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VEGETATIONAL STUDIES ON THE
ALE RESERVE, 1971

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ABSTRACT

This paper summarizes the results of six harvest periods during the 1971 spring growing season on the ALE Site.

The ALE Site consists of 36 ha of shrub-steppe vegetation in which the dominant plant is the cool season bunchgrass *Agropyron spicatum*. Cattle grazing was introduced as a stress on 18 ha after an absence of at least 28 years.

On the four harvest days after cattle were introduced the living aboveground biomass provided by non-shrub species was always greater on the ungrazed pastures. On the ungrazed pastures the peak of living non-shrub biomass was 63 g/m^2 produced in mid-May. The peak biomass of *Agropyron* amounted to 42 g/m^2 in mid-June. The biomass of standing dead material, crowns, and litter combined was estimated at 270 g/m^2 .

Artemisia tridentata, the only shrub on the site, averaged 33 g/m^2 of standing dead wood, 37 g/m^2 of live wood, and 70 g/m^2 of wood litter. Leaf biomass amounted to 4.7 g/m^2 . It was estimated that about 7 g/m^2 of *Artemisia* wood and leaves were produced during the 1971 spring growing season.

The belowground biomass was estimated at 1366 g/m^2 in mid-July.

An old field with a long history of no grazing and dominated by an annual grass, *Bromus tectorum*, produced 211 g/m^2 of aboveground biomass in the spring of 1971. This is more than twice that produced by perennial species in the shrub-steppe vegetation on similar soil and under a similar climatic regime.

INTRODUCTION

The ALE Site (Fig. 1) is the northernmost of the active Comprehensive Network Sites in the United States' International Biological Program Grassland Biome study scheme. At the present time it is the only active site located westward from the main mass of the Rocky Mountains. The site differs from others climatically in that it is a site with a pronounced winter precipitational regime and a regular occurring summer drought. The site also differs in appearance from other grassland sites because of the presence of a sparse stand of the shrub *Artemisia tridentata*. The shrubs are superimposed over a layer of perennial bunchgrasses dominated by *Agropyron spicatum*. The phenological sequence of flowering by grasses is staggered throughout the spring growing season. *Poa cusickii* is the earliest to flower (early April) followed by *Poa secunda* (mid-April) and finally by *Agropyron spicatum* (late May to early June). *Artemisia* flowered in October. Plant growth is arrested during the summer months of July, August, and September.

The purpose of this study is to provide computer compatible data concerning the dynamics of above- and belowground biomass on grazed and ungrazed pastures, using harvest methods that are comparable with those being conducted at other Network Sites. The aim of the Network Site studies is to provide field data to validate existing and developing ecosystem models. The data also provide ecological information in detail previously not available for this region.

METHODS

The methods used in the collection and processing of herbage material follow in general the guidelines contained in Technical Report 85 (French, 1971), "Basic Field Data Collection Procedures for the Grassland Biome

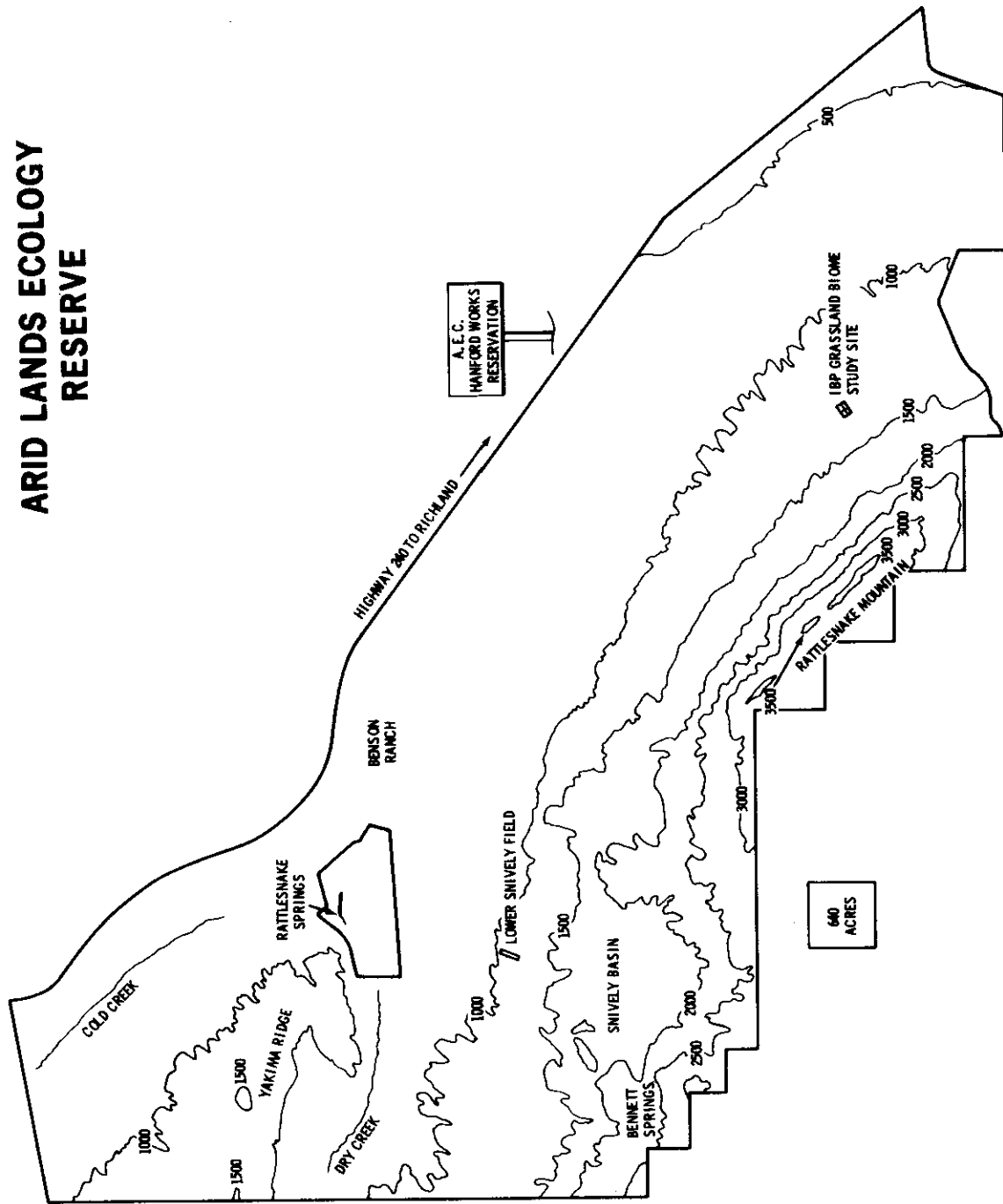


Fig. 1. Arid Lands Ecology Reserve showing location of IBP Grassland Biome Study Sites.

1971 Season." Two aspects of our methodology, however, are apparently unique among the network grassland sites during 1971: (i) the grazing of cattle during the spring growing season when herbage samples were being taken and (ii) the use of a stratified, two-stage sampling plan for locating the plots to be harvested.

Since one of the objectives of the research is to determine the effects of grazing and since the study area had not been grazed by cattle for at least 28 years, the grazing of cattle during the harvest season was considered essential. The 600×600 -m study area was divided into two equal portions of size 300×300 -m; one half was grazed by 15 yearling Hereford steers, and the other half served as a control (Fig. 2). The cattle were introduced onto one of the two grazing plots on April 14, 1971, the time of the third harvest period. Thus, all data obtained from the grazed and ungrazed plots during harvest days 1 and 2 are from an ungrazed treatment. The cattle were rotated between the two grazed plots every 7 days to allow the sampling of plants and small mammals when the cattle were in the other pasture. Water was provided to both pastures via a common water trough, and salt blocks were made available. The cattle were removed on June 10, 1971.

Each replicate (300×300 -m) was divided into three equal subdivisions, and two blocks of size 15×30 -m were chosen at random within each. All plant biomass harvested during the 1971 season was obtained within these blocks. A "buffer zone" 15-m wide was provided on the inside perimeter of each replicate to allow space for the movement of people and vehicles. Vegetation was not sampled in this zone.

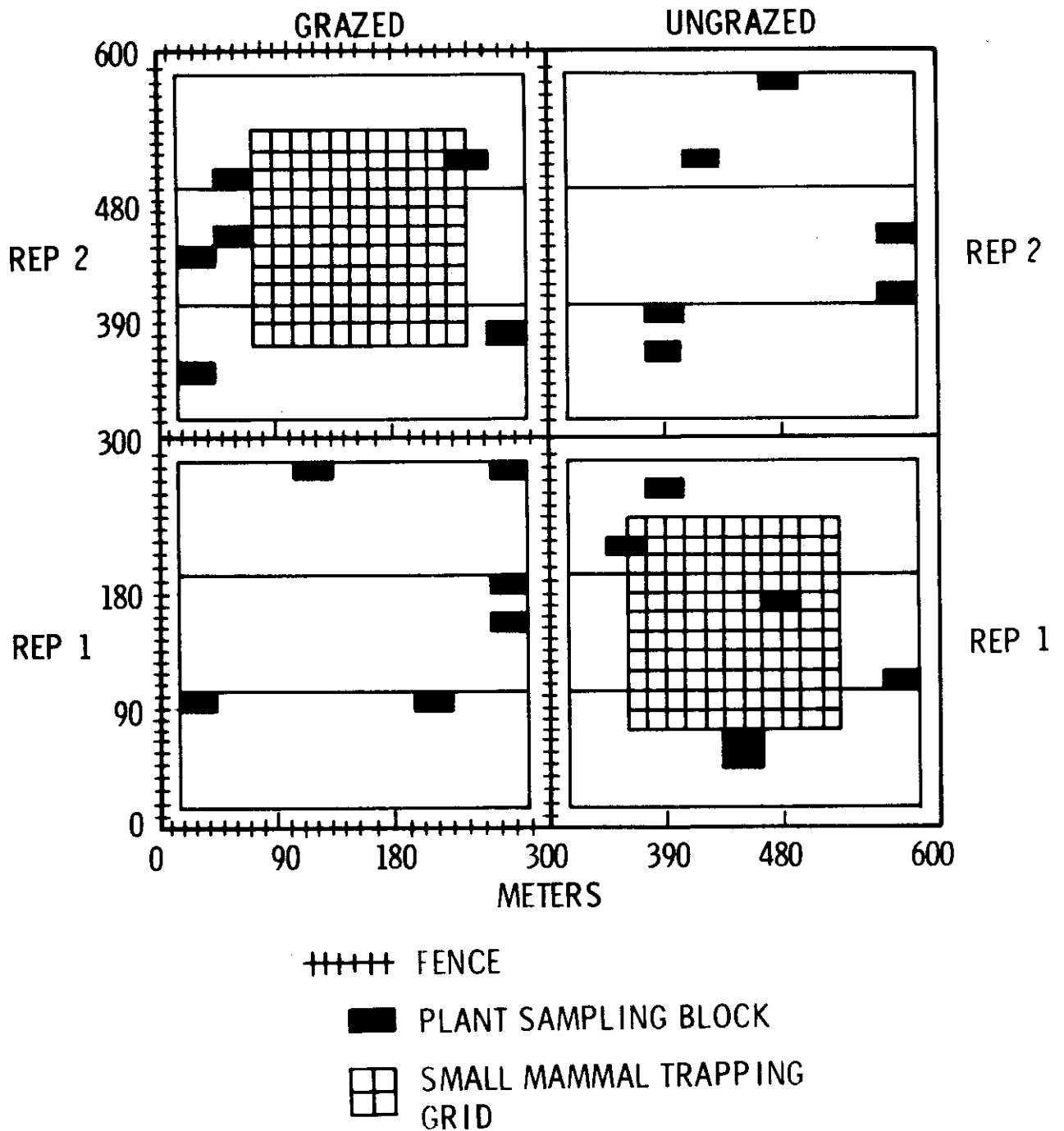


Fig. 2. Field layout of grazed and ungrazed pastures for 1971 showing the distribution of sampling blocks used for above- and belowground plant biomass harvests and the location of trap-grids for small mammal studies.

The primary purpose of subdividing each replication into three equal areas was to insure that all portions of the grazed and ungrazed areas would be represented in the material sampled. The subdivisions were also laid out so as to take advantage of any effects due to a 6% slope of the pastures. If herbage production or cattle grazing is affected by this slope, then the use of subdivisions could be expected to reduce the variance of the mean biomass estimates over that which would be obtained using simple random sampling within each replication.

The use of sampling blocks within each subdivision was motivated by the difficulty of locating at random a 2×2 -m sampling plot within subdivisions. It is relatively easy, however, for two men to find a randomly chosen plot within a 15×30 -m block (Fig. 3). The sampling plan described above and illustrated in Fig. 2 and 3 is referred to here as a stratified two-stage sampling plan.

The collection of herbaceous species was done by clipping circular 0.5-m^2 plots with hand shears as close to the ground as practical. Each species was placed into a separate paper sack and taken into the laboratory for hand sorting of live (green) and standing dead material. The crowns of the large grasses were cut off at the roots with a fine-toothed saw. The crown material was washed over a screen to reduce soil contamination before oven-drying. All the shrub materials that were encountered inside each 2-m^2 circular plot was harvested. Livewood was separated from standing deadwood, and the leaves were separated from livewood. The unattached wood lying in the soil on the 0.5-m^2 plot was picked up and designated as wood litter. The herbaceous unattached litter was screened off the soil by hand until the field vacuum suction equipment (D-vac) was available. Thereafter the herbaceous litter was collected by suction.

