	146.99	343.96
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1340	.00	.03	.08	.00	.07	.00	.04	.02	2.40	39.34	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1340	1.80	30.39	214.97	121.97	183.17	124.15	10.79	7.41	204.38	145.37	343.58
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1360	.00	.00	.08	.06	.07	.00	.05	.03	13.22	22.44	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1360	1.82	30.47	215.38	120.83	181.67	124.19	9.79	6.90	203.77	144.30	343.18
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1380	.00	.00	.07	.00	.07	.00	.05	.02	15.37	64.45	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1380	1.83	30.54	213.94	120.84	180.30	124.21	8.88	6.44	203.23	143.33	342.83
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1400	.00	.00	.07	.00	.07	.00	.05	.02	31.01	24.85	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1400	1.85	30.56	212.48	120.85	178.93	124.25	7.93	5.94	202.69	142.42	342.48
TIME	ETPD	ETPL	ARAOND	ARAORD	ARAONL	ARAORL	ASBIHD	ASBIHL	BRL	BRD	ARADY
1420	.00	.00	.07	.00	.07	.00	.05	.03	18.92	65.37	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBSIHD	CBSIHL	CSENHD	CSENHL	CRAUT
1420	1.86	30.61	211.08	120.87	177.56	124.26	6.91	5.35	202.31	141.61	342.10

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 14, 1976. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
TIME 680	.00	.00	.78	.23	.71	.25	.05	.02	190.61	681.21	1.18
TIME 680	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
680	.02	.07	15.59	4.50	14.24	5.03	.98	.30	14.63	14.01	27.53
TIME 700	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
700	.00	.03	.79	.23	.77	.25	.06	.02	26.10	696.46	1.21
TIME 700	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
700	.04	.48	31.34	9.02	29.70	10.10	2.10	.67	29.28	28.55	47.68
TIME 720	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
720	.00	.01	.85	.23	.81	.26	.07	.02	130.21	329.75	1.25
TIME 720	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
720	.09	.36	48.41	13.65	45.87	15.28	3.43	1.13	45.07	44.37	72.73
TIME 740	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
740	.00	.00	.95	.24	.81	.26	.07	.03	3678.58	3174.05	1.28
TIME 740	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
740	.08	.37	67.42	18.42	61.97	20.56	4.90	1.70	62.61	59.90	98.40
TIME 760	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
760	.00	.02	.93	.24	.85	.26	.08	.03	42.73	796.53	1.27
TIME 760	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
760	.11	.74	85.97	23.18	79.07	25.85	6.50	2.35	79.58	75.97	123.79
TIME 780	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
780	.00	.02	.94	.24	.89	.27	.09	.04	54.24	#####	1.39
TIME 780	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
780	.12	1.05	104.70	28.01	96.77	31.22	8.20	3.49	96.62	92.63	151.52
TIME 820	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
820	.00	.02	1.00	.25	.88	.27	.08	.04	46.11	584.12	1.40
TIME 820	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
820	.09	.68	124.63	32.98	114.32	36.67	9.72	3.06	115.00	109.68	179.46
TIME 860	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
860	.00	.01	.92	.25	.80	.27	.08	.05	114.42	#####	1.32
TIME 860	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
860	.09	.55	143.02	37.90	130.30	42.11	11.22	4.02	131.89	124.83	205.81
TIME 880	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
880	.00	.02	.92	.24	.88	.27	.07	.04	51.21	2162.38	1.34
TIME 880	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
880	.08	.21	161.50	42.73	147.88	47.55	12.69	5.74	148.89	141.92	232.52
TIME 900	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
900	.00	.03	.88	.24	.83	.26	.07	.04	23.21	#####	1.28
TIME 900	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
900	.09	.87	179.07	47.44	164.46	52.82	14.18	6.55	164.98	157.04	258.10
TIME 920	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT
920	.02	.10	.84	.24	.81	.27	.07	.04	6.99	38.18	1.27
TIME 920	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIND	CSOIML	CSENHD	CSENHL	CRAOT
920	.50	2.80	195.82	52.24	180.72	58.25	15.64	7.38	180.69	170.55	283.54
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIND	ASOIML	RRL	HRD	ARADT

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 14, 1976. Cont.

960.	.00	.05	.75	.23	.73	.20	.08	.04	12.09	*216.68	1.17
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
960.	.97	*3.86	210.85	56.82	195.35	63.48	16.94	8.14	194.48	183.36	306.89
TIME	ETPD	ETPL	ARAUND	ARARD	ARAONL	ARADRL	ASEIHD	ASEIHL	PRL	BRD	ARADT
980.	.00	.00	.69	.22	.68	.25	.06	.03	*292.03	*151.35	1.10
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
980.	.65	*3.81	224.59	61.19	208.88	68.49	18.08	8.83	207.15	196.24	328.92
TIME	ETPD	ETPL	ARAUND	ARARD	ARAONL	ARADRL	ASEIHD	ASEIHL	PRL	BRD	ARADT
1000.	.01	.01	.64	.25	.63	.29	.05	.03	*61.54	*100.51	1.04
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
1000.	.77	*3.62	237.29	66.29	221.39	74.25	19.11	9.48	218.95	208.29	349.79
TIME	ETPD	ETPL	ARAUND	ARARD	ARAONL	ARADRL	ASEIHD	ASEIHL	PRL	BRD	ARADT
1060.	.00	.01	.46	.19	.45	.22	.03	.02	*51.24	*140.11	.83
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
1060.	.83	*3.45	246.48	70.05	230.33	78.66	19.79	9.96	227.51	216.91	366.72
TIME	ETPD	ETPL	ARAUND	ARARD	ARAONL	ARADRL	ASEIHD	ASEIHL	PRL	BRD	ARADT
1080.	.03	.02	.39	.17	.39	.20	.03	.02	22.63	10.09	.75
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
1080.	.17	*3.76	254.31	73.44	239.05	82.72	20.38	10.41	234.10	223.88	381.32
TIME	ETPD	ETPL	ARAUND	ARARD	ARAONL	ARADRL	ASEIHD	ASEIHL	PRL	BRD	ARADT
1120.	.01	.04	.27	.15	.26	.17	.01	.02	*7.79	24.99	.54
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
1120.	.02	*3.04	259.75	76.46	243.23	86.12	20.66	10.75	239.07	229.43	392.05
TIME	ETPD	ETPL	ARAUND	ARARD	ARAONL	ARADRL	ASEIHD	ASEIHL	PRL	BRD	ARADT
1180.	.00	.00	.07	.11	.08	.12	.00	.01	16.20	31.58	.32
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
1180.	.07	*3.12	261.15	78.73	244.75	88.61	20.67	10.88	240.42	230.75	394.41
TIME	ETPD	ETPL	ARAUND	ARARD	ARAONL	ARADRL	ASEIHD	ASEIHL	PRL	BRD	ARADT
1240.	.00	.01	.11	.05	.07	.05	.01	.00	*6.36	36.51	.08
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
1240.	.02	*3.40	259.03	79.69	243.32	89.59	20.48	10.01	238.53	229.01	400.08
TIME	ETPD	ETPL	ARAUND	ARARD	ARAONL	ARADRL	ASEIHD	ASEIHL	PRL	BRD	ARADT
1260.	.00	.00	.11	.03	.09	.03	.01	.00	*34.92	39.81	.02
TIME	CETPD	CETPL	CRAUND	CRAORD	CRAONL	CRAORL	CSEIHD	CSEIHL	CSENH0	CSENL	CRAOT
1260.	.03	*3.45	256.81	80.30	241.53	90.14	20.28	10.92	236.56	227.17	400.43

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 15, 1976. Cont.

TIME	ETPU	ETPL	ARAUND	ARADRD	ARAUNDL	AMADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
760	*.02	*.04	*.81	*.24	*.74	*.27	*.05	*.02	18.78	37.26	1.21
765	CEPM	CEPL	CRADND	CRADRD	CRADNLL	CMADRL	CSBIMD	CSBIML	CSBNHD	CSBNHL	CRADT
	*.40	*.73	16.22	4.85	14.79	5.43	1.07	.33	14.74	13.73	24.13
900	ETPU	ETPL	ARAUND	ARADRD	ARAUNDL	AMADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
	*.02	*.16	*.98	*.27	*.84	*.29	*.07	*.05	4.04	44.38	1.75
905	CEPM	CEPL	CRADND	CRADRD	CRADNLL	CMADRL	CSBIMD	CSBIML	CSBNHD	CSBNHL	CRADT
	*.79	*3.87	35.74	10.21	11.53	11.27	2.49	1.25	32.46	26.41	51.21
1020	ETPU	ETPL	ARAUND	ARADRD	ARAUNDL	AMADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
	*.11	*.01	*.72	*.24	*.69	*.27	*.06	*.04	*87.45	49.36	1.16
1025	CEPM	CEPL	CRADND	CRADRD	CRADNLL	CMADRL	CSBIMD	CSBIML	CSBNHD	CSBNHL	CRADT
	*1.06	*3.72	50.17	15.07	45.32	16.69	3.78	2.08	45.33	39.52	74.47
1060	ETPU	ETPL	ARAUND	ARADRD	ARAUNDL	AMADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
	*.01	*.01	*.67	*.22	*.58	*.25	*.05	*.04	76.65	70.87	1.05
1065	CEPM	CEPL	CRADND	CRADRD	CRADNLL	CMADRL	CSBIMD	CSBIML	CSBNHD	CSBNHL	CRADT
	*1.23	*3.86	63.53	19.53	46.93	21.66	4.86	2.84	57.44	50.22	95.46
1140	ETPU	ETPL	ARAUND	ARADRD	ARAUNDL	AMADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
	*.01	*.03	*.41	*.17	*.35	*.20	*.03	*.03	8.61	35.33	.75
1145	CEPM	CEPL	CRADND	CRADRD	CRADNLL	CMADRL	CSBIMD	CSBIML	CSBNHD	CSBNHL	CRADT
	*1.43	*4.54	71.71	22.90	64.00	25.59	5.52	3.38	64.76	56.04	110.76
1160	ETPU	ETPL	ARAUND	ARADRD	ARAUNDL	AMADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
	*.03	*.21	*.35	*.15	*.23	*.18	*.03	*.03	.00	9.90	.46
1165	CEPM	CEPL	CRADND	CRADRD	CRADNLL	CMADRL	CSBIMD	CSBIML	CSBNHD	CSBNHL	CRADT
	*2.02	*8.68	78.66	26.00	68.64	29.15	6.11	3.89	70.54	56.08	123.56
1240	ETPU	ETPL	ARAUND	ARADRD	ARAUNDL	AMADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
	*.07	*.01	*.08	*.08	*.07	*.09	*.01	*.02	*9.26	.00	.30
1245	CEPM	CEPL	CRADND	CRADRD	CRADNLL	CMADRL	CSBIMD	CSBIML	CSBNHD	CSBNHL	CRADT
	*3.45	*8.53	80.25	27.67	70.13	31.03	6.26	4.19	70.54	57.41	129.60
1260	ETPU	ETPL	ARAUND	ARADRD	ARAUNDL	AMADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
	*.00	*.00	*.02	*.06	*.03	*.07	*.00	*.01	*400.89	62.11	.22
1265	CEPM	CEPL	CRADND	CRADRD	CRADNLL	CMADRL	CSBIMD	CSBIML	CSBNHD	CSBNHL	CRADT
	*3.45	*8.53	80.57	28.92	70.82	32.40	6.35	4.46	70.77	57.83	133.91

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 15, 1976. Cont.

TIME	ETPU	ETPL	ARAUND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADT
TIME 12 ⁰⁰	.70	-.01	-.04	.04	-.01	.04	.00	.01	-5.23	72.42	.13
TIME 12 ⁰⁰	CETPD -3.44	CETPL -8.64	CRAOND 79.74	CRAORD 29.74	CRAONL 70.57	CRAORL 93.29	CSEIMD 6.38	CSEIML 4.67	CSENH0 69.92	CSENL 57.27	CRAOT 136.60
TIME 13 ⁰⁰	.70	-.03	-.09	.02	-.06	.02	-.00	.01	-3.33	278.33	.06
TIME 13 ⁰⁰	CETPD -3.43	CETPL -9.19	CRAOND 77.86	CRAORD 30.13	CRAONL 69.46	CRAORL 93.72	CSEIMD 6.35	CSEIML 4.85	CSENH0 68.09	CSENL 55.42	CRAOT 137.89
TIME 13 ⁰⁰	.00	.02	-.07	-.00	-.06	-.00	-.01	.00	3.28	195.28	-.02
TIME 13 ⁰⁰	CETPD -3.42	CETPL -8.88	CRAOND 76.46	CRAORD 30.11	CRAONL 68.22	CRAORL 93.68	CSEIMD 6.18	CSEIML 4.92	CSENH0 66.86	CSENL 54.92	CRAOT 137.49
TIME 13 ⁰⁰	.00	.01	-.07	-.00	-.07	-.00	-.01	.00	9.44	258.43	-.02
TIME 13 ⁰⁰	CETPD -3.42	CETPL -8.75	CRAOND 75.03	CRAORD 30.04	CRAONL 66.89	CRAORL 93.62	CSEIMD 5.94	CSEIML 4.94	CSENH0 65.67	CSENL 53.19	CRAOT 137.01
TIME 13 ⁰⁰	.00	-.02	-.07	.00	-.07	-.00	-.02	.00	-4.65	139.02	-.02
TIME 13 ⁰⁰	CETPD -3.41	CETPL -9.11	CRAOND 73.60	CRAORD 30.05	CRAONL 65.58	CRAORL 93.59	CSEIMD 5.60	CSEIML 4.94	CSENH0 64.58	CSENL 51.02	CRAOT 136.52
TIME 14 ⁰⁰	.00	-.07	-.07	.00	-.06	.00	-.02	-.00	-1.88	268.05	-.02
TIME 14 ⁰⁰	CETPD -3.41	CETPL -10.54	CRAOND 72.23	CRAORD 30.08	CRAONL 64.31	CRAORL 93.60	CSEIMD 5.25	CSEIML 4.92	CSENH0 63.57	CSENL 48.85	CRAOT 136.11
TIME 14 ⁰⁰	.00	-.02	-.07	.00	-.06	-.00	-.02	-.01	-3.96	665.66	-.02
TIME 14 ⁰⁰	CETPD -3.41	CETPL -10.92	CRAOND 70.89	CRAORD 30.09	CRAONL 63.07	CRAORL 93.58	CSEIMD 4.81	CSEIML 4.79	CSENH0 62.67	CSENL 47.36	CRAOT 135.71
TIME 14 ⁰⁰	.00	.01	-.07	.00	-.07	.01	-.02	-.01	3.76	792.84	-.02
TIME 14 ⁰⁰	CETPD -3.41	CETPL -10.66	CRAOND 69.39	CRAORD 30.17	CRAONL 61.73	CRAORL 93.70	CSEIMD 4.33	CSEIML 4.68	CSENH0 61.66	CSENL 46.40	CRAOT 135.31

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 28, 1976. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
640	.00	.00	.71	.22	.72	.23	.03	.01	296.84	186.84	.51
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
640	.07	.05	14.18	4.31	14.40	4.56	.52	.18	13.58	14.17	10.27
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
660	.00	.00	.73	.23	.73	.24	.03	.01	323.38	221.62	1.13
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
660	.11	.01	28.86	8.93	26.13	9.71	1.18	.39	27.57	25.74	32.41
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
700	.01	.00	.83	.24	.67	.27	.05	.02	238.79	180.10	1.24
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
700	.21	.04	45.46	13.82	39.54	15.03	2.27	.86	42.98	38.72	57.54
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
760	.00	.00	.91	.28	.73	.27	.07	.04	323.61	223.61	1.32
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
760	.20	.04	63.69	18.85	54.29	20.52	3.88	1.74	59.90	52.59	83.99
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
820	.00	.03	.92	.28	.76	.28	.08	.06	26.47	585.38	1.33
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
820	.23	.47	82.14	23.95	69.50	26.03	8.14	2.86	76.77	66.16	110.63
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
860	.00	.00	.90	.28	.75	.27	.07	.06	180.75	465.95	1.31
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
860	.26	.85	100.12	28.95	84.44	31.39	6.60	4.07	93.25	79.82	136.79
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
880	.00	.00	.84	.28	.74	.27	.07	.06	347.58	226.79	1.29
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
880	.33	.51	116.93	33.98	99.86	36.81	7.91	5.37	108.69	93.38	162.53
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
900	.01	.01	.82	.24	.70	.27	.06	.07	102.42	112.86	1.25
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
900	.46	.63	133.34	38.85	113.21	42.19	9.21	6.48	123.67	105.90	187.58
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
920	.02	.01	.77	.18	.64	.27	.07	.07	52.22	36.07	1.20
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
920	.84	.88	148.68	42.48	125.97	47.58	10.56	7.99	137.28	117.14	211.62
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
940	.00	.02	.72	.24	.63	.26	.07	.06	30.87	191.86	1.16
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
940	.91	.81	163.11	47.19	135.64	52.84	11.89	9.28	150.31	128.15	234.85
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
980	.00	.00	.62	.22	.54	.25	.06	.05	256.27	156.08	1.04
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
980	.98	.17	175.47	51.59	149.47	57.83	13.06	10.25	161.43	138.06	255.63
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
1000	.00	.00	.56	.21	.50	.24	.05	.04	132.15	202.26	.98
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
1000	.03	.23	186.60	55.79	189.41	62.65	14.08	11.13	171.49	147.05	275.17
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
1020	.00	.00	.50	.20	.43	.23	.05	.04	116.35	116.35	.90
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CBOINO	CBOIML	CSENHO	CSENL	CRAOT
1020	.11	.23	196.63	59.82	168.09	67.23	14.98	11.96	180.54	154.91	293.21
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
1040	.00	.00	.42	.18	.38	.21	.04	.04	1107.33	126.80	.83

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 28, 1976. Cont.

TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1000	*1.17	*1.23	205.10	63.51	175.75	71.51	15.79	12.71	188.14	161.80	309.71
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	PRL	BRD	ARADT
1000	*.02	*.00	*.30	*.15	*.28	*.18	*.03	*.03	318.38	16.29	*.65
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1000	*1.48	*1.25	211.08	66.54	181.25	78.03	16.39	13.39	193.20	166.82	322.81
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1200	*.01	*.00	*.23	*.14	*.21	*.16	*.03	*.03	37.33	22.31	*.57
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1200	*1.66	*1.34	218.70	69.32	185.47	78.24	16.93	14.03	197.12	170.11	334.14
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1200	*.00	*.00	*.17	*.12	*.15	*.14	*.02	*.03	51.92	*129.01	*.48
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1200	*1.63	*1.39	219.14	71.73	188.87	80.97	17.33	14.57	200.18	172.81	343.74
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1200	*.00	*.02	*.11	*.10	*.10	*.12	*.01	*.02	3.61	*51.02	*.39
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1200	*1.59	*1.71	221.35	73.81	190.48	83.30	17.59	15.03	202.17	173.74	351.57
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1200	*.00	*.00	*.05	*.08	*.04	*.09	*.01	*.02	*35.27	51.04	*.30
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1200	*1.61	*1.69	222.34	75.49	191.26	85.18	17.78	15.41	202.98	174.16	357.59
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1200	*.00	*.00	*.00	*.06	*.01	*.07	*.00	*.02	*6.07	74.98	*.22
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1200	*1.61	*1.78	222.32	76.76	191.14	86.55	17.84	15.71	202.88	173.66	361.90
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1300	*.00	*.02	*.06	*.04	*.05	*.04	*.00	*.01	3.25	152.96	*.13
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1300	*1.60	*1.47	221.11	77.55	190.07	82.43	17.84	15.93	201.67	172.66	364.51
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1300	*.00	*.01	*.10	*.01	*.05	*.03	*.01	*.05	*11.67	*366.84	*.10
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1300	*1.60	*1.29	219.20	77.82	191.07	87.98	18.00	15.00	199.61	174.79	362.52
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1300	*.00	*.00	*.11	*.00	*.02	*.00	*.01	*.00	20.51	367.82	*.00
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1300	*1.59	*1.20	217.02	77.79	189.19	87.90	17.85	15.10	197.57	172.90	362.55
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1300	*.00	*.01	*.09	*.00	*.09	*.01	*.01	*.00	*13.71	496.09	*.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1300	*1.59	*1.33	218.14	77.72	187.47	87.75	17.63	15.13	195.93	171.01	362.10
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1300	*.00	*.00	*.09	*.00	*.09	*.00	*.01	*.00	*32.08	698.89	*.03
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1300	*1.59	*1.39	213.30	77.68	185.65	87.70	17.34	15.11	194.37	169.15	361.58
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1400	*.00	*.01	*.09	*.00	*.08	*.00	*.02	*.00	*11.20	500.79	*.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1400	*1.58	*1.55	211.49	77.64	183.96	87.65	16.98	15.02	192.93	167.40	361.13
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1420	*.00	*.01	*.08	*.00	*.08	*.00	*.02	*.01	*15.23	153.73	*.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1420	*1.58	*1.66	209.87	77.63	182.30	87.68	16.55	14.90	191.74	165.75	360.66
TIME	ETPD	ETPL	ARAOND	ARADRD	ARAONL	ARAOHL	ABOIND	ABOIML	BRL	BRD	ARADT
1400	*.00	*.00	*.08	*.00	*.08	*.00	*.02	*.01	*25.29	143.91	*.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAOHL	CBOIND	CBOIML	CSENHD	CSENHL	CRAOT
1400	*1.57	*1.71	208.22	77.57	180.74	87.69	16.11	14.73	190.54	164.30	360.21

Appendix Table 2. Energy balance values for Compana - Golden Compana. July 29, 1976. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
20	.00	.00	.08	.00	.08	.00	.02	.01	22.98	328.93	.07
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
20	.00	.06	.156	.01	.156	.02	.48	.22	.107	.128	.134
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
40	.00	.00	.08	.00	.08	.00	.03	.01	34.50	211.35	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
40	.01	.09	.321	.01	.312	.00	.101	.49	.219	.254	.172
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
60	.00	.02	.08	.00	.08	.00	.03	.01	2.53	231.55	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
60	.01	.44	.477	.01	.468	.03	.155	.78	.321	.343	.214
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
80	.00	.01	.07	.00	.07	.00	.03	.02	5.77	211.39	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
80	.02	.19	.26	.01	.25	.05	.210	.108	.415	.487	.255
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
100	.00	.00	.07	.00	.07	.00	.03	.02	43.40	227.44	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
100	.02	.17	.770	.01	.752	.06	.267	.141	.501	.594	.292
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
120	.00	.06	.08	.00	.07	.00	.03	.02	.00	259.92	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
120	.02	.132	.922	.03	.901	.06	.324	.175	.595	.594	.328
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
140	.00	.00	.07	.00	.07	.00	.03	.02	38.51	382.89	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
140	.03	.130	.1069	.02	.1038	.07	.384	.215	.682	.693	.363
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
160	.00	.00	.08	.00	.07	.00	.03	.02	33.20	200.98	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
160	.03	.133	.1228	.03	.1185	.06	.444	.256	.777	.796	.398
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
180	.00	.00	.07	.00	.07	.00	.03	.02	27.03	499.68	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
180	.03	.129	.1374	.05	.1328	.09	.504	.297	.867	.902	.436
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
240	.00	.00	.07	.00	.06	.00	.03	.02	28.90	352.75	.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
240	.04	.131	.1808	.07	.1445	.05	.867	.345	.937	.969	.469
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
560	.00	.29	.35	.16	.27	.18	.01	.02	.00	91.65	.66
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
560	.04	.445	.816	.319	.905	.374	.590	.381	.230	.969	.860
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
580	.00	.00	.38	.17	.30	.20	.01	.01	509.71	152.82	.71
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
580	.09	.447	.61	.666	.306	.765	.601	.409	.532	.344	.2274
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
700	.00	.01	.74	.23	.60	.26	.04	.02	65.93	250.47	.113
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CGB1HD	CGB1HL	CSENH0	CSENL	CRAZY
700	.15	.464	.1420	.1123	.887	.1276	.525	.375	.1930	.797	.4525
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASB1HD	ASB1HL	BRL	BRD	ARADY
720	.01	.00	.77	.24	.62	.25	.05	.02	184.61	133.78	.111

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 29, 1976. Cont.

TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
720.	.25	.4.71	29.67	16.01	21.34	17.67	.4.26	.3.31	33.67	19.95	67.50
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
760.	.00	.01	.86	.26	.71	.27	.06	.03	126.33	212.47	1.27
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
760.	.33	.4.81	46.95	21.12	35.52	23.15	.3.09	.2.62	49.71	33.33	92.88
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
780.	.00	.01	.86	.26	.65	.28	.07	.04	55.24	164.89	1.29
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
780.	.43	.5.03	64.18	26.25	48.50	28.68	.1.75	.1.75	65.53	48.26	118.68
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
900.	.00	.00	.39	.14	.32	.15	.06	.06	128.75	76.72	.63
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
900.	.51	.5.07	71.95	28.96	54.87	31.58	.64	.64	72.08	50.44	131.19
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
920.	.00	.03	.36	.12	.28	.13	.05	.05	5.98	66.37	.56
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
920.	.60	.5.73	79.06	31.35	60.57	34.20	.37	.44	78.09	54.40	142.41
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
940.	.01	.22	.31	.12	.24	.12	.04	.04	.00	50.51	.52
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
940.	.70	.10.05	85.23	33.67	68.72	36.70	1.26	1.27	83.27	54.40	152.87
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
1000.	.01	.00	.20	.08	.16	.09	.03	.03	77.77	11.20	.36
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
1000.	.97	.10.09	89.17	35.28	68.98	38.46	1.93	1.89	84.27	57.00	160.00
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
1040.	.00	.00	.20	.08	.17	.09	.03	.03	272.33	61.50	.36
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
1040.	.1.03	.10.10	93.17	36.89	72.43	40.19	2.48	2.39	89.67	59.93	167.13
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
1060.	.00	.00	.36	.14	.32	.16	.03	.02	1339.04	76.29	.63
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
1060.	.1.11	.10.10	100.34	39.65	76.73	43.38	2.99	2.86	96.24	65.78	179.67
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
1240.	.00	.00	.01	.02	.01	.02	.01	.02	42.14	-79.41	.07
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
1240.	.1.11	.10.10	100.61	40.07	79.00	43.85	3.21	3.16	96.29	65.74	181.16
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
1260.	.09	.00	.09	.04	.08	.05	.01	.01	834.62	.00	.20
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
1260.	.2.82	.10.10	102.47	40.92	80.69	44.77	3.36	3.39	96.29	67.20	185.17
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
1280.	.01	.00	.01	.02	.01	.02	.01	.01	5811.83	.00	.09
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
1280.	.2.97	.10.10	102.74	41.31	80.80	45.23	3.48	3.57	96.29	67.12	186.92
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
1300.	.00	.00	.00	.02	.00	.02	.01	.00	405.56	51.51	.07
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
1300.	.2.98	.10.10	102.78	41.68	80.87	45.60	3.65	3.67	96.16	67.10	188.28
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIND	ASBIML	BRL	BRD	ARADY
1320.	.00	.00	.01	.02	.00	.02	.00	.01	46.36	27.56	.07
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBSIND	CBSIML	CSENND	CSENNL	CRADY
1320.	.2.98	.10.10	102.89	42.05	80.88	45.98	3.66	3.81	96.24	66.97	189.67

Appendix Table 2. Energy balance values for Compana -
Golden Compana. July 29, 1976. Cont.