A SAMPLING BLOCK SHOWING THE LOCATION
OF TWO RANDOMLY CHOSEN PLOTS

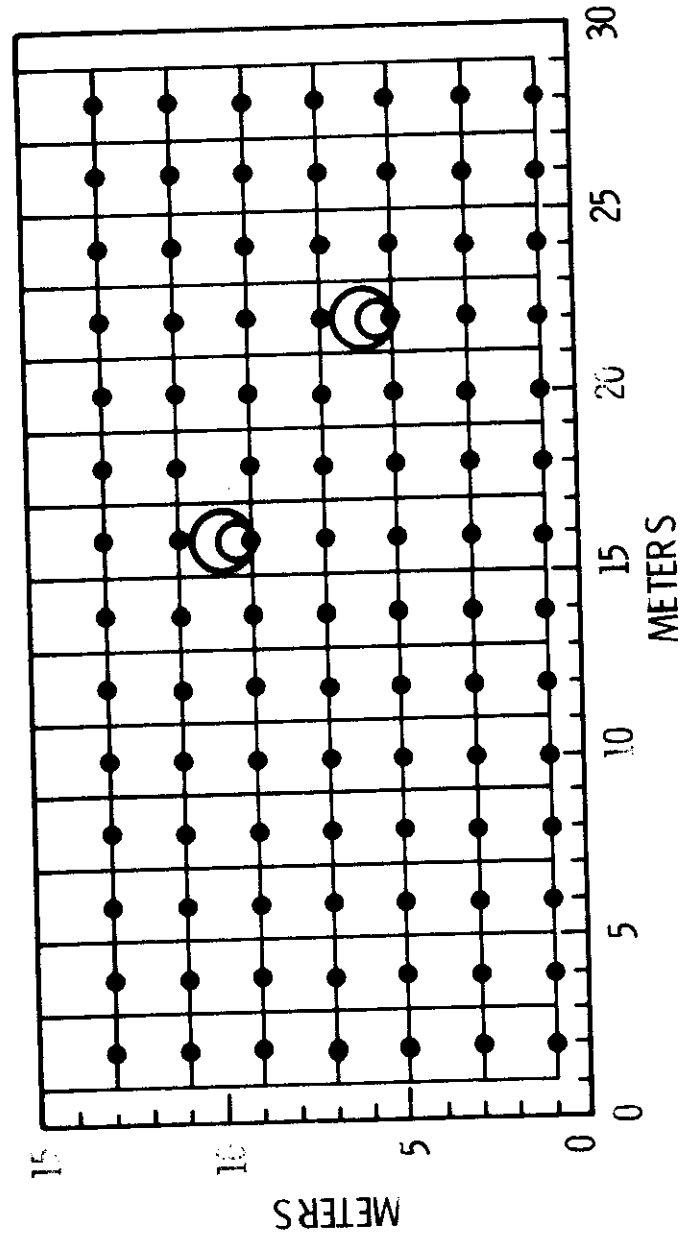


Fig. 3. A sampling block showing the location of paired plots on a particular harvest day. Plant harvests were made on $.5\text{-m}^2$ circular plots nested within a larger 2-m^2 circular plot.

In 1971 six harvest periods were made between March 30 and July 17 at approximately 3-week intervals and one in late October. All of the data have been recorded on data sheets and punched onto data cards, copies of which have been sent to the Natural Resource Ecology Laboratory in Fort Collins.

The aboveground biomass from the first 6 harvest days have been analyzed to obtain means, standard errors, and percent composition for each species as well as for the categories of (i) total living aboveground biomass (excluding shrubs), (ii) total living aboveground biomass (excluding shrubs and the dominant grasses *Agropyron spicatum* and *Poa secunda*), (iii) total standing dead (excluding shrubs), and (iv) total standing dead (excluding shrubs, *A. spicatum*, and *Poa secunda*). The standard errors were computed in two ways: (i) assuming simple random sampling and (ii) according to the plan actually used, stratified two-stage sampling. These were used to investigate whether the stratified two-stage sampling plan resulted in smaller standard errors than would have resulted if simple random sampling within replicates had been used. Nested analyses of variance were also computed on *Agropyron* aboveground living biomass and total living aboveground biomass (excluding shrubs) for harvest days 3 through 6 to determine any statistically significant differences in mean biomass between grazed and ungrazed treatments. In addition, we have obtained estimates of the sample sizes required to obtain sample means within 20% of the true mean with 80% probability. Occasionally the biomass obtained from a plot was lost which had the effect of reducing the sample size. It is not appropriate to consider these lost samples as zero and not reduce the sample size since this would bias the estimated mean. Appropriate changes were made in the stratified two-stage standard error computing formula to adjust for these lost samples.

The weight of "recent dead" *Poa secunda* for harvest days 4, 5, and 6 was obtained from a linear regression equation computed from the regression of green dry weight on total (green plus standing dead) dry weight for harvest days 1, 2, and 3 from the ungrazed plots. This was done since it was impossible to separate recent dead from old dead for days 4, 5, and 6. The linear relationship between green and total dry weight of *Poa secunda* for days 1, 2, and 3 was fairly strong ($R^2 = 0.78$, $s_{y \cdot x} = 0.94$); but in using this equation for estimating dry weight of recent and old dead on days 4, 5, and 6 on the grazed plots, we must assume that the cattle did not eat *Poa secunda* after harvest day 3, or if they did, they ate the same proportion of recent dead after day 3 as they did green before day 4. There was probably very little grazing of *Poa secunda* on days 4, 5, and 6 since it was no longer green by that time.

STATISTICAL ANALYSIS OF SAMPLING DESIGN

As mentioned above, standard errors were computed in two different ways. the first is given by

$$SE_{\text{simple}} = \left[\frac{1}{n(n-1)} \sum_{i=1}^n (x_i - \bar{x})^2 \right]^{1/2} \quad (1)$$

where n = number of observations on a given harvest day for a grazing treatment

\bar{x} = the sample mean for a given species

This formula is appropriate when using simple random sampling. The second is the stratified two-stage formula given by:

$$SE_{\text{two-stage}} = \left[\sum_{h=1}^H \frac{1}{H^2} \left[\frac{1 - f_{1h}}{n_h} s_{1h}^2 + \frac{f_{1h}(1 - f_{2h})}{n_h m_h} s_{2h}^2 \right] \right]^{1/2} \quad (2)$$

where $n_h = 2$ = number of blocks used within the h^{th} subdivision

$m_h = 2$ = number of plots used within each block in the h^{th} subdivision

H = number of subdivisions

$f_{1h} = \frac{n_h}{N_h} = \frac{2}{54}$ = proportion of blocks actually used in the h^{th} subdivision

where N_h is the total number of blocks available in the h^{th} subdivision

$f_{2h} = \frac{m_h}{M_h} = \frac{2}{98}$ = proportion of plots actually sampled within each block

in the h^{th} subdivision where M_h is the total number of plots available within each block in the h^{th} subdivision

$s_{1h}^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (\bar{x}_{ih} - \bar{x}_h)^2$ = between block variance

$s_{2h}^2 = \frac{1}{n_h(m_h - 1)} \sum_{i=1}^{n_h} \sum_{j=1}^{m_h} (x_{ijh} - \bar{x}_{ih})^2$ = within block variance

This formula is given in Cochran (1963, p. 288). For treatment of standard errors ($H = 6$), formula (2) reduces our values of n_h/N_h and m_h/M_h to

$$\left[\frac{1}{36} \sum_{h=1}^6 (.48148 s_{1h}^2 + .009070 s_{2h}^2) \right]^{1/2} \quad (3)$$

For harvest days 1 and 2 when grazing had not yet begun, there were 12 ungrazed subdivisions. The standard error in this case is given by formula (3) after replacing $1/36$ by $1/144$ and summing h from 1 to 12.

Formulas (1) and (3) were computed on all sets of data, but were compared for both grazing treatments on only the following data: (i) total living herbs, (ii) total living *Artemisia tridentata*, (iii) total standing dead herbs, (iv) standing dead *Artemisia tridentata*, and (v) total crowns.

The average percent change in standard errors from simple to stratified two-stage sampling for these five groups were -2.6 ± 10.1 (\pm SE), -6.1 ± 7.6 , -4.5 ± 7.2 , -2.3 ± 8.5 , and -6.4 ± 6.0 , respectively. Thus, while on the average some reduction in SE's did result from using stratified, two-stage sampling, the difference was not large (certainly not statistically significant) nor was it consistent from sample to sample. We conclude that while the statistical design used at ALE in 1971 was of considerable help in locating plots at random in a large area, it did little or nothing on the average to increase the precision of our estimates of mean biomass.

Nested analyses of variance were computed on *A. spicatum* aboveground living biomass and total living aboveground biomass (excluding shrubs) on harvest days 3 through 6 to compare grazed and ungrazed treatments. There were no statistically significant differences between treatments except for harvest day 5 on total non-shrub aboveground biomass. These analyses also indicated no differences in mean biomass between subdivisions, which again suggests that the use of subdivisions will not increase the precision of the estimated means.

ABIOTIC FACTORS

The climatic regime of the ALE Site differs from Grassland Biome Comprehensive Sites located eastward of the main mass of the Rocky Mountains, by having a moist winter season followed by summer drought.

The plant growing season begins in the autumn with the onset of winter rain. Plant growth is accelerated in April and May and arrested in late spring with the onset of soil drought. The seasonal distribution of precipitation (inches) for the year 1970-71 is shown in Table 1 for the Hanford Meteorological Station and a rain gage near the IBP site.

Table 1. Seasonal distribution of precipitation (inches) for Hanford Meteorological Station and the ALE Site, 1970-71.

Location	1970							1971				Total	
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July		Aug.
Meteorological Station	0.03	0.24	0.70	0.61	0.78	0.10	1.02	0.07	0.56	0.71	0.13	0.09	5.04
ALE Site	0.00	0.58	0.84	2.06	1.42	0.41	1.20	0.96	0.97	0.37	0.15	0.00	8.96

Although there is usually a secondary precipitation peak in June, it is not of sufficient magnitude to wet the soil deeper than the surface 1 to 3 inches.

A 3-year comparison of October to May precipitation at the ALE Site with the meteorological station is shown below:

Year	IBP	Meteorol. Sta.	Change
1968-69	9.37	7.02	+ 2.35
1969-70	9.85	6.00	+ 3.85
1970-71	8.44	4.09	+ 4.35

The higher elevation (1200 ft) of the IBP site is clearly reflected in increased precipitation when compared with the meteorological station located at 733 ft. The average daily solar radiation values and the average monthly maximum and minimum air temperatures measured at the Hanford Meteorological Station are shown in Table 2.

Temperature corrections for the IBP site as compared to the meteorological station are -5°F for maximum temperatures and $+3^{\circ}\text{F}$ for a minimum temperature, but solar radiation values between the meteorological station and the ALE Site are nearly identical. The monthly summaries of climatological data reported from September 1970 to October 1971 at the meteorological station are appended to provide a comparison between other Network Site locations.

Soil water content is an important measurement when considering its relationship to the growth of vascular plants. Soil water content was measured gravimetrically (105°C) at decimeter depth increments to a depth of 1 m from mid-March to mid-July 1971 (Table 3). For the most part the values are averages of duplicated cores at each collection date. The data

Table 2. Average daily solar radiation values and average monthly air temperature measured at Hanford Meteorological Station.

Year	Month	Solar Radiation (Langleys)	Temperature	
			Max °F	Min °F
1970	Sept.	403	75.4	48.2
	Oct.	272	64.2	37.6
	Nov.	138	48.7	30.8
	Dec.	116	38.5	23.1
1971	Jan.	114	45.0	26.6
	Feb.	211	49.7	28.5
	Mar.	325	52.1	29.3
	Apr.	488	65.4	38.6
	May	589	77.9	50.2
	June	619	78.7	51.3
	July	685	94.6	62.7
	Aug.	602	96.6	64.3

Table 3. Soil water content expressed as percent dry weight in grazed and ungrazed pastures on the ALE Site, 1971.

Sample Depth (dm)	3/18	3/30	4/20	4/30	5/21	7/14
<i>Grazed Treatment</i>						
0-1	12.1	13.1	7.2	5.1	3.9	2.7
1-2	13.6	13.4	10.4	8.3	6.8	5.7
2-3	13.2	13.1	11.2	9.9	7.4	6.5
3-4	12.6	12.9	11.3	10.6	7.7	6.5
4-5	11.7	12.2	11.2	11.0	7.7	6.6
5-6	11.5	11.7	11.5	11.0	6.1	6.6
6-7	9.6	9.3	9.7	11.1	6.3	6.2
7-8	7.5	7.0	7.4	9.3	7.4	6.0
8-9	5.1	5.8	5.9	7.7	6.6	5.7
9-10	4.4	4.6	4.9	5.5	4.2	--
<i>Ungrazed Treatment</i>						
0-1	13.2	12.4	8.4	6.4	3.5	2.4
1-2	13.7	14.4	10.4	9.3	6.4	4.4
2-3	13.3	12.9	11.3	10.4	6.7	5.0
3-4	13.2	13.0	11.6	10.9	7.0	5.3
4-5	13.3	13.0	12.6	11.1	7.5	5.5
5-6	12.0	12.6	10.8	10.9	7.8	5.5
6-7	9.6	10.7	10.6	10.2	7.6	5.9
7-8	7.5	7.6	8.0	10.1	6.9	5.7
8-9	5.5	5.4	6.8	8.5	5.5	4.8
9-10	4.5	4.6	4.8	6.3	4.9	--

indicate that water did not penetrate beyond 8 dm in depth during the 1970-71 growing season and that soil water was strongly depleted during the 3-week period of April 30 to May 21. The soil at the 9 to 10-dm depth was surprisingly dry throughout the sampling period.

At this writing bulk density values have not been determined so that conversion to soil water percent by volume cannot be calculated precisely, but for general purposes a bulk density value of 1.30 is a reasonable value to expect for this soil type. Soil samples have been sent to the Natural Resource Ecology Laboratory for analyses of chemical and physical properties.

BOTANICAL DESCRIPTION OF THE ALE IBP GRASSLAND BIOME SITE

The vegetation of the ALE Site is representative of the *Artemisia tridentata*/*Agropyron* association as described by Daubenmire (1970). The principal grasses are *Agropyron spicatum* and *Poa secunda* with small amounts of *Poa cusickii* and *Stipa thurberiana*. The only shrub is *Artemisia tridentata*. Annual plants are scarce and are represented by *Festuca octoflora*, *Bromus tectorum*, *Draba verna*, and *Descurainia pinnata*. Half-shrubs are represented by *Erigeron filifolius*, *Antennaria dimorpha*, and *Phlox longifolia*. The more conspicuous forbs are *Lupinus laxiflorus*, *Lomatium macrocarpum*, *Calochortus macrocarpus*, and *Balsamorhiza careyana*.

For the most part the plants are widely spaced exposing a considerable amount of non-vegetated ground. These open spaces, however, do support soil algae, mosses, and lichens.

The ALE Site has been essentially ungrazed for 28 years. However, the grazing history prior to government ownership is not known. Therefore,

the recent grazing stress imposed represents only one season of grazing, i.e., 1971.

Before cattle were introduced, the density, canopy coverage, and heights of *Artemisia* were measured in each of the 24 sampling block locations. Six lines, each 30 m long and spaced at 3-m intervals, were used to intercept shrub canopies. The results of these analyses are shown in Table 4. These data indicate that the density, stature, and amount of ground covered by shrub canopies was comparable on grazed and ungrazed treatments prior to the introduction of cattle.

CATTLE GRAZING

On April 14, 1971, 15 head of yearling Hereford steers were released into fenced pasture 1. After 1 week the cattle were moved to pasture 2. These two pastures represented replicates of the grazed treatment. The rotation was performed every week to permit the trapping of small mammals in pasture 2 without interference by foraging cattle.

The cattle were removed on June 10 after the flowering of *Agropyron spicatum* and before the current year's new growth had completely changed from green to brown with the onset of soil drought. In all, each pasture received 29 days of grazing use or 435 animal use days/9 ha pasture (48 animal use days/ha).

During the first few days of grazing the cattle exhibited great selectivity. The most palatable plants were *Poa cusickii* and *Crepis atrabarba*. There was apparently not a clump of either of these plants that escaped grazing. *Agropyron* was eaten only when other forage was not available. The dead standing material in the *Agropyron* clumps apparently detracted from its palatability.

Table 4. Canopy cover, density, and average heights of *Artemisia tridentata* on 15 x 30-m sampling blocks.

Grazed Treatment				Ungrazed Treatment			
Block Number	Cover (%)	Density	Avg Height (cm)	Block Number	Cover (%)	Density	Avg Height (cm)
1	3.6	64	46.6	13	5.4	56	49.9
2	2.0	39	40.6	14	7.4	75	58.0
3	2.4	82	45.2	15	2.8	53	46.5
4	3.0	54	43.3	16	2.5	62	39.4
5	6.2	119	43.9	17	2.0	39	35.7
6	1.4	33	56.2	18	3.5	51	44.5
7	2.5	37	48.2	19	2.7	27	50.2
8	4.2	51	56.8	20	0.9	31	40.7
9	2.4	42	48.5	21	4.1	69	59.5
10	3.3	85	44.5	22	4.2	46	54.0
11	5.7	61	41.3	23	7.1	148	48.9
12	3.4	94	52.5	24	1.0	18 ^{a/}	59.0
Avg	3.32	63.4	47.3	Avg	3.63	56.2	48.8

a/ Fire scars are evident in this block.

The major impact of cattle grazing was the surface soil disturbances caused by trampling. Some sagebrush shrubs were crushed by cattle hooves.

HERBAGE DYNAMICS IN GRAZED AND UNGRAZED PASTURES

A summarization of the aboveground biomass at six harvest dates, March 20, April 9, April 29, May 19, June 17, and July 16, are shown in Tables 5, 6, and 7.

The total living herbaceous biomass increased from 16 g/m^2 in March to 63 g/m^2 in May on the ungrazed pasture (Table 5). After the introduction of cattle the total living herbaceous biomass was always less on the grazed pasture.

The living biomass of *Agropyron spicatum* increased from 4.6 g/m^2 in March to a peak of 43 g/m^2 in June (Table 5). As is the case with total herbaceous biomass there was always less *Agropyron* on the grazed pastures. *Poa secunda* matures and dries earlier than *Agropyron*. The peak yield of *Poa* was measured on the second harvest day and amounted to 7 g/m^2 . The peak biomass of all other herbaceous species combined occurred in May and yielded 21 g/m^2 . From these data it is estimated that about 71 g/m^2 of herbaceous material was produced on the ungrazed pastures during the spring of 1971.

The standing dead herbaceous biomass, crowns, and litter for 6 harvest days is shown in Table 6. The maximum standing dead herbaceous material on the ungrazed plot amounted to 100 g/m^2 on harvest day 3. Standing dead material present on the ungrazed treatment exceeded that of the grazed treatment on harvest days 5 and 6.

Agropyron spicatum and *Poa cusickii* provided almost all the crown biomass (*Poa secunda* crowns were not harvested). The total crown weight as averaged over the 6 harvest days amounted to 89 g/m^2 on the ungrazed treatment and 81 g/m^2 on the grazed treatment.

Table 5. Summary of living aboveground herbaceous biomass (g/m^2) on 6 harvest days in 1971.

Species	Harvest Days					
	1	2	3	4	5	6
<i>Ungrazed</i>						
AGSP	4.61 \pm 0.73	10.01 \pm 1.28	33.06 \pm 4.19	36.60 \pm 5.31	42.39 \pm 6.30	35.90 \pm 3.75
POSE	6.39 \pm 0.44	7.06 \pm 0.69	5.48 \pm 0.29	4.54 \pm 0.45	--	--
Other	5.13 \pm 1.25	6.83 \pm 1.12	9.19 \pm 3.11	21.45 \pm 5.05	13.20 \pm 2.03	10.48 \pm 2.59
Total	16.12 \pm 1.69	23.90 \pm 2.39	47.58 \pm 5.05	62.70 \pm 4.27	55.60 \pm 5.66	46.38 \pm 2.04
<i>Grazed</i>						
AGSP	--	--	18.68 \pm 3.43	23.46 \pm 3.09	18.80 \pm 3.29	26.76 \pm 7.52
POSE	--	--	4.83 \pm 0.37	3.01 \pm 0.55	--	--
Other	--	--	7.03 \pm 3.11	6.73 \pm 1.64	3.98 \pm 1.87	1.27 \pm 0.42
Total	--	--	29.60 \pm 3.22	33.00 \pm 3.69	22.78 \pm 3.93	28.03 \pm 7.41

Table 6. Summary of litter standing dead (non-shrub) and crown biomass (g/m^2) on 6 harvest days in 1971.

Species	Harvest Days					
	1	2	3	4	5	6
<i>Ungrazed</i>						
Standing Dead						
AGSP	74.76 \pm 9.48	64.96 \pm 7.17	87.05 \pm 13.72	64.41 \pm 12.15	63.10 \pm 10.24	66.04 \pm 14.56
POSE (old)	11.54 \pm 0.58	8.92 \pm 1.38	9.59 \pm 1.13	9.06 \pm 9.15	5.45 \pm 0.88	4.11 \pm 0.58
POSE (recent)	--	--	--	--	3.84 \pm 0.43	3.18 \pm 0.28
Other	4.85 \pm 1.80	6.47 \pm 1.03	3.40 \pm 2.66	6.26 \pm 1.90	3.82 \pm 1.74	3.49 \pm 0.71
Total	91.14 \pm 9.59	80.88 \pm 9.46	99.72 \pm 14.82	79.73 \pm 12.56	76.82 \pm 9.12	76.82 \pm 14.34
Crowns						
AGSP	59.10 \pm 10.80	69.20 \pm 10.96	123.81 \pm 14.47	57.50 \pm 8.67	71.79 \pm 9.15	75.46 \pm 13.33
POCU	5.21 \pm 3.72	12.17 \pm 5.58	5.95 \pm 5.87	25.43 \pm 6.04	10.38 \pm 7.36	19.46 \pm 7.97
Total	65.20 \pm 10.87	81.04 \pm 14.05	130.28 \pm 16.65	82.93 \pm 10.04	82.12 \pm 12.07	94.43 \pm 15.46
Litter (D-vac)	--	--	--	81.82 \pm 6.39	75.94 \pm 12.27	88.51 \pm 6.57
<i>Grazed</i>						
Standing Dead						
AGSP	--	--	61.61 \pm 11.89	60.06 \pm 5.02	47.67 \pm 8.64	41.83 \pm 6.32
POSE (old)	--	--	8.82 \pm 0.93	6.63 \pm 1.12	2.88 \pm 0.62	2.40 \pm 0.63
POSE (recent)	--	--	--	--	2.53 \pm 0.31	2.34 \pm 0.20
Other	--	--	2.02 \pm 1.00	9.73 \pm 3.12	3.54 \pm 1.40	0.01 \pm 0.01
Total	--	--	73.12 \pm 11.52	77.12 \pm 7.04	56.62 \pm 8.47	46.57 \pm 6.05
Crowns						
AGSP	--	--	54.21 \pm 6.81	71.63 \pm 10.29	90.30 \pm 10.33	70.16 \pm 10.14
POCU	--	--	1.64 \pm 1.64	8.82 \pm 3.67	9.15 \pm 5.67	16.63 \pm 4.70
Total	--	--	56.28 \pm 7.27	81.26 \pm 11.51	100.28 \pm 13.12	86.79 \pm 12.72
Litter (D-vac)	--	--	--	72.70 \pm 6.17	102.4 \pm 8.78	91.26 \pm 7.94

Table 7. Summary of aboveground biomass (g/m^2) provided by *Artemisia tridentata* on 6 harvest days in 1971.

Species	Harvest Days					
	1	2	3	4	5	6
<i>Ungrazed</i>						
Leaves	4.35 ± 1.16	4.31 ± 1.29	2.70 ± 0.88	10.55 ± 5.14	5.66 ± 1.67	7.92 ± 1.34
Livewood	45.47 ± 15.53	38.70 ± 11.07	10.88 ± 1.96	46.47 ± 22.21	36.41 ± 12.44	45.06 ± 10.17
Total	49.82 ± 16.76	43.01 ± 11.89	13.58 ± 2.79	57.02 ± 27.04	42.06 ± 13.88	52.98 ± 11.30
Standing Dead	24.12 ± 5.89	17.63 ± 6.14	34.72 ± 7.18	56.94 ± 17.86	60.08 ± 14.60	21.94 ± 8.48
<i>Grazed</i>						
Leaves	--	--	8.53 ± 3.48	1.94 ± 1.09	3.21 ± 1.48	3.33 ± 2.10
Livewood	--	--	59.17 ± 14.34	17.08 ± 11.31	14.60 ± 4.64	20.88 ± 9.95
Total	--	--	67.70 ± 22.14	19.02 ± 12.31	17.81 ± 5.62	24.22 ± 12.01
Standing Dead	--	--	18.22 ± 6.89	18.50 ± 12.34	18.92 ± 8.92	19.77 ± 5.19

The non-standing litter averaged over the last 3 harvest days amounted to 82 g/m^2 on the ungrazed treatment and 89 g/m^2 on the grazed treatment.

From these data it was determined that on the ungrazed pasture about 70 g/m^2 of non-shrub biomass was produced in the 1970-71 growth year. The standing dead material amounted to 100 g/m^2 , the crowns 89 g/m^2 , and the litter 82 g/m^2 . Total aboveground biomass was estimated at 340 g/m^2 on the ungrazed pasture.

The biomass contributed by *Artemisia* is summarized in Table 7. The average leaf biomass over the 6 harvest days amounted to 4.7 g/m^2 on the ungrazed pasture and 3.5 g/m^2 on the grazed pasture. The livewood biomass averaged 37.2 g/m^2 on the ungrazed pasture and 28 g/m^2 on the grazed pasture. The standing deadwood averaged 33 g/m^2 on the ungrazed pasture and 19 g/m^2 on the grazed pasture. The total standing aboveground biomass contributed by *Artemisia* amounted to 75 g/m^2 on the ungrazed pasture and 50 g/m^2 on the grazed pasture. In addition to the standing shrub material, an additional 70 g/m^2 of wood was present on the soil surface. An average of both pastures indicates that about 130 g/m^2 of biomass was contributed by *Artemisia*. Assuming that 50% of the leaf biomass measured was produced in 1971 and that 10% of the livewood was produced in the same year, it was calculated that a biomass of 7 g/m^2 was contributed by shrubs.

The aboveground production as estimated by the harvest method was 78 g/m^2 for the 1971 growth year.

The belowground biomass (roots) was measured at the beginning and at the end of the spring growing season. The results are summarized in Table 8. A 78-mm inside diameter steel tube was used to collect soil cores at the first harvest period in March, and the tube was driven into

Table 8. Root biomass in ungrazed pastures during the spring growing season, 1971.

Sample Depth (cm)	Washed Weight (g)	Weight (g/m ²)
<i>March Harvest</i>		
0- 5	1.92 ± .28	403
5- 10	0.70 ± .08	147
10- 20	1.33 ± .12	279
20- 50	1.07 ± .14	225
50-100	1.48 ± .14	310
TOTAL	6.50	1364
(Correction 40% ash)	--	818
<i>July Harvest</i>		
0- 5	4.86 ± .40	835
5- 10	2.68 ± .28	461
10- 20	2.13 ± .28	367
20- 50	2.86 ± .20	492
50-100	2.32 ± .10	400
TOTAL	14.85	2535
(Correction 46.5% ash)	--	1366

soil by hand. However, when the soil was dry at the end of the spring growing season this method was not practical, and instead a sand auger was used that drilled a 86-mm diameter hole.

The results indicate that a belowground biomass of about 820 g/m^2 was present at the beginning of the spring growing season. At the end of the growing season the data show that about 1370 g/m^2 of belowground biomass were present. The measured increase amounted to about 550 g/m^2 .

On the Pawnee Site Sims et al. (1971) reported that in ungrazed pastures total root biomass in the upper 80 cm of soil increased from 1380 g/m^2 in November to 1487 g/m^2 in August. This is an increase of only 107 g/m^2 .

These data suggest that the large increase in root biomass on the ALE Site is an artifact and that the biomass estimate made early in the season is too low. Data collections for 1972 will help resolve this point.

HERBAGE DYNAMICS IN AN OLD FIELD COMMUNITY

The ALE Site offers both a comparison between grazed and ungrazed treatments and a comparison between seral and climax communities. The climax plant community as represented by the ungrazed pasture on the IBP site can be compared with an old field community that is also ungrazed. The vegetation of the climax community consists largely of perennial species while the seral community consists largely of annuals, especially *Bromus tectorum*.

The old field community (Lower Snively Field) is located at about the same elevation, slope angle, exposure, and soil type as the ALE Site. The aboveground biomass on the old field was measured five times during the spring of 1971. Methods employed were similar to those used

in the grassland study except that a .1-m rectangular-shaped quadrat was used as the basic sampling unit, and the litter was picked by hand.

The results of the 1971 aboveground harvest are shown in Table 9. At the peak of harvest (May 7) cheatgrass amounted to 198 g/m^2 . However, the peak harvest of *Sisymbrium* was later (May 28) and amounted to 17 g/m^2 . These data indicate that approximately 215 g/m^2 of dry matter was produced on the old field during the 1971 growing season by the two most abundant species. On the basis of biomass, cheatgrass clearly is the dominant species on the old field.