TIME	ETPU	ETPL	ARAQND	ARADRD	ARADNL	ARADRL	ASQIND	ASQIML	BRL	BRD	ARADY
1340	*.00	.00	*.03	.01	*.03	.01	.00	.00	84.38	*26.46	.01
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CBSIND	CBSIML	CBSNHD	CBSNHL	CRAQY
1340	*3.01	*10.10	102.24	42.19	80.35	46.08	3.68	3.89	95.55	66.36	189.67
TIME	ETPU	ETPL	ARAQND	ARADRD	ARADNL	ARADRL	ASQIND	ASQIML	BRL	BRD	ARADY
1360	*.00	.00	*.04	.00	*.04	.00	.00	.00	*11.59	*119.21	*.01
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CBSIND	CBSIML	CBSNHD	CBSNHL	CRAQY
1360	*3.01	*10.05	101.40	42.22	79.59	46.11	3.65	2.61	94.74	66.94	189.74
TIME	ETPU	ETPL	ARAQND	ARADRD	ARADNL	ARADRL	ASQIND	ASQIML	BRL	BRD	ARADY
1360	*.04	*.00	*.04	*.00	*.04	.00	*.00	.00	*182.75	.00	*.02
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CBSIND	CBSIML	CBSNHD	CBSNHL	CRAQY
1360	*2.23	*10.05	100.57	42.21	78.80	46.11	3.60	2.63	94.74	66.12	189.43
TIME	ETPU	ETPL	ARAQND	ARADRD	ARADNL	ARADRL	ASQIND	ASQIML	BRL	BRD	ARADY
1400	.00	.00	*.05	.00	*.05	.00	*.01	.00	13.23	2882.90	*.02
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CBSIND	CBSIML	CBSNHD	CBSNHL	CRAQY
1400	*2.22	*9.99	99.61	42.23	77.88	46.13	3.50	2.63	93.89	65.26	189.10
TIME	ETPU	ETPL	ARAQND	ARADRD	ARADNL	ARADRL	ASQIND	ASQIML	BRL	BRD	ARADY
1420	*.00	*.00	*.06	.00	*.06	.00	*.01	.00	*172.66	*226.92	*.02
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CBSIND	CBSIML	CBSNHD	CBSNHL	CRAQY
1420	*2.23	*9.99	98.43	42.25	76.87	46.13	3.35	2.61	92.84	64.26	188.75
TIME	ETPU	ETPL	ARAQND	ARADRD	ARADNL	ARADRL	ASQIND	ASQIML	BRL	BRD	ARADY
1440	*.00	.00	*.04	*.00	*.04	.00	*.01	.00	46.03	*193.77	*.02
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CBSIND	CBSIML	CBSNHD	CBSNHL	CRAQY
1440	*2.23	*9.98	97.89	42.18	76.11	46.21	3.19	2.56	92.16	63.87	188.48

Appendix Table 2. Energy balance values for Compana -
Golden Compana. August 3, 1976. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
660.	00	01	64	17	53	17	01	01	45.94	1063.62	36
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBBINO	CBBIML	CBBNHD	CBBNHL	CRADT
660.	01	23	12.89	3.37	10.47	3.39	18	17	12.70	10.61	7.13
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
680.	00	01	66	17	54	17	01	01	58.70	2921.14	33
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBBINO	CBBIML	CBBNHD	CBBNHL	CRADT
680.	02	42	26.13	6.78	21.57	6.74	39	35	28.72	21.81	13.81
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
700.	00	00	77	41	64	41	04	01	201.43	2117.24	77
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBBINO	CBBIML	CBBNHD	CBBNHL	CRADT
700.	02	48	41.47	14.94	34.43	14.87	1.20	09	40.25	34.05	29.17
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
720.	00	68	81	43	71	43	05	02	00	999999	92
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBBINO	CBBIML	CBBNHD	CBBNHL	CRADT
720.	02	14.11	87.78	23.61	48.54	23.51	2.20	38	55.53	34.05	47.55
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
740.	00	00	86	45	73	44	06	03	154.99	574.71	94
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBBINO	CBBIML	CBBNHD	CBBNHL	CRADT
740.	01	14.20	74.88	32.59	43.11	32.39	3.23	1.01	71.56	47.89	66.35
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBINO	ASBIML	BRL	BRD	ARADT
760.	00	00	91	46	76	45	06	04	224.71	835.37	102
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CBBINO	CBBIML	CBBNHD	CBBNHL	CRADT
760.	03	14.14	92.99	41.73	78.37	41.41	4.60	1.78	88.42	62.46	86.74

Appendix Table 2. Energy balance values for Compana -
Golden Compana. August 4, 1976. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
740	.00	.01	.90	.38	.72	.39	.07	.05	123.93	#####	1.17
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
740	.00	.11	17.95	7.63	14.43	7.72	1.47	1.00	16.48	13.33	23.38
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
780	.00	.01	.96	.39	.78	.39	.08	.06	79.70	395.36	1.39
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
780	.04	.29	37.18	15.37	30.05	15.53	3.04	2.16	34.04	27.61	51.16
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
820	.00	.00	.95	.40	.82	.40	.09	.07	380.87	568.63	1.25
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
820	.07	.25	56.07	23.29	46.41	23.58	4.86	3.48	51.14	42.68	76.20
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
860	.00	.00	.79	.40	.81	.40	.08	.07	213.59	268.73	1.28
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
860	.02	.32	71.92	31.19	62.58	31.53	6.40	4.91	65.50	57.35	101.86
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
900	.22	.07	.88	.38	.80	.34	.08	.07	9.48	2.87	1.27
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
900	.450	1.70	89.46	38.86	78.52	38.41	7.93	6.33	77.03	70.49	127.31
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
960	.00	.00	.12	.19	.12	.20	.06	.06	14.44	51.85	.31
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
960	.453	1.61	91.95	42.73	80.88	42.33	9.14	7.46	78.28	71.81	133.60
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1000	.00	.00	.04	.15	.03	.14	.03	.03	211.62	47.03	.18
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
1040	.452	1.61	92.84	45.44	81.44	45.09	9.70	8.10	78.62	71.73	137.11
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1060	.00	.00	.02	.13	.01	.13	.02	.03	19.32	15.95	.12
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
1060	.452	1.63	93.17	45.32	81.51	47.67	10.13	8.62	78.52	71.35	139.61
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1080	.06	.00	.07	.14	.06	.14	.01	.02	31.74	.00	.17
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
1080	.563	1.61	94.53	51.20	82.81	50.49	10.38	9.07	78.52	72.13	142.95
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1200	.00	.00	.13	.18	.12	.18	.01	.02	64.26	42.96	.24
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
1200	.557	1.64	97.12	54.88	85.23	54.11	10.56	9.44	80.98	74.15	147.79
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1220	.00	.00	.00	.12	.01	.12	.01	.02	33.40	16.61	.05
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
1220	.556	1.62	97.10	57.28	85.12	56.50	10.74	9.76	80.79	73.74	148.81
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1240	.01	.00	.03	.16	.03	.16	.00	.01	20.53	7.00	.01
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
1240	.568	1.58	96.45	60.52	84.49	59.62	10.80	9.99	79.97	72.91	148.55
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1260	.00	.00	.09	.12	.09	.12	.01	.01	41.70	46.64	.02
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
1260	.564	1.63	94.71	63.00	82.70	62.03	10.67	10.13	78.39	70.94	148.25
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1280	.00	.00	.03	.11	.03	.11	.01	.00	19.04	22.60	.01
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENHD	CSENHL	CRADY
1280	.563	1.60	94.15	65.27	89.17	64.23	10.38	10.15	78.14	70.42	148.04

Appendix Table 2. Energy balance values for Compana - Golden Compana. Aug. 5, 1976. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
760*	*.01	*.02	.77	.18	.75	.19	.08	.03	30.47	58.48	1.07
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
760*	*.24	*.46	15.50	3.69	14.91	3.76	1.07	.54	14.19	13.91	21.50
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
720*	*.01	*.06	.82	.40	.75	.39	.06	.03	10.78	84.68	1.06
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
720*	*.42	*1.67	31.94	11.63	29.83	11.59	2.21	1.19	29.30	26.97	42.71
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
740*	*.06	.00	.82	.41	.79	.41	.06	.04	398.38	11.11	1.10
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
740*	*1.64	*1.63	48.35	19.76	45.58	19.79	3.40	1.92	43.27	41.99	64.66
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
820*	*.01	.00	.94	.38	.80	.38	.07	.06	345.18	156.45	1.30
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
820*	*1.79	*1.59	67.17	27.43	61.49	27.42	4.82	3.03	60.57	56.87	90.58
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
840*	*.02	.00	.94	.48	.81	.48	.08	.06	290.13	47.18	1.23
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
840*	*2.14	*1.54	85.91	36.95	77.59	36.93	6.36	4.20	77.40	71.85	115.17
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
920*	*.02	*.02	.89	.40	.74	.40	.07	.07	35.16	44.78	1.20
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
920*	*2.50	*1.91	103.73	45.02	92.47	45.00	7.70	5.54	93.52	85.02	139.18
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
960*	*.01	*.14	.76	.48	.70	.48	.06	.07	3.39	82.69	1.11
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
960*	*2.67	*4.80	118.98	54.63	106.52	54.58	8.96	6.90	107.35	94.82	161.45
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
1040*	*.00	*.02	.49	.40	.40	.41	.03	.04	18.58	139.69	.80
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
1080*	*2.74	*5.17	128.72	62.67	114.50	62.69	9.59	7.60	116.40	101.72	177.54
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
1200*	*.00	*.02	.42	.38	.36	.38	.02	.03	19.78	146.43	.72
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
1200*	*2.79	*5.49	137.09	70.22	121.73	70.19	10.05	8.23	124.22	108.01	191.94
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	BRD	ARADY
1220*	*.00	.02	.38	.36	.33	.37	.02	.03	17.08	494.33	.69
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
1220*	*2.80	*5.11	144.74	77.47	138.39	77.58	10.48	8.78	131.45	114.50	205.76

Appendix Table 2. Energy balance values for Compana - Golden Compana. Aug. 5, 1976. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1200	.00	.03	.26	.31	.26	.27	.01	.03	7.74	741.95	.53
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1200	-2.80	-4.49	149.90	83.62	133.10	82.99	10.77	9.30	136.33	119.30	216.29
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1200	.00	.01	.18	.30	.13	.30	.01	.02	14.72	251.59	.41
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1200	-2.78	-4.63	153.59	89.57	135.68	98.97	10.97	9.71	139.84	121.34	224.56
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1200	.00	.01	.09	.27	.07	.27	.01	.02	2.57	117.79	.30
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1200	-2.77	-4.93	150.82	94.92	137.07	94.28	11.10	10.05	141.56	122.10	230.61
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1300	.00	.01	.04	.19	.04	.18	.00	.01	3.30	89.29	.08
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1300	-2.76	-4.66	154.56	98.62	136.22	97.86	11.14	10.32	140.65	121.23	232.11
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1300	.00	.01	.05	.17	.05	.17	.00	.01	7.25	358.63	.00
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1300	-2.76	-4.52	153.59	102.06	135.20	101.18	11.05	10.50	139.78	120.18	232.15
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1300	.00	.01	.05	.16	.05	.16	.01	.01	9.16	74.77	.00
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1300	-2.75	-4.41	152.54	105.28	134.22	104.31	10.91	10.63	138.68	119.18	232.06
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1300	.00	.00	.07	.16	.06	.15	.01	.05	9.08	45.75	.01
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1300	-2.73	-4.40	151.23	105.95	132.98	107.39	10.72	9.94	137.78	119.23	231.80
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1300	.00	.00	.07	.17	.06	.16	.01	.00	19.52	1266.05	.02
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1300	-2.73	-4.47	149.89	111.89	131.80	110.65	10.46	9.36	136.71	117.97	231.40
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1400	.00	.05	.06	.16	.06	.16	.02	.00	.00	619.26	.02
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1400	-2.73	-3.37	148.65	115.16	130.66	113.84	10.13	9.31	135.79	117.97	231.00
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1400	.00	.03	.05	.15	.05	.15	.02	.01	2.74	427.40	.02
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1400	-2.73	-3.93	147.62	118.26	129.58	116.86	9.79	9.21	135.11	116.43	230.55
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASSIND	ASSIML	BRL	BRD	ARADY
1400	.00	.00	.06	.16	.07	.11	.02	.01	17.29	7496.20	.02
TIME	CETPL	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSSIND	CSSIML	CSENND	CSENHL	CRADY
1400	-2.73	-4.00	146.35	121.48	128.28	119.88	9.42	9.07	134.20	115.20	230.15

Appendix Table 3. Energy balance values for Liberty - Golden Liberty. June 24, 1977. This table will be continued through August 2, 1977.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
510.	-2.29	-1.19	.16	.00	.03	.00	..14	..13	.00	..03	.73
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
510.	-8.77	-5.74	4.70	.00	.96	.00	-4.07	-4.02	.00	..76	22.05
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
540.	-2.45	-1.37	.28	.00	.16	.00	..14	..13	..03	..07	.92
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
540.	-22.27	-16.81	13.17	.00	5.77	.00	-8.14	-8.04	..96	-3.00	49.52
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
570.	-2.53	-1.42	.38	.00	.22	.00	..14	..13	..02	..07	1.00
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
570.	-29.21	-24.56	24.45	.00	12.50	.00	-12.21	-12.06	..54	..99	79.52
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
600.	-2.67	-1.41	.53	.00	.38	.00	..14	..13	.00	.11	1.18
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
600.	-48.27	-41.96	40.44	.00	24.04	.00	-16.28	-16.09	..54	..84	114.94
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
630.	-2.68	-1.56	.47	.00	.32	.00	..14	..13	..08	..10	1.10
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
630.	-58.74	-58.66	54.55	.00	33.65	.00	-20.35	-20.11	..85	..99	147.83
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
660.	-2.65	-1.84	.60	.00	.45	.00	..14	..13	.08	..26	1.25
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
660.	-98.15	-83.82	72.41	.00	47.12	.00	-24.42	-24.13	..31	..57	185.42
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
690.	-2.96	-1.58	.63	.00	.45	.00	..14	..13	..09	.00	1.25
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
690.	-123.83	-101.30	91.22	.00	60.58	.00	-26.49	-26.15	..11	-12.57	223.01
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
720.	-2.88	-1.58	.69	.00	.54	.00	..14	..13	..06	.10	1.36
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
720.	-150.25	-118.71	111.91	.00	76.92	.00	-32.56	-32.17	..77	..61	263.86
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
750.	-2.97	-1.71	.69	.00	.58	.00	..14	..13	..15	.00	1.40
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
750.	-179.48	-140.04	132.60	.00	94.23	.00	-36.63	-36.19	..24	..61	305.78
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
780.	-2.91	-1.82	.72	.00	.61	.00	..14	..13	..15	..07	1.46
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
780.	-209.78	-164.54	154.23	.00	112.50	.00	-40.71	-40.21	..84	-11.82	349.52
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
810.	-2.46	-1.33	.25	.00	.19	.00	..14	..13	..07	.00	.81
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
810.	-223.58	-174.33	161.76	.00	118.27	.00	-44.78	-44.24	..05	-11.82	373.73
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADT	
840.	-2.13	-1.71	.72	.00	.58	.00	..14	..13	..28	.00	1.43
TIME	CETPD	CETPL	CRAOND	CPADRD	CRAONL	CRABRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADT
840.	-257.56	-195.66	183.39	.00	135.58	.00	-48.85	-48.26	..33	-11.82	416.75

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. June 27, 1977. Cont.

TIME	ETPD	ETPL	ARADND	AFADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
750.	-.83	-.48	.69	.00	.58	.00	-.14	-.13	.00	.23	1.41
TIME	CETPD	CETPL	CRADND	CFADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
750.	-24.76	-14.30	20.69	.00	17.31	.00	-.407	-.402	.00	7.03	92.29
TIME	ETPD	ETPL	ARADND	AFADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
810.	-.83	-.57	.69	.00	.61	.00	-.14	-.13	.00	.17	1.46
TIME	CETPD	CETPL	CRADND	CFADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
810.	-49.52	-31.44	41.38	.00	35.58	.00	-.814	-.804	.00	12.18	86.02
TIME	ETPD	ETPL	ARADND	AFADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
840.	-.79	-.71	.66	.00	.58	.00	-.14	-.13	.00	.00	1.42
TIME	CETPD	CETPL	CRADND	CFADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
840.	-73.34	-52.76	61.13	.00	52.88	.00	-12.21	-12.06	.00	12.18	128.67
TIME	ETPD	ETPL	ARADND	AFADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
870.	-.90	-.62	.66	.00	.58	.00	-.14	-.13	-.11	.09	1.43
TIME	CETPD	CETPL	CRADND	CFADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
870.	-100.42	-71.29	80.88	.00	70.19	.00	-16.28	-16.09	3.26	14.98	171.69
TIME	ETPD	ETPL	ARADND	AFADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
900.	-.69	-.52	.47	.00	.38	.00	-.14	-.13	-.09	.00	1.18
TIME	CETPD	CETPL	CRADND	CFADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
900.	-121.26	-86.85	94.98	.00	81.73	.00	-20.35	-20.11	5.92	14.98	207.11
TIME	ETPD	ETPL	ARADND	AFADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
930.	-.76	-.76	.53	.00	.48	.00	-.14	-.13	-.09	-.14	1.30
TIME	CETPD	CETPL	CRADND	CFADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
930.	-144.03	-109.54	110.97	.00	96.15	.00	-24.42	-24.13	8.63	10.74	246.14

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. June 30, 1977. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
720.	..50	..49	.20	.26	.73	.31	.04	.03	.36	.22	1.35
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
720.	-14.99	-14.59	27.08	7.79	22.02	9.32	1.26	.88	10.84	6.54	40.48
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
750.	..46	..48	.94	.27	.78	.32	.05	.03	.44	.27	1.41
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
750.	-24.65	-29.06	55.30	15.86	45.48	19.04	2.73	1.89	23.92	14.53	82.77
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
780.	..61	..52	.99	.29	.81	.34	.05	.03	.33	.25	1.47
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
780.	-44.84	-44.75	85.11	24.50	69.81	29.36	4.31	2.94	33.96	22.13	126.87
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
810.	..79	..48	.96	.28	.80	.34	.05	.03	.12	.28	1.46
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
810.	-70.62	-59.22	113.98	33.04	93.75	39.61	5.86	3.98	37.50	30.54	170.60
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
840.	..73	..55	.90	.28	.79	.33	.05	.03	.12	.21	1.42
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
840.	-92.48	-75.83	140.88	41.39	117.60	49.64	7.25	4.99	41.15	36.78	213.25
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
870.	..82	..57	.86	.28	.77	.33	.04	.03	.00	.17	1.39
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
870.	-116.97	-92.98	166.55	49.68	140.77	59.50	8.43	5.91	41.15	41.88	254.82
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
930.	..55	..49	.74	.27	.67	.31	.04	.03	.15	.15	1.28
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
930.	-139.60	-107.60	188.84	57.64	160.77	68.82	9.53	6.76	45.72	46.41	293.13
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
960.	..55	..45	.66	.26	.61	.30	.03	.03	.08	.12	1.19
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
960.	-15.03	-121.23	208.49	65.36	178.94	77.75	10.54	7.56	48.01	50.15	328.92

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. July 1, 1977. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
600.	-.50	-.03	.71	.24	.58	.27	.03	.03	.18	.53	1.08
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
600.	-15.10	-.82	21.44	7.07	17.50	8.00	.85	.92	5.49	15.75	32.53
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
630.	-.36	-.44	.68	.23	.54	.26	.01	.01	.31	.09	106.02
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
630.	-24.81	-13.96	41.76	13.86	33.75	15.75	1.30	1.33	14.64	18.46	3213.25
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
660.	-.38	-.38	.58	.19	.46	.22	.02	.02	.17	.06	91.57
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
660.	-37.30	-25.36	59.15	19.54	47.60	22.29	1.99	1.93	19.86	20.31	5980.24
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
690.	-.45	-.36	.54	.18	.44	.21	.03	.02	.06	.05	86.75
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
690.	-50.84	-36.15	75.33	24.96	60.67	28.50	2.85	2.61	21.64	21.91	8562.64
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
720.	-.54	-.49	.73	.23	.61	.27	.03	.02	.16	.09	114.46
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
720.	-67.06	-50.86	97.15	31.96	78.94	36.64	3.79	3.34	26.30	24.74	*****
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
750.	-.54	-.43	.87	.27	.71	.32	.04	.03	.29	.26	13.25
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
750.	-83.34	-63.74	123.29	40.11	100.29	46.11	4.88	4.10	35.07	32.44	*****
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
780.	-.51	-.43	.83	.26	.69	.31	.04	.03	.28	.23	12.12
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
780.	-92.69	-76.64	148.21	47.93	120.87	55.29	6.19	4.95	43.33	39.27	*****
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
810.	-.50	-.50	1.00	.31	.83	.36	.04	.03	.46	.30	14.52
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
810.	-113.74	-91.62	178.31	57.25	145.77	66.21	7.41	5.79	57.16	48.36	*****
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
840.	-.31	-.49	.57	.29	.77	.34	.04	.03	.22	.25	13.34
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
840.	-122.96	-106.30	195.33	65.86	168.75	76.36	8.55	6.64	63.82	55.81	*****
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
870.	-.55	-.50	.89	.28	.75	.33	.04	.03	.31	.22	13.31
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
870.	-139.35	-121.35	222.13	74.21	191.15	86.29	9.73	7.52	73.06	62.28	*****

Appendix Table 3. Energy balance values for Liberty - Golden Liberty. July 5, 1977. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
660.	-.47	-.55	.71	.44	.67	.26	-.01	-.00	.24	.13	1.11
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
660.	-14.15	-16.46	21.25	7.11	20.10	7.68	-.16	-.12	7.27	3.76	33.25
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
690.	-.59	-.66	.80	.23	.79	.26	.02	.02	.18	.11	1.19
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
690.	-31.81	-36.17	45.14	14.04	43.65	15.50	.57	.52	12.76	6.96	69.04
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
720.	-.52	-.57	.85	.24	.83	.27	.03	.03	.29	.24	1.25
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
720.	-47.55	-53.13	70.72	21.11	68.56	23.71	1.59	1.33	21.58	14.10	106.62
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
750.	-.59	-.66	.91	.24	.87	.29	.05	.04	.28	.17	1.35
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
750.	-65.19	-73.04	98.09	28.21	94.71	32.32	3.05	2.45	29.85	19.21	147.11
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
780.	-.75	-.73	.88	.22	.82	.27	.05	.04	.07	.05	1.29
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
780.	-87.83	-94.91	124.42	34.89	119.23	40.50	4.60	3.70	31.99	20.62	165.78
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
810.	-.76	-.66	.88	.23	.78	.27	.05	.04	.07	.07	1.24
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
810.	-110.59	-114.84	150.75	41.64	142.60	48.68	6.07	5.03	34.10	22.73	223.01
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
960.	-.64	-.62	.82	.25	.74	.30	.02	.02	.16	.10	1.28
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
960.	-129.78	-133.34	175.30	49.14	164.71	57.61	6.76	5.67	38.76	25.70	261.32
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
990.	-.60	-.43	.62	.19	.49	.23	.02	.02	.00	.05	.95
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
990.	-147.67	-146.13	193.92	54.89	179.52	64.36	7.49	6.27	38.76	27.11	289.98
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
1050.	-.36	-.31	.44	.16	.37	.18	.02	.02	.05	.04	.76
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
1050.	-158.58	-155.55	207.08	59.88	190.67	69.89	8.14	6.80	40.36	28.33	312.65
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
1080.	-.35	-.31	.44	.18	.36	.21	.02	.01	.07	.03	.83
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
1080.	-169.10	-164.86	220.34	65.07	201.35	76.07	8.75	7.24	42.49	29.25	337.59
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
1100.	.01	.01	.01	.01	.01	.02	.02	.01	.00	.00	.12
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
1100.	-168.84	-164.59	220.72	65.50	201.54	76.57	9.36	7.68	42.52	29.27	341.70
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
1130.	-.01	-.01	.02	.02	.02	.02	.01	.01	.00	.00	.11
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
1130.	-169.05	-164.77	221.38	66.00	202.12	77.11	9.81	8.04	42.52	29.30	344.46
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
1160.	-.11	-.10	.13	.11	.13	.11	.01	.01	.01	.03	.43
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
1160.	-172.44	-167.70	225.42	69.25	206.15	80.54	10.09	8.28	42.89	30.17	357.47
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
1190.	.01	.00	.00	.03	.00	.03	.01	.01	.00	-.00	.16
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
1190.	-172.24	-167.66	225.42	70.25	206.25	81.50	10.36	8.45	42.89	30.14	362.17

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. July 6, 1977. Cont.

TIME	ETPC	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
600.	..20	..39	.61	.20	.54	.23	.01	.01	.41	.15	.94
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
600.	..93	..56	18.34	6.11	16.15	8.93	.16	.16	12.25	4.43	28.19
TIME	ETPC	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
630.	..35	..48	.71	.22	.65	.25	.01	.02	.35	.15	1.08
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
630.	..31	..10	39.59	12.71	35.67	14.50	.61	.64	22.67	8.93	60.72
TIME	ETPC	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
750.	..56	..48	.95	.26	.88	.32	.04	.03	.34	.37	1.41
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
750.	..21	..45	68.09	20.54	62.02	24.11	1.95	1.57	32.93	20.00	103.01
TIME	ETPC	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
780.	..51	..44	.92	.25	.85	.31	.04	.03	.36	.38	1.36
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
780.	..57	..52	95.55	28.07	87.50	33.43	3.18	2.45	43.80	31.52	143.86
TIME	ETPC	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
810.	..48	..42	.90	.25	.84	.31	.04	.03	.38	.39	1.35
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
810.	..95	..16	122.63	35.68	112.69	42.75	4.44	3.34	55.25	43.20	184.34
TIME	ETPC	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADT	
840.	..30	..41	.79	.23	.73	.28	.04	.03	.45	.29	1.19
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADT
840.	..85	..50	146.24	42.44	134.62	51.04	5.70	4.18	68.69	51.94	220.12

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. July 7, 1977. Cont.