In arid regions nitrogen is often in short supply. The nitrogen content (Kjeldahl) of cheatgrass was determined on each harvest date, and the data is shown in Table 10 along with the total amount of nitrogen in the aboveground biomass of living cheatgrass. These data indicate that approximately $1.8 \text{ g nitrogen/m}^2$ was assimilated by the 1971 crop of cheatgrass.

Belowground biomass was estimated at the beginning and at the end of the growing season. Cores 86 mm in diameter were taken at 1-dm depths to a depth of 5-dm. The roots were washed and collected on 42-mesh screens. The average dry weights of the roots are shown in Table 11 with the standard error at the beginning and at the end of the 1971 growing season. The data on roots should only be regarded as approximations because the values have not been corrected for soil contamination at the time of this report. However, past experience indicates that about 35% of the washed root weight is ash.

Table 9. Results of aboveground harvest (g dry wt/m²), ALE Site, 1971.

Species	Mar. 8	Apr. 1	Apr. 19	May 7	May 28
<i>Bromus tectorum</i>	35.4	59.6	126.9	198.3	125.0
<i>Sisymbrium altissimum</i>	0.5	1.0	2.8	9.8	16.9
<i>Poa secunda</i>	1.1	3.1	0	1.1	0.4
<i>Amsinckia lycopsioides</i>	0		0	2.0	0
<i>Holosteum umbellatum</i>	0	0	1	0	0
Total live \bar{x}	37.0	63.7	130.7	211.2	142.3
SE	±2.9	±5.2	±7.8	±11	±11
Standing dead litter	227	195	168	92	168
SE	±11	±20	±11	±15	±12
Flat litter ^{a/}	664	410	401	393	485

^{a/} Hand harvested and not corrected for soil contamination.

Table 10. Total amount and percentage of nitrogen in the aboveground biomass of cheatgrass on each harvest date, 1971.

Harvest Date	Nitrogen (%)	Nitrogen (g/m ²)
Mar. 8	1.951	.682
Apr. 1	1.565	.939
Apr. 19	1.300	1.650
May 7	.953	1.782
May 28	.538	.672

Table 11. Average dry weights of roots with SE at the beginning and end of the 1971 growing season.

Depth Sampled (dm)	March 8		May 28		Increase in Biomass
	Root Weight (g)	Root Weight (g/m ²)	Root Weight (g)	Root Weight (g/m ²)	
0-1	5.558 ± 1.040	956	6.815 ± 0.910	1172	216
1-2	1.103 ± 0.200	190	1.777 ± 0.210	306	116
2-3	0.635 ± 0.028	109	0.822 ± 0.075	141	32
3-4	0.340 ± 0.054	58	0.520 ± 0.068	89	31
4-5	0.305 ± 0.040	32	0.434 ± 0.049	75	23
TOTAL		1365		1783	418

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APPENDIX I

PLANTS INCLUDED IN BIOMASS COLLECTIONS DURING THE 1971 GROWING SEASON

Perennial grasses

<i>Agropyron spicatum</i>	AGSP
<i>Poa secunda</i>	POSE
<i>Poa cusickii</i>	POCU
<i>Stipa thurberiana</i>	STTH

Annual grasses

<i>Festuca octoflora</i>	FEOC
<i>Bromus tectorum</i>	BRTE

Annual forbs

<i>Descurainia pinnata</i>	DEPI
<i>Draba verna</i>	DRVE

Perennial forbs

<i>Lomatium macrocarpum</i>	LOMA
<i>Lupinus laxiflorus</i>	LULA
<i>Astragalus purshii</i>	ASPU
<i>Calochortus macrocarpus</i>	CAMA
<i>Balsamorhiza careyana</i>	BACA
<i>Townsendia florifer</i>	TOFL

Half-shrubs

<i>Erigeron filifolius</i>	ERFI
<i>Phlox longifolia</i>	PHLO
<i>Antennaria dimorpha</i>	ANDI

Shrubs

<i>Artemisia tridentata</i>	ARTR
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APPENDIX II
CLIMATOLOGICAL DATA

BATTELLE-NORTHWEST RICHLAND WASHINGTON										PACIFIC NORTHWEST LABORATORY METEOROLOGY STATION 25 MILES N.W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N. LONGITUDE 119° 35' W. ELEVATION (GROUND) 733 FEET										MONTH September 1970	
CLIMATOLOGICAL DATA																					
DATE	TEMPERATURE (°F, 3 FT. LEVEL)					PRECIP. (IN.)	WIND (50 FT. LEVEL)	PEAK GUST			AVERAGE REL. HUM. %	SOLAR RADIATION (LANGLEYS)	SEAS (FEET)	FRONTS AND MISC. PHENOMENA							
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)			TOTAL (WTR EQUIVALENT IN IN.)	WIND DIRECTION	AVERAGE SPEED (MPH)					PEAK SPEED (MPH)	DIRECTION					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
1	89	55	72	+2	0				NW	8.1	32	WNW	38	564	4						
2	83	50	66	-4	0				NW	7.5	23	ENW	40	591	1						
3	72	58	65	-5	0	T			W	10.3	32	WSW	46	151	10						
4	75	56	66	-3	0	T			NW	13.2	34	WNW	40	487	10						
5	76	56	66	-3	0				W	11.2	29	WNW	41	371	10						
6	82	62	72	+3	0				W	14.8	38	WSW	44	367	5						
7	78	58	68	-1	0				NW	12.7	34	WNW	44	267	8	KFR 0045					
8	74	50	62	-6	3				W	12.0	32	W	35	490	3						
9	76	41	58	-10	7				W	3.6	14	WNW	36	508	2						
10	86	45	66	-2	0				W	10.2	34	NW	29	511	0	KFR 2145; D					
11	69	48	58	-9	7				N	11.5	29	NE	23	485	3	D					
12	62	45	54	-13	11				NE	19.2	37	NNE	24	471	1						
13	62	41	52	-15	13				N	10.9	26	NNE	23	523	0						
14	68	38	53	-13	12				SE	3.7	17	SSE	34	379	8						
15	72	35	54	-12	11				SE	2.5	12	SSE	36	486	1						
16	79	46	62	-4	3				E	3.4	16	ESE	32	430	5						
17	80	54	67	+2	0				SW	8.4	38	WSW	38	196	10	KFR 0500					
18	75	51	63	-2	2				W	11.4	26	NW	43	289	10						
19	73	49	61	-4	4				SW	5.5	17	WSW	44	388	3						
20	69	50	60	-4	5	0.03			W	6.5	23	WNW	53	352	7						
21	73	45	59	-5	6				W	6.2	17	SSW	44	426	7						
22	76	53	64	0	1	T			SW	14.4	39	SW	48	190	8	KFR 1845					
23	67	46	56	-8	9				NW	15.0	35	W	36	409	1						
24	66	42	54	-9	11				W	6.1	18	NE	34	443	0						
25	70	34	52	-11	13				NE	4.5	14	ENE	36	419	3						
26	77	47	62	-1	3				MW	7.8	20	N	30	412	0						
27	80	54	67	+5	0				NW	6.1	17	W	36	406	1						
28	83	44	64	+2	1				W	4.1	13	WSW	39	403	0						
29	84	48	66	+5	0				SE	3.4	10	SE	39	271	4						
30	86	46	66	+5	0				E	3.4	12	WNW	35	299	8						
31																					
SUM						0.03	None														
AVE	75.4	48.2								8.6					4.4						

NOTES:				PRECIPITATION (IN.)				MISC. PHENOMENA NOTATIONS USED IN COL. 17			
(1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME.				TOTAL FOR THE MONTH				A - HAIL			
(2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE.				DEPARTURE FROM NORMAL				AU - AURORA			
(3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE SRM CALORIE / CM ²				GREATEST IN 24 HRS.				D - DUST			
				NUMBER OF DAYS WITH:				DL - DISTANT LIGHTNING			
				TRACE OR MORE				DR - DRIFTING SNOW			
				0.01 OR MORE				GL - GLAZE			
				0.10 OR MORE				IC - ICE CRYSTALS			
								T - THUNDERSTORM			
TEMPERATURE (°F, 3 FT. LEVEL)				SNOW, SLEET, HAIL				BAROMETRIC PRESSURE (IN.)			
AVERAGE FOR THE MONTH				TOTAL FOR THE MONTH				AVERAGE STATION			
DEPARTURE FROM NORMAL				GREATEST IN 24 HOURS				HIGHEST SEA LEVEL			
HIGHEST				GREATEST ON GND				LOWEST SEA LEVEL			
LOWEST				WIND (50 FT. LEVEL)				SOLAR RADIATION (LANGLEYS)			
NUMBER OF DAYS WITH:				AVERAGE SPEED (MPH)				AVERAGE DAILY TOTAL			
MAX. 32 OR BELOW				DEPARTURE FROM NORMAL				GREATEST DAILY			
MAX. 80 OR ABOVE				PEAK GUST				LEAST DAILY			
MIN. 32 OR BELOW				WET BULB (°F)				MISCELLANEOUS NUMBER OF DAYS			
MIN. 0 OR BELOW				REL. HUM. (%)				CLEAR			
HEATING DEGREE DAYS (BASE 65°)				DEW PT. (°F)				PARTLY CLOUDY			
TOTAL FOR THE MONTH				+ DENOTES LATEST OF SEVERAL DATES				CLOUDY			
DEPARTURE FROM NORMAL								REL. HUM. EXTREMES (%)			
SEASONAL TOTAL (SINCE JULY 1)								HIGHEST			
SEASONAL DEPARTURE FROM NORMAL								LOWEST			

BATTELLE-NORTHWEST RICHLAND, WASHINGTON										PACIFIC NORTHWEST LABORATORY METEOROLOGY STATION 25 MILES N.W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N LONGITUDE 119° 35' W. ELEVATION (GROUND) 733 FEET										MONTH October 1970	
CLIMATOLOGICAL DATA																					
DATE	TEMPERATURE (°F - 3 FT. LEVEL)				PRECIP.		WIND (SOFT. LEVEL)		WIND (SOFT. LEVEL)		WIND (SOFT. LEVEL)		WIND (SOFT. LEVEL)		WIND (SOFT. LEVEL)		FRONTS AND MISC. PHENOMENA				
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WTR EQUIVALENT IN IN.)	SNOW, SLEET, HAIL (IN)	PREVAILING DIRECTION	AVERAGE SPEED (MPH)	PEAK GUST SPEED (MPH)	PEAK GUST DIRECTION	Average Relative Humidity (%)	Solrad (Langley's)	DRY COVER (TENTHS FROM SUNRISE TO SUNSET)	NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
1	85	46	64	+4	1			W	3.8	12	NNE	26	368	0							
2	85	47	66	+6	0			W	6.5	15	NW	32	375	7							
3	82	46	64	+4	1			SE	4.3	13	SSE	39	344	0							
4	86	43	64	+5	1	0.01		NW	9.2	40	NW	48	345	2		KFR 1330					
5	68	46	57	-2	8	T		W	14.9	34	WtW	49	317	5							
6	59	37	48	-11	17	0.01		NW	8.6	24	NW	60	178	10							
7	63	30	46	-12	19			NW	7.5	19	EW	40	275	7							
8	55	44	50	-8	15	T		NE	2.4	16	WNW	59	104	10							
9	66	45	56	-1	9	0.04		E	3.7	25	WNW	77	174	9		WFR 1000					
10	72	40	56	-1	9	T		W	6.8	21	W	54	264	8							
11	76	48	62	+6	3			NW	10.0	30	WNW	49	301	7		KFR 1630					
12	67	45	56	0	9			NW	8.7	23	WNW	43	347	0							
13	66	39	52	-3	13			NE	5.0	17	NE	44	342	4							
14	67	38	52	-3	13			N	6.8	18	NW	40	343	0							
15	64	29	46	-8	19			W	6.4	16	WNW	40	344	0							
16	64	31	48	-6	17			W	4.2	12	WNW	44	344	0							
17	64	34	49	-4	16			W	4.0	11	SSE	46	310	5							
18	66	44	55	+3	10	T		SW	7.8	21	W	52	135	10							
19	62	35	48	-4	17	T		SE	4.2	13	WSW	63	191	10							
20	60	44	52	+1	13	T		SW	12.0	38	SW	61	137	10		KFR 1040					
21	53	40	46	-5	19	0.15		SW	7.8	35	WSW	67	113	10		KFR 1655					
22	57	37	47	-3	18	T		SW	13.0	31	S	56	255	6							
23	64	44	54	+4	11	0.03		SW	12.0	31	SSW	58	260	4		KFR 1535					
24	58	35	46	-3	19			SW	11.5	28	SW	51	338	1							
25	53	33	43	-6	22			NW	5.2	18	WNW	57	229	10							
26	56	28	42	-6	23			W	6.4	18	W	46	269	0							
27	52	23	38	-10	27			NW	3.3	15	E	61	312	1							
28	55	32	44	-3	21			W	6.9	15	NW	53	294	1							
29	55	24	40	-7	25			W	5.1	11	W	60	297	0							
30	55	25	40	-6	25			W	5.8	12	NW	62	275	3							
31	57	35	46	0	19			E	3.0	11	NE	61	262	1							
SUM						0.24	None								4.5						
AVG	64.2	37.6							7.0												

NOTES:				PRECIPITATION (IN)				MISC. PHENOMENA NOTATIONS USED IN COL. 17			
(1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME.				TOTAL FOR THE MONTH				A - HAIL			
(2) "T" IN COLUMNS 7 - 8 DENOTES A TRACE.				DEPARTURE FROM NORMAL				AU - AURORA			
(3) THE LANGLEY (COL 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2				GREATEST IN 24 HRS.				D - DUST			
				NUMBER OF DAYS WITH:				DL - DISTANT LIGHTNING			
				TRACE OR MORE				F - FOG			
				0.01 OR MORE				SS - DRIFTING SNOW			
				0.10 OR MORE				IC - ICE CRYSTALS			
								T - THUNDERSTORM			
TEMPERATURE (°F - 3 FT. LEVEL)				SNOW, SLEET, HAIL				BAROMETRIC PRESSURE (IN.)			
AVERAGE FOR THE MONTH				TOTAL FOR THE MONTH				AVERAGE STATION			
DEPARTURE FROM NORMAL				GREATEST IN 24 HOURS				HIGHEST SEA LEVEL			
HIGHEST				GREATEST ON END				LOWEST SEA LEVEL			
LOWEST				WIND (80 FT. LEVEL)				SOLAR RADIATION (LANGLEY'S)			
NUMBER OF DAYS WITH:				AVERAGE SPEED (MPH)				AVERAGE DAILY TOTAL			
MAX. 32 OR BELOW				DEPARTURE FROM NORMAL				GREATEST DAILY			
MAX. 60 OR ABOVE				PEAK GUST				LEAST DAILY			
MIN. 32 OR BELOW				FROM				MISCELLANEOUS NUMBER OF DAYS			
MIN. 0 OR BELOW				ON				CLEAR			
HEATING DEGREE DAYS (BASE 65°)				WET BULB (°F)				PARTLY CLOUDY			
TOTAL FOR THE MONTH				REL. HUM. (%)				CLOUDY			
DEPARTURE FROM NORMAL				DEW PT (°F)				REL. HUMIDITY EXTREMES (%)			
SEASONAL TOTAL (SINCE JULY 1)								Highest			
SEASONAL DEPARTURE FROM NORMAL								Lowest			

BATTELLE-NORTHWEST RICHLAND WASHINGTON										PACIFIC NORTHWEST LABORATORY METEOROLOGY STATION 25 MILES N.W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N. LONGITUDE 119° 35' W. ELEVATION (GROUND) 733 FEET										MONTH November 1970	
CLIMATOLOGICAL DATA																					
DATE	TEMPERATURE (°F., 3 FT. LEVEL)					PRECIP.		WIND (SOFT. LEVEL)		PEAK GUST		AVERAGE RELATIVE HUMIDITY (%)		SOLRAD (Langley's)		FRONTS AND MISC. PHENOMENA					
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 66°)	TOTAL (WTR EQUIVALENT IN IN.)	SNOW, SLEET, HAIL (IN)	WIND DIRECTION	AVERAGE SPEED (MPH)	PEAK GUST SPEED (MPH)	PEAK GUST DIRECTION	AVERAGE RELATIVE HUMIDITY (%)	SOLRAD (Langley's)	SEAS COVER (CENTS FROM SUNRISE TO SUNSET)	NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
1	58	29	44	-1	21				W	6.4	15	NW	64	265	0						
2	63	37	50	+5	15				NW	6.6	16	WNW	55	274	0						
3	62	37	50	+6	15				NW	7.5	15	NW	46	273	0						
4	56	41	48	+4	17	T			NW	7.9	20	WNW	42	107	10						
5	51	35	43	0	22	0.03			NW	5.0	17	WNW	79	66	9	F					
6	49	38	44	+1	21	T			NW	5.0	15	NW	90	107	10	F					
7	56	35	46	+4	19	T			NE	2.4	11	W	83	177	9	F					
8	58	40	49	+7	16	0.07			SW	5.2	21	SW	78	147	9						
9	57	34	46	+5	19				W	9.3	27	SSW	59	113	9	KFR 0350					
10	49	25	37	-4	28	0.06			NW	4.9	16	NW	72	160	10						
11	44	37	40	-1	25	0.26			NW	3.2	11	WNW	91	52	10	F					
12	58	35	46	+6	19				W	8.8	25	WSW	70	217	4	F					
13	50	27	38	-2	27				W	5.0	19	WNW	73	211	8						
14	48	34	41	+1	24				NW	6.5	19	WNW	73	162	10						
15	54	38	46	+7	19	0.01			W	5.1	19	S	68	139	9						
16	61	35	48	+9	17	T			W	8.5	26	WSW	68	140	10						
17	54	38	46	+7	19	T			SW	7.1	23	WSW	55	140	8						
18	54	38	46	+8	19				W	12.6	32	WNW	49	214	6						
19	55	33	44	+6	21				W	6.0	23	WNW	61	68	9						
20	54	28	41	+3	24				W	14.8	42	WSW	54	213	1	KFR1900					
21	33	13	23	-15	42				N	8.8	30	WSW	40	205	3						
22	26	11	18	-19	47	T	T		NW	10.1	20	NNE	44	86	10						
23	25	21	23	-14	42	0.05	T	T	W	2.5	12	WNW	86	33	10	GL					
24	60	24	42	+5	23	0.06		T	NW	7.9	41	SW	81	143	8	GL; F; WFR1030; KFR1405					
25	44	30	37	0	28				SW	4.3	14	W	75	109	9						
26	38	27	32	-4	33	0.11	T		SE	5.5	18	SE	81	52	10	F					
27	36	31	34	-2	31	0.01	T		NW	9.1	17	WNW	87	69	10	F; GL					
28	39	24	32	-4	33				NW	6.3	16	NW	73	109	8						
29	30	23	26	-10	39	T	T		NW	6.1	14	NW	87	43	10	GL; F					
30	38	26	32	-4	33	0.05	0.5		NW	6.5	39	SSW	87	32	10	F; KFR1830					
31																					
SUM						0.71	0.5														
AVE	48.7	30.8								6.8				7.6							
NOTES: (1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME. (2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE. (3) THE LANGLEY (COL 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2										PRECIPITATION (IN) TOTAL FOR THE MONTH 0.71 DEPARTURE FROM NORMAL -0.06 GREATEST IN 24 HRS. 0.32 ON 10-11 NUMBER OF DAYS WITH: TRACE OR MORE 17 0.25 OR MORE 1 0.01 OR MORE 10 0.50 OR MORE 0 0.10 OR MORE 2 1.00 OR MORE 0										MISC. PHENOMENA NOTATIONS USED IN COL. 17 A - HAIL AU - AURORA B - DUST F - FOG GL - GLAZE K - SMOKE SD - BLOWING DUST SS - BLOWING SNOW SL - DISTANT LIGHTNING DS - DRIFTING SNOW IC - ICE CRYSTALS T - THUNDERSTORM	
TEMPERATURE (°F., 3 FT. LEVEL) AVERAGE FOR THE MONTH 39.7 DEPARTURE FROM NORMAL +0.1 HIGHEST 63 ON 2nd LOWEST 11 ON 22nd NUMBER OF DAYS WITH: MAX. 32 OR BELOW 2 MAX. 60 OR ABOVE 0 MIN. 32 OR BELOW 14 MIN. 0 OR BELOW 0										SNOW, SLEET, HAIL TOTAL FOR THE MONTH 0.5 GREATEST IN 24 HOURS: 0.5 ON 30th GREATEST ON END: 0.5 ON 30th WIND (SOFT. LEVEL) AVERAGE SPEED (MPH) 6.8 DEPARTURE FROM NORMAL +0.6 PEAK GUST 42 FROM WSW ON 20th										BAROMETRIC PRESSURE (IN.) AVERAGE STATION 29.225 HIGHEST SEA LEVEL 30.73 ON 22nd LOWEST SEA LEVEL 29.31 ON 24th	
HEATING DEGREE DAYS (BASE 66°) TOTAL FOR THE MONTH 753 DEPARTURE FROM NORMAL +3 SEASONAL TOTAL (SINCE JULY 1) 1319 SEASONAL DEPARTURE FROM NORMAL +117										AVERAGE PSYCHROMETRIC DATA DRY BULB (°F) 39.5 WET BULB (°F) 35.4 REL. HUM (%) 67.0 DEW PT (°F) 29.1										SOLAR RADIATION (LANGLEYS) AVERAGE DAILY TOTAL 132 GREATEST DAILY 274 ON 2nd LEAST DAILY 32 ON 30th	
										MISCELLANEOUS NUMBER OF DAYS CLEAR 5 FOG 10 PARTLY CLOUDY 2 THUNDER 0 CLOUDY 23 DUST 0											
										REL. HUMIDITY EXTREMES (%) Highest 100 on 6th Lowest 28 on 3rd											

BATTELLE-NORTHWEST RICHLAND, WASHINGTON						PACIFIC NORTHWEST LABORATORY METEOROLOGY STATION 25 MILES N.W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N. LONGITUDE 119° 35' W. ELEVATION (GROUND) 733 FEET											MONTH DECEMBER 1970	
CLIMATOLOGICAL DATA																		
DATE	TEMPERATURE (°F., 3 FT. LEVEL)					PRECIP. (IN.)	SNOW, SLEET, HAIL (IN.)	WIND (50 FT. LEVEL) PREVAILING DIRECTION	WIND SPEED (MPH)	PEAK GUST SPEED (MPH)	DIRECTION	AVERAGE REL. HUM. %	SOLAR (LANGLEYS)	SKY COVER (FEET) FROM SUNRISE TO SUNSET	FRONTS AND MISC. PHENOMENA			
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)										NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)			
1	45	35	40	+4	25			T	SW	15	9	44	SSW	58	148	9		
2	46	28	37	+1	28			T	SW	8	1	24	SSW	68	181	6		
3	45	30	38	+2	27	0 09	T	T	SW	16	0	39	SW	68	110	6	KFR 1205	
4	44	27	36	+1	29				NW	6	5	20	WNW	59	150	8		
5	37	27	32	-3	33	0 02	0 1		NW	6	0	22	WNW	78	134	10	GL	
6	47	26	36	+1	29	0 02		T	NW	3	0	11	NW	85	78	10		
7	58	31	44	+9	21	T			SW	12	6	36	SW	60	141	10	WFR 0220; KFR 0615	
8	43	26	34	-1	31				NW	7	5	22	NW	73	146	8		
9	44	27	36	+1	29				NW	5	4	15	WNW	67	174	1		
10	36	24	30	-5	35	0 04	0 2		NW	2	6	12	NNW	84	55	10	F	
11	46	25	36	+1	29			T	W	9	2	24	WSW	65	148	7	F	
12	36	20	28	-7	37				NW	7	2	18	WNW	79	129	10		
13	32	20	26	-9	39				SE	4	0	12	WNW	84	92	10	F	
14	28	16	22	-12	43	0 03	0 6		NW	3	7	15	WNW	93	42	10	F	
15	41	19	30	-4	35	0 14	T	1	N	5	5	20	SE	95	25	10	F; GL	
16	47	30	38	+4	27			T	S	19	1	44	S	59	54	10	F; WFR 0130	
17	44	27	36	+2	29				NW	6	2	15	SW	76	167	5		
18	38	23	30	-4	35				W	4	7	13	WNW	84	171	1		
19	32	22	27	-7	38				S	1	1	8	NNW	87	77	10	F	
20	31	27	29	-5	36	0 17	3 1	1	NW	8	1	20	SE	92	57	10		
21	32	14	23	-10	42	T	T	3	NW	7	5	16	NW	83	117	9		
22	28	10	19	-14	46			3	W	4	5	15	WNW	81	180	2	KFR 0115	
23	26	10	18	-15	47	T	T	2	NW	1	7	13	NW	86	164	9		
24	20	8	14	-19	51			2	NW	2	5	9	WNW	94	125	9	F	
25	27	9	18	-15	47			2	NW	4	2	16	WNW	92	112	8	F	
26	27	22	24	-8	41	0 01	0 3	2	NE	1	2	6	SSE	92	58	10	F	
27	28	16	22	-10	43	0 02	0 1	2	NW	1	9	10	NW	91	109	10	F	
28	42	16	29	-3	36	0 07		2	NW	8	8	39	SW	89	55	10	F; GL; WFR 1845	
29	42	34	38	+6	27			2	SW	14	3	35	SW	64	116	8		
30	54	39	46	+14	19	T		1	S	16	6	42	SSW	61	121	10	KFR 1715	
31	46	27	36	+5	29			T	SW	9	8	28	WSW	58	174	0		
SUM						0 61	4 4									7 9		
AVE	38.5	23.1								7.3								

NOTES:				PRECIPITATION (IN)				MISC. PHENOMENA NOTATIONS USED IN COL. 17			
(1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME.				TOTAL FOR THE MONTH				A - HAIL			
(2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE.				DEPARTURE FROM NORMAL				AU - AURORA			
(3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2				GREATEST IN 24 HRS.				D - DUST			
				NUMBER OF DAYS WITH:				DL - DISTANT LIGHTNING			
TEMPERATURE (°F., 3 FT. LEVEL)				TRACE OR MORE				DS - DRIFTING SNOW			
AVERAGE FOR THE MONTH				0.01 OR MORE				IC - ICE CRYSTALS			
DEPARTURE FROM NORMAL				0.10 OR MORE				T - THUNDERSTORM			
HIGHEST				SNOW, SLEET, HAIL				B - BLOWING DUST			
LOWEST				TOTAL FOR THE MONTH				BS - BLOWING SNOW			
NUMBER OF DAYS WITH:				GREATEST IN 24 HOURS				BL - BLAZE			
MAX. 32 OR BELOW				GREATEST ON GND:				K - SMOKE			
MAX. 90 OR ABOVE				WIND (50 FT. LEVEL)				B - BLOWING DUST			
MIN. 32 OR BELOW				AVERAGE SPEED (MPH)				BS - BLOWING SNOW			
MIN. 0 OR BELOW				DEPARTURE FROM NORMAL				DL - DISTANT LIGHTNING			
HEATING DEGREE DAYS (BASE 65°)				PEAK GUST				DS - DRIFTING SNOW			
TOTAL FOR THE MONTH				FROM				IC - ICE CRYSTALS			
DEPARTURE FROM NORMAL				AVERAGE PSYCHROMETRIC DATA				T - THUNDERSTORM			
SEASONAL TOTAL (SINCE JULY 1)				REL. HUM. (%)				B - BLOWING DUST			
SEASONAL DEPARTURE FROM NORMAL				+ DENOTES LATEST OF SEVERAL DATES				BS - BLOWING SNOW			

BAROMETRIC PRESSURE (IN.)				SOLAR RADIATION (LANGLEYS)				MISCELLANEOUS NUMBER OF DAYS			
AVERAGE STATION				AVERAGE DAILY TOTAL				CLEAR			
HIGHEST SEA LEVEL				GREATEST DAILY				PARTLY CLOUDY			
LOWEST SEA LEVEL				LEAST DAILY				CLOUDY			
REL. HUM. EXTREMES (%)				REL. HUM. EXTREMES (%)				REL. HUM. EXTREMES (%)			
HIGHEST				HIGHEST				HIGHEST			
LOWEST				LOWEST				LOWEST			