TIME	ETP ⁿ	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
660.	.33	.37	.77	.24	.62	.28	.02	.02	.42	.23	1.23
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
660.	.0.88	.11.19	23.23	7.11	18.65	8.39	.65	.60	12.70	6.86	36.87
TIME	ETP ⁿ	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
690.	.37	.44	.82	.25	.70	.30	.03	.03	.42	.23	1.30
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
690.	.21.00	.24.49	47.77	14.54	39.52	17.25	1.59	1.41	25.19	13.62	75.90
TIME	ETP ⁿ	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
720.	.43	.44	.86	.25	.77	.31	.04	.03	.38	.30	1.37
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
720.	.34.02	.37.66	73.54	22.18	62.50	28.46	2.81	2.33	36.71	22.51	117.11
TIME	ETP ⁿ	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
750.	.37	.43	.90	.26	.80	.32	.05	.03	.48	.34	1.42
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
750.	.44.15	.50.52	100.63	30.11	86.54	38.21	4.27	3.34	51.20	32.68	199.76
TIME	ETP ⁿ	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
780.	.39	.45	.95	.27	.83	.33	.06	.03	.50	.34	1.45
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
780.	.54.87	.64.16	129.12	38.11	111.44	46.07	5.94	4.34	66.31	42.94	263.13

Appendix Table 3. Energy balance values for Liberty - Golden Liberty. July 11, 1977. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
660.	..37	..34	.70	.21	.56	.24	.01	.01	.31	.20	1.06
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
660.	..11.24	..10.21	21.07	6.29	16.73	7.29	.41	.44	9.42	6.08	31.81
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
690.	..44	..45	.79	.23	.63	.27	.02	.02	.32	.16	1.16
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
690.	..24.49	..23.62	44.67	13.07	35.58	15.29	1.06	1.09	19.12	10.87	66.51
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
720.	..30	..39	.57	.16	.46	.19	.03	.03	.24	.04	.86
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
720.	..37.51	..35.42	61.79	18.00	49.23	21.11	1.95	1.89	26.32	11.92	92.17
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
750.	..25	..35	.46	.14	.38	.17	.03	.03	.18	.00	.73
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
750.	..4.87	..45.92	75.61	22.29	60.58	28.14	2.93	2.73	31.81	11.92	114.22
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
780.	..41	..68	.93	.25	.78	.30	.03	.03	.49	.07	1.26
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
780.	..53.58	..66.29	103.54	29.82	83.85	35.25	3.87	3.90	46.39	14.06	184.70
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
810.	..38	..70	1.22	.31	1.03	.37	.07	.05	.76	.27	1.67
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
810.	..64.83	..87.23	140.13	39.07	114.62	48.50	6.02	5.11	69.27	22.27	204.94
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
840.	..49	..51	.91	.25	.78	.30	.04	.03	.37	.24	1.34
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
840.	..70.59	..102.46	167.30	46.84	127.98	55.64	7.20	5.99	80.51	29.53	245.06
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
900.	..47	..52	.83	.24	.69	.29	.04	.03	.32	.14	1.24
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
900.	..97.71	..118.08	192.32	53.86	158.65	69.21	8.39	6.92	90.22	33.66	282.29
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
930.	..52	..45	.74	.23	.62	.27	.04	.03	.18	.13	1.16
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
930.	..109.26	..131.64	214.51	60.75	177.12	78.29	9.48	7.84	95.77	37.64	316.99
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
960.	..58	..57	.73	.24	.60	.28	.03	.03	.12	.00	1.18
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
960.	..126.53	..148.73	236.33	67.93	195.10	88.64	10.50	8.73	99.30	37.64	352.41
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
990.	..70	..23	.37	.14	.31	.16	.02	.05	.04	.03	.67
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
990.	..13.63	..155.77	247.43	72.25	204.42	88.54	11.18	10.21	100.64	38.44	372.65
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
1020.	..18	..19	.19	.08	.16	.09	.02	.02	.00	.05	.40
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
1020.	..14.89	..161.51	253.26	74.71	209.33	88.32	11.72	10.74	100.64	37.08	384.58
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
1050.	..28	..29	.29	.14	.24	.15	.01	.01	.00	.07	.60
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
1050.	..149.19	..170.32	262.01	78.82	216.54	92.89	12.17	11.18	100.64	35.04	402.65
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENWD	ASENHLARADY	
1080.	..18	..23	.23	.12	.19	.13	.01	.01	.03	.05	.52
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSOIMD	CSOIML	CSENWD	CSENHL	CRADY
1080.	..154.67	..177.18	268.78	82.39	222.21	96.86	12.54	11.58	101.57	33.45	418.19

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. July 12, 1977. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
450.	.10	.01	.13	.04	.12	.04	.01	.01	.02	.10	.18
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
450.	3.09	.39	3.86	1.18	3.65	1.29	.24	.36	.52	2.90	5.42
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
480.	.08	.11	.12	.05	.10	.05	.01	.00	.04	.00	.20
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
480.	5.43	.55	7.34	2.64	6.73	2.93	.08	.28	1.83	2.90	11.57
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
510.	.12	.16	.18	.08	.15	.09	.00	.00	.07	.01	.34
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
510.	8.96	.42	12.79	5.07	11.35	5.57	.04	.24	3.87	2.69	21.69
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
540.	.24	.13	.47	.18	.38	.20	.00	.00	.23	.25	.77
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
540.	16.09	.31	26.80	10.57	22.69	11.64	.08	.32	10.79	10.06	44.82
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
570.	.24	.39	.56	.20	.45	.22	.00	.00	.32	.05	.92
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
570.	23.30	.08	43.73	16.54	36.06	18.36	.04	.44	20.47	11.54	72.29
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
600.	.26	.26	.63	.20	.50	.23	.01	.01	.35	.23	.98
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
600.	31.21	.88	62.63	22.68	51.06	28.36	.33	.80	31.10	18.37	161.57
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
630.	.28	.37	.71	.22	.57	.25	.02	.02	.41	.18	1.07
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
630.	39.56	.98	83.98	29.25	68.17	32.89	1.02	1.45	43.40	23.74	133.73
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
660.	.39	.36	.77	.23	.64	.27	.03	.03	.35	.25	1.12
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
660.	51.24	.70	107.21	36.14	87.31	46.89	1.99	2.25	53.97	31.35	167.35
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
690.	.56	.53	.84	.24	.69	.28	.04	.03	.23	.13	1.24
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
690.	68.13	.48	132.32	43.32	107.98	49.32	3.18	3.22	61.02	35.28	264.58
TIME	ETPD	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADY	
720.	.67	.33	.89	.25	.74	.29	.04	.04	.18	.37	1.33
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADY
720.	88.24	.47	159.03	50.79	130.10	58.14	4.36	4.30	66.43	46.32	244.34

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. July 14, 1977. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
570.	-.25	-.37	.47	.18	.36	.20	-.01	-.00	.23	.00	.82
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
570.	-7.49	-10.99	14.20	5.32	10.87	6.00	-.24	-.12	6.95	.00	24.58
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
600.	-.24	-.31	.58	.20	.46	.22	.00	.00	.34	.14	.94
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
600.	-14.55	-20.22	31.50	11.21	24.52	12.71	-.24	-.00	17.20	4.30	82.77
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
630.	-.39	-.13	.67	.21	.54	.24	.01	.01	.27	.39	1.07
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
630.	-26.28	-24.17	51.63	17.61	40.58	20.00	.08	.36	23.27	16.04	84.94
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
660.	-.06	-.37	.74	.22	.60	.26	.02	.02	.66	.21	1.14
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
660.	-27.97	-38.16	73.82	24.32	58.56	27.75	.69	.97	45.16	22.43	119.28
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
690.	.06	-.41	.81	.24	.67	.27	.03	.03	.84	.24	1.23
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
690.	-26.11	-44.44	98.09	31.39	78.75	38.96	1.59	1.81	70.39	29.50	186.14
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
720.	-.32	-.55	.87	.25	.73	.29	.04	.03	.51	.15	1.31
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
720.	-35.77	-63.92	124.23	38.75	100.77	44.87	2.73	2.86	85.73	33.99	195.54
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
750.	-.51	-.49	.92	.25	.77	.30	.05	.04	.36	.25	1.36
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
750.	-51.03	-78.52	151.69	46.32	123.94	59.50	4.15	4.02	96.51	41.40	286.39
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
780.	-.45	-.36	.95	.26	.80	.30	.05	.04	.45	.40	1.41
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
780.	-64.62	-89.42	180.28	54.00	148.08	62.61	5.78	5.23	109.88	53.43	278.67
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
810.	-.92	-.47	.97	.26	.81	.31	.05	.04	.00	.30	1.42
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
810.	-92.08	-103.56	209.25	61.79	172.31	71.86	7.29	6.43	109.88	62.31	321.32
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
840.	-.91	-.49	.95	.26	.81	.31	.05	.04	.00	.28	1.41
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
840.	-119.24	-118.35	237.84	69.50	196.63	81.07	8.71	7.68	109.88	70.60	363.61
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
870.	-.88	-.60	.93	.25	.80	.30	.05	.04	.00	.16	1.39
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
870.	-145.61	-138.39	265.67	77.14	220.58	90.14	10.18	8.93	109.88	75.26	485.18
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
900.	-.85	-.47	.89	.25	.74	.30	.05	.04	.00	.23	1.35
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
900.	-170.99	-150.49	292.48	84.75	242.79	99.11	11.60	10.13	109.88	82.16	445.66
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
960.	-.28	-.36	.64	.22	.54	.26	.04	.03	.32	.14	1.10
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
960.	-179.43	-161.42	311.66	91.46	258.85	106.82	12.70	11.18	119.53	86.24	478.55
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARABRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
990.	-.27	-.36	.54	.20	.47	.24	.03	.03	.24	.08	1.00
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRABRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
990.	-187.42	-172.19	327.74	97.61	272.88	113.89	13.68	12.14	126.65	88.55	508.55

Appendix Table 3. Energy balance values for Liberty - Golden Liberty. July 15, 1977. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
660.	-.20	-.35	.73	.23	.59	.26	.02	.02	.52	.22	1.11
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
660.	-5.87	-10.44	22.01	6.82	17.69	7.79	.65	.64	15.49	6.61	23.25
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
690.	-.26	-.16	.81	.24	.65	.28	.03	.03	.52	.46	1.19
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
690.	-13.54	-15.23	46.18	14.00	37.21	19.04	1.59	1.49	31.05	20.49	59.04
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
720.	-.25	-.47	.91	.25	.75	.30	.04	.04	.61	.24	1.35
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
720.	-21.14	-29.30	73.35	21.64	59.62	24.96	2.93	2.61	49.28	27.70	109.52
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
750.	-.29	-.41	.94	.26	.78	.30	.04	.04	.61	.32	1.39
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
750.	-29.84	-41.62	101.47	29.39	82.88	34.07	4.19	3.86	67.44	37.41	151.08
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
780.	-.31	-.43	.95	.26	.79	.31	.04	.04	.60	.31	1.41
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
780.	-39.00	-54.58	129.97	37.21	106.44	42.29	5.54	5.15	85.43	46.72	123.37
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
810.	-.34	-.38	.94	.26	.79	.31	.05	.05	.55	.36	1.40
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
810.	-49.18	-65.92	158.09	45.00	130.00	52.50	7.04	6.51	101.86	57.57	235.30
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
840.	-.38	-.41	.89	.26	.77	.30	.05	.04	.46	.31	1.37
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
840.	-60.60	-78.25	184.70	52.75	152.98	61.64	8.55	7.84	115.56	66.88	226.51

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. July 18, 1977. Cont.

TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
570.	+.12	+.16	+.41	.18	.39	.19	+.00	+.00	.30	.24	.78
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
570.	+.3.61	+.4.65	12.41	8.29	11.73	8.68	+.12	+.04	8.92	7.12	23.49
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
600.	+.17	+.30	.50	.20	.47	.21	.00	.00	.33	.17	.89
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
600.	+.8.70	+.13.66	27.55	11.14	25.87	12.04	+.08	.08	18.94	12.12	50.24
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
660.	+.18	+.06	.68	.23	.32	.25	.02	.02	.48	.24	1.12
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
660.	+.14.16	+.15.36	47.96	17.96	35.48	12.68	.41	.68	33.40	19.44	83.86
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
690.	+.11	.19	.74	.24	.71	.27	.02	.03	.61	.49	1.20
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
690.	+.17.50	+.21.00	70.25	28.11	56.63	27.75	1.02	1.45	51.73	34.19	120.00
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
720.	+.24	.16	.80	.24	.76	.28	.03	.03	.53	.88	1.28
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
720.	+.24.60	+.16.26	94.14	32.43	79.33	38.11	1.79	2.37	67.75	60.69	158.31
TIME	ETPD	ETPL	ARADND	ARADRD	ARADRL	ARADRL	ASBIMD	ASBIML	ASENHD	ASENHLARADT	
750.	+.25	+.26	.84	.25	.80	.29	.03	.04	.56	.50	1.33
TIME	CETPD	CETPL	CRADND	CRADRD	CRADRL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRADT
750.	+.32.12	+.24.21	119.25	39.93	103.27	44.75	2.73	3.46	84.40	75.60	178.07

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. July 20, 1977. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
480.	*.07	*.11	*.14	*.12	*.17	*.11	*.01	*.01	11.87	24.13	.45
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
480.	*2.16	*3.42	4.33	3.46	5.10	3.39	*.41	*.32	2.57	2.00	13.37
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
500.	*.12	*.17	*.35	*.16	*.33	*.17	*.01	*.01	19.80	38.16	.71
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
500.	*5.89	*8.56	14.86	8.39	15.10	8.43	*.61	*.48	9.58	7.02	34.70
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
520.	*.18	*.18	*.46	*.18	*.41	*.19	*.00	*.00	24.86	31.48	.83
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
520.	*11.34	*14.09	28.78	13.82	27.40	14.14	*.69	*.48	18.13	13.79	59.64
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
540.	*.10	*.33	*.61	*.22	*.57	*.24	*.01	*.01	14.02	100.84	1.05
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
540.	*14.33	*24.03	47.02	20.39	44.52	21.29	*.33	*.16	33.01	20.65	91.08
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
560.	*.17	*.25	*.72	*.23	*.59	*.25	*.02	*.02	26.90	65.40	1.13
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
560.	*17.29	*31.39	68.56	27.32	62.21	28.82	*.28	*.40	48.98	30.42	125.06
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
580.	*.21	*.24	*.79	*.24	*.66	*.27	*.02	*.03	32.26	53.09	1.22
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
580.	*25.68	*38.71	92.35	34.54	81.92	36.79	*.98	1.17	65.69	42.05	161.57
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
600.	*.86	*.07	*.90	*.26	*.75	*.29	*.04	*.04	173.31	.00	1.27
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
600.	*51.40	*40.94	119.25	42.29	104.52	45.54	2.16	2.45	65.69	61.12	202.77
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
620.	*.17	*.30	*.62	*.23	*.60	*.25	*.04	*.04	17.49	49.07	1.16
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
620.	*56.54	*50.03	137.96	49.14	122.60	53.11	3.30	3.62	78.13	68.95	237.47
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
640.	*.07	*.18	*.54	*.22	*.53	*.24	*.04	*.04	33.90	130.55	1.06
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
640.	*58.57	*55.53	154.14	55.71	138.37	60.25	4.40	4.71	91.17	78.13	269.28
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
660.	*.03	*.14	*.28	*.14	*.27	*.14	*.03	*.03	13.62	161.88	.65
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
660.	*59.40	*59.81	162.51	59.79	146.44	64.54	5.33	5.63	97.78	81.00	288.79
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
680.	*.08	*.01	*.11	*.61	*.10	*.06	*.03	*.03	115.60	*39.74	.33
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
680.	*58.99	*59.37	165.71	78.00	149.33	66.39	6.23	6.43	102.49	83.53	298.55
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	RRL	BRD	ARADT
700.	*.02	*.02	*.01	*.20	*.00	*.02	*.02	*.02	.00	*4.52	.16
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAOT
700.	*58.29	*58.64	165.89	84.07	149.33	67.04	6.96	7.16	102.64	83.53	303.25

Appendix Table 3. Energy balance values for Liberty - Golden Liberty. July 27, 1977. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
480	*.04	*.01	.15	.11	.15	.10	*.01	*.01	492.31	61.13	.40
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
480	*1.21	*.19	4.42	3.25	4.42	3.00	*.45	*.40	3.65	4.63	11.93
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
510	*.01	*.02	.31	.15	.29	.13	*.01	*.02	264.97	632.28	.44
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
510	*1.49	*.77	13.73	7.68	13.08	6.86	*.12	*.08	12.36	12.22	24.19
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
540	*.19	*.16	.40	.17	.34	.16	*.01	*.01	19.68	22.49	.73
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
540	*1.13	*5.67	25.77	12.86	23.17	11.61	*.04	*.52	18.60	16.98	50.24
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
570	*.05	*.19	.49	.20	.40	.18	*.01	*.01	20.38	159.74	.81
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
570	*8.74	*11.52	40.34	18.75	35.29	17.11	*.28	*.92	31.32	22.84	74.44
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
600	*.21	*.26	.56	.21	.47	.21	*.01	*.01	15.42	32.45	.89
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
600	*15.10	*19.35	57.18	25.11	49.42	23.29	*.61	*.29	41.47	28.79	101.70
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
630	*.10	*.24	.63	.23	.54	.22	*.02	*.02	23.21	103.40	1.00
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
630	*1.11	*26.61	76.08	31.93	65.48	30.00	1.14	1.77	56.83	37.10	131.20
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
660	*.11	*.17	.69	.24	.62	.24	*.02	*.02	50.14	107.67	1.07
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
660	*21.28	*31.77	96.77	39.18	84.04	37.14	1.87	2.45	73.62	49.82	163.37
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
690	*.00	*.25	.75	.25	.67	.25	*.03	*.03	31.83	#####	1.19
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
690	*21.18	*39.19	119.34	46.82	104.04	44.68	2.65	3.38	95.52	61.47	199.16
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
930	*.06	*.27	.57	.21	.51	.20	*.04	*.04	15.54	165.29	.98
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
930	*2.93	*4.27	136.36	53.18	119.42	50.79	3.70	4.50	109.73	67.65	228.43
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
960	*.06	*.10	.20	.09	.18	.08	*.03	*.03	9.68	32.32	.42
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
960	*24.84	*50.21	142.29	55.75	124.81	53.29	4.68	5.55	112.77	69.05	241.08
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
990	*.08	*.09	.23	.10	.22	.10	*.03	*.03	20.72	32.61	.51
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
990	*27.18	*53.03	149.25	58.86	131.44	46.14	5.54	6.47	116.53	71.93	256.76
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
1080	*.02	*.19	.32	.18	.29	.17	*.02	*.03	9.12	224.77	.75
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
1080	*27.91	*58.61	158.75	64.32	140.29	41.29	6.23	7.24	124.61	74.44	278.67
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
1110	*.06	*.18	.18	.15	.20	.13	*.02	*.03	.00	31.37	.58
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
1110	*29.83	*63.90	164.29	68.68	146.35	65.29	6.88	8.00	127.59	74.44	296.02
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
1140	*.04	*.18	.10	.13	.12	.11	*.02	*.02	.9.35	18.15	.48
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
1140	*31.12	*69.41	167.30	72.46	150.00	68.64	7.45	8.49	128.74	71.90	310.48
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASOIHND	ASOIHML	RRL	BRD	ARADYT
1170	*.09	*.07	.03	.08	.05	.07	*.02	*.02	10.32	17.71	.33
TIME	CETPD	CETPL	CRAQND	CRAQRD	CRAQNL	CRAQRL	CSOIHND	CSOIHML	CSENHND	CSENHML	CRAQYT
1170	*34.92	*71.39	168.15	74.93	151.54	70.79	7.94	9.25	126.29	70.90	320.24

Appendix Table 3. Energy balance values for Liberty - Golden Liberty. July 29, 1977. Cont.

TIME	ETPD	ETPL	ARAND	ARARD	ARADRL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADY	
600.	-.41	-.48	.51	.23	.49	.21	.01	.01	.09	.00	.92
TIME	CETPD	CETPL	CRAND	CRARD	CRADRL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADY
600.	-12.31	-14.47	15.33	6.79	14.71	6.18	.28	.24	2.73	.00	27.47
TIME	ETPD	ETPL	ARAND	ARARD	ARADRL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADY	
630.	-.05	-.15	.59	.24	.55	.23	.02	.01	.52	.39	1.02
TIME	CETPD	CETPL	CRAND	CRARD	CRADRL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADY
630.	-13.87	-18.98	32.92	14.07	31.25	12.96	.77	.68	18.27	11.58	58.19
TIME	ETPD	ETPL	ARAND	ARARD	ARADRL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADY	
660.	-.13	-.13	.65	.26	.61	.24	.02	.02	.50	.45	1.12
TIME	CETPD	CETPL	CRAND	CRARD	CRADRL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADY
660.	-17.75	-22.98	52.29	21.75	49.52	26.18	1.38	1.37	33.15	25.17	21.81
TIME	ETPD	ETPL	ARAND	ARARD	ARADRL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADY	
720.	-.71	-.24	.74	.27	.69	.26	.03	.03	.00	.41	1.25
TIME	CETPD	CETPL	CRAND	CRARD	CRADRL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADY
720.	-39.00	-30.13	74.39	29.96	70.10	28.04	2.24	2.41	33.15	37.55	129.40
TIME	ETPD	ETPL	ARAND	ARARD	ARADRL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADY	
810.	-.22	-.15	.82	.29	.78	.28	.04	.05	.56	.58	1.36
TIME	CETPD	CETPL	CRAND	CRARD	CRADRL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADY
810.	-45.52	-34.57	99.03	38.71	93.46	36.50	3.42	3.82	50.09	55.07	120.24
TIME	ETPD	ETPL	ARAND	ARARD	ARADRL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADY	
840.	-.08	-.17	.54	.21	.52	.20	.04	.05	.42	.30	.94
TIME	CETPD	CETPL	CRAND	CRARD	CRADRL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADY
840.	-48.03	-39.65	115.30	44.89	108.94	42.39	4.64	5.23	62.63	64.07	128.43
TIME	ETPD	ETPL	ARAND	ARARD	ARADRL	ARADRL	ASOIMD	ASOIML	ASENHD	ASENHLARADY	
870.	-.29	.01	.71	.27	.70	.26	.04	.04	.38	.67	1.20
TIME	CETPD	CETPL	CRAND	CRARD	CRADRL	CRADRL	CSOIMD	CSOIML	CSENHD	CSENHL	CRADY
870.	-56.75	-39.23	136.55	53.00	129.81	50.11	5.82	6.55	73.98	84.02	234.58

Appendix Table 3. Energy balance values for Liberty - Golden
Liberty. August 1, 1977. Cont.

TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
540.	-.07	-.38	.46	.23	.38	.20	.00	.00	.38	.00	.84
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
540.	-2.24	-11.27	13.73	6.82	11.35	6.07	.08	.08	11.41	.00	25.30
TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
570.	-.25	-.14	.55	.25	.45	.23	.01	.01	.28	.29	.95
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
570.	-9.88	-15.52	30.09	14.32	24.71	12.86	.49	.40	19.72	8.79	53.86
TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
600.	-.15	-.10	.61	.27	.50	.25	.02	.02	.44	.38	1.06
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
600.	-14.51	-18.58	48.53	22.36	39.62	20.21	1.14	.97	32.88	20.07	85.66
TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
630.	-.06	-.09	.67	.28	.56	.26	.02	.03	.58	.44	1.16
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
630.	-16.44	-21.31	65.68	30.82	56.38	28.04	1.87	1.77	60.34	33.26	120.36
TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
660.	-.14	-.09	.73	.29	.60	.27	.03	.03	.56	.48	1.23
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
660.	-20.69	-23.98	90.47	39.66	74.33	38.18	2.73	2.82	67.08	47.53	187.23
TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
690.	-.21	-.21	.77	.30	.63	.28	.03	.04	.55	.38	1.29
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
690.	-26.87	-30.35	113.70	48.71	93.37	46.61	3.74	4.02	83.08	58.99	195.90
TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
720.	-.21	-.18	.82	.31	.66	.29	.04	.04	.57	.44	1.33
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
720.	-33.09	-35.63	138.24	58.04	113.27	59.29	4.88	5.35	100.27	72.29	235.66
TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
810.	.01	.03	.81	.32	.71	.30	.04	.05	.78	.63	1.33
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
810.	-32.79	-36.58	162.51	67.54	134.52	62.25	6.15	6.84	123.67	91.10	275.42
TIME	ETPD	ETPL	ARAND	APARD	ARADNL	ARADRL	ASOIMD	ASOIML	ASENHO	ASENMLARADY	
840.	-.03	-.19	.75	.31	.69	.29	.04	.05	.68	.45	1.30
TIME	CETPD	CETPL	CRAOND	CRAORD	CRAONL	CRAORL	CSOIMD	CSOIML	CSENHO	CSENML	CREDY
840.	-33.76	-42.39	185.08	76.86	185.19	71.07	7.41	8.28	143.91	104.51	374.46

Appendix Table 3. Energy balance values for Liberty - Golden Liberty. August 2, 1977. Cont.

TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
600.	*.20	*.28	*.43	*.24	*.42	*.21	*.00	*.00	10.03	23.10	*.87
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
600.	*5.93	*8.44	12.79	7.21	12.69	6.32	*.12	*.08	6.74	4.17	26.02
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
630.	*.56	*.20	*.52	*.26	*.50	*.23	*.01	*.01	29.33	*1.99	*.98
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
630.	*22.68	*14.40	28.31	15.04	27.60	13.29	*.53	*.40	5.10	12.79	55.30
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
660.	*.28	*.25	*.59	*.28	*.57	*.25	*.02	*.02	24.32	19.90	1.08
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
660.	*31.21	*21.92	45.89	23.36	44.71	20.82	1.22	1.01	13.46	21.79	87.83
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
690.	*.31	*.29	*.65	*.29	*.64	*.27	*.03	*.03	22.08	20.57	1.17
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
690.	*40.52	*30.68	65.45	32.14	63.85	28.86	2.04	1.85	22.90	31.32	122.89
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
720.	*.34	*.35	*.71	*.31	*.69	*.28	*.03	*.04	17.25	20.22	1.25
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
720.	*50.74	*41.32	86.71	41.32	84.62	37.29	2.89	2.94	33.08	40.36	160.48
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
810.	*.62	*.58	*.66	*.27	*.63	*.25	*.04	*.05	*.00	*.00	1.14
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
810.	*69.27	*58.72	106.46	49.46	103.46	44.93	4.11	4.38	33.08	40.36	194.82
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
900.	*.04	*.17	*.73	*.32	*.72	*.30	*.04	*.05	58.87	303.52	1.30
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
900.	*70.57	*63.93	128.46	58.93	125.19	53.96	5.37	5.79	52.52	55.47	233.86
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
930.	*.05	*.12	*.57	*.26	*.55	*.25	*.04	*.05	65.43	203.90	1.08
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
930.	*72.00	*67.53	145.49	66.86	141.83	61.50	6.64	7.20	66.85	67.10	266.39
TIME	ETPU	ETPL	ARADND	ARADRD	ARADNL	ARADRL	ASBIMD	ASBIML	BRL	HRD	ARADT
960.	*.01	*.12	*.44	*.22	*.44	*.21	*.04	*.04	44.23	1150.05	*.90
TIME	CETPD	CETPL	CRADND	CRADRD	CRADNL	CRADRL	CSBIMD	CSBIML	CSENHD	CSENHL	CRAUT
960.	*72.20	*71.23	158.56	73.50	154.90	67.75	7.86	8.53	78.50	75.15	293.49

Appendix Table 4. Reflected radiation / total radiation for Compana
- Golden Compana. 1976.

Time	July 2		July 3		July 4		July 5		July 6		July 7		July 8	
	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.
360									.40	.40				
380			.25	.25	.40	.40								
400			.29	.29							.33	.33		
420			.30	.30							.30	.30		
440			.26	.29	.28	.28	.26	.29			.33	.33		
460			.28	.31	.25	.27	.25	.27			.35	.25		
480			.26	.29	.25	.26	.25	.27			.27	.30		
500			.25	.27	.25	.28	.23	.25						
520			.24	.25	.20	.24	.22	.25			.17	.25		
540			.22	.25	.37	.78	.22	.23			.24	.26		
560			.23	.25	.23	.23	.25	.27			.21	.21		
580			.22	.24	.35	.31					.22	.25		
600			.22	.23										
620			.21	.23							.27	.27		
640			.21	.23	.23	.24	.20	.21			.24	.22		
660			.21	.22							.18	.20		
680			.20	.21	.20	.22	.19	.21	.20	.21				
700			.20	.21	.21	.23	.20	.21			.20	.22	.40	.42
720			.20	.22	.22	.23					.20	.21	.38	.40
740	.19	.21	.20	.21	.20	.23					.19	.21		
760	.18	.21			.17	.23	.19	.20					.38	.39
780	.20	.22	.20	.21			.19	.20						
800							.19	.20			.15	.22	.39	.34
820							.19	.20			.19	.21		
840							.19	.21	.19	.20	.20	.21		
860			.21	.19	.19	.21							.39	.41
880	.19	.21			.18	.19	.19	.21	.19	.20			.41	.42
900			.20	.21	.22	.23			.19	.21	.20	.22	.38	.33
920	.20	.21									.22	.22	.41	.43
940	.20	.22	.20	.21	.21	.19	.20	.22	.20	.21			.43	.45
960	.21	.22			.21	.24			.20	.21	.24	.24		
980	.16	.20			.23	.23	.21	.23	.20	.23	.22	.24		
1000	.20	.23	.22	.23	.25	.25			.21	.23	.22	.25	.47	.43
1020	.23	.25	.21	.23					.21	.23	.25	.25		
1040	.22	.24							.22	.24	.22	.22		
1060	.21	.24					.24	.19			.22	.22	.21	.25
1080	.22	.25	.20	.20			.23	.26			.24	.28	.22	.27
1100	.23	.26	.23	.23							.25	.25	.22	.26
1120	.25	.26	.23	.25			.25	.27			.25	.25	.24	.27
1140	.25	.27	.21	.26			.24	.27			.25	.25	.24	.28
1160	.25	.28	.24	.26			.29	.29					.24	.15
1180	.27	.30	.28	.28			.26	.32			.22	.22	.25	.31
1200	.29	.29					.29	.29			.20	.20	.26	.30
1220	.29	.29	.25	.30			.33	.33					.33	.33
1240	.29	.29	.25	.25										
1260														
1280														
1300														
Mean	.22	.23	.23	.24	.24	.27	.23	.24	.22	.23	.23	.22	.34	.35

Appendix Table 4. Reflected radiation / total radiation for Compana
- Golden Compana. 1976. Cont.

Time	July 13		July 14		July 15		July 20		July 22		July 23		July 25	
	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.
360														
380														
400														
420														
440														
460														
480														
500														
520														
540														
560														
580									.44	.48				
600									.45	.47				
620									.40	.43	.57	.54		
640									.32	.34	.45	.50		
660									.36	.40	.40	.46	.28	.28
680			.19	.21					.36	.40	.34	.43		
700	.40	.42	.19	.21					.35	.37	.34	.39		
720	.38	.40	.18	.21									.23	.27
740			.19	.20			.55	.58						
760	.38	.39	.19	.20	.20	.22	.47	.50						
780			.17	.19										
800	.39	.34			.20	.22							.23	.24
820			.18	.19										
840														
860	.39	.41	.19	.20					.32	.34				
880	.41	.42	.18	.20			.46	.49						
900	.38	.33	.19	.20	.20	.21			.32	.34			.22	.24
920	.41	.43	.19	.21			.44	.47					.33	.24
940	.43	.45					.53	.55					.39	.41
960			.20	.22									.36	.37
980			.20	.23										
1000	.47	.43	.24	.28									.33	.40
1020					.21	.23							.31	.31
1040														
1060	.21	.25	.23	.27	.21	.24								
1080	.22	.27	.23	.27										
1100	.22	.26												
1120	.24	.27	.28	.31	.23	.25							.27	.32
1140	.24	.28			.23	.27							.29	.33
1160	.25	.15			.23	.27								
1180	.25	.31	.34	.38	.25	.28							.26	.48
1200	.26	.30			.25	.29			.40	.44			.40	.47
1220	.33	.33			.26	.31			.41	.44				
1240					.27	.30			.42	.47				
1260					.27	.32			.45	.50				
1280					.31	.31			.49	.53				
1300					.33	.33								
Mean	.34	.35	.21	.22	.24	.27	.49	.51	.39	.43	.41	.46	.30	.34

Appendix Table 4. Reflected radiation / total radiation for Compana
- Golden Compana. 1976. Cont.