BATTELLE-NORTHWEST RICHLAND WASHINGTON							PACIFIC NORTHWEST LABORATORY METEOROLOGY STATION 25 MILES N.W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N LONGITUDE 119° 35' W. ELEVATION (GROUND) 733 FEET										MONTH JANUARY 1971	
CLIMATOLOGICAL DATA																		
DATE	TEMPERATURE (°F, 3 FT. LEVEL)				PRECIP.		WIND (SOFT. LEVEL)							AVERAGE REL. HUM.	SOLRAD (LANGLEY'S)	SKY COVER (TENTHS FROM SUNRISE TO SUNSET)	FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "EFR" (COLD FRONT) AND "WFR" (WARM FRONT)	
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WTR EQUIVALENT IN IN.)	SNOW, SLEET, HAIL (IN)	SNOW, SLEET, HAIL OR ICE ON GROUND AT 0400 (IN)	PREVAILING DIRECTION	AVERAGE SPEED (MPH)	PEAK GUST SPEED (MPH)	DIRECTION						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
1	39	16	28	-3	37				W	4.1	15	W	63	176	0			
2	30	13	22	-9	43				NE	3.8	14	WNW	79	157	4			
3	31	10	20	-11	45				SE	3.1	10	SE	74	152	6			
4	23	8	16	-15	49				NW	2.5	10	NW	86	79	9			
5	23	9	16	-15	49	T	T		NW	2.0	10	SE	80	62	9			
6	27	22	24	-6	41	T	T	T	NW	2.1	9	SSE	80	52	10			
7	30	20	25	-5	40				NE	1.0	13	NNE	84	71	10			
8	50	26	38	+8	27				S	4.5	22	SW	76	52	10	WFR 0315		
9	55	31	43	+13	22				SW	11.1	59	WSW	70	121	6			
10	49	32	40	+10	25	0.01	T		SW	13.6	49	SSW	60	120	9	KFR 1435		
11	39	25	32	+2	33	T	T		NW	7.5	30	S	74	105	8	KFR 1020		
12	28	21	24	-6	41	0.01	0.2	T	NW	6.3	19	NW	85	66	10			
13	27	13	20	-9	45	T	T	T	NW	7.0	20	NW	82	121	9			
14	24	14	19	-10	46	0.14	1.4	T	NW	6.7	17	NW	82	85	10			
15	51	19	35	+6	30	0.07	0.4	2	S	15.2	51	SSW	77	65	10	GL; WFR 0915		
16	52	33	42	+13	23	0.53		T	NW	7.4	30	S	82	16	10	F		
17	53	34	44	+15	21	T			SW	11.7	45	SW	69	46	10	F; WFR 0040		
18	46	36	41	+12	24	T			N	2.3	10	SSE	89	94	10	F		
19	55	32	44	+15	21	0.02			NW	9.6	29	WNW	75	46	10	F; WFR 0830		
20	47	30	38	+9	27				SW	13.9	34	WSW	50	218	0			
21	45	27	36	+7	29				NW	18.4	45	SW	56	149	6	KFR 0945		
22	50	30	40	+12	25				SW	12.7	37	BSW	59	108	10			
23	56	30	43	+15	22				SW	5.4	27	BSW	62	168	10			
24	49	42	46	+18	19				SW	24.3	57	SW	53	88	10			
25	57	32	44	+15	21				SW	11.8	40	BSW	60	151	10	WFR 1210		
26	61	41	51	+22	14				SW	9.2	30	SW	60	202	10			
27	47	30	38	+9	27				NW	2.6	12	WSW	79	136	9			
28	50	29	40	+10	25				E	2.8	10	SSE	83	216	5	F		
29	61	27	44	+14	21				SW	6.6	30	SW	75	110	10	F; WFR 1435		
30	67	53	60	+30	5				SW	11.3	31	SW	58	53	10			
31	72	39	56	+26	9				W	6.4	20	WNW	57	239	1			
SUM						0.78	2.0											
AVE	45.0	26.6								8.0					8.1			

NOTES:				PRECIPITATION (IN)				MISC. PHENOMENA NOTATIONS USED IN COL. 17			
(1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME.				TOTAL FOR THE MONTH				A - HAIL			
(2) "****" IN COLUMNS 7 - 9 DENOTES A TRACE.				DEPARTURE FROM NORMAL				AU - AURORA			
(3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2				GREATEST IN 24 HRS.				B - DUST			
				NUMBER OF DAYS WITH:				C - FOG			
				TRACE OR MORE				GL - GLAZE			
				0.01 OR MORE				R - SMOKE			
				0.10 OR MORE				BD - BLOWING DUST			
				0.50 OR MORE				BS - BLOWING SNOW			
				1.00 OR MORE				DL - DISTANT LIGHTNING			
								DS - DRIFTING SNOW			
								IC - ICE CRYSTALS			
								T - THUNDERSTORM			

TEMPERATURE (°F, 3 FT. LEVEL)				SNOW, SLEET, HAIL				BAROMETRIC PRESSURE (IN.)			
AVERAGE FOR THE MONTH				TOTAL FOR THE MONTH				AVERAGE STATION			
DEPARTURE FROM NORMAL				GREATEST IN 24 HOURS				HIGHEST SEA LEVEL			
HIGHEST				GREATEST ON SNOW				LOWEST SEA LEVEL			
LOWEST				WIND (SOFT. LEVEL)				SOLAR RADIATION (LANGLEY'S)			
NUMBER OF DAYS WITH:				AVERAGE SPEED (MPH)				AVERAGE DAILY TOTAL			
MAX. 32 OR BELOW				DEPARTURE FROM NORMAL				GREATEST DAILY			
MAX. 50 OR ABOVE				PEAK GUST				LEAST DAILY			
MIN. 32 OR BELOW				WET BULB (°F)				MISCELLANEOUS NUMBER OF DAYS			
MIN. 0 OR BELOW				REL. HUM. (%)				CLEAR			
HEATING DEGREE DAYS (BASE 65°)				REL. HUM. (%)				PARTLY CLOUDY			
TOTAL FOR THE MONTH				DEW PT (°F)				CLOUDY			
DEPARTURE FROM NORMAL				+ DENOTES LATEST OF SEVERAL DATES				DUST			
SEASONAL TOTAL (SINCE JULY 11)											
SEASONAL DEPARTURE FROM NORMAL											

BATTELLE-NORTHWEST RICHLAND WASHINGTON						HANFORD METEOROLOGY STATION 28 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N, LONGITUDE 119° 36' W, ELEVATION (GROUND) 733 FEET										MONTH FEBRUARY 1971	
CLIMATOLOGICAL DATA																	
DATE	TEMPERATURE (°F; 3 FT. LEVEL)					PRECIP. TOTAL (WTR EQUIVALENT IN IN.)	SHOW. ICE PELLETS (SLEET) (IN.)	SHOW. ICE PELLETS (SLEET) (IN.) GROUND AT GROUND (IN.)	WIND (50 FT. LEVEL)					REL. HUM. AVERAGE	SOLRAD (LANGLEY)	SKY COVER (1/10TH FROM SUNRISE TO SUNSET)	FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREES DAYS (BASE 65°)				PREVAILING DIRECTION	AVERAGE SPEED (MPH)	PEAK GUST SPEED (MPH)	DIRECTION					
1	63	33	48	+17	17				NW	7.9	29	WNW	59	212	6	KFR 1220	
2	52	33	42	+11	23				W	15.8	35	WNW	44	235	1		
3	47	27	37	+5	28				SW	11.8	38	SW	46	222	9		
4	50	28	39	+7	26				SW	18.7	45	SSW	49	226	5	KFR 0625	
5	44	20	32	0	33				W	4.2	12	WNW	62	277	0		
6	42	15	28	-5	37				W	4.4	12	ESE	64	254	9		
7	43	16	30	-3	35				NW	3.8	12	NW	68	271	1		
8	44	24	34	+1	31				NW	6.7	17	WNW	63	280	0		
9	32	23	28	-6	37	0.06	T		SE	2.5	10	WNW	84	54	10	GL; F	
10	62	26	44	+10	21				W	11.2	54	WSW	69	268	2	F; WFR 0925; BD	
11	62	37	50	+16	15				N	4.1	12	SSE	66	225	9		
12	55	37	46	+11	19				NW	6.6	17	NW	71	219	10		
13	66	36	51	+16	14				SW	4.2	14	SSE	66	280	8		
14	56	34	45	+10	20	T			SW	10.4	48	SSW	76	62	10	WFR 1500; KFR 2130	
15	56	41	48	+12	17				SW	15.3	37	SW	51	184	8		
16	53	28	40	+4	25				NW	4.8	22	WSW	58	293	9		
17	52	36	44	+8	21				N	6.0	16	N	53	225	9		
18	49	32	40	+3	25	0.03			W	4.9	29	W	70	57	10	KFR 1825	
19	49	31	40	+3	25				W	9.7	22	WNW	56	184	7		
20	49	28	38	+1	27				NW	4.9	13	WNW	68	302	4		
21	40	25	32	-6	33				NW	5.8	13	N	82	125	10		
22	42	29	36	-2	29				NW	3.1	11	NW	77	123	10	F	
23	50	29	40	+2	25				SW	7.2	32	SSW	67	128	10		
24	55	35	45	+6	20				SW	24.0	65	SW	53	275	5	KFR 1040; BD	
25	51	30	40	+1	25				W	15.6	45	WNW	47	273	7		
26	43	19	31	-8	34	T	T		SW	9.5	34	SSE	52	184	9		
27	41	26	34	-6	31	0.01	T		SW	7.9	26	NNW	56	131	10		
28	43	21	32	-8	33				N	10.1	20	NNW	47	329	7		
29																	
30																	
31																	
SUM						0.10	T										
AVE	49.7	28.5					</										

BATTELLE-NORTHWEST RICHLAND, WASHINGTON CLIMATOLOGICAL DATA										MANFORD METEOROLOGY STATION 25 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N, LONGITUDE 119° 36' W., ELEVATION (GROUND) 733 FEET							MONTH MAR 1971
DATE	TEMPERATURE (°F; 3 FT. LEVEL)						PRECIP.		WIND (SOFT, LEVEL)					REL. HUM.	SOLAR (LANGLEY)	SKY COVER (TENTHS FROM SUNRISE TO SUNSET)	FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS **KFR** (COLD FRONT) AND **WFR** (WARM FRONT)
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WTR EQUIVALENT IN IN.)	SHOW, ICE PELLETS (SLEET) (IN.)	SHOW, ICE PELLETS (SLEET) (IN.)	PREVAILING DIRECTION	AVERAGE SPEED (MPH)	PEAK GUST	PEAK GUST DIRECTION	AVERAGE REL. HUM.				
1	41	15	28	-12	37				SE	5.6	17	SSE	40	396	3		
2	51	15	33	-8	32				NW	7.3	29	SSW	58	150	10		WFR 1240; KFR 2010
3	51	27	39	-2	26	T			SW	11.6	39	SW	50	305	5		
4	38	21	30	-11	35	T	T		W	6.8	20	WSW	67	174	8		
5	47	22	34	-8	31				W	7.5	20	W	50	428	2		
6	38	19	28	-14	37	0.07	0.5		NW	5.2	15	NW	76	134	10		F
7	50	32	41	-1	24	0.01	T	T	W	7.1	28	W	80	147	10		KFR 1720
8	45	24	34	-10	31				SE	5.9	21	W	53	302	9		
9	47	27	37	-6	28	T	T		S	3.4	22	SSW	74	140	10		
10	54	31	42	-1	23	0.02			SW	13.8	46	SW	70	82	10		KFR 1800
11	46	33	40	-3	25	0.10			SW	8.8	42	WSW	70	100	10		
12	53	40	46	+3	19	0.01			SW	10.1	39	SW	56	207	8		
13	54	29	42	-2	23	0.06			W	12.5	38	WNW	56	392	6		
14	55	28	42	-2	23	0.02	0.1		SW	8.5	31	SW	67	281	7		F
15	52	31	42	-2	23				W	12.2	24	WSW	48	426	3		
16	51	26	38	-6	27				NW	4.7	20	W	45	442	4		
17	52	29	40	-5	25				NW	7.0	18	WNW	42	485	2		
18	54	22	38	-7	27				E	2.8	12	SSE	47	486	4		
19	57	27	42	-3	23				NW	4.7	11	ESE	45	493	1		
20	62	29	46	+1	19				NW	8.6	31	NW	38	444	8		
21	55	33	44	-2	21				NE	5.7	18	NE	32	487	8		
22	47	32	40	-6	25	0.21	T		E	4.1	16	E	71	205	10		F
23	51	37	44	-2	21	0.01			NW	5.9	23	WSW	80	224	9		
24	58	37	48	+2	17				W	12.4	36	SW	50	435	8		
25	49	27	38	-9	27	0.43			W	6.0	23	WNW	60	314	9		
26	57	33	45	-2	20	0.08			SW	18.9	62	SSW	59	478	4		WFR 0640; RD
27	57	34	46	-1	19				SW	14.0	39	SSW	50	364	7		
28	61	33	47	0	18	T			SW	13.0	39	SSW	59	350	10		
29	65	43	54	+6	11				SW	13.4	35	SSW	50	368	10		
30	59	39	49	+1	16	T			W	16.0	36	NW	46	335	9		KFR 1445
31	58	33	46	-2	19				W	11.1	27	W	39	514	5		
SUM						1.02	0.6										
AVE	52.1	29.3								8.9						7.1	
NOTES: (1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME. (2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE. (3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2										PRECIPITATION (IN)					MISC. PHENOMENA NOTATIONS USED IN COL.		
										TOTAL FOR THE MONTH					A - HAIL		
										DEPARTURE FROM NORMAL					BD - BLOWING DUST		
										GREATEST IN 24 HRS.					BS - BLOWING SNOW		
										NUMBER OF DAYS WITH:					D - DUST		
										TRACE OR MORE					F - FOG		
										0.01 OR MORE					GL - GLAZE		
										0.10 OR MORE					E - SMOKE		
										TOTAL FOR THE MONTH					T - THUNDERSTORM		
										GREATEST IN 24 HOURS					BAROMETRIC PRESSURE (IN.)		
										GREATEST ON END					AVERAGE STATION		
										WIND (SOFT, LEVEL)					HIGHEST SEA LEVEL		
										AVERAGE SPEED (MPH)					LOWEST SEA LEVEL		
										DEPARTURE FROM NORMAL					SOLAR RADIATION (LANGLEY)		
										PEAK GUST					AVERAGE DAILY TOTAL		
										FROM					GREATEST DAILY		
										SSW					LEAST DAILY		
										AVERAGE PSYCHROMETRIC DATA					MISCELLANEOUS NUMBER OF DAYS		
										DRY BULB (°F)					CLEAR		
										WET BULB (°F)					PARTLY CLOUDY		
										REL. HUM. (%)					CLOUDY		
										DEW PT (°F)					REL. HUM. EXTREMES (%)		
										HIGHEST					HIGHEST		
										LOWEST					LOWEST		
										+ DENOTES LATEST OF SEVERAL DATES							

BN - 1800-023 (2-71) ACC RL RICHLAND, WASH.