Time	July 28		July 29		Season	
	C.	G.C.	C.	G.C.	C.	G.C.
360						
380						
400						
420						
440						
460						
480						
500						
520						
540						
560			.24	.27		
580			.24	.28		
600						
620						
640	.44	.45				
660	.20	.23				
680	.20	.22				
700			.20	.23		
720	.20	.21	.22	.23		
740						
760	.19	.20				
780			.20	.22		
800						
820	.19	.21				
840	.19	.20				
860						
880	.19	.21				
900			.22	.24		
920			.21	.23		
940	.21	.22	.23	.23		
960						
980						
1000			.22	.25		
1020						
1040			.22	.25		
1060			.22	.25		
1080						
1100						
1120						
1140						
1160						
1180						
1200	.25	.28				
1220	.25	.29				
1240	.26	.31	.29	.29		
1260	.27	.30	.20	.25		
1280	.27	.32	.22	.22		
1300			.29	.29		
Mean	.24	.26	.23	.25	.28	.30

Appendix Table 5. Reflected radiation / total radiation for Liberty
- Golden Liberty. 1977.

Time	June 30		July 5		July 6		July 7		July 11		July 12		July 14	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
390							.27	.27						
420							.26	.30						
450							.28	.31			.22	.22		
480							.25	.27			.25	.25		
510							.25	.26			.24	.26		
540							.23	.26			.23	.26		
570							.22	.25			.22	.24	.22	.24
600					.21	.24	.21	.24			.20	.23	.21	.23
630					.20	.23					.21	.23	.20	.22
660			.22	.23			.20	.23	.20	.23	.21	.24	.19	.23
690			.19	.22			.19	.23	.20	.23	.19	.23	.20	.22
720	.19	.23	.19	.22			.18	.23	.19	.22	.19	.22	.19	.22
750	.19	.23	.18	.21	.18	.23	.18	.23	.19	.23			.18	.22
780	.20	.23	.17	.21	.18	.23	.19	.23	.19	.22			.18	.21
810	.19	.23	.19	.22	.19	.23							.18	.22
840	.20	.23			.19	.24			.19	.22			.18	.22
870	.20	.24			.19	.24			.19	.22			.18	.22
900	.21	.24			.19	.23			.19	.23			.19	.22
930	.22	.25			.20	.24			.20	.23				
960			.20	.23	.21	.24			.20	.24			.20	.24
990			.20	.24	.21	.23			.21	.24			.20	.24
1020					.21	.21			.20	.23				
1050			.21	.24	.23	.25			.23	.25				
1080			.22	.25	.24	.27			.23	.25				
1110					.25	.27								
1140			.18	.18	.27	.28								
1170			.26	.26	.26	.28								
1200			.19	.19	.27	.27								
1230					.18	.18								
1260					.25	.13								
Mean	.20	.24	.20	.22	.22	.24	.22	.25	.20	.23	.22	.24	.19	.23

Appendix Table 5. Reflected radiation / total radiation for Liberty
- Golden Liberty. 1977. Cont.

Time	July 15		July 18		July 20		July 27		July 29		Aug. 1		Aug. 2	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
390														
420														
450														
480					.27	.24	.28	.25						
510					.23	.23	.28	.24						
540					.23	.24	.23	.22			.27	.24		
570			.23	.24	.22	.23	.25	.22			.26	.24		
600			.22	.24			.24	.24	.25	.23	.25	.24	.28	.24
630			.21	.22	.21	.23	.23	.22	.29	.23	.24	.22	.27	.23
660	.21	.23	.20	.23	.20	.22	.22	.22	.23	.21	.24	.22	.26	.23
690	.20	.24	.19	.22	.20	.22	.21	.21	.22	.21	.23	.22	.25	.23
720	.19	.22	.19	.22	.20	.21	.20	.20	.21	.21	.23	.22	.25	.22
750	.19	.22											.24	.22
780	.18	.22			.19	.21							.24	.22
810	.19	.22					.21	.21	.22	.21	.24	.23	.24	.22
840	.19	.22			.19	.21			.23	.22	.24	.22	.23	.22
870							.22	.22	.23	.22			.24	.23
900					.20	.22	.21	.20					.25	.23
930							.21	.20					.24	.23
960					.20	.22	.21	.19					.24	.23
990					.21	.23	.20	.20						
1020					.21	.22								
1050					.22	.22	.24	.23						
1080							.24	.23						
1110							.26	.22						
1140							.27	.23						
1170							.24	.21						
1200														
1230														
1260														
Mean	.19	.23	.19	.22	.20	.22	.23	.22	.23	.22	.24	.23	.25	.23

Appendix Table 5. Reflected radiation / total radiation for Liberty -
Golden Liberty. 1977. Cont.

Time	Aug. 5		Season	
	L.	G.L.	L.	G.L.
390				
420				
450				
480				
510				
540				
570	.28	.23		
600	.27	.24		
630	.27	.24		
660	.24	.22		
690	.25	.24		
720	.26	.25		
750	.26	.23		
780	.25	.23		
810	.24	.23		
840	.25	.23		
870				
900				
930				
960				
990				
1020				
1050				
1080				
1110				
1140				
1170				
1200				
1230				
1260				
Mean	.26	.23	.22	.23

Appendix Table 6. Linear regression for net radiation vs. reflected radiation, 1976.

Date	Compana			Golden Compana		
	r^2	a	b	r^2	a	b
July 2	.92	-.14	3.67	.97	-.11	2.92
3	.94	-.06	3.33	.95	-.07	2.76
4	.96	-.07	3.43	.89	-.03	2.39
5	.86	-.07	3.44	.96	-.10	3.12
6	.98	-.10	3.97	.97	-.03	2.89
7	.96	-.05	3.63	.97	-.05	2.91
8	.85	-.64	5.90	.98	-.47	4.44
13	.97	-.05	1.96	.96	-.05	1.63
14	.92	-.40	5.18	.91	-.32	4.12
15	.96	-.13	3.55	.94	-.12	2.81
20	.94	-2.65	6.69	.96	-1.84	4.63
22	.83	-1.29	5.30	.88	-.78	3.34
23	.94	-.27	2.54	.98	-.21	1.78
25	.95	-.13	3.34	.88	-.15	2.67
26	.87	-.08	1.45	.90	-.07	1.32
28	.98	-.37	4.86	.95	-.34	3.92

Appendix Table 6. Linear regression for net radiation vs. reflected radiation, 1976. cont.

Date	Compana			Golden compana		
	r^2	a	b	r^2	a	b
July 29	.98	-.07	3.36	.97	-.06	2.50
Mean		-.39	3.86		-.28	2.95

Appendix Table 7. Linear regression for net radiation vs. reflected radiation, 1977.

Date	Liberty			Golden liberty		
	r^2	a	b	r^2	a	b
July 1	.98	-.11	3.57	.99	-.11	2.61
5	.93	-.12	3.89	.92	-.11	3.10
6	.89	-.18	3.86	.93	-.13	2.90
7	.95	-.20	3.97	.97	-.16	2.81
11	.95	-.24	4.51	.97	-.18	3.09
12	.96	-.07	3.58	.96	-.04	2.45
14	.97	-.69	6.35	.96	-.49	4.21
15	.90	-.73	6.42	.96	-.53	4.29
18	.98	-.72	6.21	.61	-.42	4.03
20	.93	-.48	5.10	.97	-.09	2.73
27	.91	-.27	3.84	.93	-.17	3.25
29	.82	-.17	3.21	.93	-.19	3.36
Aug. 1	.97	-.46	4.04	.98	-.33	3.44
2	.87	-.33	3.44	.94	-.26	3.36
5	.98	-.10	2.76	.99	-.04	2.37
Mean		-.32	4.32		-.22	3.20

Appendix Table 8. Evapotranspiration / net radiation for Compana -
Golden Compana. 1976.

Time	July 4		July 5		July 6		July 7		July 8		July 13		July 14	
	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.
640														
660														
680														
700	.93	.94												
720							.02	.08						
740							.04	.13						
760	.28	.07	.00	.02										
780			.03	.16										
800			.00	.33			.02	.07						
820			.00	.95			.03	.16						
840			.00	.06	.01	.02	.25	.08						
860			.00	.13										
880					.01	.95	.02	.30						
900					.00	.42	.37	.12			.01	.01	.00	.04
920											.01	.03	.02	.12
940	.05	.92									.00	.03		
960	.04	.04	.00	.10					.03	.02			.00	.07
980	.08	.12	.03	.24	.01	.94	.96	.37	.00	.16	.04	.10		
1000					.11	.13					.23	.00	.02	.02
1020			.00	.50	.05	.18								
1040			.00	.10										
1060											.23	.02	.00	.02
1080											.02	.05	.08	.05
1100											.00	.03		
1120													.04	.15
1140														
1160														
1180														
1200														
1220									.03	.26				
1240														
Mean	.28	.42	.01	.24	.03	.44	.21	.16	.02	.12	.07	.03	.02	.06

Appendix Table 8. Evapotranspiration / net radiation for
Compana - Golden Compana. 1976. Cont.

Time	July 15		July 28		July 29		Aug. 3		Aug. 5		Season	
	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.
640												
660							.00	.02				
680							.00	.02				
700					.00	.02			.01	.03		
720					.01	.00	.00	.96	.01	.08		
740									.07	.00		
760	.02	.05			.00	.01						
780					.00	.02						
800												
820			.00	.04					.01	.00		
840												
860												
880												
900	.02	.19	.01	.01								
920			.00	.02	.00	.11			.02	.03		
940			.00	.03	.03	.85						
960									.01	.20		
980												
1000												
1020	.01	.01										
1040												
1060	.01	.02										
1080									.00	.05		
1100												
1120												
1140	.02	.09										
1160	.09	.01										
1180												
1200									.00	.06		
1220												
1240	.88	.14										
Mean	.15	.20	.00	.02	.01	.14	.00	.25	.02	.06	.07	.18

Appendix Table 9. Evapotranspiration / net radiation for Liberty - Golden Liberty. 1977.

Time	June 24		June 27		June 30		July 1		July 5		July 6		July 7	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
420													2.00	3.00
450													.82	1.18
480													.48	.56
510	1.81	6.33											.28	.36
540	1.61	2.31											.26	.44
570	1.39	1.91											.07	1.00
600	1.26	1.08					.70	.05			.33	.72	.36	.78
630	1.45	1.75					.53	.81			.49	.74		
660	1.08	1.87					.66	.83	.66	.82			.43	.60
690	1.37	1.29					.83	.82	.74	.84			.45	.63
720	1.28	1.07			.56	.67	.74	.80	.61	.69			.50	.57
750	1.41	1.22	1.20	.83	.49	.62	.62	.80	.65	.76	.59	.55	.41	.54
780	1.40	1.34			.62	.64	.61	.62	.85	.89	.55	.52	.41	.54
810	1.84	1.74	1.20	.93	.82	.60	.80	.60	.86	.85	.53	.50		
840	1.57	1.22	1.20	1.22	.81	.70	.54	.64			.38	.56		
870			1.36	1.07	.95	.74	.62	.67			.75	.11		
900			1.47	1.37							.91	.71		
930			1.43	1.58	.74	.73					.74	.31		
960					.83	.74			.78	.84	.70	.48		
990									.97	.88	.73	.81		
1020											.69	1.21		
1050									.82	.84	.77	1.25		
1080									.80	.86	.76	.86		
1110									1.00	1.00	.64	.80		
1140									.50	.50	.57	.90		
1170									.85	.77	.64	1.00		
1200											.60	1.17		
1230														
1260											1.25	2.25		
Mean	1.46	1.93	1.31	1.17	.73	.68	.64	.66	.78	.81	.68	.81	.54	.85

Appendix Table 9. Evapotranspiration / net radiation for Liberty - Golden Liberty. 1977. Cont.

Time	July 11		July 12		July 14		July 15		July 18		July 20		July 27	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
420														
450			.77	.08							.50	.65		
480			.67	1.10							.11	.46	.27	.07
510			.67	1.07							.34	.52	.03	.07
540			.51	.34							.39	.44	.98	.47
570			.43	.87	.53	1.03			.29	.41			.10	.48
600			.41	.52	.41	.67			.34	.64	.16	.58	.38	.55
630			.39	.65	.58	.24					.24	.42	.16	.44
660	.53	.61	.51	.56	.08	.62	.27	.59	.26	.19	.27	.36	.16	.27
690	.56	.71	.67	.77	.07	.61	.32	.25	.15	.27	.10	.41	.00	.37
720	.53	.85	.75	.45	.37	.75	.27	.63	.30	.21			.31	.38
750	.54	.92			.55	.64	.31	.53	.30	.33				
780	.44	.87			.47	.45	.33	.54			.35	.33		
810					.95	.58	.36	.48					.16	.42
840	.31	.68			.96	.60	.43	.53			.96	.09		
870	.54	.65			.96	.64							.19	.45
900	.57	.75			.44	.67							.16	.40
930	.70	.73			.50	.77					.23	.45	.11	.53
960	.79	.95											.30	.56
990	.81	.74									.27	.50	.35	.41
1020	.95	1.19									.13	.34		
1050	.97	1.21									.09	.40	.30	.70
1080	.78	1.21									.11	.52	.06	.66
1110											.73	.10	.33	.90
1140													.40	1.50
1170													3.00	1.40
1200														
1230														
1260														
Mean	.64	.86	.58	.64	.56	.64	.33	.51	.27	.34	.31	.41	.39	.55

Appendix Table 9. Evapotranspiration / net radiation for Liberty -
Golden Liberty. 1977. Cont.

Time	July 29		Aug. 1		Aug. 2		Aug. 5		Season	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
420										
450										
480										
510										
540			.15	1.00						
570			.45	.31						
600	.80	.98	.25	.20	.47	.67	1.17	.00		
630	.08	.27	.09	.16	1.08	.40	.24	.25		
660	.20	.21	.19	.15	.47	.44	.34	.11		
690			.27	.33	.48	.45	.64	.11		
720	.96	.35	.26	.27	.48	.51	1.74	.25		
750					.31	.22	.18	.09		
780					.49	.25	.59	.07		
810	.27	.19	.01	.04	.94	.92	.98	.17		
840	.15	.33	.04	.28	.30	.25	.20	.00		
870	.41	.01			.04	.16	.63	.05		
900	.23	.44			.05	.24				
930					.09	.22				
960					.02	.27				
990										
1020										
1050										
1080										
1110										
1140										
1170										
1200										
1230										
1260										
Mean	.39	.35	.19	.30	.40	.38	.67	.10	.60	.67

Appendix Table 10. Biweekly soil water use (in) for Compana and Golden Compana. Bozeman farm (1975).

Depth (in.)	June						July													
	25		30		3		8		10		14		17		21		24		28	
	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.
6-12	.06	.07	.15	.16	.15	.15	.03	.02	.05	.06	.02	.00	-.01	-.03	-.02	.01	.06	.05	-.26	-.21
12-18	.07	.05	.09	.07	.26	.19	.06	.08	.10	.13	.00	.03	.03	.01	.00	-.01	.03	.04	.01	.00
18-24	.07	.06	.05	.02	.20	.20	.11	.03	.17	.23	.02	.05	.03	.01	.00	.00	.03	.05	.03	.01
24-30	.03	.06	.04	.01	.09	.05	.10	.08	.19	.17	.09	.06	.04	.08	.02	.01	.06	.08	.03	.01
30-36	.04	.02	.02	.04	.05	.02	.05	.04	.12	.06	.09	.14	.09	.04	.06	.04	.10	.14	.03	.05
36-42	.04	.04	.03	.02	.02	.00	.01	.03	.09	.04	.03	.03	.08	.08	.07	.03	.17	.16	.02	.02
42-48	.03	.05	.01	.01	-.02	-.01	.06	.04	.02	.00	.03	.03	.05	.04	.02	.02	.12	.09	.06	.04
48-54	.04	.06	.01	.01	-.01	-.03	.04	.04	.02	.00	.00	.03	.03	.00	.02	.04	.07	.03	.02	.03
54-60	.03	.02	.01	.00	-.02	.02	.05	.00	-.01	.02	.01	.00	.01	.00	.02	.03	.04	.01	.03	.05
60-66	.01	.01	.03	.01	-.02	-.03	.02	.05	.03	.00	-.01	.00	.00	-.02	.04	.04	.02	.02	.02	.02
66-72	.05	.02	.01	.01	.02	-.04	.03	.04	-.01	.00	.00	.01	.02	.00	.00	.02	.05	.00	.00	.01
Total	.46	.44	.47	.48	.66	.53	.57	.46	.78	.70	.28	.37	.39	.21	.23	.22	.76	.68	.00	.06
R F*	.56	.56	.00	.00	.00	.00	.00	.00	.06	.06	.37	.37	.42	.42	.28	.28	.00	.00	1.39	1.39
Use**	1.02	1.00	.47	.38	.66	.53	.57	.46	.84	.76	.65	.74	.81	.63	.51	.50	.76	.68	1.39	1.45
D U	.204	.200	.157	.127	.132	.106	.285	.230	.210	.190	.217	.247	.2025	.1575	.170	.167	.190	.170	.3475	.3625

August													
1		5		7		11		14		18		25	
6-12	.19	.14	.04	.06	.00	.02	.02	.00	.02	.02	-.08	-.05	.03
12-18	.01	.00	.00	.02	-.02	-.02	.02	.01	.01	.03	-.06	-.01	.03
18-24	-.01	.02	.03	.02	-.02	-.02	.02	.02	-.01	.02	-.01	-.01	.00
24-30	-.01	.03	.00	-.02	.01	.01	.01	.02	.00	.02	-.01	-.03	.01
30-36	.00	-.01	.01	.03	.00	.00	.01	.03	.01	.03	-.01	-.03	.01
36-42	.02	.03	.03	.04	.00	.04	.02	.04	.02	.01	-.01	-.02	.00
42-48	.01	.02	.05	.03	.02	.05	.04	.04	.03	-.01	.00	-.01	-.01
48-54	.03	.03	.04	.03	.03	.02	.06	.03	.03	.05	-.02	-.01	.00
54-60	.02	.01	.04	.03	.01	.01	.04	.02	.02	.02	.00	-.01	.00
60-66	.02	-.01	.03	.03	-.01	.02	.03	.00	.03	.03	.00	-.02	-.01
66-72	.02	.02	.01	.01	.00	.01	.03	.01	.02	.00	.01	.02	.01
Total	.31	.27	.26	.25	.05	.15	.27	.24	.18	.27	-.19	-.16	.08
R F	.00	.00	.00	.00	.48	.48	.22	.22	.35	.35	.51	.51	.00
Use	.31	.27	.26	.25	.53	.63	.49	.46	.53	.62	.32	.35	.08
D U	.0775	.0675	.130	.125	.1325	.1575	.163	.153	.1325	.155	.046	.05	.027

*Rain factor

**Daily use

Appendix Table 11. Biweekly soil water use (in) for Compansa and Golden Compansa. Kamp's farm (1976).

Depth (in.)	May						June										July					
	27		31		3		7		10		21		24		28		1		6			
	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.
6-12	.03	.02	.07	.05	.14	.08	.12	.08	-.22	-.18	-.17	-.11	.13	.12	.20	.21	.19	.18	.09	.09		
12-18	.04	.02	.06	.04	.07	.03	.08	.08	-.05	-.06	-.10	-.05	.05	.04	.15	.13	.16	.21	.07	.13		
18-24	.00	.02	.04	.01	.03	.06	.02	.05	.07	-.02	.00	-.06	-.03	.01	.09	.13	.12	.19	.11	.14		
24-30	-.01	.00	.04	.01	-.04	.02	.04	.04	.07	-.00	-.01	-.02	-.02	-.02	.07	.10	.07	.12	.12	.14		
30-36	.02	.03	-.01	.00	.01	.02	.00	.00	.02	.01	.02	.00	-.01	-.01	.04	.02	.08	.17	.04	.06		
36-42	.00	.01	.01	.07	-.03	.01	.02	-.01	.04	.03	.00	-.02	.00	-.02	.01	.04	.03	.03	.05	.09		
42-48	-.02	-.01	.00	.01	.01	-.02	-.03	.00	.05	.05	.01	-.01	-.03	-.01	.01	.01	.03	.02	.01	.02		
48-54	-.05	-.05	.04	.02	-.04	-.02	.04	.02	.00	.00	.02	.01	-.05	-.03	.06	.01	-.02	.01	.01	.01		
54-60	.02	-.03	.02	.00	-.04	.01	.00	-.02	.03	.03	-.03	-.01	.00	-.02	.02	.01	.02	.01	.00	-.01		
60-66	-.02	-.03	.01	.02	-.04	.00	.05	.05	-.02	.01	.00	.00	-.03	-.01	.02	.03	.01	-.01	.02	-.01		
Total	.02	-.03	.27	.18	.06	.17	.35	.23	-.02	-.14	-.24	-.28	.01	.06	.66	.70	.70	.88	.51	.66		
R F*	.15	.15	---	---	---	---	---	---	1.60	1.60	.85	.85	---	---	---	---	---	---	---	---		
Use	.17	.12	.27	.18	.06	.17	.35	.23	1.58	1.46	.61	.57	.01	.06	.66	.70	.70	.88	.61	.66		
D U**	.0425	.030	.09	.06	.015	.0425	.117	.077	.144	.133	.203	.19	.0025	.015	.220	.233	.14	.176	.17	.22		
	July										August											
	9		12		15		20		23		27		30		2		5		9			
	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.	C.	G.C.
6-12	.05	.05	.00	.03	-.27	-.21	.16	.14	.14	.10	.07	.05	-.09	-.09	.00	.02	.05	.01	.00	.00		
12-18	.07	.06	-.01	.02	-.11	-.04	.07	.02	.06	.03	.03	.03	-.01	-.02	-.01	.02	.03	-.01	-.01	.01		
18-24	.07	.09	.01	.03	-.07	.01	.05	.01	.10	.01	-.01	.02	.02	.00	.00	.01	.02	.00	-.02	.01		
24-30	.09	.13	.00	.03	-.06	.04	.03	.00	.06	.02	.06	.01	.01	.02	.02	.01	.00	-.01	.02	-.01		
30-36	.09	.13	.03	.04	-.06	.07	.05	.00	.08	.01	.04	.04	.03	.02	-.01	-.02	.00	.01	-.01	.00		
36-42	.07	.07	.00	.03	-.03	.08	.03	.00	.09	.05	.05	.01	.03	.04	-.02	-.02	.02	.01	.02	-.01		
42-48	.03	.04	.00	.00	-.04	.06	.02	.01	.05	.04	.02	.04	.06	.02	-.02	-.02	.02	.01	-.01	.01		
48-54	.02	.02	-.02	-.01	-.03	.02	.02	.03	.01	.01	.07	.01	-.02	.04	-.01	-.01	.03	.00	.00	-.01		
54-60	.02	.02	-.06	.00	-.01	.02	.02	-.02	.02	.01	.03	.03	.01	.04	.02	-.02	.00	.04	.04	-.01		
60-66	-.02	.02	-.06	-.02	-.01	.01	.04	-.02	-.06	-.06	.10	.08	-.03	.00	.02	.00	-.02	.02	.00	.02		
Total	.48	.61	-.12	.15	-.67	.05	.49	.17	.52	.23	.46	.32	.03	.05	.01	.00	.12	.01	.03	.00		
R F	.40	.40	---	---	1.00	1.00	---	---	---	---	---	---	1.20	1.20	---	---	---	---	---	---		
Use	.88	1.01	-.12	.15	.33	1.05	.49	.17	.52	.23	.46	.32	1.23	1.25	.01	.00	.12	.01	.03	.00		
D U	.293	.337	-.04	.05	.066	.21	.163	.057	.13	.0575	.153	.107	.41	.417	.0033	---	.03	.0025	.01	.00		

* Rain factor

** Daily use

Appendix Table 12. Biweekly soil water use (in) for Liberty and Golden Liberty. Kamp's farm (1976).

Depth (in.)	May				June								July							
	27		31		3		7		10		21		24		28		1		6	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
6-12	.04	.06	-.03	-.02	.12	.06	.12	.09	-.20	-.15	-.15	-.10	.16	.09	.17	.16	.20	.23	.12	.11
12-18	.05	.04	.02	.01	.06	.03	.06	.07	-.05	-.05	-.11	.09	.07	.07	.19	.05	.17	.27	.12	.13
18-24	.02	.02	.05	.03	.03	.04	.05	.02	-.01	.00	.01	-.01	.02	-.01	.06	.11	.17	.15	.15	.15
24-30	.01	.04	.05	.01	.03	.02	.03	.01	.00	.01	-.01	.01	-.02	-.04	.06	.08	.00	.12	.25	.07
30-36	.04	.05	.04	.00	-.02	.00	.03	.01	.05	.00	.01	.02	.00	-.05	.03	.04	.05	.08	.08	.08
36-42	.04	.05	.05	.06	-.01	.00	.00	.01	.01	.03	.02	-.01	-.05	-.03	.05	.01	.02	.05	.04	.01
42-48	.14	.05	-.04	.01	.04	.00	-.05	-.01	.05	.03	.03	-.01	-.04	-.03	.02	.03	.00	.01	.08	-.01
48-54	.03	.04	.01	.02	.02	.00	.00	.00	.00	-.01	.03	-.01	-.01	-.06	.01	.03	.00	.03	.02	.01
54-60	.03	.04	.04	.02	.00	.00	-.05	-.02	.03	-.04	.04	.00	-.02	-.03	.00	.00	.00	.05	.04	-.04
60-66	.04	-.02	-.02	.06	-.03	.01	-.02	.01	.00	.00	.05	-.03	-.04	-.03	.01	.02	-.01	-.03	.03	.03
Total	.45	.34	.16	.20	.22	.15	.18	.20	-.24	-.20	-.08	-.24	.07	-.10	.61	.54	.61	.95	.91	.57
R F*	---	---	1.20	1.20	---	---	---	---	1.60	1.60	.85	.85	---	---	---	---	---	---	---	---
Use	.45	.34	1.36	1.40	.22	.15	.18	.20	1.36	1.40	.77	.61	.07	-.10	.61	.54	.61	.95	.91	.57
D U**	.150	.113	.453	.467	.055	.0375	.06	.067	.124	.127	.257	.203	.0175	.025	.203	.180	.122	.190	.303	.190
Depth (in.)	July																August			
	9		12		15		20		23		27		30		2		5		9	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
6-12	.03	.06	.03	.03	-.29	-.24	.18	.18	.12	.09	.04	.06	-.03	-.02	.00	.03	.00	.00	.01	.01
12-18	.02	.06	.03	.03	-.10	-.07	.05	.04	.04	.06	.05	.04	.02	.01	-.02	.00	.01	.02	.00	-.01
18-24	.07	.07	.02	.04	-.09	-.05	.03	.03	.04	.06	.02	.02	.05	.03	-.02	-.04	.01	.04	-.01	.02
24-30	.09	.15	.02	.06	-.04	-.04	.08	.03	.01	.05	.01	.04	.05	.01	-.01	.00	.00	-.01	-.02	.00
30-36	.10	.09	.04	.03	.01	-.01	.01	.03	.05	.06	.04	.05	.04	.00	.01	.01	.00	.00	.01	.00
36-42	.02	.07	.03	.00	.06	.00	.01	.01	.05	.07	.04	.05	.05	.06	.02	-.03	-.01	.02	-.01	-.01
42-48	.00	.05	-.01	-.01	.07	-.01	.03	.02	.01	.06	.14	.05	-.04	.01	.00	.00	.00	.04	.02	-.01
48-54	.03	.00	.00	.00	.00	-.03	.04	.03	-.01	.03	.03	.04	.01	.02	.03	.02	.02	.02	-.04	.00
54-60	.00	.02	-.01	.00	.01	-.03	.00	.00	-.02	.04	.03	.02	.04	.02	.01	.00	.00	.04	-.02	.00
60-66	.03	.05	.01	-.04	-.07	-.05	-.01	.00	.01	.02	.04	-.02	-.02	.06	.03	.00	-.03	.01	-.01	.00
Total	.40	.64	.16	.12	-.43	-.52	.42	.37	.29	.53	.45	.34	.16	.20	.05	.00	.02	.18	-.09	.01
R F*	.40	.40	---	---	1.00	1.00	---	---	---	---	---	---	1.20	1.20	---	---	---	---	---	---
Use	.80	1.04	.16	.12	.57	.48	.42	.37	.29	.53	.45	.34	1.36	1.40	.05	.00	.02	.18	-.09	.01
D U	.267	.347	.053	.040	.114	.096	.14	.123	.0725	.1325	.150	.113	.453	.467	.017	.00	.005	.045	-.03	.003

*Rain factor

**Daily use

Appendix Table 13. Biweekly soil water use (in) for Liberty and Golden Liberty. Kamp's farm (1977).

Depth (in.)	June																July			
	4		7		13		16		20		24		27		30		5		8	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
6-12	.07	.06	.01	.05	.01	-.02	.11	.08	.18	.18	.22	.20	.13	.15	.05	.05	.04	.03	.01	.02
12-18	.05	.05	.03	.04	.04	.02	-.07	.02	.16	.19	.20	.16	.12	.15	.09	.10	.01	.05	.06	.01
18-24	.05	.07	.07	.06	.00	.00	.04	.01	.13	.10	.16	.13	.17	.16	.10	.13	.04	.08	.03	.04
24-30	.02	.03	.04	.04	.03	.02	-.03	-.02	.10	.08	.09	.09	.13	.09	.15	.13	.06	.08	.02	.07
30-36	.01	.02	.03	.04	-.01	.01	.04	-.02	.01	.04	.05	.05	.07	.04	.08	.10	.05	.10	.04	.06
36-42	-.01	-.02	.01	.02	.04	.00	-.02	.00	.04	.03	.02	.02	.02	.00	.02	.06	.05	.03	.05	.08
42-48	.02	-.02	.00	.01	-.01	.01	.00	-.03	.01	.03	.01	.00	-.01	.02	.03	.04	.05	.03	.03	-.02
48-54	-.05	-.02	.04	.02	-.02	-.01	-.01	.00	.02	.01	-.01	.01	.02	-.03	-.02	.03	.05	-.01	.02	.01
54-60	-.01	-.01	.02	.00	.00	-.01	-.03	-.01	.02	.00	.02	.02	-.03	.00	-.01	-.05	.04	.05	.01	.01
Total	.15	.16	.26	.28	.07	.02	.17	.04	.67	.64	.75	.70	.64	.57	.48	.58	.39	.44	.27	.27
R F*	.00	.00	.75	.75	.30	.30	.00	.00	.00	.00	.00	.00	.00	.00	.40	.40	.00	.00	.35	.35
Use	.15	.16	1.01	1.03	.37	.32	.17	.04	.67	.64	.75	.70	.64	.57	.88	.98	.39	.44	.62	.62
D U**	.05	.05	.17	.17	.12	.11	.04	.01	.17	.16	.25	.23	.21	.19	.18	.20	.13	.15	.21	.21

Depth (in.)	July								August			
	11		14		18		21		25		28	
	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.	L.	G.L.
6-12	.04	.03	.05	.06	.01	.01	.01	.03	.01	.01	.01	.05
12-18	.02	.04	.01	.03	.01	.03	.01	.00	.01	.00	.01	.02
18-24	.04	.02	.01	.05	.02	.02	.01	.03	-.01	-.03	.02	.02
24-30	.06	.05	.01	.06	.01	.02	.03	.02	.01	.01	.03	.02
30-36	.07	.06	.04	.07	.05	.05	.02	-.02	.02	.05	.02	.00
36-42	.05	.06	.03	.07	.00	.09	.06	.03	.02	.04	.01	.01
42-48	.02	.09	.01	.00	.01	.03	.02	-.02	.02	.04	.01	.08
48-54	.01	.06	.00	-.02	.00	.01	.03	-.01	-.01	.01	.01	.00
54-60	.03	.02	-.03	.01	.02	-.04	-.02	-.01	.01	.03	.00	-.02
Total	.34	.45	.14	.31	.12	.24	.15	.07	.04	.09	.08	.17
R F	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Use	.34	.45	.14	.31	.12	.24	.15	.07	.04	.09	.08	.17
D U	.11	.15	.04	.08	.04	.08	.04	.02	.01	.03	.02	.04

*Rain factor

**Daily use

Appendix Table 14. Cultivar number, name, and number of rows in head.

Cultivar	Name	Row
1	Marie	2
2	Titan	6
3	Betzes	2
4	Vantage	6
5	Compana	2
6	Glacier	6
7	Dekap	2
8	Traill	6
9	Freja	2
10	Trophy	6
11	Ingrid	2
12	Larker	6
13	New Moravian	2
14	Atlas 46	6
15	Pirolina	2
16	Harlan	6
17	Frontier	2

Appendix Table 14. Cultivar number, name, and number of rows in head. cont.

<u>Cultivar</u>	<u>Name</u>	<u>Row</u>
18	Hiland	6
19	Hienes Hanna	2
20	Otis	6
21	Horn	2
22	Trebi	6
23	Haisa II	2
24	Gem	6
25	Haanchen	2
26	Bonneville	6
27	Munsing	2
28	Liberty	6
29	Spartan	2
30	Galt	6
31	Firlbecks III	2
32	Steptoe	6
33	Vanguard	2
34	Beecher	6

Appendix Table 14. Cultivar number, name, and number of rows in head. cont.

Cultivar	Name	Row
35	Hector	2
36	California Mariout 67	6
37	Klages	2
38	Steveland	6
39	Erbet	2
40	Dickson	6
41	Maris Mink	2
42	Montcalm	6
43	Vireo	2
44	Primus II	6
45	Zephyr	2
46	Nordic	6
47	Georgie	2
48	Briggs	6
49	Herta	2
50	Unitan	6

Appendix Table 15. Osmotic potentials (bars) for the morning (A.M.), afternoon (P.M.) and the difference (P.M. - A.M.). 1975.

Cultivar	July 14			Aug. 12		
	A.M.	P.M.	P.M.-A.M.	A.M.	P.M.	P.M.-A.M.
1	-	-	-	-	-	-
2	-13.8	-18.0	- 4.2	-16.3	-26.3	-10.0
3	-15.0	-16.0	- 1.0	-13.0	-21.0	- 8.0
4	-13.8	-16.9	- 3.1	-18.0	-19.8	- 1.8
5	-14.0	-21.7	- 7.7	-12.4	-20.1	- 7.7
6	-12.4	-21.5	- 9.1	-15.5	-24.3	- 8.8
7	-13.2	-27.0	-13.8	-14.6	-19.5	- 4.9
8	-16.2	-19.9	- 3.7	-12.7	-21.8	- 9.1
9	-12.9	-23.9	-11.0	-12.5	-21.1	- 8.6
10	-10.2	-17.2	- 7.0	-14.6	-24.7	-10.1
11	-12.5	-15.8	- 3.3	-14.4	-19.9	- 5.5
12	-16.4	-17.4	- 1.0	-12.1	-24.8	-12.7
13	-12.3	-22.0	- 9.7	-10.8	-17.4	- 6.6
14	-10.5	-23.9	-13.4	-14.9	-23.5	- 8.6
15	-12.4	-22.5	-10.1	-14.0	-25.2	-11.2
16	-12.3	-14.2	- 1.9	-14.4	-24.7	-10.3
17	-11.9	-22.3	-10.4	-10.6	-26.4	-15.8
18	-10.2	-16.9	- 6.7	-13.7	-24.2	-10.5
19	-15.0	-18.9	- 3.9	-15.4	-23.3	- 7.9
20	-16.7	-19.9	- 3.2	-13.6	-19.7	- 6.1
21	-11.3	-22.8	-11.5	-11.5	-14.7	- 3.2
22	-14.2	-22.3	- 8.1	-16.4	-25.9	- 9.5
23	-11.5	-20.8	- 9.3	-11.3	-14.0	- 2.7
24	-17.9	-20.6	- 2.7	-14.4	-25.2	-10.8
25	-12.5	-19.6	- 7.1	-13.4	-17.8	- 4.4
26	-13.3	-17.5	- 4.2	-13.1	-18.8	- 5.7
27	-22.0	-22.8	- 0.8	-12.5	-18.4	- 5.9
28	-14.2	-20.4	- 6.2	-15.3	-23.9	- 8.6
29	-15.6	-19.8	- 4.2	-14.7	-22.4	- 7.7
30	-12.0	-16.0	- 4.0	-15.0	-23.5	- 8.5
31	-14.4	-18.4	- 4.0	-13.6	-23.0	- 9.4
32	-11.9	-18.9	- 7.0	-14.4	-23.9	- 9.5
33	-11.9	-20.6	- 8.7	-12.6	-15.8	- 3.2
34	-17.2	-23.3	- 6.1	-16.3	-21.5	- 5.2
35	-13.6	-19.4	- 5.8	-14.7	-21.2	- 6.5
36	-14.6	-23.0	- 8.4	-14.0	-22.7	- 8.7
37	-18.4	-18.7	- 0.3	-13.3	-19.3	- 6.0
38	-12.0	-14.2	- 2.2	-14.5	-22.4	- 7.9
39	-16.0	-18.5	- 2.5	-15.1	-20.2	- 5.1
40	- 9.9	-16.0	- 6.1	-13.1	-17.5	- 4.4
41	-11.2	-21.3	-10.1	-11.6	-16.5	- 4.9
42	-12.7	-20.4	- 7.7	-13.7	-19.4	- 5.7
43	-13.7	-15.9	- 2.2	-13.1	-22.3	- 9.2
44	-14.0	-18.1	- 4.1	-11.6	-18.3	- 6.7
45	-15.2	-14.2	- 1.0	-14.5	-21.4	- 6.9
46	- 9.7	-13.9	- 4.2	- 9.4	-19.7	-10.3
47	-16.5	-19.5	- 3.0	-16.4	-21.1	- 4.7
48	-	-	-	-	-	-
49	-14.5	-24.1	- 9.6	-12.7	-21.2	- 8.5
50	-16.8	-19.7	- 2.9	-14.7	-21.0	- 6.3

Appendix Table 16. Osmotic potential (bar) for the morning (A.M.), afternoon (P.M.) and the difference (P.M. - A.M.). 1976.

Cultivar	July 14			Aug. 10		
	A.M.	P.M.	P.M.-A.M.	A.M.	P.M.	P.M.-A.M.
1	-10.2	-14.7	-4.5	-17.0	-17.3	-0.3
2	-10.4	-14.7	-4.3	-19.5	-22.7	-3.2
3	-10.7	-15.0	-4.3	-15.0	-21.8	-6.8
4	-10.4	-12.7	-2.3	-15.6	-20.7	-5.1
5	-11.3	-16.7	-5.4	-19.3	-24.4	-5.1
6	-11.0	-15.6	-4.6	-17.5	-19.3	-1.8
7	-12.2	-15.6	-3.4	-18.7	-18.4	0.3
8	-10.2	-14.4	-4.2	-19.3	-24.1	-4.8
9	-11.3	-17.0	-5.7	-15.0	-21.0	-6.0
10	-9.9	-14.1	-4.2	-17.5	-23.5	-6.0
11	-10.4	-13.9	-3.5	-16.7	-21.0	-4.3
12	-9.9	-15.6	-5.7	-11.9	-23.2	-11.3
13	-11.9	-14.4	-2.5	-16.7	-24.7	-8.0
14	-9.9	-15.3	-5.4	-15.0	-21.2	-6.2
15	-11.0	-14.7	-3.7	-19.0	-24.9	-5.9
16	-10.2	-16.7	-6.5	-17.3	-23.8	-6.5
17	-12.2	-16.4	-4.2	-	-25.5	-
18	-8.2	-16.1	-7.9	-17.3	-23.8	-6.5
19	-10.4	-15.8	-5.4	-18.7	-23.2	-4.5
20	-11.0	-15.8	-4.8	-18.1	-23.2	-5.1
21	-10.7	-18.4	-7.7	-20.7	-23.8	-3.1
22	-11.0	-17.3	-6.3	-16.7	-21.0	-4.3
23	-9.9	-15.3	-5.4	-15.6	-22.9	-7.3
24	-11.0	-16.4	-5.4	-15.8	-22.1	-6.3
25	-10.4	-13.0	-2.6	-18.1	-20.7	-2.6
26	-7.9	-17.3	-9.4	-18.7	-16.1	2.6
27	-11.9	-21.2	-9.3	-18.1	-24.1	-6.0
28	-9.6	-13.9	-4.3	-17.5	-22.7	-5.2
29	-11.3	-18.7	-7.4	-21.0	-26.9	-5.9
30	-9.9	-15.8	-5.9	-17.0	-21.8	-4.8
31	-9.3	-15.3	-6.0	-17.5	-21.5	-4.0
32	-11.0	-16.1	-5.1	-13.3	-23.2	-9.9
33	-10.7	-13.9	-3.2	-17.5	-20.1	-2.6
34	-11.3	-16.7	-5.4	-16.4	-13.9	2.5
35	-9.3	-14.7	-5.4	-18.4	-22.4	-4.0
36	-11.9	-18.1	-6.2	-22.4	-21.8	0.6
37	-11.0	-16.4	-5.4	-17.3	-15.8	1.5
38	-10.4	-9.6	0.8	-17.3	-21.0	-3.7
39	-9.3	-17.3	-8.0	-16.7	-20.7	-4.0
40	-8.2	-14.7	-6.5	-13.6	-19.5	-5.9
41	-10.4	-13.3	-2.9	-17.5	-19.3	-1.8
42	-8.7	-15.0	-6.3	-16.4	-24.4	-8.0
43	-12.2	-13.9	-1.7	-14.4	-21.8	-7.4
44	-10.7	-16.4	-5.7	-16.4	-22.9	-6.5
45	-11.0	-17.0	-6.0	-14.4	-22.7	-8.3
46	-9.6	-13.0	-3.4	-16.1	-23.2	-7.1
47	-12.2	-16.7	-4.5	-19.8	-17.3	2.5
48	-11.0	-16.4	-5.4	-17.0	-26.4	-9.4
49	-9.6	-13.9	-4.3	-16.4	-19.5	-3.1
50	-11.0	-13.9	-2.9	-18.7	-21.0	-2.3

Appendix Table 17. Osmotic potential (bar) for the morning (A.M.), afternoon (P.M.) and the difference (P.M. - A.M.). June 22, 1977.

Cultivar	Rep. 1			Rep. 2		
	A.M.	P.M.	P.M.-A.M.	A.M.	P.M.	P.M.-A.M.
1	- 9.7	-	-	- 9.7	-14.6	-4.9
2	- 8.9	-12.6	-3.7	-	-11.6	-
3	- 9.7	-11.9	-2.2	- 9.0	-12.6	-3.6
4	- 8.3	-11.2	-2.9	- 8.9	-13.0	-4.1
5	- 8.9	-14.0	-5.1	- 9.3	-13.9	-4.6
6	-10.5	-13.4	-2.9	- 9.6	-12.9	-3.3
7	-11.0	-13.9	-2.9	- 9.6	-12.3	-2.7
8	- 7.6	-11.6	-4.0	- 9.5	-11.6	-2.1
9	- 9.5	-11.4	-1.9	- 8.7	-13.7	-5.0
10	-10.2	-10.5	-0.3	- 7.6	-10.9	-3.3
11	- 8.9	-14.1	-5.2	- 8.5	-12.6	-4.1
12	- 8.7	-10.6	-1.9	-10.2	-11.4	-1.2
13	- 8.6	-12.4	-3.8	- 8.5	-14.8	-6.3
14	-10.5	-12.0	-1.5	-10.5	-12.3	-1.8
15	- 9.0	-11.4	-2.4	-11.0	-12.7	-1.7
16	- 6.0	-14.4	-8.4	- 8.8	-11.4	-2.6
17	-10.2	-11.2	-1.0	- 8.5	-11.3	-2.8
18	- 9.7	-12.9	-3.2	-10.9	-14.1	-3.2
19	- 9.5	-11.4	-1.9	- 8.7	-16.5	-7.8
20	-	-	-	-10.0	-10.6	-0.6
21	-11.6	-13.7	-2.1	- 8.9	-11.9	-3.0
22	- 9.0	-13.0	-4.0	-10.2	-13.6	-3.4
23	-10.3	-11.6	-1.3	- 9.0	-13.0	-4.0
24	- 9.7	-12.6	-2.9	-10.2	-13.2	-3.0
25	-11.2	-13.3	-2.1	-10.0	-14.3	-4.3
26	-10.2	-13.0	-2.8	- 8.9	-15.1	-6.2
27	- 9.9	-13.9	-4.0	- 9.6	-13.4	-3.8
28	-10.2	-11.9	-1.7	- 9.5	-11.3	-1.8
29	- 9.7	-14.0	-4.3	- 8.9	-14.6	-5.7
30	- 8.0	-13.7	-5.7	- 8.6	-14.9	-6.3
31	- 8.5	-14.9	-6.4	- 8.0	-13.4	-5.4
32	-10.9	-13.7	-2.8	- 9.0	-12.7	-3.7
33	-10.5	-11.2	-0.7	- 7.9	-14.3	-6.4
34	-10.9	-13.2	-2.3	- 9.2	-15.7	-6.5
35	-11.2	-11.4	-0.2	- 8.5	-13.2	-4.7
36	- 8.9	-	-	-12.6	-14.0	-1.4
37	-10.6	-12.9	-2.3	- 8.2	-14.7	-6.5
38	-10.2	-12.9	-2.7	- 8.7	-12.9	-4.2
39	-10.0	-14.1	-4.1	-13.0	-11.3	1.7
40	- 8.7	-12.7	-4.0	- 8.2	-14.7	-6.5
41	- 9.3	-13.4	-4.1	- 8.5	-14.0	-5.5
42	- 9.0	-13.2	-4.2	- 7.9	-11.7	-3.8
43	- 9.3	-13.2	-3.9	- 9.3	-12.6	-3.3
44	- 9.3	-13.0	-3.7	- 7.6	-11.7	-4.1
45	-10.3	-11.7	-1.4	- 9.0	-13.0	-4.0
46	-10.3	-11.3	-1.0	- 8.7	-13.4	-4.7
47	- 8.7	-10.5	-1.8	-11.2	-10.6	0.6
48	-10.2	-13.2	-3.0	-	-14.0	-
49	- 8.6	-14.0	-5.4	- 8.6	-10.3	-1.7
50	- 8.6	-11.9	-3.3	- 8.6	-10.5	-1.9

Appendix Table 18. Osmotic potential (bar) for the morning (A.M.), afternoon (P.M.) and the difference (P.M. - A.M.). July 20, 1977.

Cultivar	Rep. 1			Rep. 2		
	A.M.	P.M.	P.M.-A.M.	A.M.	P.M.	P.M.-A.M.
1	-21.1	-21.5	-0.4	-20.8	-	-
2	-18.7	-22.9	-4.2	-20.1	-	-
3	-22.9	-22.1	0.8	-19.8	-	-
4	-	-16.7	-	-20.2	-	-
5	-20.7	-19.5	1.2	-20.2	-25.9	-5.7
6	-	-	-	-21.5	-	-
7	-20.4	-20.8	-0.4	-20.1	-16.6	3.5
8	-19.1	-	-	-20.4	-18.3	2.1
9	-	-	-	-22.5	-	-
10	-	-23.9	-	-18.4	-26.8	-8.4
11	-22.8	-	-	-18.1	-18.8	-0.7
12	-20.1	-	-	-22.4	-23.2	-0.8
13	-21.1	-24.1	-3.0	-21.5	-24.8	-3.3
14	-21.2	-23.4	-2.2	-21.2	-	-
15	-20.2	-20.2	0.0	-20.0	-20.7	-0.7
16	-19.5	-25.6	-6.1	-18.4	-	-
17	-25.8	-	-	-22.9	-17.5	5.4
18	-22.1	-	-	-23.0	-22.5	0.5
19	-20.1	-20.1	0.0	-19.5	-	-
20	-	-	-	-22.9	-	-
21	-25.2	-22.4	2.8	-20.1	-	-
22	-22.7	-22.9	-0.2	-22.9	-24.1	-1.2
23	-25.2	-22.4	2.8	-19.4	-	-
24	-20.7	-	-	-20.4	-	-
25	-	-	-	-19.2	-20.1	-0.9
26	-18.4	-	-	-18.4	-	-
27	-18.4	-	-	-21.0	-	-
28	-	-22.1	-	-19.3	-22.4	-3.1
29	-22.4	-22.7	-0.3	-20.1	-22.5	-2.4
30	-19.8	-	-	-20.1	-	-
31	-22.1	-24.5	-2.4	-20.1	-20.7	-0.6
32	-18.7	-20.1	-1.4	-19.0	-	-
33	-	-17.0	-	-21.5	-23.4	-1.9
34	-	-23.2	-	-17.5	-20.2	-2.7
35	-18.1	-	-	-19.5	-	-
36	-	-	-	-22.7	-25.1	-2.4
37	-20.5	-21.2	-0.7	-18.8	-	-
38	-21.5	-	-	-20.8	-	-
39	-16.4	-	-	-20.1	-	-
40	-	-22.7	-	-21.5	-25.1	-3.6
41	-15.0	-	-	-17.8	-	-
42	-	-18.7	-	-19.3	-26.8	-7.5
43	-23.5	-18.5	5.0	-20.1	-22.1	-2.0
44	-	-20.4	-	-16.1	-21.5	-5.4
45	-20.1	-	-	-19.2	-19.8	-0.6
46	-	-	-	-18.4	-23.2	-4.8
47	-24.2	-21.5	2.7	-19.8	-22.9	-3.1
48	-20.2	-21.0	-0.8	-19.0	-	-
49	-	-	-	-19.1	-21.5	-2.4
50	-22.7	-25.4	-2.7	-	-22.5	-

Appendix Table 19. Soil water content (%) at 6 in intervals for the drought line. Bozeman farm. 1976.

Cultivar	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	60-66	66-72
1	21.5	19.8	12.1	10.1	9.5	9.5	9.4	10.8	12.2	13.1	13.3	15.3
2	22.7	17.8	11.4	9.1	8.5	8.5	9.3	11.3	12.4	13.9	15.1	16.2
3	22.5	17.7	13.3	9.8	8.6	8.4	9.1	9.0	11.0	13.0	15.3	16.6
4	22.4	18.3	11.6	9.9	9.2	10.8	12.0	13.9	14.1	14.4	14.9	16.2
5	22.9	18.4	9.9	8.4	7.8	8.5	9.0	10.4	11.8	13.0	14.3	14.0
6	22.5	20.0	13.1	10.4	9.3	9.1	9.5	10.3	12.4	12.9	13.3	14.4
7	22.1	18.5	10.5	9.9	8.5	8.7	8.3	9.4	12.4	14.0	15.6	16.5
8	22.5	20.2	11.6	9.5	9.0	8.5	8.8	9.2	11.3	13.3	14.7	16.5
9	22.9	18.8	12.7	9.6	8.8	8.6	8.8	9.4	11.1	12.1	14.3	17.3
10	22.0	20.0	14.6	10.3	8.5	8.2	9.2	9.2	10.7	12.5	13.8	15.0
11	21.6	18.8	10.8	9.5	7.9	8.2	8.3	9.9	11.9	13.9	14.6	16.5
12	21.7	20.7	12.8	9.6	8.5	8.2	8.9	10.1	12.0	13.1	13.8	15.3
13	21.3	19.5	11.6	9.4	8.2	8.3	8.2	9.6	11.9	13.0	14.1	15.3
14	22.3	17.8	11.3	9.6	9.0	9.5	11.0	12.2	13.2	13.9	15.0	15.4
15	22.5	18.8	11.2	9.6	9.2	8.5	10.2	11.4	13.1	14.7	15.5	16.6
16	22.1	17.4	12.8	9.8	9.1	8.9	8.8	9.7	12.1	13.4	15.0	15.9
17	22.4	20.6	10.8	9.2	8.2	8.4	8.2	9.2	12.4	13.6	15.2	17.1
18	23.3	20.9	11.0	9.5	8.5	8.8	10.0	10.3	11.9	12.6	14.4	15.8
19	22.9	19.1	11.7	9.7	8.7	8.8	8.3	8.9	11.1	12.6	14.5	16.1
20	23.8	20.0	11.3	10.1	9.2	9.0	8.7	9.4	10.9	13.2	15.8	16.8
21	21.7	19.9	12.5	10.6	9.0	8.7	9.0	9.6	11.6	12.0	14.1	16.4
22	22.4	20.3	12.0	9.3	8.6	8.7	9.0	10.6	12.2	13.2	14.7	16.5
23	22.1	18.9	12.0	10.2	9.0	9.0	9.3	10.6	12.5	13.6	14.6	16.8
24	21.9	18.4	11.0	10.1	9.1	9.0	9.7	11.8	13.0	14.6	14.6	15.3
25	21.4	18.1	10.8	9.5	8.4	8.5	8.4	11.1	13.1	13.6	16.2	15.8
26	22.5	18.4	10.8	9.1	8.0	8.0	8.3	8.7	11.5	12.4	13.5	15.4
27	23.1	20.1	12.2	10.1	8.6	8.3	8.6	9.5	11.4	12.7	13.9	16.2
28	22.6	19.7	12.6	9.5	8.6	8.6	8.4	9.4	11.5	12.6	13.5	14.9
29	23.1	17.0	10.4	9.0	8.9	9.0	10.6	13.5	13.0	14.6	16.7	15.7
30	22.9	21.3	10.8	9.6	8.9	9.6	10.2	11.4	13.2	12.9	13.5	14.8
31	22.6	19.0	10.7	9.8	8.9	8.5	8.7	9.9	12.0	13.5	14.9	16.1
32	23.0	18.6	10.4	9.2	8.6	8.8	9.1	10.2	11.9	13.0	15.6	16.3
33	22.2	19.9	13.7	10.5	8.9	8.9	8.9	9.4	11.5	13.0	14.7	17.2
34	22.7	20.2	11.0	9.8	8.9	8.8	9.3	12.1	13.2	14.0	15.3	16.7
35	22.2	18.9	11.2	10.1	10.2	11.9	12.8	13.6	14.1	14.1	15.4	16.1
36	21.1	19.7	12.0	10.8	9.7	10.4	10.5	11.3	12.7	13.2	14.3	16.1
37	21.6	19.9	10.5	9.2	8.0	8.2	8.0	9.8	9.8	12.1	13.8	15.9
38	22.7	18.5	10.8	9.4	8.5	8.8	9.7	11.3	12.2	13.3	14.1	14.8
39	23.6	19.7	12.2	9.4	8.3	8.8	9.3	11.4	13.1	14.0	15.6	17.4
40	22.4	19.6	12.5	9.9	9.1	8.3	9.7	9.9	12.5	13.5	14.2	15.3
41	23.6	19.1	10.6	9.6	8.5	8.2	8.1	8.2	9.5	11.5	13.5	14.6
42	23.0	21.5	12.5	9.4	8.5	8.2	9.2	11.5	12.9	14.0	15.3	16.5
43	23.0	21.0	16.3	10.3	8.2	8.5	8.8	11.6	14.0	13.7	15.4	16.1
44	23.2	20.4	11.7	9.3	8.8	9.5	11.5	13.4	13.5	13.8	15.7	15.6
45	22.8	21.2	13.4	9.8	8.8	8.6	8.2	8.0	9.1	10.9	13.1	15.2
46	23.9	21.7	13.8	9.2	8.3	8.4	9.6	9.2	11.2	12.4	13.8	15.0
47	22.0	21.2	16.8	10.8	9.2	8.7	8.6	8.8	10.4	11.2	13.9	16.4
48	22.8	21.2	14.9	9.8	8.6	9.0	8.7	8.6	9.3	11.3	13.5	14.8
49	21.7	21.2	14.1	9.8	8.6	8.5	8.8	9.8	11.3	12.2	14.3	15.6
50	22.6	18.2	10.8	9.4	9.0	9.2	8.4	10.1	11.8	12.4	15.1	15.8

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line.*

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Atlas 46										
6 - 12	.09	.19	.64	.79	.78	.84	.87	.82	.84	.89
12 - 18	.12	.15	.54	.72	.72	.79	.78	.76	.75	.76
18 - 24	.11	.12	.40	.65	.64	.65	.70	.65	.65	.66
24 - 30	.03	.04	.21	.42	.54	.57	.59	.57	.56	.58
30 - 36	.00	-.05	.09	.21	.28	.40	.50	.47	.49	.43
36 - 42	-.02	-.02	.05	.08	.12	.20	.22	.26	.22	.22
42 - 48	-.05	.01	.03	.07	.08	.11	.18	.16	.18	.16
48 - 54	.03	-.03	.04	.05	.03	.12	.20	.12	.15	.20
Total	.30	.41	1.99	2.99	3.18	3.67	4.03	3.80	3.83	3.90
Beecher										
6 - 12	.05	.15	.54	.67	.70	.79	.77	.78	.81	.84
12 - 18	.06	.11	.45	.62	.70	.76	.74	.72	.71	.76
18 - 24	.09	.13	.29	.60	.73	.81	.82	.78	.81	.79
24 - 30	.04	.11	.23	.45	.58	.67	.70	.69	.68	.67
30 - 36	.04	.04	.16	.22	.41	.56	.62	.59	.57	.56
36 - 42	.01	.03	.04	.12	.28	.40	.50	.49	.52	.50
42 - 48	.00	-.02	-.03	.02	.11	.14	.26	.27	.30	.34
48 - 54	.00	-.04	.01	-.05	.01	.02	.11	.13	.14	.15
54 - 60	.03	-.06	.03	.00	.03	.06	.10	-.02	.05	.05
60 - 66	.02	.00	.02	.00	.04	.02	.02	-.01	.03	.03
Total	.33	.44	1.73	2.65	3.58	4.21	4.61	4.40	4.59	4.66
Betzes										
6 - 12	.13	.28	.69	.83	.82	.89	.92	.90	.87	.92
12 - 18	.09	.25	.59	.74	.75	.80	.80	.77	.75	.78
18 - 24	.08	.10	.39	.60	.61	.67	.67	.67	.64	.63
24 - 30	.00	.00	.22	.46	.51	.60	.60	.61	.56	.62
30 - 36	.01	.03	.10	.21	.24	.46	.49	.45	.43	.43
36 - 42	.01	-.06	.11	.15	.17	.26	.29	.29	.32	.36
42 - 48	-.02	.02	.02	.06	.09	.18	.25	.24	.29	.29
48 - 54	.08	-.11	-.07	.01	.01	.14	-.06	.04	.14	.14
Total	.39	.52	2.06	3.06	3.21	4.02	4.00	4.01	4.10	4.21
Bonneville										
6 - 12	.05	.23	.63	.79	.81	.88	.93	.93	.94	.94
12 - 18	.14	.18	.58	.75	.78	.82	.87	.83	.83	.84
18 - 24	.11	.14	.41	.65	.71	.71	.74	.77	.77	.75
24 - 30	.06	.11	.26	.46	.53	.60	.65	.67	.62	.65
30 - 36	.01	.04	.08	.29	.34	.44	.52	.50	.51	.48
36 - 42	-.06	-.03	.00	.11	.19	.31	.40	.42	.44	.47
42 - 48	-.06	-.02	-.03	.02	.09	.15	.15	.21	.19	.24
48 - 54	-.03	-.02	.01	.01	.01	.05	.09	.06	.06	.08
54 - 60	.01	-.03	.04	.03	.03	.02	.06	.03	.03	.05
60 - 66	-.05	-.02	.01	.03	.01	-.02	.01	-.01	.00	.04
Total	.17	.56	1.97	3.12	3.47	3.95	4.39	4.36	4.37	4.58

* These values do not include the addition of the rain factor.