BATTELLE-NORTHWEST RICHLAND, WASHINGTON										HANFORD METEOROLOGY STATION 25 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N, LONGITUDE 119° 36' W, ELEVATION (GROUND) 733 FEET										MONTH April - 1971	
CLIMATOLOGICAL DATA																					
DATE	TEMPERATURE (°F, 3 FT. LEVEL)						PRECIP.		WIND (50 FT. LEVEL)	PEAK GUST			AVERAGE REL. HUM. %	SOLRAD (LANGLEYS)	DAY COVER (TENTH FROM SUNRISE TO SUNSET)	FRONTS AND MISC. PHENOMENA					
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WTR EQUIVALENT IN IN.)	SNOW, ICE PELLETS (SLEET) (IN.)	SHOW, ICE PELLETS (SLEET) OR ICE ON GROUND AT 0400 (IN.)		PREVAILING DIRECTION	AVERAGE SPEED (MPH)	SPEED (MPH)				DIRECTION	NOTE: TIMES OF FRONTAL PASSAGE ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17					
1	55	27	41	-8	24				NW	4.2	36	SW	53	401	9	WFR 2335					
2	62	40	51	+2	14				NW	11.6	30	NW	39	539	3	KFR 0330					
3	61	32	46	-3	19				W	5.0	15	WNW	43	517	5						
4	66	32	49	0	16				W	4.6	14	N	42	557	4						
5	72	42	57	+7	8				NW	8.0	18	NW	38	536	8						
6	76	46	61	+11	4				NW	10.2	34	WSW	37	--	9	KFR 1515					
7	62	38	50	0	15				W	10.0	23	W	37	512	6						
8	60	33	46	-5	19	0.01			N	3.5	19	SW	58	265	10						
9	68	42	55	+4	10	T			SW	12.0	46	WSW	62	374	10	KFR 1415					
10	60	33	46	-5	19	T			SW	13.4	42	SW	42	598	3						
11	59	35	47	-5	18	T			SW	10.3	50	WSW	45	457	7						
12	63	28	46	-6	19				E	6.9	23	ENE	42	611	3						
13	69	41	55	+2	10				NW	8.7	18	NW	38	475	10						
14	74	42	58	+5	7				W	8.8	36	NW	39	439	8	KFR 1510					
15	59	36	48	-5	17				W	16.0	37	W	34	--	6						
16	55	31	43	-11	22				W	2.8	14	E	45	349	10						
17	59	42	50	-4	15	T			W	9.0	25	WNW	50	307	10						
18	67	41	54	0	11				W	9.0	23	WNW	36	--	3						
19	67	30	48	-7	17				SE	4.1	15	ENE	46	--	0						
20	64	48	56	+1	9	T			W	11.6	40	WNW	42	329	10						
21	64	42	53	-2	12				SE	9.6	33	WNW	38	620	2						
22	65	32	48	-8	17	T			SW	7.0	26	SW	50	473	9						
23	62	45	54	-2	11	T			NW	7.5	31	WNW	42	458	9						
24	55	44	50	-6	15	0.06			W	7.7	28	WNW	63	153	10						
25	74	41	58	+1	7				NE	13.2	36	NE	49	626	1						
26	74	41	58	+1	7				NE	8.2	22	NE	29	681	0						
27	73	48	60	+3	5				NW	10.8	40	WNW	38	472	10	KFR 1435					
28	72	41	56	-2	9				W	9.3	31	NW	44	623	8						
29	70	39	54	-4	11				W	6.7	21	SW	38	625	9						
30	74	46	60	+2	5				E	3.5	14	NE	37	542	10						
31																					
SUM						0.07	None														
AVE	65.4	38.6								8.4					6.7						
NOTES: (1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME. (2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE. (3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2										PRECIPITATION (IN.) TOTAL FOR THE MONTH 0.07 DEPARTURE FROM NORMAL -0.30 GREATEST IN 24 HRS. 0.06 ON 24th NUMBER OF DAYS WITH: TRACE OR MORE 9 0.25 OR MORE 0 0.01 OR MORE 2 0.50 OR MORE 0 0.10 OR MORE 0 1.00 OR MORE 0										MISC. PHENOMENA NOTATIONS USED IN COL. 17 A - HAIL AU - AURORA B - DUST F - FOG GL - GLAZE K - SMOKE BD - BLOWING DUST BS - BLOWING SNOW DL - DISTANT LIGHTNING DS - DRIFTING SNOW IC - ICE CRYSTALS T - THUNDERSTORM	
TEMPERATURE (°F, 3 FT. LEVEL) AVERAGE FOR THE MONTH 52.0 DEPARTURE FROM NORMAL -1.4 HIGHEST 76 ON LOWEST 27 ON										SNOW, ICE PELLETS (SLEET) (INCHES) TOTAL FOR THE MONTH 0 GREATEST IN 24 HOURS: 0 ON - GREATEST ON GND: 0 ON - WIND (50 FT. LEVEL) AVERAGE SPEED (MPH) 8.4 DEPARTURE FROM NORMAL -0.4 PEAK GUST 50 FROM WSW ON 11th										BAROMETRIC PRESSURE (IN.) AVERAGE STATION 29.199 HIGHEST SEA LEVEL 30.54 ON 3rd LOWEST SEA LEVEL 29.46 ON 9th	
NUMBER OF DAYS WITH: MAX. 32 OR BELOW 0 MAX. 90 OR ABOVE 0 MIN. 32 OR BELOW 7 MIN. 0 OR BELOW 0										SOLAR RADIATION (LANGLEYS) AVERAGE DAILY TOTAL 488 GREATEST DAILY 681 ON 26th LEAST DAILY 153 ON 24th										MISCELLANEOUS NUMBER OF DAYS CLEAR 8 FOG 0 PARTLY CLOUDY 5 THUNDER 0 CLOUDY 17 DUST 0	
HEATING DEGREE DAYS (BASE 65°F) TOTAL FOR THE MONTH 392 DEPARTURE FROM NORMAL +21 SEASONAL TOTAL (SINCE JULY 1) 5158 SEASONAL DEPARTURE FROM NORMAL +33										AVERAGE PSYCHROMETRIC DATA DRY BULB (°F) 52.0 WET BULB (°F) 41.9 REL. HUM. (%) 43.2 DEW PT (°F) 28.7 + DENOTES LATEST OF SEVERAL DATES										REL. HUM. EXTREMES (%) HIGHEST 89 ON 25th LOWEST 17 ON 26th	

BATTELLE-NORTHWEST RICHLAND, WASHINGTON						HANFORD METEOROLOGY STATION 25 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N, LONGITUDE 119° 36' W, ELEVATION (GROUND) 733 FEET										MONTH MAY, 1971	
CLIMATOLOGICAL DATA																	
DATE	TEMPERATURE (°F., 3 FT. LEVEL)					PRECIP.		SHOW, ICE PELLETS (SLEET) (IN.)	SHOW, ICE PELLETS (SLEET) (IN.) 0.01 OR MORE	WIND (50 FT. LEVEL)				AVERAGE REL. HUM. %	SOLRAD (LANGLEY'S)	SEA COVER (TENTHS FROM SUNRISE TO SUNSET)	FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WET EQUIVALENT IN IN.)	PREVAILING DIRECTION			AVERAGE SPEED (MPH)	PEAK GUST	SPEED (MPH)	DIRECTION				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	83	51	67	+8	0				NW	9.7	20	NNW	32	565	10		
2	89	60	74	+15	0				NW	10.5	26	N	28	509	8		
3	89	60	74	+15	0				NW	12.4	32	WNW	26	677	3		
4	83	56	70	+11	0				W	19.8	52	WNW	31	691	0	KFR 1430	
5	73	50	62	+2	3				NW	13.7	30	NW	37	576	7		
6	75	44	60	0	5				N	13.0	32	NNE	43	470	9		
7	80	51	66	+6	0				N	7.0	19	NNW	34	694	1		
8	84	57	70	+10	0				NW	12.1	41	W	32	650	7	KFR 1610	
9	79	50	64	+3	1				W	7.3	26	WNW	28	710	6		
10	83	45	64	+3	1				NW	5.2	18	ENE	30	712	2		
11	91	58	74	+13	0				NW	5.6	15	NW	26	707	0		
12	92	52	72	+11	0	0.03			W	10.0	54	SSW	40	516	6	KFR 1425; BD	
13	70	44	57	-5	8				SW	16.7	38	WSW	41	745	4	KFR 2130	
14	68	37	52	-10	13				NW	6.1	19	NW	34	684	7		
15	69	49	59	-3	6	0.02			NW	12.0	43	WSW	38	377	9		
16	64	43	54	-8	11	T			SW	21.5	40	SSW	39	423	10		
17	70	40	55	-8	10				W	11.4	26	WNW	33	--	3		
18	73	40	56	-7	9				SE	6.2	22	SE	36	736	5		
19	66	41	54	-9	11	0.06			W	13.7	38	WNW	45	334	7	A	
20	64	36	50	-13	15				NW	8.0	24	N	45	608	6		
21	81	41	61	-3	4				N	10.3	41	NNE	40	751	1		
22	85	56	70	+6	0				NW	7.4	22	WNW	32	742	0		
23	88	54	71	+7	0				NW	6.8	29	NW	31	700	7		
24	89	53	71	+7	0	T			W	8.7	25	WSW	32	704	9		
25	78	57	68	+4	0	0.08			NE	5.8	23	S	55	431	10	DL	
26	82	58	70	+5	0	0.01			NW	7.3	31	WNW	56	527	10		
27	89	62	76	+11	0				NW	9.6	25	NW	34	744	3		
28	89	62	76	+11	0				NW	10.1	33	WNW	22	755	5	KFR 2005	
29	73	52	62	-3	3				NW	18.3	37	NW	33	423	10		
30	62	48	55	-11	10	0.01			SW	6.5	17	WSW	44	256	10		
31	54	48	51	-15	14	0.35			SE	1.8	8	SSE	83	156	10	F	
SUM						0.56	None								6.0		
AVE	77.9	50.2								10.1							
NOTES: (1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME. (2) "T" IN COLUMNS 7 - 8 DENOTES A TRACE. (3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2																	
TEMPERATURE (°F., 3 FT. LEVEL)																	
AVERAGE FOR THE MONTH						PRECIPITATION (IN.)						MISC. PHENOMENA NOTATIONS USED IN COL. 17					
DEPARTURE FROM NORMAL						TOTAL FOR THE MONTH						A - HAIL AU - AURORA O - DUST F - FOG GL - GLAZE S - SMOKE					
HIGHEST						DEPARTURE FROM NORMAL						BD - BLOWING DUST BS - BLOWING SNOW DL - DISTANT LIGHTNING DS - DRIFTING SNOW IC - ICE CRYSTALS T - THUNDERSTORM					
LOWEST						GREATEST IN 24 HRS.						BAROMETRIC PRESSURE (IN.)					
NUMBER OF DAYS WITH:						NUMBER OF DAYS WITH:						AVERAGE STATION					
MAX. 32 OR BELOW						TRACE OR MORE						HIGHEST SEA LEVEL					
MAX. 30 OR ABOVE						0.01 OR MORE						LOWEST SEA LEVEL					
MIN. 32 OR BELOW						0.10 OR MORE						SOLAR RADIATION (LANGLEY'S)					
MIN. 30 OR BELOW						TOTAL FOR THE MONTH						AVERAGE DAILY TOTAL					
HEATING DEGREE DAYS (BASE 65°F)						GREATEST ON END:						GREATEST DAILY					
TOTAL FOR THE MONTH						WIND (50 FT. LEVEL)						LEAST DAILY					
DEPARTURE FROM NORMAL						AVERAGE SPEED (MPH)						MISCELLANEOUS NUMBER OF DAYS					
SEASONAL TOTAL (SINCE JULY 1)						PEAK GUST						CLEAR					
SEASONAL DEPARTURE FROM NORMAL						FROM						PARTLY CLOUDY					
						SSW						THUNDER					
						ON						CLOUDY					
						12th						DUST					
						AVERAGE PSYCHROMETRIC DATA						REL. HUM. EXTREMES (%)					
						DRY BULB (°F)						HIGHEST					
						WET BULB (°F)						LOWEST					
						REL. HUM. (%)						ON					
						+ DENOTES LATEST OF SEVERAL DATES						31st					
												28th					