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Briggs										
6 - 12	.10	.23	.62	.66	.67	.74	.76	.73	.75	.76
12 - 18	.10	.17	.53	.67	.67	.72	.70	.67	.69	.70
18 - 24	.10	.15	.52	.66	.68	.74	.75	.68	.71	.75
24 - 30	.06	.08	.30	.50	.58	.64	.65	.64	.63	.62
30 - 36	.01	.07	.10	.40	.53	.56	.59	.55	.59	.58
36 - 42	-.01	-.01	.08	.19	.32	.40	.39	.39	.42	.41
42 - 58	-.04	-.04	.01	-.01	.10	.17	.23	.25	.27	.31
48 - 54	.03	.00	.05	.02	.04	.08	.14	.11	.14	.15
54 - 60	-.03	-.03	-.03	-.02	-.02	.01	.04	-.01	.00	.00
60 - 66	.01	.00	.05	.00	.05	.04	.03	.00	.00	.00
Total	.31	.60	2.21	3.05	3.58	4.07	4.27	3.99	4.15	4.24
California Mariout 67										
6 - 12	.05	.15	.49	.63	.67	.68	.69	.72	.69	.72
12 - 18	.08	.15	.45	.59	.60	.65	.63	.61	.61	.63
18 - 24	.06	.13	.41	.61	.64	.65	.65	.65	.64	.66
24 - 30	.03	.05	.28	.48	.54	.61	.62	.57	.56	.58
30 - 36	.01	.00	.02	.27	.34	.42	.43	.39	.44	.45
36 - 42	-.03	-.03	-.03	.05	.19	.30	.32	.35	.38	.38
42 - 48	-.01	-.06	-.09	-.02	.04	.14	.17	.15	.21	.19
48 - 54	.04	.11	.07	.01	.11	.09	.08	.12	.07	.10
54 - 60	.01	-.02	-.02	.04	-.07	.02	-.02	-.02	-.06	-.02
60 - 66	.00	.02	.02	.01	.04	.05	.06	.02	.01	.02
Total	.23	.49	1.61	2.75	3.12	3.63	3.65	3.54	3.56	3.72
Compana										
6 - 12	.14	.27	.64	.74	.78	.79	.81	.79	.79	.81
12 - 18	.12	.25	.64	.68	.69	.70	.73	.69	.71	.73
18 - 24	.08	.17	.46	.59	.64	.65	.64	.62	.64	.63
24 - 30	.04	.06	.27	.50	.57	.58	.61	.57	.58	.57
30 - 36	.02	.03	.11	.32	.52	.53	.56	.53	.57	.54
36 - 42	-.03	-.04	.03	.14	.33	.34	.44	.42	.42	.43
42 - 48	.00	-.01	.03	.07	.17	.18	.19	.24	.18	.22
48 - 54	.02	-.04	.03	.03	.07	.08	.10	.09	.03	.07
54 - 60	.00	.02	.01	.05	.08	.09	.08	.05	.05	.07
60 - 66	.02	.01	.03	.04	.04	.05	.01	.02	.05	.05
Total	.42	.75	2.27	3.18	3.91	4.00	4.18	4.03	4.08	4.15
DeKap										
6 - 12	.07	.23	.60	.68	.72	.81	.81	.79	.87	.85
12 - 18	.08	.18	.57	.67	.70	.73	.74	.73	.75	.74
18 - 24	.06	.13	.50	.69	.73	.77	.80	.77	.77	.77
24 - 30	.09	.12	.34	.57	.64	.69	.72	.69	.71	.71
30 - 36	.08	.07	.21	.36	.49	.55	.61	.58	.58	.58
36 - 46	.02	.05	.08	.20	.31	.38	.43	.44	.47	.46
42 - 48	-.01	-.02	.01	.04	.08	.19	.23	.25	.29	.29
48 - 54	-.04	-.05	-.02	-.07	.00	.05	.08	.06	.11	.09
54 - 60	.02	.02	.01	.00	.04	.04	.03	.02	.02	.00
60 - 66	-.02	-.01	.01	.00	-.01	-.01	-.07	-.08	-.08	-.06
Total	.35	.71	2.30	3.12	3.68	4.18	4.37	4.25	4.48	4.43

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Dickson										
6 - 12	.06	.15	.56	.76	.74	.82	.83	.85	.85	.87
12 - 18	.08	.09	.37	.61	.65	.71	.74	.73	.72	.73
18 - 24	.07	.11	.25	.53	.61	.67	.72	.69	.69	.73
24 - 30	.13	.13	.19	.43	.52	.65	.68	.68	.67	.67
30 - 36	.06	.00	.10	.19	.25	.36	.44	.44	.44	.47
36 - 42	.01	-.06	.00	.05	.12	.18	.26	.23	.32	.35
42 - 48	.02	-.01	.01	.07	.06	.10	.14	.14	.18	.19
48 - 54	.00	.02	.04	.05	.05	.11	.13	.09	.09	.08
54 - 60	.00	-.03	.02	.03	.02	.02	.05	.01	.01	.04
60 - 66	-.03	-.07	.01	-.01	.01	.00	.00	-.05	.01	-.06
Total	.40	.36	1.58	2.75	3.09	3.68	4.06	3.89	4.07	4.11
Erbe										
6 - 12	.06	.15	.49	.65	.69	.74	.75	.76	.75	.76
12 - 18	.15	.15	.48	.60	.63	.69	.71	.70	.69	.71
18 - 24	.03	.08	.31	.54	.56	.63	.62	.63	.65	.66
24 - 30	.05	.10	.21	.40	.47	.55	.56	.52	.57	.54
30 - 36	-.02	-.02	.05	.22	.31	.41	.47	.45	.44	.47
36 - 42	-.02	-.04	.01	.09	.12	.24	.28	.31	.31	.31
42 - 48	.01	.00	.02	.05	.08	.11	.15	.09	.13	.13
48 - 54	-.03	-.01	.02	-.03	.02	.06	.08	.00	.05	.02
54 - 60	-.01	.01	.01	.02	.06	.07	.06	.04	.06	.05
60 - 66	.02	.00	.01	.02	.05	-.01	.02	-.03	.02	.04
Total	.25	.42	1.61	2.58	3.02	3.50	3.71	3.48	3.68	3.70
Firlbecks III										
6 - 12	.06	.19	.60	.69	.74	.79	.83	.82	.85	.85
12 - 18	.10	.20	.54	.68	.70	.76	.79	.78	.81	.79
18 - 24	.06	.13	.33	.59	.61	.67	.69	.68	.66	.67
24 - 30	.11	.12	.26	.50	.54	.61	.63	.62	.61	.64
30 - 36	.04	.04	.12	.32	.46	.53	.53	.59	.62	.67
36 - 42	-.01	.02	.06	.16	.28	.43	.47	.55	.57	.56
42 - 48	-.06	.01	.01	.06	.11	.19	.30	.38	.39	.35
48 - 54	.00	-.03	.00	.04	.07	.08	.10	.14	.14	.15
54 - 60	-.01	-.04	.00	-.03	.02	.03	.03	.01	.04	.05
60 - 66	.00	-.01	.01	-.01	-.01	.02	.04	.00	.04	.05
Total	.29	.62	1.92	2.99	3.51	4.11	4.50	4.55	4.72	4.77
Freja										
6 - 12	.08	.22	.59	.69	.70	.79	.81	.78	.80	.82
12 - 18	.05	.14	.45	.61	.63	.65	.66	.65	.69	.66
18 - 24	.06	.09	.38	.58	.60	.67	.67	.65	.65	.65
24 - 30	.09	.06	.27	.58	.64	.65	.73	.69	.71	.68
30 - 36	-.01	.03	.14	.35	.47	.57	.62	.61	.63	.58
36 - 42	.01	.03	.10	.21	.30	.39	.47	.49	.47	.49
42 - 48	-.05	-.02	-.03	.03	.05	.09	.18	.21	.23	.25
48 - 54	-.05	-.02	-.05	.01	.00	.08	.07	.08	.07	.08
54 - 60	-.03	.01	.00	.02	.05	.04	.08	.04	.04	.07
60 - 66	.00	-.01	.02	.02	.03	.00	-.06	-.05	-.02	.00
Total	.16	.52	1.86	3.09	3.47	3.97	4.29	4.20	4.31	4.32

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Frontier										
6 - 12	.08	.27	.61	.76	.75	.85	.87	.85	.85	.89
12 - 18	.13	.23	.68	.77	.81	.83	.87	.85	.86	.84
18 - 24	.07	.17	.52	.75	.72	.83	.81	.79	.80	.79
24 - 30	.03	.07	.33	.57	.61	.66	.69	.69	.70	.67
30 - 36	.00	.01	.16	.40	.46	.60	.61	.58	.61	.59
36 - 42	-.04	.04	.08	.19	.24	.35	.35	.38	.42	.43
42 - 48	.01	-.04	.02	.04	.05	.18	.19	.22	.25	.26
48 - 54	.03	-.03	.05	.01	.07	.09	.05	.07	.10	.10
54 - 60	-.03	.02	.02	.00	.01	.00	.02	.02	.03	.03
60 - 66	-.03	-.02	.01	.01	.02	-.04	-.02	-.09	-.04	-.02
Total	.25	.72	2.46	3.51	3.75	4.36	4.41	4.33	4.55	4.56
Haisa II										
6 - 12	.11	.39	.66	.71	.79	.80	.82	.87	.87	.88
12 - 18	.12	.22	.56	.66	.66	.68	.72	.70	.68	.71
18 - 24	.08	.15	.55	.70	.71	.72	.74	.73	.73	.75
24 - 30	.09	.09	.41	.61	.66	.68	.69	.68	.66	.68
30 - 36	.03	.07	.19	.43	.50	.59	.61	.58	.59	.60
36 - 42	-.01	.01	.08	.20	.29	.42	.44	.45	.44	.48
42 - 48	-.04	-.03	-.02	.04	.13	.25	.26	.28	.37	.34
48 - 54	-.05	-.04	-.02	.02	-.01	.07	.12	.07	.11	.13
54 - 60	.01	.00	.00	.02	-.01	.02	.06	.00	-.02	.04
60 - 66	.00	.02	-.05	.01	-.01	-.01	.01	-.04	-.01	.01
Total	.34	.84	2.35	3.38	3.69	4.21	4.45	4.33	4.41	4.59
Hannchen										
6 - 12	.13	.16	.53	.72	.71	.76	.79	.82	.84	.86
12 - 18	.08	.17	.46	.68	.70	.78	.79	.77	.77	.79
18 - 24	.07	.07	.29	.56	.62	.67	.71	.70	.68	.67
24 - 30	.08	.10	.22	.49	.59	.63	.67	.65	.69	.67
30 - 36	.03	.08	.12	.31	.44	.54	.59	.59	.56	.57
36 - 42	-.03	-.04	.01	.12	.25	.41	.46	.45	.46	.48
42 - 48	-.03	-.03	-.02	.04	.07	.13	.23	.27	.28	.31
48 - 54	-.03	.01	.02	.02	.03	.05	.08	.05	.09	.10
54 - 60	-.01	.00	-.01	.01	.03	.03	.05	-.02	.00	.05
60 - 66	-.03	.00	.00	.02	-.02	-.04	.02	-.05	-.04	-.03
Total	.25	.52	1.62	2.99	3.45	3.99	4.42	4.26	4.36	4.49
Harlan										
6 - 12	.12	.27	.71	.78	.85	.91	.89	.90	.90	.93
12 - 18	.13	.20	.54	.72	.70	.77	.78	.76	.75	.82
18 - 24	.02	.10	.29	.54	.61	.65	.68	.66	.67	.67
24 - 36	.02	.02	.18	.40	.45	.61	.67	.65	.68	.69
36 - 42	.01	.03	.10	.21	.30	.40	.47	.47	.49	.48
42 - 48	-.04	-.10	-.03	.01	.06	.14	.16	.13	.13	.16
48 - 54	.02	.00	.07	.11	.08	.13	.13	.09	.13	.18
54 - 60				.05	.05	.05	.10	.05	.09	.11
Total	.28	.52	1.85	2.80	3.09	3.64	3.86	3.69	3.82	4.02

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Klages										
6 - 12	.06	.15	.55	.77	.79	.90	.91	.95	.97	.99
12 - 18	.09	.10	.38	.64	.69	.71	.78	.79	.79	.78
18 - 24	.12	.14	.33	.56	.66	.71	.70	.72	.74	.75
24 - 30	.04	.06	.15	.33	.40	.55	.62	.59	.61	.60
30 - 36	.06	.07	.10	.19	.24	.37	.48	.49	.49	.54
36 - 42	.00	.06	.06	.07	.14	.21	.30	.35	.38	.42
42 - 48	.01	-.04	-.03	.01	.07	.11	.14	.15	.17	.24
48 - 54	-.03	.01	-.02	.03	.04	.06	.06	.01	.11	.10
54 - 60	-.01	-.04	-.02	.04	.07	.03	.04	.00	.00	.01
60 - 66	-.01	.02	.05	.08	.10	.04	.04	.01	.06	.08
Total	.33	.54	1.55	2.72	3.21	3.71	4.09	4.07	4.30	4.50
Heines Hanna										
6 - 12	.10	.26	.58	.68	.72	.77	.81	.81	.81	.83
12 - 18	.18	.19	.53	.72	.71	.78	.81	.78	.77	.76
18 - 24	.12	.15	.39	.64	.69	.76	.77	.74	.78	.75
24 - 30	-.03	.06	.22	.49	.56	.65	.65	.62	.65	.67
30 - 36	.00	.03	.16	.33	.45	.53	.62	.59	.61	.64
36 - 42	.01	.05	.08	.16	.27	.35	.39	.43	.46	.45
42 - 48	.01	.00	.00	.02	-.01	.08	.11	-.09	.10	.17
48 - 54	.00	-.02	-.05	.03	-.04	.00	.04	-.01	.02	.01
54 - 60	-.03	-.06	.00	-.01	-.04	-.07	.00	-.03	-.01	.00
60 - 66	-.02	-.03	-.01	.00	.02	.00	-.01	-.02	-.06	.00
Total	.34	.64	1.91	3.07	3.35	3.87	4.22	4.02	4.16	4.29
Herta										
6 - 12	.12	.18	.54	.73	.68	.80	.85	.81	.86	.85
12 - 18	.09	.14	.40	.60	.66	.71	.69	.71	.71	.70
18 - 24	.05	.09	.22	.48	.49	.59	.64	.62	.60	.64
24 - 30	.03	.00	.11	.33	.36	.48	.58	.57	.57	.59
30 - 36	.02	.03	.08	.14	.17	.35	.45	.51	.57	.60
36 - 42	.06	.09	.10	.12	.16	.31	.38	.41	.48	.52
42 - 48	-.03	.04	.11	.07	.10	.16	.21	.19	.30	.24
48 - 54	-.05	-.02	-.02	-.01	.01	.05	.10	.07	.11	.15
54 - 60	-.01	.00	.04	.08	.08	.10	.13	.08	.12	.10
60 - 66	.01	-.01	.03	.03	.07	.08	.05	-.03	.05	.03
Total	.30	.55	1.62	2.59	2.80	3.63	4.08	3.92	4.34	4.43
Hiland										
6 - 12	.05	.16	.61	.75	.75	.86	.89	.90	.89	.92
12 - 18	.10	.17	.53	.72	.77	.81	.82	.81	.81	.82
18 - 24	.04	.07	.40	.61	.68	.72	.73	.74	.72	.76
24 - 30	.04	.07	.24	.54	.61	.70	.71	.68	.69	.67
30 - 36	.03	.06	.16	.39	.50	.58	.60	.58	.58	.60
36 - 42	.01	.01	.03	.14	.27	.37	.37	.38	.41	.42
42 - 48	-.05	-.01	.01	.03	.06	.18	.22	.23	.25	.25
48 - 54	.07	.02	.04	.07	.09	.12	.15	.10	.17	.17
54 - 60	.02	-.02	.01	.00	.01	.03	.03	.00	.04	-.01
60 - 66	.04	.02	.01	.02	.03	.05	.07	.03	.05	.03
Total	.36	.56	2.06	3.30	3.80	4.44	4.61	4.46	4.62	4.64

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Hector										
6 - 12	.04	.17	.51	.63	.66	.68	.67	.67	.69	.71
12 - 18	.16	.27	.62	.72	.73	.74	.76	.72	.73	.74
18 - 24	.09	.19	.55	.72	.76	.76	.77	.75	.77	.76
24 - 30	.04	.09	.34	.56	.63	.65	.68	.65	.66	.65
30 - 36	.06	.07	.19	.43	.50	.58	.58	.58	.59	.59
36 - 42	.00	.02	.06	.18	.28	.36	.40	.41	.41	.44
42 - 48	-.06	-.03	-.05	.03	.05	.24	.27	.25	.26	.26
48 - 54	.05	.02	.05	.08	.07	.08	.15	.11	.14	.12
54 - 60	.03	.02	.05	.04	.05	.05	.08	.08	.07	.09
60 - 66	.01	.00	.05	.07	.07	.05	.03	.03	.06	.06
Total	.42	.81	2.36	3.44	3.78	4.17	4.36	4.22	4.36	4.38
Galt										
6 - 12	.04	.20	.63	.74	.73	.82	.83	.89	.89	.90
12 - 18	.12	.19	.50	.62	.66	.72	.73	.73	.73	.76
18 - 24	.06	.09	.31	.51	.54	.61	.60	.59	.61	.61
24 - 30	-.01	-.01	.12	.35	.42	.52	.52	.55	.55	.54
30 - 36	.00	-.01	.03	.17	.29	.45	.46	.48	.50	.52
36 - 42	-.01	-.03	.03	.09	.15	.33	.42	.49	.47	.48
42 - 48	.02	-.02	-.06	.03	.09	.15	.21	.29	.27	.30
Total	.23	.41	1.58	2.53	2.90	3.62	3.78	4.03	4.02	4.11
Gem										
6 - 12	.07	.23	.59	.70	.74	.79	.81	.78	.82	.83
12 - 18	.14	.22	.60	.78	.77	.80	.85	.81	.77	.81
18 - 24	.13	.21	.48	.70	.75	.77	.78	.74	.76	.76
24 - 30	.07	.15	.39	.57	.62	.66	.71	.67	.66	.64
30 - 36	-.02	.02	.14	.31	.34	.48	.49	.45	.47	.47
36 - 42	.03	.04	.04	.20	.30	.40	.53	.49	.52	.54
42 - 48	.03	.03	.06	.07	.13	.27	.36	.37	.36	.38
48 - 54	.02	.02	.03	.09	.10	.13	.21	.18	.14	.18
54 - 60	.02	-.01	.03	.03	.05	.04	.07	.07	.03	.07
60 - 66	-.01	-.02	-.01	.04	-.02	.03	-.02	.00	-.04	.00
Total	.48	.90	2.34	3.49	3.78	4.36	4.77	4.54	4.53	4.71
Georgie										
6 - 12	.04	.17	.58	.67	.68	.76	.78	.80	.79	.78
12 - 18	.07	.18	.54	.66	.73	.72	.74	.74	.74	.74
18 - 24	.04	.11	.44	.62	.70	.71	.74	.70	.73	.72
24 - 30	.03	.11	.31	.53	.65	.64	.66	.63	.63	.65
30 - 36	.04	.05	.21	.43	.53	.62	.63	.63	.62	.60
36 - 42	.02	.06	.04	.25	.37	.46	.52	.51	.50	.49
42 - 48	.00	.00	.00	.03	.10	.15	.20	.25	.28	.24
48 - 54	.02	.00	.06	.02	.08	.07	.06	.08	.11	.11
54 - 60	.01	-.01	.00	.00	.08	.05	.04	.00	.04	.05
60 - 66	-.02	.01	.08	.00	.03	.05	.02	-.01	-.01	.00
Total	.26	.70	2.29	3.22	3.90	4.22	4.38	4.32	4.44	4.39

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Liberty										
6 - 12	.05	.25	.58	.71	.72	.76	.77	.79	.77	.76
12 - 18	.07	.16	.54	.66	.70	.71	.71	.69	.74	.73
18 - 24	.10	.17	.45	.70	.69	.77	.76	.75	.73	.75
24 - 30	.05	.10	.31	.55	.62	.70	.70	.68	.68	.67
30 - 36	.03	.04	.16	.32	.37	.46	.52	.48	.49	.50
36 - 42	.05	.00	.02	.11	.17	.27	.34	.34	.33	.35
42 - 48	-.02	.01	.01	.04	.09	.16	.19	.24	.19	.24
48 - 54	.02	.03	.05	.02	.08	.08	.09	.08	.08	.11
54 - 60	.02	-.03	-.05	.00	.02	.02	.00	-.02	-.01	-.01
60 - 66	.00	-.03	.00	.02	.00	.06	.01	.00	-.03	-.04
Total	.38	.71	2.08	3.14	3.45	3.98	4.07	3.98	3.92	4.07
Marie										
6 - 12	.01	.14	.69	.64	.66	.73	.75	.72	.74	.77
12 - 18	.08	.19	.49	.67	.76	.80	.79	.76	.81	.81
18 - 24	.08	.11	.31	.64	.71	.80	.82	.81	.80	.78
24 - 30	.01	.07	.21	.50	.60	.67	.70	.68	.72	.71
30 - 36	.05	.05	.04	.30	.44	.52	.58	.56	.57	.59
36 - 42	.04	.01	.08	.16	.28	.40	.48	.48	.50	.50
42 - 48	-.04	-.01	-.01	.05	.11	.23	.27	.34	.31	.32
48 - 54	.01	-.02	.02	.03	.02	.07	.10	.07	.11	.13
54 - 60	-.01	.01	.05	.03	.01	.04	.06	.06	.07	.07
60 - 66	-.04	.02	-.02	.03	.02	.01	.00	.03	.00	.02
Total	.19	.53	1.84	3.05	3.61	4.27	4.53	4.42	4.53	4.67
Horn										
6 - 12	.09	.23	.59	.69	.70	.77	.78	.83	.80	.84
12 - 18	.10	.14	.50	.63	.66	.69	.69	.67	.69	.65
18 - 24	.08	.15	.44	.61	.65	.67	.70	.71	.72	.68
24 - 30	.04	.08	.27	.47	.55	.58	.62	.59	.58	.57
30 - 36	-.02	.01	.06	.26	.33	.43	.44	.46	.43	.44
36 - 42	-.05	-.03	.02	.13	.27	.41	.45	.46	.48	.49
42 - 48	-.03	-.04	-.01	.01	.10	.22	.27	.27	.30	.35
48 - 54	-.02	-.02	.03	.05	.05	.07	.10	.07	.13	.16
54 - 60	-.07	-.06	-.02	-.04	-.04	.01	-.05	-.03	.01	-.04
60 - 66	.00	-.03	.01	.00	.01	.02	.03	-.01	.04	.00
Total	.13	.44	1.91	2.81	3.28	3.87	4.03	4.01	4.18	4.14
Ingrid										
6 - 12	.04	.13	.45	.66	.65	.78	.79	.78	.78	.80
12 - 18	.09	.16	.45	.63	.64	.69	.71	.73	.73	.72
18 - 24	.01	.01	.16	.36	.48	.54	.58	.58	.56	.57
24 - 30	-.02	-.03	.02	.22	.33	.46	.52	.51	.52	.53
30 - 36	.09	.05	.03	.13	.18	.34	.39	.41	.44	.41
36 - 42	-.03	.01	.09	.10	.11	.13	.22	.18	.27	.23
42 - 48	.01	.03	.04	.07	.05	.12	.12	.12	.17	.18
48 - 54	.01	.05	.04	.04	.06	.06	.10	.10	.13	.15
54 - 60	-.02	.00	.02	.04	.06	.05	.11	.09	.07	.12
Total	.18	.40	1.29	2.25	2.56	3.17	3.54	3.50	3.68	3.10

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Maris Mink										
6 - 12	.09	.20	.59	.69	.71	.84	.83	.86	.86	.84
12 - 18	.13	.17	.51	.68	.73	.76	.78	.77	.77	.78
12 - 24	.10	.12	.38	.60	.67	.71	.70	.69	.68	.72
24 - 30	.03	.07	.26	.47	.53	.56	.55	.57	.55	.57
30 - 36	.03	.05	.11	.29	.35	.50	.53	.51	.52	.53
36 - 42	.02	.00	.06	.18	.22	.37	.48	.47	.49	.50
42 - 48	-.04	-.09	-.06	.03	.04	.15	.22	.25	.27	.27
48 - 54	-.01	-.03	-.04	-.02	.02	.08	.09	.12	.07	.08
54 - 60	-.03	.00	.04	.03	.03	.07	.07	.07	.02	.10
60 - 66	-.01	-.01	.01	.02	.00	.00	.01	.02	.03	.04
Total	.30	.49	1.88	3.01	3.35	4.09	4.33	4.34	4.32	4.45
Montcalm										
6 - 12	.02	.18	.67	.71	.74	.77	.81	.81	.85	.84
12 - 18	.08	.13	.50	.64	.67	.73	.74	.77	.73	.76
18 - 24	.08	.11	.45	.55	.66	.71	.71	.74	.72	.74
24 - 30	.03	.03	.10	.34	.41	.53	.56	.52	.57	.55
30 - 36	.03	.03	.10	.24	.34	.44	.51	.49	.51	.51
36 - 42	-.02	-.02	.03	.05	.10	.22	.24	.30	.31	.30
42 - 48	-.02	-.05	-.03	.00	.01	.09	.12	.10	.12	.13
48 - 54	.01	-.02	.01	.03	.01	.02	.07	.05	.04	.05
54 - 60	-.04	-.04	-.03	-.01	.01	.01	-.02	-.01	-.03	.00
Total	.17	.36	1.80	2.55	2.96	3.54	3.75	3.76	3.81	3.88
Munsing										
6 - 12	.02	.20	.59	.71	.72	.80	.83	.79	.79	.84
12 - 18	.12	.16	.61	.72	.76	.77	.79	.78	.77	.78
18 - 24	.13	.19	.54	.73	.77	.79	.80	.79	.78	.81
24 - 30	.09	.10	.33	.57	.64	.68	.72	.68	.67	.67
30 - 36	.05	.07	.18	.41	.54	.65	.63	.61	.60	.62
36 - 42	.00	.03	.06	.15	.35	.42	.46	.45	.44	.47
42 - 48	.02	-.01	.05	.02	.11	.20	.27	.29	.30	.31
48 - 54	.03	-.03	.00	-.01	.03	.04	.11	.08	.00	.10
54 - 60	-.02	-.01	-.04	-.01	.00	.01	.02	.00	-.02	.02
60 - 66	-.02	-.03	.01	-.03	.00	-.01	.00	-.04	-.06	-.02
Total	.40	.65	2.30	3.23	3.88	4.30	4.58	4.38	4.35	4.60
Larker										
6 - 12	.06	.22	.62	.69	.69	.78	.77	.77	.78	.79
12 - 18	.07	.18	.53	.70	.75	.73	.78	.75	.74	.73
18 - 24	.08	.13	.41	.66	.72	.76	.77	.75	.76	.78
24 - 30	.08	.12	.27	.52	.61	.72	.76	.76	.72	.76
30 - 36	.05	.14	.17	.34	.44	.55	.58	.58	.61	.62
36 - 42	.02	.05	.04	.15	.27	.37	.42	.43	.44	.49
42 - 48	-.03	-.03	.00	.01	.08	.15	.20	.19	.20	.21
48 - 54	-.03	-.03	-.04	.01	-.01	.05	.07	-.01	.00	.00
54 - 60	-.03	-.03	-.02	.03	.01	.01	-.01	-.11	-.07	-.01
60 - 66	-.02	-.02	-.02	.02	-.01	.00	-.04	-.03	-.07	-.02
Total	.24	.73	1.97	3.11	3.56	4.12	4.30	4.07	4.08	4.33

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Traill										
6 - 12	.06	.22	.57	.68	.71	.77	.78	.80	.79	.83
12 - 18	.11	.21	.55	.71	.73	.77	.78	.75	.78	.75
18 - 24	.03	.14	.45	.66	.69	.74	.74	.77	.78	.77
24 - 30	.01	.08	.27	.50	.55	.61	.63	.62	.66	.62
30 - 36	.03	.04	.13	.18	.29	.41	.48	.47	.49	.48
36 - 42	-.01	.00	.02	.08	.21	.32	.42	.43	.50	.42
42 - 48	.04	.00	.01	.02	.08	.19	.22	.28	.28	.31
48 - 54	-.01	-.01	.01	.07	.06	.10	.12	.08	.07	.15
54 - 60	.01	.00	.01	.05	.08	.07	.06	.04	.07	.09
60 - 66	.04	.04	-.02	.07	.01	.08	.07	-.02	.02	.05
Total	.32	.72	2.00	3.03	3.41	4.06	4.29	4.20	4.41	4.47
Trebl										
6 - 12	.06	.25	.62	.73	.76	.82	.85	.82	.85	.90
12 - 18	.11	.22	.60	.71	.77	.77	.81	.79	.80	.79
18 - 24	.08	.11	.44	.61	.68	.72	.74	.69	.76	.74
24 - 30	.05	.07	.31	.48	.55	.60	.63	.60	.61	.58
30 - 36	.05	.08	.14	.37	.49	.54	.59	.58	.57	.57
36 - 42	.01	-.03	.09	.15	.22	.37	.39	.40	.43	.42
42 - 48	.00	.00	.03	.02	.17	.22	.20	.26	.31	.27
48 - 54	-.02	-.01	-.03	-.05	.02	.05	.06	.05	.09	.06
54 - 60	-.02	.02	-.01	.00	.02	.03	.04	-.02	.00	.02
60 - 66	-.07	-.03	-.04	-.04	.01	.00	.03	-.03	-.02	-.04
Total	.24	.68	2.15	2.97	3.68	4.12	4.34	4.13	4.39	4.30
Trophy										
6 - 12	.04	.17	.56	.67	.67	.73	.74	.75	.73	.78
12 - 18	.06	.13	.55	.69	.69	.74	.76	.73	.76	.75
18 - 24	.12	.14	.38	.68	.74	.78	.78	.76	.79	.77
24 - 30	.06	.09	.29	.56	.65	.74	.75	.77	.77	.76
30 - 36	.04	.07	.16	.33	.48	.57	.66	.63	.67	.63
36 - 42	.00	.01	.05	.14	.26	.40	.46	.48	.48	.49
42 - 48	-.03	-.02	-.02	.01	.04	.18	.25	.26	.29	.29
48 - 54	.01	-.01	.00	.04	.03	.06	.08	.10	.12	.11
54 - 60	-.02	-.06	-.06	-.02	.01	.01	.00	-.04	.02	-.01
60 - 66	.04	-.02	.01	.01	.05	.03	.02	.02	-.03	-.05
Total	.31	.48	1.90	3.09	3.59	4.23	4.49	4.45	4.58	4.52
Steptoe										
6 - 12	.02	.18	.62	.69	.70	.78	.79	.79	.82	.80
12 - 18	.08	.14	.32	.63	.67	.71	.72	.69	.68	.70
18 - 24	.07	.13	.31	.62	.67	.74	.78	.75	.75	.74
24 - 30	.06	.07	.22	.42	.54	.62	.69	.66	.66	.68
30 - 36	.05	.07	.16	.25	.41	.46	.53	.53	.53	.52
36 - 42	.02	.02	.06	.13	.18	.27	.26	.33	.33	.40
42 - 48	-.02	-.06	-.03	.02	.02	.10	.11	.17	.12	.19
48 - 54	-.01	.04	.02	.03	.04	.06	.07	.10	.11	.08
54 - 60	-.03	.00	.05	-.03	.00	.03	.04	.03	.04	.02
60 - 66	-.03	-.01	-.02	.02	.01	.01	.00	-.04	-.05	-.02
Total	.22	.58	1.85	2.76	3.22	3.77	3.97	3.97	3.96	4.13

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Steveland										
6 - 12	.06	.14	.52	.71	.74	.80	.84	.81	.81	.82
12 - 18	.10	.17	.41	.68	.74	.80	.79	.76	.79	.77
18 - 24	.10	.13	.31	.58	.67	.77	.75	.77	.78	.75
24 - 30	.03	.05	.16	.39	.50	.59	.60	.57	.63	.63
30 - 36	-.05	.08	.12	.29	.38	.56	.61	.63	.59	.60
36 - 42	-.01	.00	.03	.11	.20	.30	.41	.38	.40	.41
42 - 48	-.03	-.01	-.06	-.04	.02	.06	.03	.06	.06	.12
48 - 54	-.01	-.02	.00	.01	.01	.02	.04	.01	.02	.00
54 - 60	-.04	.00	-.03	.01	-.01	-.01	-.03	-.01	-.01	.00
60 - 66	.03	.06	.03	.07	.05	.06	.08	.01	.02	-.03
Total	.27	.58	1.46	2.78	3.30	3.91	4.09	3.97	4.09	4.06
Titan										
6 - 12	.04	.20	.59	.73	.72	.76	.76	.75	.74	.80
12 - 18	.10	.19	.56	.66	.70	.71	.71	.69	.70	.71
18 - 24	.03	.13	.42	.61	.61	.70	.70	.66	.70	.70
24 - 30	.05	.12	.26	.49	.57	.63	.63	.63	.63	.62
30 - 36	-.02	.00	.07	.24	.32	.42	.44	.46	.45	.44
36 - 42	.00	-.01	.05	.11	.19	.33	.33	.35	.36	.36
42 - 48	-.04	-.04	-.01	.06	.08	.15	.19	.17	.16	.14
48 - 54	-.03	.06	.05	.06	.05	.05	.04	.04	.04	.10
54 - 60	-.02	.00	-.01	.03	-.02	-.02	.01	-.02	.02	.02
60 - 66	.01	.01	.01	.01	.01	.01	.00	.02	-.02	.01
Total	.15	.59	1.91	2.98	3.24	3.76	3.86	3.75	3.79	3.91
Pirolino										
6 - 12	.03	.19	.52	.69	.76	.80	.84	.85	.84	.84
12 - 18	.11	.16	.45	.65	.72	.74	.78	.77	.75	.77
18 - 24	.07	.09	.30	.59	.68	.76	.75	.77	.73	.70
24 - 30	.00	.06	.21	.45	.57	.66	.68	.68	.67	.66
30 - 36	.00	.07	.13	.30	.41	.54	.60	.57	.59	.63
36 - 42	.02	.02	.08	.14	.24	.33	.43	.43	.44	.43
42 - 48	.01	.01	.02	.05	.08	.08	.14	.14	.19	.21
48 - 54	.00	-.03	-.02	-.03	-.02	.03	.01	.00	.02	.03
54 - 60	-.02	.00	.06	.03	.01	.07	.05	.04	.01	.00
60 - 66	.00	.01	.01	.00	.01	-.01	.02	.01	.03	-.01
Total	.23	.59	1.76	2.86	3.43	3.99	4.28	4.25	4.26	4.25
Primus II										
6 - 12	.13	.27	.66	.79	.80	.87	.86	.84	.83	.84
12 - 18	.09	.20	.53	.68	.70	.76	.81	.77	.75	.77
18 - 24	.13	.15	.40	.64	.68	.77	.76	.74	.75	.73
24 - 30	-.01	.02	.14	.34	.45	.51	.51	.54	.53	.52
30 - 36	.04	.03	.09	.26	.35	.44	.51	.48	.49	.50
36 - 42	-.03	-.02	-.02	.07	.13	.28	.31	.33	.33	.31
42 - 48	.00	.02	.08	.06	.13	.12	.20	.19	.19	.19
48 - 54	.03	.02	.06	.03	.08	.08	.05	.03	.03	.09
54 - 60	-.02	-.01	.00	-.03	.00	.03	-.01	-.01	-.01	.04
60 - 66	-.02	-.02	.02	.06	.01	.04	.00	.01	-.01	.00
Total	.33	.63	1.94	2.88	3.31	3.88	4.00	3.93	3.93	3.98

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Spartan										
6 - 12	.09	.20	.51	.68	.77	.85	.85	.86	.87	.85
12 - 18	.11	.18	.45	.65	.75	.77	.78	.78	.80	.79
18 - 24	.10	.10	.29	.51	.65	.68	.73	.70	.70	.73
24 - 30	.04	.03	.15	.31	.41	.51	.51	.49	.53	.53
30 - 36	-.02	.03	.03	.15	.26	.39	.42	.43	.43	.44
36 - 42	-.01	-.02	-.01	.01	.09	.15	.24	.19	.18	.21
42 - 48	-.01	-.03	-.04	-.04	.01	.06	.09	.05	.08	.06
48 - 54	.00	.00	.00	-.05	.00	.05	.08	.04	.00	.02
54 - 60	-.01	.00	.03	-.02	-.02	.05	-.02	-.05	-.05	.00
60 - 66	-.01	-.02	.01	.00	.01	-.01	.03	-.02	-.02	-.04
Total	.28	.46	1.40	2.22	2.97	3.49	3.62	3.43	3.49	3.56
New Moravian										
6 - 12	.03	.18	.54	.64	.66	.76	.79	.81	.83	.82
12 - 18	.08	.21	.48	.67	.66	.74	.78	.74	.74	.74
18 - 24	.04	.10	.29	.53	.59	.65	.68	.63	.64	.66
24 - 30	.11	.11	.21	.38	.51	.58	.58	.63	.64	.66
30 - 36	.02	-.01	.10	.23	.33	.45	.55	.53	.56	.56
36 - 42	-.03	-.05	.04	.07	.15	.32	.33	.40	.41	.49
42 - 48	.02	.01	.04	.09	.12	.20	.26	.25	.30	.30
48 - 54	-.01	.01	-.01	.03	.08	.10	.14	.11	.12	.13
54 - 60	-.05	-.01	.01	.02	.06	.02	.00	.02	.01	.08
60 - 66	.01	-.04	.02	.04	.00	.06	.10	.04	.04	.04
Total	.23	.51	1.73	2.71	3.16	3.88	4.22	4.18	4.31	4.49
Nordic										
6 - 12	.06	.21	.57	.68	.71	.76	.84	.77	.79	.80
12 - 18	.07	.15	.50	.66	.70	.72	.75	.70	.71	.73
18 - 24	.07	.14	.45	.66	.70	.72	.76	.73	.73	.72
24 - 30	.04	.11	.21	.47	.54	.56	.59	.59	.61	.60
30 - 36	.01	.09	.13	.36	.45	.56	.57	.51	.57	.53
36 - 42	.00	.05	.06	.19	.28	.38	.45	.41	.45	.47
42 - 48	.00	-.01	-.03	.02	.07	.12	.14	.18	.14	.20
48 - 54	.02	.02	.03	.07	.07	.07	.07	.05	.08	.03
54 - 60	.01	.03	.03	.03	.01	.01	.01	.01	-.03	-.01
60 - 66	.01	.02	.02	.03	.04	.08	.05	.03	.00	.06
Total	.29	.81	1.96	3.15	3.55	3.96	4.21	3.97	4.03	4.10
Otis										
6 - 12	.10	.18	.61	.76	.83	.89	.88	.86	.87	.92
12 - 18	.09	.19	.58	.78	.80	.82	.84	.83	.81	.84
18 - 24	.11	.17	.52	.75	.83	.86	.89	.86	.89	.89
24 - 30	.05	.06	.22	.49	.58	.65	.71	.69	.67	.67
30 - 36	.02	.06	.17	.33	.45	.48	.55	.54	.53	.50
36 - 42	-.01	-.02	-.02	.09	.16	.20	.25	.26	.27	.27
42 - 48	-.01	-.05	-.04	-.03	.05	.03	.08	.05	.09	.09
48 - 54	.02	-.05	.02	-.01	.01	.01	.01	.05	-.02	.00
54 - 60	-.05	-.03	-.06	-.02	-.02	.04	-.03	-.04	-.01	.01
60 - 66	-.05	-.06	-.10	-.07	-.05	-.05	-.02	-.12	-.08	-.08
Total	.28	.45	1.89	3.06	3.63	3.93	4.16	3.87	3.99	4.11

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Glacier										
6 - 12	.04	.18	.58	.71	.70	.79	.82	.80	.82	.83
12 - 18	.07	.10	.45	.62	.69	.70	.73	.70	.72	.71
18 - 24	.05	.10	.37	.63	.73	.76	.77	.74	.78	.77
24 - 30	.05	.10	.26	.50	.68	.74	.77	.72	.71	.76
30 - 36	-.02	-.01	.12	.23	.42	.51	.55	.54	.56	.57
36 - 42	-.03	.00	.07	.14	.18	.30	.35	.35	.40	.41
42 - 48	-.06	-.11	-.06	-.05	.04	.09	.11	.16	.21	.21
48 - 54	-.02	-.01	.02	-.04	.03	.06	.03	.00	.08	.06
54 - 60	-.07	-.07	-.01	-.03	-.03	.00	.02	-.07	-.01	.00
60 - 66	-.02	-.01	-.04	-.01	-.02	.00	.01	-.06	-.05	-.03
Total	.05	.31	1.79	2.73	3.46	3.99	4.20	3.90	4.25	4.31
Unitan										
6 - 12	.08	.25	.63	.81	.81	.92	.91	.91	.90	.93
12 - 18	.10	.22	.56	.70	.76	.82	.80	.77	.80	.78
18 - 24	.10	.12	.44	.63	.69	.75	.76	.77	.74	.74
24 - 30	.00	.14	.29	.49	.60	.65	.67	.66	.64	.63
30 - 36	.04	.05	.12	.28	.35	.46	.47	.49	.49	.48
36 - 42	.00	.01	.06	.11	.18	.33	.39	.43	.41	.42
42 - 48	.04	.04	.08	.10	.13	.20	.26	.26	.28	.31
48 - 54	.06	.01	.03	.05	.09	.12	.09	.06	.04	.10
54 - 60	.01	.01	.02	.05	.02	-.02	.04	.01	.01	.01
60 - 66	.06	.02	.06	.08	.06	.07	.04	.02	.05	.03
Total	.49	.85	2.28	3.29	3.67	4.29	4.42	4.36	4.33	4.43
Vantage										
6 - 12	.03	.13	.57	.68	.67	.76	.77	.81	.83	.85
12 - 18	.10	.15	.51	.68	.69	.76	.74	.74	.77	.76
18 - 24	.01	.11	.37	.61	.71	.76	.76	.79	.75	.77
24 - 30	.09	.15	.34	.54	.63	.75	.76	.73	.77	.77
30 - 36	.07	.05	.12	.27	.44	.52	.58	.55	.61	.61
36 - 42	.03	.04	.07	.11	.25	.34	.39	.39	.39	.40
42 - 48	.00	-.07	-.02	.02	.04	.10	.15	.17	.18	.19
48 - 54	.00	.04	.02	-.05	.00	.03	.05	.04	.05	.04
54 - 60	-.04	-.02	.00	-.02	-.01	.03	-.02	-.05	-.02	.03
60 - 66	-.01	-.06	.03	-.05	-.03	.04	.02	-.03	-.02	-.05
Total	.28	.52	2.01	2.79	3.40	4.10	4.19	4.12	4.29	4.35
Vanguard										
6 - 12	-.02	.15	.52	.63	.65	.72	.71	.72	.72	.74
12 - 18	.03	.11	.47	.62	.64	.68	.69	.68	.68	.65
18 - 24	.06	.13	.45	.65	.69	.68	.73	.73	.70	.69
24 - 30	.04	.10	.31	.55	.59	.67	.68	.67	.70	.70
30 - 36	-.03	-.01	.10	.30	.41	.48	.52	.50	.50	.50
36 - 42	.04	.05	.06	.19	.26	.37	.43	.43	.45	.44
42 - 48	.01	.01	.00	.05	.10	.19	.23	.24	.28	.26
48 - 54	-.03	-.03	.02	.00	-.01	.02	.02	.04	.06	.09
54 - 60	.01	.00	.01	.02	.00	.07	.05	-.01	.00	.05
60 - 66	.03	.00	-.02	-.03	-.01	.02	.01	-.02	-.01	-.01
Total	.15	.51	1.04	3.00	3.34	3.93	4.10	4.00	4.11	4.11

Appendix Table 20. Cumulative water use (in) at 6 inch intervals for the drought line. Cont.

Depth Inches	June			July				August		
	13	20	27	5	11	18	25	1	8	16
Virao										
6 - 12	.03	.14	.59	.77	.72	.78	.82	.83	.83	.85
12 - 18	.04	.11	.43	.63	.65	.72	.73	.70	.73	.72
18 - 24	.05	.10	.24	.45	.54	.58	.61	.61	.64	.60
24 - 30	.05	.03	.07	.20	.31	.42	.50	.46	.46	.46
30 - 36	.03	-.02	.03	.14	.11	.21	.30	.32	.33	.31
Total	.20	.36	1.36	2.19	2.33	2.71	2.96	2.92	2.98	2.94
Zephyr										
6 - 12	.05	.17	.54	.64	.66	.74	.77	.77	.76	.79
12 - 18	.00	.09	.37	.60	.61	.70	.70	.70	.73	.73
18 - 24	.09	.10	.32	.57	.72	.76	.79	.78	.80	.78
24 - 30	.07	.12	.20	.37	.54	.64	.70	.69	.71	.69
30 - 36	.04	.05	.11	.17	.34	.45	.55	.56	.60	.58
36 - 42	.05	.07	.07	.11	.20	.33	.40	.41	.48	.45
42 - 48	-.01	-.04	.03	-.02	.05	.08	.12	.10	.10	.15
48 - 54	.01	-.01	.02	-.01	-.01	.05	.04	.02	.04	.05
54 - 60	-.04	-.07	-.01	-.07	.02	.03	.03	-.02	.01	-.01
60 - 66	.04	-.01	-.01	-.04	.01	.00	.05	-.05	-.02	.01
Total	.30	.47	1.64	2.32	3.15	3.77	4.13	3.95	4.20	4.21

Appendix Table 21. Total soil water use (cm) at 6 in intervals for the drought line. Kamp's farm. 1977.

Cultivar	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54
1	5.85	6.16	5.86	4.87	3.70	2.93	1.57	0.53
2	6.09	5.43	5.26	4.63	2.82	2.07	0.86	0.46
3	7.25	6.32	5.06	4.18	2.90	1.90	1.42	0.32
4	6.10	5.90	5.64	5.53	3.82	2.41	0.76	0.22
5	6.56	5.94	5.12	4.35	3.73	2.48	1.27	0.48
6	6.27	5.49	5.70	5.29	3.47	2.17	0.54	0.25
7	6.43	5.89	5.99	5.28	4.11	2.84	1.35	0.21
8	6.21	6.14	5.77	4.55	3.00	2.40	1.43	0.64
9	6.28	5.19	5.00	5.10	3.99	2.96	0.94	0.27
10	5.84	5.86	5.94	5.44	4.24	2.77	1.25	0.54
11	5.86	5.55	3.85	3.06	2.47	1.31	0.91	0.74
12	6.17	5.96	5.82	5.32	4.08	2.68	0.88	0.01
13	6.06	5.84	4.81	4.41	3.32	2.13	1.59	0.70
14	6.75	6.09	5.23	4.11	2.82	1.33	0.93	0.91
15	6.36	5.90	5.44	4.64	3.84	2.56	0.93	-0.01
16	7.26	6.17	4.89	4.37	2.96	0.62	0.94	0.50
17	6.78	6.87	6.25	5.02	4.02	2.44	1.18	0.49
18	6.78	6.36	5.67	4.95	4.08	2.41	1.17	1.00
19	6.37	6.23	5.79	4.54	3.96	2.65	0.57	-0.02
20	6.90	6.58	6.77	4.79	3.63	1.45	0.26	-0.06
21	6.32	5.42	5.41	4.35	2.84	2.63	1.44	0.62
22	6.66	6.37	5.57	4.48	3.98	2.45	1.48	0.22
23	6.90	5.71	5.86	5.25	4.19	2.80	1.58	0.40
24	6.36	6.55	6.08	5.14	3.15	3.09	2.06	-
25	6.32	5.99	5.04	4.79	3.83	2.57	1.45	0.46
26	7.13	6.62	5.76	4.61	3.21	2.25	0.94	0.32
27	6.29	6.26	6.33	5.15	4.36	2.83	1.56	0.35
28	6.16	5.71	5.87	5.06	3.37	1.98	1.15	0.64
29	6.53	6.06	5.19	3.51	2.56	1.03	0.18	0.14
30	6.67	5.76	4.53	3.55	2.89	2.42	1.28	1.10
31	6.42	6.15	5.09	4.64	4.02	3.09	1.74	0.69
32	6.19	5.34	5.56	4.62	3.51	2.00	0.62	0.54
33	5.54	5.25	5.51	5.01	3.27	2.72	1.37	0.18
34	6.10	5.63	5.85	4.82	3.77	2.89	1.39	0.48
35	5.43	6.19	6.12	4.95	4.17	2.56	1.22	0.87
36	5.49	5.00	5.10	4.32	2.77	1.88	0.72	0.86
37	7.04	5.75	5.43	3.95	3.03	1.99	0.82	0.37
38	6.25	6.01	5.61	4.15	3.81	2.23	0.21	0.08
39	5.80	5.51	4.71	3.97	2.78	1.61	0.77	0.18
40	6.49	5.43	5.07	4.75	2.75	1.46	0.90	0.66
41	6.51	6.08	5.27	4.16	3.42	2.79	0.94	0.36
42	6.40	5.75	5.47	3.64	3.20	1.51	0.47	0.27
43	6.36	5.46	4.42	2.96	1.66	-	-	-
44	6.89	6.06	5.75	3.55	3.19	1.69	1.18	0.45
45	5.89	5.23	5.71	4.73	3.45	2.57	0.56	0.20
46	6.19	5.69	5.68	4.32	3.78	2.74	0.83	0.51
47	6.05	5.86	5.51	4.83	4.36	3.22	1.25	0.61
48	6.02	5.62	5.74	4.70	3.98	2.58	1.25	0.76
49	6.42	5.41	4.42	3.62	2.92	2.63	1.39	0.39
50	7.15	6.31	5.74	4.77	3.23	2.34	1.70	0.65

Appendix Table 22. Soil water use plotted according to the relationship, $w = a + b \ln t$.

Cultivar	Parameter	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54
1	r^2	.82	.91	.88	.92	.84	.85	.83	.70
	a	.08	.08	.00	-.07	-.08	-.11	-.13	-.03
	b	.34	.35	.39	.37	.30	.26	.19	.06
2	r^2	.86	.84	.90	.91	.90	.86	.84	.40
	a	.10	.14	.03	.01	-.10	-.09	-.08	.00
	b	.34	.29	.33	.30	.25	.20	.11	.03
3	r^2	.88	.85	.85	.89	.85	.87	.84	.15
	a	.18	.13	.06	-.07	-.08	-.08	-.04	-.04
	b	.36	.29	.29	.32	.25	.18	.15	.05
4	r^2	.92	.88	.91	.87	.87	.85	.73	.17
	a	.03	.09	-.02	-.06	-.06	-.06	-.09	.00
	b	.38	.33	.38	.30	.30	.20	.11	.02
5	r^2	.86	.82	.85	.86	.86	.87	.84	.45
	a	.19	.19	.11	.01	-.07	-.14	-.05	-.07
	b	.31	.27	.21	.20	.29	.26	.12	.04
6	r^2	.91	.87	.89	.90	.91	.92	.77	.22
	a	.07	.05	.01	-.03	-.13	-.11	-.16	-.01
	b	.37	.33	.34	.37	.32	.22	.14	.02
7	r^2	.93	.87	.88	.90	.89	.90	.81	.66
	a	.10	.11	.06	.04	-.01	-.07	-.10	-.09
	b	.36	.32	.36	.32	.28	.23	.16	.09
8	r^2	.92	.87	.92	.92	.89	.83	.69	.73
	a	.09	.14	.03	-.03	-.07	-.14	-.07	-.07
	b	.35	.32	.36	.32	.24	.25	.14	.07
9	r^2	.91	.88	.87	.86	.91	.91	.82	.78
	a	.11	.07	.04	.01	-.10	-.09	-.12	-.07
	b	.34	.30	.31	.33	.33	.25	.14	.07
10	r^2	.89	.56	.87	.91	.90	.86	.76	.75
	a	.08	.08	.07	-.02	-.07	-.12	-.13	-.03
	b	.34	.34	.35	.38	.33	.27	.17	.06
11	r^2	.92	.91	.90	.87	.73	.90	.82	.76
	a	.02	.08	-.08	-.15	-.05	-.60	-.02	-.01
	b	.37	.32	.30	.30	.19	.12	.07	.05
12	r^2	.88	.85	.89	.97	.93	.86	.83	.28
	a	.11	.10	.05	-.01	-.03	-.09	-.09	-.04
	b	.33	.33	.35	.36	.29	.24	.13	.03
13	r^2	.94	.90	.90	.91	.88	.84	.83	.81
	a	.04	.10	.00	.00	-.12	-.16	-.06	-.04
	b	.37	.32	.32	.29	.30	.25	.15	.07
14	r^2	.87	.84	.83	.88	.86	.88	.93	.63
	a	.12	.12	.09	-.03	-.12	-.07	-.06	-.04
	b	.37	.32	.29	.29	.26	.14	.10	.08

Appendix Table 22. Soil water use plotted according to the relationship, $w = a + b \ln t$. Cont.

Cultivar	Parameter	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54
15	r^2	.93	.90	.87	.91	.92	.87	.78	.30
	a	.05	.08	.01	-.07	-.10	-.09	-.04	-.03
	b	.39	.33	.36	.35	.32	.23	.09	.01
16	r^2	.89	.88	.91	.92	.97	.78	.75	.50
	a	.16	.13	-.01	-.10	-.09	-.11	.00	-.04
	b	.37	.32	.33	.36	.25	.12	.06	.06
17	r^2	.92	.86	.87	.90	.90	.95	.76	.52
	a	.12	.16	.08	-.01	-.09	-.10	-.08	-.07
	b	.37	.35	.36	.34	.33	.23	.13	.04
18	r^2	.92	.89	.90	.88	.90	.86	.85	.61
	a	.05	.10	.00	-.03	-.05	-.09	-.11	.02
	b	.41	.36	.36	.35	.30	.22	.15	.06
19	r^2	.93	.85	.89	.92	.93	.90	.58	.11
	a	.13	.16	.07	-.08	-.10	-.08	-.04	-.08
	b	.34	.31	.34	.35	.33	.23	.06	.01
20	r^2	.89	.86	.90	.89	.91	.84	.63	.03
	a	.10	.11	.08	-.04	-.04	-.09	-.06	.00
	b	.39	.36	.39	.34	.27	.16	.06	-.01
21	r^2	.92	.83	.90	.89	.89	.88	.80	.84
	a	.11	.11	.07	.01	-.10	-.17	-.14	-.05
	b	.34	.29	.31	.28	.25	.29	.19	.07
22	r^2	.92	.87	.89	.89	.89	.87	.80	.59
	a	.10	.14	.05	.01	-.03	-.10	-.08	-.05
	b	.37	.33	.34	.29	.29	.23	.15	.05
23	r^2	.94	.85	.85	.85	.90	.91	.83	.80
	a	.19	.16	.10	.06	-.04	-.10	-.14	-.09
	b	.33	.27	.32	.31	.30	.25	.20	.08
24	r^2	.91	.84	.87	.89	.91	.85	.78	.78
	a	.11	.17	.13	.06	-.08	-.10	-.08	-.02
	b	.35	.32	.31	.30	.26	.27	.19	.08
25	r^2	.91	.91	.88	.90	.89	.85	.80	.87
	a	.10	.07	.00	.00	-.06	-.17	-.13	-.09
	b	.36	.35	.33	.32	.29	.28	.17	.05
26	r^2	.93	.87	.93	.93	.89	.88	.87	.83
	a	.08	.13	.08	.00	-.08	-.18	-.12	-.05
	b	.42	.29	.42	.31	.27	.27	.14	.05
27	r^2	.90	.83	.87	.87	.87	.86	.76	.45
	a	.07	.13	.13	.04	-.03	-.10	-.08	-.03
	b	.37	.33	.33	.31	.31	.25	.16	.04
28	r^2	.88	.86	.87	.89	.91	.78	.84	.74
	a	.12	.10	.09	.01	-.04	-.06	-.07	.01
	b	.33	.31	.33	.33	.25	.17	.13	.04

Appendix Table 22. Soil water use plotted according to the relationship, $w = a + b \ln t$. Cont.

Cultivar	Parameter	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54
29	r^2	.93	.91	.90	.90	.85	.75	.55	.16
	a	.07	.09	.01	-.05	-.11	-.08	-.05	-.02
	b	.38	.34	.33	.27	.24	.12	.05	.02
30	r^2	.92	.92	.90	.90	.86	.81	.69	-
	a	.07	.11	.03	-.10	-.14	-.16	-.10	-
	b	.40	.31	.28	.30	.28	.27	.15	-
31	r^2	.92	.91	.89	.89	.90	.88	.83	.82
	a	.08	.11	.04	.04	-.09	-.15	-.15	-.05
	b	.37	.34	.31	.28	.33	.30	.21	.08
32	r^2	.89	.86	.89	.91	.90	.87	.74	.79
	a	.07	.05	.02	-.04	-.04	-.07	-.09	-.01
	b	.36	.32	.36	.33	.26	.18	.10	.04
33	r^2	.90	.86	.86	.92	.90	.86	.84	.69
	a	.03	.05	.06	-.01	-.11	-.06	-.06	-.05
	b	.35	.31	.32	.34	.29	.22	.14	.05
34	r^2	.92	.88	.89	.91	.86	.84	.74	.56
	a	.05	.05	.01	-.03	-.08	-.12	-.12	-.07
	b	.37	.34	.38	.34	.30	.27	.17	.08
35	r^2	.88	.82	.85	.89	.89	.90	.79	.66
	a	.08	.21	.12	.02	-.02	-.09	-.14	.02
	b	.31	.27	.33	.32	.29	.23	.18	.05
36	r^2	.89	.85	.87	.87	.84	.83	.66	.24
	a	.07	.10	.02	-.01	-.09	-.15	-.12	.06
	b	.32	.26	.29	.29	.24	.22	.12	.02
37	r^2	.94	.90	.91	.90	.85	.81	.70	.60
	a	.02	.02	.05	-.07	-.06	-.09	-.08	-.05
	b	.45	.36	.33	.31	.24	.19	.11	.05
38	r^2	.89	.88	.90	.91	.92	.85	.60	.44
	a	.06	.05	.02	-.06	-.13	-.12	-.07	-.08
39	r^2	.90	.88	.91	.91	.89	.85	.79	.39
	a	.06	.12	-.01	.00	-.12	-.12	-.02	-.08
	b	.34	.29	.32	.26	.26	.18	.07	.03
40	r^2	.90	.89	.91	.87	.85	.77	.77	.73
	a	.06	.03	-.01	.01	-.06	-.11	-.04	-.01
	b	.39	.34	.34	.30	.22	.17	.09	.05
41	r^2	.92	.88	.82	.89	.87	.85	.78	.62
	a	.09	.11	.06	.00	-.07	-.11	-.16	.00
	b	.37	.32	.31	.22	.27	.26	.17	.00
42	r^2	.88	.89	.91	.88	.89	.84	.74	.53
	a	.07	.07	.04	-.07	-.08	-.11	-.08	-.01
	b	.37	.34	.33	.29	.26	.19	.08	.03

Appendix Table 22. Soil water use plotted according to the relationship, $w = a + b \ln t$. Cont.

Cultivar	Parameter	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54
43	r^2	.88	.89	.92	.84	.79	-	-	-
	a	.05	.03	-.01	-.06	-.07	-	-	-
	b	.39	.34	.30	.24	.16	-	-	-
44	r^2	.83	.89	.88	.91	.88	.82	.88	-
	a	.18	.11	.09	-.08	-.07	-.13	-.03	-
	b	.34	.33	.32	.39	.35	.20	.10	-
45	r^2	.92	.92	.90	.91	.86	.80	.73	.35
	a	.06	.02	.00	-.04	-.10	-.07	-.06	-.01
	b	.35	.36	.32	.34	.29	.21	.07	.02
46	r^2	.90	.86	.82	.91	.89	.90	.74	.38
	a	.09	.09	.07	.01	-.05	-.09	-.07	.02
	b	.35	.32	.33	.29	.28	.24	.10	.02
47	r^2	.90	.87	.88	.89	.89	.86	.78	.68
	a	.07	.10	.03	.01	-.04	-.08	-.08	.00
	b	.35	.32	.34	.31	.31	.27	.14	.04
48	r^2	.87	.83	.85	.89	.87	.89	.82	.65
	a	.15	.13	.11	.01	-.06	-.09	-.13	-.02
	b	.30	.29	.31	.30	.31	.23	.17	.06
49	r^2	.91	.90	.91	.89	.81	.77	.86	.80
	a	.10	.07	-.02	-.10	-.13	-.06	-.05	-.08
	b	.36	.31	.30	.30	.28	.21	.13	.08
50	r^2	.91	.88	.88	.92	.90	.85	.84	.22
	a	.11	.13	.06	-.01	-.05	-.11	-.03	.03
	b	.40	.33	.34	.32	.24	.23	.13	.02

Appendix Table 23. Total water use (in), yield (bu)
and water use efficiency (bu/in) for
the drought line. Kamp's farm. 1977.

Cultivar	Water use to 54 in	Yield	Water use efficiency
1	6.42	29.9	4.66
2	5.68	25.1	4.42
3	6.01	34.0	5.66
4	6.17	18.3	2.97
5	5.83	33.0	5.66
6	6.14	29.1	4.74
7	6.29	27.3	4.34
8	6.13	25.7	4.19
9	6.05	25.6	4.23
10	6.38	20.7	3.24
11	5.38	23.9	4.44
12	6.16	26.1	4.24
13	6.17	30.0	4.86
14	5.70	23.4	4.11
15	6.06	29.5	4.87
16	5.82	24.7	4.24
17	6.35	17.1	2.69
18	6.42	27.3	4.25
19	6.09	25.8	4.24
20	5.98	29.4	4.92
21	5.98	23.2	3.80
22	6.12	22.9	3.74
23	6.36	26.6	4.18
24	6.44	20.4	4.41
25	6.27	26.6	4.24
26	6.29	20.7	3.29
27	6.40	31.9	4.98
28	5.92	24.7	4.17
29	5.40	22.9	4.24
30	5.91	28.4	4.81
31	6.47	25.4	3.93
32	5.93	30.9	5.21
33	5.87	28.0	4.77
34	6.41	22.3	3.48
35	6.03	30.0	4.98
36	5.52	20.1	3.64
37	6.21	27.1	4.36
38	5.89	22.1	3.75
39	5.41	28.4	5.25
40	5.93	20.5	3.46
41	6.11	23.5	3.85
42	5.68	18.0	3.17
43	4.74	22.5	4.75
44	5.74	22.9	3.99
45	6.01	24.4	4.06
46	5.85	25.6	4.38
47	6.14	26.7	4.35
48	6.04	25.8	4.27
49	6.10	26.9	4.41
50	6.19	25.5	4.12

Appendix Table 24. Water loss (%) for young (not headed) plants of the drought line. 1975.

Cultivar	1 hr	6 hr	12 hr	18 hr	24 hr	48 hr	72 hr	96 hr	240 hr
1	-	-	-	-	-	-	-	-	-
2	110.5	184.2	221.0	236.8	257.9	289.5	305.3	310.6	336.9
3	100.0	189.7	248.3	275.9	303.5	331.1	344.9	351.8	365.6
4	62.5	137.5	200.0	237.5	275.0	325.0	343.8	350.1	368.9
5	89.3	160.7	214.3	242.9	271.5	310.8	325.1	335.0	360.8
6	65.0	140.0	200.0	245.0	280.0	330.0	350.0	360.0	385.0
7	100.0	150.0	200.0	231.3	262.6	312.6	343.9	356.4	387.7
8	93.3	180.0	220.0	246.7	266.7	286.7	293.4	300.1	326.8
9	104.5	181.8	240.9	268.2	290.9	322.7	331.8	336.3	349.9
10	93.3	186.6	239.9	266.6	293.3	326.6	339.9	339.9	366.6
11	119.0	219.0	285.7	314.3	342.9	371.5	381.0	381.0	395.3
12	100.0	195.0	250.0	280.0	315.0	355.0	375.0	385.0	410.0
13	108.6	208.6	285.7	322.8	354.2	395.6	397.0	405.6	425.6
14	66.7	144.5	211.2	251.9	292.6	348.2	374.1	385.2	414.8
15	100.0	180.0	240.0	270.0	305.0	345.0	355.0	365.0	380.0
16	64.3	142.9	225.0	282.1	332.1	403.5	435.6	446.3	478.4
17	107.7	223.1	294.9	343.6	387.2	441.0	456.4	461.5	479.4
18	75.0	150.0	215.0	255.0	290.0	350.0	375.0	385.0	410.0
19	103.1	200.0	271.9	309.4	343.8	381.3	396.9	400.0	425.0
20	90.3	158.0	216.1	248.4	277.4	316.1	329.0	335.5	354.8
21	96.4	153.5	203.5	239.2	282.1	357.1	400.0	421.4	482.1
22	100.0	200.0	252.6	284.2	305.3	336.9	347.4	352.7	368.5
23	120.0	212.0	268.0	300.0	332.0	368.0	384.0	392.0	416.0
24	53.1	118.7	178.1	221.9	259.4	318.8	346.9	359.4	393.8
25	128.0	232.0	288.0	316.0	336.0	364.0	372.0	376.0	396.0
26	70.8	145.8	212.5	254.2	287.5	337.5	358.3	366.6	391.6
27	100.0	177.4	245.1	280.6	309.6	351.5	364.4	370.9	396.7
28	77.8	144.5	194.5	222.3	255.6	300.0	327.8	338.9	372.2
29	96.7	158.0	209.6	241.9	274.2	322.6	345.2	358.1	390.4
30	59.1	109.1	159.1	190.9	227.3	286.4	318.2	336.4	377.3
31	117.4	208.7	273.9	308.7	343.5	387.0	400.0	404.3	421.7
32	58.3	125.0	175.0	204.2	229.2	270.9	291.7	304.2	333.4
33	111.8	194.2	247.1	276.5	294.1	317.6	329.4	335.3	347.1
34	71.4	153.5	210.6	246.3	278.4	321.3	335.6	339.2	357.1
35	104.3	182.6	243.5	278.3	308.7	352.2	369.6	378.3	404.4
36	57.1	122.8	182.8	222.8	262.8	317.1	340.0	351.4	380.0
37	112.5	203.1	262.5	293.8	321.9	362.5	375.0	381.3	403.2
38	72.7	159.1	231.8	272.7	309.1	354.6	368.2	372.7	395.4
39	89.3	171.4	235.7	271.4	300.0	332.1	346.4	350.0	367.9
40	100.0	192.9	235.8	257.2	278.6	307.2	314.3	328.6	350.0
41	105.9	200.1	264.7	305.9	341.2	376.5	394.1	400.0	417.6
42	56.5	121.7	173.9	208.7	247.8	291.3	308.7	321.7	352.2
43	93.8	187.6	243.9	275.2	306.5	344.0	350.3	356.6	375.4
44	59.1	118.2	172.7	209.1	245.5	304.6	331.9	341.0	368.3
45	82.4	158.9	217.7	253.0	288.3	329.5	341.3	347.2	370.7
46	64.7	152.9	205.8	241.1	264.6	294.0	323.4	329.3	347.0
47	100.0	183.3	245.8	279.1	308.3	345.8	362.5	366.7	383.4
48	-	-	-	-	-	-	-	-	-
49	86.7	163.4	220.1	256.8	286.8	330.1	346.8	356.8	376.8
50	112.0	172.0	212.0	236.0	256.0	288.0	304.0	312.0	332.0

Appendix Table 25. Water loss (%) for old (headed) plants of the drought line. 1975.

Cultivar	1 hr	6 hr	12 hr	24 hr	48 hr	72 hr	96 hr	240 hr
1	-	-	-	-	-	-	-	-
2	28.4	102.0	146.0	184.3	207.0	216.7	223.8	242.9
3	38.2	120.7	179.2	224.4	257.9	271.1	282.6	302.6
4	23.9	87.1	134.1	186.3	223.7	238.8	249.2	272.6
5	44.2	133.0	185.5	223.5	247.1	257.6	267.4	276.8
6	33.1	118.7	172.4	229.2	274.7	294.5	304.4	319.1
7	36.0	100.3	146.1	189.8	219.2	230.7	241.2	257.6
8	36.0	136.8	197.4	240.4	272.0	288.0	297.4	313.6
9	47.2	135.2	189.6	217.8	263.1	275.4	286.5	298.8
10	26.0	131.3	194.6	250.6	286.8	302.0	310.5	324.5
11	41.1	132.6	202.9	277.0	318.8	333.7	344.1	353.6
12	33.4	106.4	153.9	200.8	242.2	261.9	272.8	294.1
13	28.8	113.8	182.6	258.5	309.8	326.2	338.4	358.1
14	28.3	99.3	143.8	189.2	225.5	240.7	250.5	271.3
15	42.6	127.7	188.5	243.2	276.6	294.5	306.2	324.9
16	23.2	80.5	120.9	168.1	208.0	227.7	240.2	264.7
17	42.8	139.2	193.8	247.9	282.4	296.9	305.1	321.0
18	35.9	135.9	189.4	233.2	258.4	269.7	276.5	290.7
19	46.5	151.3	203.0	254.6	280.2	293.3	303.6	317.9
20	50.0	122.1	163.7	192.5	214.1	222.5	229.5	239.3
21	29.7	102.6	160.8	237.3	321.6	356.5	374.0	398.1
22	33.0	119.5	161.7	188.5	207.7	218.6	225.9	243.6
23	34.7	120.0	184.0	260.5	318.9	338.1	352.0	371.5
24	34.5	113.3	156.1	191.5	217.2	231.2	238.5	249.7
25	34.4	134.0	193.1	237.8	265.1	277.7	286.1	300.4
26	30.8	120.4	179.4	240.9	275.3	286.7	293.1	307.6
27	53.9	153.1	209.9	248.1	266.8	273.9	278.9	285.1
28	28.0	102.6	150.0	195.9	229.9	242.6	250.0	272.0
29	42.8	108.5	143.4	169.3	189.0	197.2	203.2	214.8
30	29.0	103.4	143.0	178.4	202.3	215.7	225.7	253.4
31	35.3	124.0	183.1	230.1	256.7	268.0	277.3	296.3
32	34.0	129.1	178.5	213.5	236.9	248.5	254.4	264.7
33	35.6	123.2	182.8	239.7	278.5	294.5	304.1	328.3
34	34.2	107.4	140.6	161.5	177.0	187.0	192.5	207.4
35	34.8	131.5	192.5	257.1	299.4	313.2	323.1	337.2
36	33.8	122.0	152.1	174.1	188.8	198.3	204.7	221.8
37	39.8	134.7	193.9	242.1	273.0	287.1	297.7	315.7
38	33.8	128.8	166.8	198.8	221.7	235.2	244.1	265.4
39	39.8	119.9	153.5	177.7	195.3	203.5	211.3	227.3
40	40.6	156.0	212.5	254.1	278.3	292.0	300.4	320.0
41	41.6	149.8	226.2	294.4	330.5	342.6	350.8	368.2
42	34.1	128.3	181.5	229.8	260.0	276.0	285.9	309.0
43	28.8	106.7	158.4	218.3	265.1	282.0	294.0	311.2
44	27.5	112.2	163.0	212.2	247.2	265.0	274.5	295.5
45	34.8	120.8	180.7	238.8	270.5	286.5	297.1	321.9
46	31.3	109.3	155.0	197.6	226.5	238.5	246.4	264.5
47	47.8	136.2	188.8	236.9	268.8	283.4	293.5	315.3
48	-	-	-	-	-	-	-	-
49	24.9	91.4	143.2	211.7	265.3	286.4	299.1	326.0
50	26.9	114.3	160.1	198.9	218.8	230.9	239.4	255.2

Appendix Table 26. Water loss (%) for whole
plants of the drought line. 1976.

Cultivar	1½ hr	6 hr	12 hr	24 hr	48 hr
1	56.08	159.6	240.7	297.8	339.1
2	85.74	217.7	292.8	350.7	391.2
3	78.65	186.2	265.7	322.5	359.0
4	70.22	165.6	245.8	321.5	373.1
5	64.56	166.1	262.1	306.7	344.0
6	68.06	169.5	246.1	306.9	358.9
7	68.74	159.3	233.3	284.3	319.6
8	74.90	199.0	287.1	361.9	400.8
9	76.26	184.1	262.1	318.5	358.6
10	85.30	248.5	329.5	398.5	445.3
11	63.44	184.2	252.0	312.6	350.0
12	69.40	161.1	235.1	318.8	383.6
13	76.26	192.7	286.9	357.7	394.8
14	73.08	184.6	265.7	322.7	374.2
15	84.12	180.9	253.2	321.5	373.8
16	73.57	177.1	248.8	324.0	374.7
17	68.04	149.6	206.8	273.3	325.4
18	61.60	138.9	183.3	219.3	255.6
19	75.55	176.1	237.9	262.2	287.2
20	75.27	195.5	250.7	307.8	347.2
21	75.66	158.5	222.9	290.8	378.1
22	74.10	176.7	250.0	304.2	346.6
23	106.5	226.5	303.4	353.2	393.1
24	68.92	154.0	225.0	284.0	324.9
25	75.64	183.6	251.3	301.9	335.1
26	99.68	277.9	412.0	484.0	523.9
27	63.32	160.3	227.6	280.6	326.1
28	75.76	188.1	273.3	341.1	384.0
29	70.80	152.0	221.7	277.2	330.0
30	75.40	193.9	279.6	340.9	423.7
31	82.76	205.2	280.4	335.6	368.6
32	79.06	174.6	239.5	298.1	348.9
33	72.44	180.0	259.7	330.2	397.3
34	64.35	161.8	225.3	262.5	287.3
35	85.80	206.9	292.2	351.4	391.0
36	74.94	194.2	281.2	336.9	379.5
37	83.80	205.5	282.1	338.5	386.6
38	83.70	192.7	263.1	311.0	349.9
39	66.48	160.4	224.6	276.8	316.6
40	98.86	216.5	283.7	331.8	370.1
41	82.88	211.9	291.2	342.7	377.1
42	86.17	188.7	257.6	323.3	373.3
43	79.76	187.4	259.5	316.8	357.4
44	72.52	165.3	235.3	294.0	335.7
45	82.68	180.0	253.1	320.6	373.3
46	75.60	172.9	246.7	322.2	395.3
47	91.10	210.8	291.7	356.1	403.6
48	79.32	192.7	254.4	291.9	322.6
49	69.76	175.1	253.1	316.3	363.5
50	84.72	206.2	259.9	302.1	339.4

Appendix Table 27. Water loss (%) for leaves of the drought line. 1976.

Cultivar	0 - 3 hr	0 - oven dry
1	249.1	265.9
2	204.6	277.9
3	186.2	276.3
4	187.1	258.5
5	243.3	287.2
6	238.6	282.5
7	227.0	293.0
8	181.8	257.6
9	214.7	309.2
10	193.7	270.0
11	234.7	325.4
12	219.9	268.4
13	179.4	280.2
14	250.3	299.7
15	167.8	262.4
16	193.8	272.4
17	237.6	303.6
18	182.0	262.0
19	172.1	257.8
20	167.6	272.3
21	161.2	292.4
22	187.8	255.4
23	157.2	272.8
24	223.1	261.6
25	202.0	278.6
26	162.4	243.3
27	229.9	313.0
28	177.5	259.1
29	178.1	279.0
30	129.7	247.2
31	185.1	299.2
32	181.3	289.1
33	190.9	286.9
34	217.5	245.7
35	172.7	269.5
36	209.6	265.0
37	198.9	294.8
38	228.7	301.1
39	209.2	258.3
40	189.6	267.4
41	193.7	295.7
42	187.1	270.5
43	236.4	330.2
44	201.6	265.7
45	182.2	269.4
46	181.3	286.6
47	182.5	272.0
48	225.1	280.1
49	195.3	268.1
50	224.2	269.9

Appendix Table 28. Water loss (%) for heads of the drought line. 1976.

Cultivar	With Grain Weight	Grain Weight Subtracted
1	16.14	60.28
2	23.68	53.98
3	23.80	58.60
4	16.66	42.97
5	18.08	43.96
6	20.20	50.84
7	18.36	43.52
8	25.68	39.84
9	27.56	35.44
10	23.90	56.24
11	19.52	41.60
12	19.98	64.82
13	31.14	54.46
14	18.64	59.74
15	32.15	56.60
16	21.80	75.22
17	22.22	78.10
18	22.08	60.94
19	28.06	48.90
20	32.06	90.92
21	26.84	75.90
22	19.68	66.30
23	25.50	73.98
24	14.28	76.54
25	26.78	54.98
26	26.26	104.9
27	13.20	51.92
28	24.22	143.3
29	14.52	65.00
30	24.18	95.90
31	26.14	81.64
32	13.26	91.60
33	33.56	105.6
34	14.52	84.00
35	22.38	81.50
36	16.66	73.96
37	38.14	86.16
38	26.00	55.90
39	16.80	79.74
40	19.12	100.7
41	22.66	88.34
42	17.80	113.0
43	25.80	86.10
44	17.60	89.63
45	29.70	85.76
46	20.66	84.76
47	22.54	87.14
48	19.36	85.32
49	17.16	75.00
50	18.38	90.00

Appendix Table 29. Modulus of elasticity (bar) for
the drought line. 1976 & 1977.

Cultivar	1976	1977
1	41	
2	178	
3	117	
4	52	
5	159	
6	107	
7	110	
8	199	
9	100	
10	99	
11	102	
12	227	
13	107	
14	113	
15	113	
16	81	
17	80	
18	176	
19	193	
20	134	
21	159	
22	145	
23	64	
24	102	
25	209	
26	259	
27	186	
28		97
29	160	
30		66
31		92
32		166
33		43
34		
35		99
36		117
37		214
38		82
39		99
40		82
41		95
42		117
43		107
44		102
45		138
46		84
47		45
48		109
49		79
50		70

Appendix Table 30. Plant height to the bottom of the head, A (cm), and top of the awns, B (cm), percent plump kernels (%), and 100 kernel weights (gm) for the drought line. 1977.

	A	B	Kernels	Wts.
1	39.1	56.7	30.2	3.21
2	49.5	65.2	16.0	2.89
3	48.8	69.3	49.3	3.51
4	54.3	71.4	18.4	3.01
5	42.4	62.6	64.0	4.60
6	56.0	75.8	61.6	4.10
7	41.0	57.1	16.6	3.53
8	52.2	68.5	5.6	2.69
9	44.4	64.2	23.1	3.14
10	54.2	72.0	5.1	2.45
11	44.9	65.9	24.0	3.21
12	57.2	74.3	27.4	2.93
13	55.0	73.8	62.4	3.80
14	45.7	63.8	64.6	3.92
15	50.6	70.0	30.6	3.13
16	53.9	73.5	58.8	3.92
17	49.5	66.1	9.6	2.89
18	48.8	65.0	51.0	3.71
19	54.1	74.5	26.5	3.37
20	44.3	65.7	49.2	3.87
21	57.8	79.1	40.1	3.56
22	51.5	70.6	18.6	3.61
23	51.5	71.2	29.2	3.21
24	53.4	72.9	64.6	4.27
25	53.8	73.7	5.5	2.99
26	44.2	60.5	29.5	3.20
27	38.9	57.0	42.8	3.67
28	53.6	69.0	11.9	2.83
29	53.6	73.7	74.2	3.82
30	54.0	72.7	35.8	3.23
31	46.0	67.2	49.6	3.34
32	48.2	65.5	55.0	3.76
33	49.6	69.8	17.9	3.09
34	46.7	66.6	74.8	4.24
35	54.2	73.6	24.6	3.40
36	34.3	53.5	51.7	3.97
37	44.7	66.2	29.0	3.47
38	33.2	50.1	24.2	3.08
39	45.6	64.3	30.7	3.60
40	58.8	76.0	8.9	2.73
41	37.9	57.8	24.5	3.32
42	60.9	80.1	9.2	2.70
43	37.3	57.6	13.2	3.23
44	51.8	72.4	37.6	2.79
45	42.3	63.8	13.2	3.11
46	61.6	78.4	12.3	2.69
47	38.4	60.3	23.5	3.13
48	45.3	63.5	47.4	3.80
49	45.0	64.9	37.2	3.23
50	49.6	68.0	12.1	3.20

APPENDIX TABLE 31

LIST OF SYMBOLS

Symbol	Units	Definition
A	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Sensible heat flux
B	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Bound water
B_s	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Stored energy
C_p	$\text{cal-g}^{-1}\text{°C}^{-1}$	Specific heat of dry air at constant pressure
e	mb	Vapor pressure
e_m	mb	Modulus of elasticity
E	$\text{g-cm}^{-2}\text{-min}^{-1}$	Evaporation rate
K_h	$\text{cm}^2\text{-min}^{-1}$	Eddy diffusivity for heat
K_w	$\text{cm}^2\text{-min}^{-1}$	Eddy diffusivity for water vapor
L	cal-g^{-1}	Heat of vaporization of water
LE	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Evapotranspiration rate
M	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Metabolic rate
P	mb	Absolute pressure
P_s	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Photosynthetic rate
q	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Water flux
r		Fraction reflected
r_a	sec-cm^{-1}	Air resistance
r_l	sec-cm^{-1}	Leaf resistance
r_r	sec-cm^{-1}	Root resistance

Appendix Table 31 (Continued)

Symbol	Units	Definition
r_s	sec-cm^{-1}	Stomatal resistance
R		Relative water content
R_o		Relative water content at zero turgor potential
R_l	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Long wave radiation
R_n	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Net radiation
R_s	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Short wave radiation
S	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Soil heat flux
t		Fraction transmitted
T	$^{\circ}\text{K}$	Absolute temperature
U	$\text{cal-cm}^{-2}\text{-min}^{-1}$	Uptake of water
V	mm	Cell volume
V_o	mm	Cell volume at zero turgor potential
w		Ratio of mole weight of water vapor to dry air
β		Bowen ratio
ϵ		Emissivity
ζ	g-cm^{-3}	Air density
ψ	bar	Water potential
ψ_a	bar	Air water potential
ψ_l	bar	Leaf water potential
ψ_m	bar	Matric potential

Appendix Table 31 (Continued)

Symbol	Units	Definition
Ψ_o	bar	Osmotic potential
Ψ_p	bar	Pressure or turgor potential
Ψ_r	bar	Root water potential
Ψ_{m_t}	bar	Matric potential at full turgidity
Ψ_{o_t}	bar	Osmotic potential at full turgidity

Appendix Table 32. Feekes Scale (45).

Stage

- 1 One shoot (number of leaves can be added)
- 2 Beginning of tillering
- 3 Tillers formed, leaves often twisted spirally.
- 4 Beginning of the erection of the pseudo-stem, leaf sheaths beginning to lengthen
- 5 Pseudo-stem (formed by sheaths of leaves) strongly erected
- 6 First node of stem visible at base of shoot
- 7 Second node of stem formed, next-to-last leaf just visible
- 8 Last leaf visible, but still rolled up, ear beginning to swell
- 9 Ligule of last leaf just visible
- 10 Sheath of last leaf completely grown out, ear swollen but not yet visible
- 10.1 First ears just visible (awns just showing in barley, ear escaping through split of sheath in wheat or oats)
- 10.2 Quarter of heading process completed
- 10.3 Half of heading process completed
- 10.4 Three-quarters of heading process completed
- 10.5 All ears out of sheath
- 10.5.1 Beginning of flowering (wheat)
- 10.5.2 Flowering complete to top of ear

Appendix Table 32. Feekes Scale (45). Cont.

Stage

- 10.5.3 Flowering over at base of ear
- 10.5.4 Flowering over, kernel watery ripe
- 11.1 Milky ripe
- 11.2 Mealy ripe, contents of kernel soft but dry
- 11.3 Kernel hard (difficult to divide by thumb-nail)
- 11.4 Ripe for cutting. Straw dead

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color and screening tests

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