BATTELLE-NORTHWEST RICHLAND WASHINGTON CLIMATOLOGICAL DATA										HANFORD METEOROLOGY STATION 25 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N, LONGITUDE 119° 36' W., ELEVATION (GROUND) 733 FEET							MONTH JUNE 1971		
DATE	TEMPERATURE (°F., 3 FT. LEVEL)						PRECIP.		WIND (50 FT. LEVEL)	PEAK GUST			AVERAGE REL. HUM. %	SOLRAD (LANGLEYS)	SKY COVER (TENTHS FROM SUNRISE TO SUNSET)	FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)			
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WTR EQUIVALENT IN IN.)	SNOW, ICE PELLETS (SLEET) (IN.)	SHOW, ICE PELLETS (SLEET) OR ICE ON GROUND (AT 0400 IN.)		PREVAILING DIRECTION	AVERAGE SPEED (MPH)	SPEED (MPH)					DIRECTION		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
1	71	49	60	-6	5	T			SW	4.8	19	SSW	66	543	10	F			
2	70	50	60	-6	5	0.09			SE	7.2	24	SE	59	382	10				
3	64	50	57	-9	8	0.30			NW	3.4	12	WNW	51	220	10	F			
4	75	48	62	-5	3				SE	5.9	25	NW	53	670	3				
5	81	48	64	-3	1				S	7.2	29	NW	33	730	4				
6	81	50	66	-1	0				SW	4.3	22	WSW	35	684	5				
7	75	53	64	-3	1	T			W	12.2	31	WSW	38	595	10	KFR 0100			
8	75	44	60	-7	5				NW	8.5	26	NW	36	784	2				
9	77	51	64	-3	1	0.02			W	7.4	18	NW	36	526	10				
10	73	56	64	-4	1				W	11.3	34	WNW	48	333	9				
11	79	50	64	-4	1				SE	7.8	29	W	37	747	4				
12	80	51	66	-2	0				E	5.5	24	SW	39	463	10				
13	75	55	65	-3	0	0.05			SW	10.5	39	WSW	40	567	6				
14	76	45	60	-8	5				SW	10.8	31	NW	36	821	1				
15	79	52	66	-3	0				NW	10.5	34	NW	33	797	3				
16	76	53	64	-5	1				W	8.5	25	NW	30	677	4				
17	77	47	62	-7	3				SE	4.3	20	NW	31	-	10				
18	75	58	66	-3	0	0.03			W	8.2	28	SW	49	376	10				
19	84	55	70	+1	0				SW	9.0	27	WSW	34	775	4				
20	89	63	76	+6	0	T			W	7.9	29	SSW	32	605	10				
21	95	74	80	+10	0				W	8.8	22	NW	34	705	4				
22	99	64	82	+12	0	0.14			W	10.3	34	SW	33	654	9	T. KFR 1745			
23	81	54	68	-2	0	0.01			NW	11.8	29	NW	42	654	4				
24	79	49	64	-7	1	0.06			SW	7.7	27	W	44	498	10				
25	77	53	65	-6	0	0.01			NW	11.2	37	SSW	45	751	3	KFR 0430			
26	77	48	62	-9	3				NW	7.9	28	NW	33	730	10				
27	74	52	63	-8	2				NW	10.7	29	WNW	33	-	10				
28	76	48	62	-10	3	T			W	11.5	28	NW	39	-	6				
29	82	46	64	-8	1				NW	6.0	23	NW	35	787	1				
30	89	49	69	-3	0				NW	8.2	26	NW	28	732	7				
31																			
SUM						0.71	None												
AVE	78.7	51.8								8.4					6.6				
NOTES: (1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME. (2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE. (3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2										PRECIPITATION (IN) TOTAL FOR THE MONTH 0.71 DEPARTURE FROM NORMAL +0.14 GREATEST IN 24 HRS. 0.39 ON 12 and 3 NUMBER OF DAYS WITH: TRACE OR MORE 13 0.25 OR MORE 1 0.01 OR MORE 9 0.50 OR MORE 0 0.10 OR MORE 2 1.00 OR MORE 0					MISC. PHENOMENA NOTATIONS USED IN COL. A - HAIL AU - AURORA B - BUST F - FOG GL - GLAZE S - SMOKE BD - BLOWING DUST BS - BLOWING SNOW BL - BRIGHT LIGHTNING DS - DRIFTING SNOW IC - ICE CRYSTALS T - THUNDERSTORM				
TEMPERATURE (°F., 3 FT. LEVEL) AVERAGE FOR THE MONTH 65.3 DEPARTURE FROM NORMAL -4.1 HIGHEST 99 ON 22nd LOWEST 44 ON 8th NUMBER OF DAYS WITH: MAX. 32 OR BELOW 0 MAX. 60 OR ABOVE 2 MIN. 32 OR BELOW 0 MIN. 0 OR BELOW 0 HEATING DEGREE DAYS (BASE 65°F) 5332										BAROMETRIC PRESSURE (IN.) AVERAGE STATION 29.158 HIGHEST SEA LEVEL 30.18 ON 14th LOWEST SEA LEVEL 29.68 ON 9th SOLAR RADIATION (LANGLEYS) TOTAL FOR THE MONTH 0 GREATEST IN 24 HOURS: 0 ON - GREATEST ON GND: 0 ON - WIND (50 FT. LEVEL) AVERAGE SPEED (MPH) 8.4 DEPARTURE FROM NORMAL -0.8 PEAK GUST 33 FROM WSW ON 13th AVERAGE PSYCHROMETRIC DATA DRY BULB (°F) 66.1 WET BULB (°F) 52.1 REL. HUM. (%) 40.6 DEW PT (°F) 39.2					REL. HUM. EXTREMES (%) HIGHEST 91 ON 3rd LOWEST 13 ON 30th				
TOTAL FOR THE MONTH 50 DEPARTURE FROM NORMAL +14 SEASONAL TOTAL (SINCE JULY 1) 5332 SEASONAL DEPARTURE FROM NORMAL +13										4 DENOTES LATEST OF SEVERAL DATES CLOUDY 14 DUST & BD 0									

BATTELLE-NORTHWEST RICHLAND WASHINGTON								HANFORD METEOROLOGY STATION 25 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N, LONGITUDE 119° 36' W, ELEVATION (GROUND) 733 FEET								MONTH July 1971	
CLIMATOLOGICAL DATA																	
DATE	TEMPERATURE (°F, 3 FT. LEVEL)						PRECIP.		WIND (50 FT. LEVEL)	PEAK GUST			AVERAGE REL HUM	SOLRAD (LANGLEY°)	DAY COVER (10TH FROM SUNRISE TO SUNSET)	FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)	
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WTR EQUIVALENT IN IN.)	SNOW, ICE PELLETS (SLEET) (IN.)	PREVAILING DIRECTION		AVERAGE SPEED (MPH)	SPEED (MPH)	DIRECTION					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	84	60	72	-1	0				NW	15.3	35	NW	28	733	4		
2	82	55	68	-5	0				NW	10.6	30	NW	26	802	0		
3	84	53	68	-5	0				NW	5.8	25	WNW	20	793	1		
4	87	58	72	-1	0				NW	13.3	36	NW	25	751	8	KFR 1635	
5	75	51	63	-11	2				W	9.2	28	WNW	36	509	9		
6	75	44	60	-14	5				NW	11.4	33	NW	37	627	3		
7	81	45	63	-11	2				N	6.1	18	NNE	33	731	6		
8	90	62	76	+1	0	T			NW	8.3	33	WSW	26	617	10		
9	79	54	66	-9	0	0.13			SW	9.6	31	SW	49	253	10		
10	71	52	62	-13	3	T			SW	8.4	21	SW	50	470	7	KFR 1430	
11	80	48	64	-12	1				W	6.7	23	NW	42	681	4		
12	84	52	68	-8	0				NE	5.9	19	NNE	35	773	0		
13	92	56	74	-2	0				NW	6.2	15	NW	29	770	0		
14	95	59	77	0	0				N	5.6	16	NE	25	764	0		
15	101	62	82	+5	0				NW	6.8	23	WNW	21	702	1	DL	
16	104	72	88	+11	0				NW	9.6	26	NW	19	737	0		
17	103	72	88	+10	0				N	8.4	18	NW	20	749	0		
18	105	70	88	+10	0				NE	8.3	21	NE	21	694	4		
19	108	72	90	+12	0				NW	7.2	19	NNW	22	707	5		
20	106	73	90	+12	0				NW	8.3	30	NW	24	613	3	DL	
21	105	72	88	+9	0				NW	9.0	33	NW	23	733	0		
22	102	67	84	+5	0				W	8.6	27	NW	21	723	0		
23	103	65	84	+5	0				NW	11.8	36	NW	28	725	0		
24	99	71	85	+6	0				NW	7.3	18	N	21	732	0		
25	100	71	86	+7	0				N	7.8	22	NNE	21	724	0		
26	103	69	86	+7	0				NW	5.1	21	E	22	710	0		
27	108	70	89	+10	0				W	6.2	19	W	19	687	2		
28	107	72	90	+12	0				N	9.3	34	ENE	22	702	0		
29	103	72	88	+10	0				N	10.0	26	N	28	689	0		
30	107	70	88	+10	0				NE	5.0	18	E	22	679	1		
31	111	74	92	+14	0				E	5.8	22	NE	22	669	0		
SUM						0.13	None										
AVE	94.6	62.7								8.3					2.5		
NOTES: (1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME. (2) "T" IN COLUMNS 7 - 8 DENOTES A TRACE. (3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2								PRECIPITATION (IN.) TOTAL FOR THE MONTH 0.13 DEPARTURE FROM NORMAL -0.01 GREATEST IN 24 HRS. 0.13 ON 9th NUMBER OF DAYS WITH: TRACE OR MORE 3 0.25 OR MORE 0 0.01 OR MORE 1 0.50 OR MORE 0 0.10 OR MORE 1 1.00 OR MORE 0					MISC. PHENOMENA NOTATIONS USED IN COL. 17 A - HAIL BD - BLOWING DUST AU - AURORA BS - BLOWING SNOW D - DUST DL - DISTANT LIGHTNING F - FOG DR - DRIFTING SNOW GL - GLAZE IC - ICE CRYSTALS K - SMOKE T - THUNDERSTORM				
TEMPERATURE (°F, 3 FT. LEVEL) AVERAGE FOR THE MONTH 78.7 DEPARTURE FROM NORMAL +2.3 HIGHEST 111 ON 31st LOWEST 44 ON 6th NUMBER OF DAYS WITH: MAX. 32 OR BELOW 0 MAX. 90 OR ABOVE 20 MIN. 32 OR BELOW 0 MIN. 0 OR BELOW 0 HEATING DEGREE DAYS (BASE 65°F) 13 TOTAL FOR THE MONTH 13 DEPARTURE FROM NORMAL +10 SEASONAL TOTAL (SINCE JULY 1) 13 SEASONAL DEPARTURE FROM NORMAL +10								WIND (50 FT. LEVEL) AVERAGE SPEED (MPH) 8.3 DEPARTURE FROM NORMAL -0.3 PEAK GUST 36 FROM NW ON 4, 23 AVERAGE PSYCHROMETRIC DATA DRY BULB (°F) 79.8 WET BULB (°F) 57.8 REL. HUM. (%) 27.0 DEW PT (°F) 40.2 + DENOTES LATEST OF SEVERAL DATES					BAROMETRIC PRESSURE (IN.) AVERAGE STATION 29.172 HIGHEST SEA LEVEL 30.15 ON 7, 11, 16 LOWEST SEA LEVEL 29.71 ON 23rd SOLAR RADIATION (LANGLEYS) AVERAGE DAILY TOTAL 685.5 GREATEST DAILY 802 ON 2nd LEAST DAILY 253 ON 9th MISCELLANEOUS NUMBER OF DAYS CLEAR 21 FOG 0 PARTLY CLOUDY 6 THUNDER 0 CLOUDY 4 DUST 0 REL. HUM. EXTREMES (%) HIGHEST 80 ON 10th LOWEST 11 ON 3, 15, 16				

BM -1800-023 (2-71) REC'D RICHLAND, WASH.

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BATTELLE-NORTHWEST RICHLAND, WASHINGTON						HANFORD METEOROLOGY STATION 25 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N, LONGITUDE 119° 36' W, ELEVATION (GROUND) 733 FEET										MONTH AUGUST, 1971			
CLIMATOLOGICAL DATA																			
DATE	TEMPERATURE (°F; 3 FT. LEVEL)					PRECIP.		WIND (50 FT. LEVEL)					AVERAGE REL HUM	SOLAR (LANGLEYS)	SEA COVER (PERCENT FROM SURFACE TO SURFACE)	FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)			
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WTR EQUIVALENT IN IN.)	SNOW, ICE PELLETS (SLEET) (IN.)	PREVAILING DIRECTION	AVERAGE SPEED (MPH)	PEAK GUST SPEED (MPH)	DIRECTION								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
1	109	78	94	+16	0				NW	9.2	31	WNW	24	658	3				
2	103	67	85	+7	0				W	6.9	25	WNW	23	699	1	DL			
3	98	65	82	+5	0	T			W	10.0	33	SW	27	703	1	T: DL			
4	98	66	82	+5	0				W	5.2	18	WNW	36	671	1				
5	103	65	84	-7	0				W	5.3	20	WNW	30	670	0				
6	102	69	86	+9	0				E	6.6	21	ENE	31	667	1				
7	104	73	88	+11	0				NW	7.8	35	WNW	34	599	2				
8	107	79	93	+17	0				W	7.8	32	NW	22	655	0				
9	112	76	94	+18	0				NW	9.2	26	WNW	18	672	0				
10	109	77	93	+17	0				NW	7.3	22	NW	12	694	0				
11	108	68	88	+12	0				W	6.2	24	WNW	14	679	3				
12	108	70	89	+13	0				W	8.5	27	WNW	17	665	0				
13	104	71	88	+13	0				W	8.8	26	WNW	18	657	0				
14	89	64	76	+1	0				NW	8.5	25	WSW	32	676	0	KFR 0340			
15	93	56	74	-1	0				W	6.6	27	WNW	32	664	0				
16	92	65	78	+3	0				W	12.8	28	W	30	656	0				
17	90	59	74	-1	0				W	6.5	27	NW	31	655	1				
18	94	57	76	+2	0				SE	4.8	22	WNW	30	637	0				
19	99	61	80	+6	0				W	6.1	24	WSW	28	626	1				
20	91	66	78	+4	0	T			W	12.2	31	WSW	35	628	1	KFR 0205, DL			
21	91	63	77	+3	0				SW	12.3	34	SW	36	521	6	KFR 2150			
22	74	56	65	-8	0	0.09			NW	12.0	35	NW	50	242	9	T			
23	80	51	66	-7	0				W	5.2	20	ENE	42	635	2				
24	89	52	70	-3	0				NW	5.5	15	NW	34	627	0				
25	96	57	76	+3	0				SE	5.1	21	NW	30	610	0				
26	97	60	78	+6	0				E	4.9	19	NW	25	607	1				
27	94	60	77	+5	0	T			NW	4.8	25	SSW	30	344	10	T, DL			
28	96	59	78	+6	0	T			NE	3.0	16	ENE	40	568	1	T, DL			
29	98	65	82	+11	0				NW	4.5	14	NE	30	503	7				
30	95	65	80	-9	0	T			SW	11.2	37	WSW	34	515	5	KFR 1430, DL			
31	72	53	62	-9	3				SW	17.8	36	SW	45	270	10				
SUM						0.09	None												
AVE	96.6	64.3								7.8					2.1				
NOTES: (1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME. (2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE. (3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM 2						PRECIPITATION (IN)						MISC. PHENOMENA NOTATIONS USED IN COL. 17							
						TOTAL FOR THE MONTH						A - HAIL AU - AURORA D - DUST F - FOG GL - GLAZE K - SMOKE							
						DEPARTURE FROM NORMAL						BD - BLOWING DUST BS - BLOWING SNOW DL - DISTANT LIGHTNING DR - DRIFTING SNOW IC - ICE CRYSTALS T - THUNDERSTORM							
						GREATEST IN 24 HRS.						BAROMETRIC PRESSURE (IN.)							
						NUMBER OF DAYS WITH:						AVERAGE STATION							
						TRACE OR MORE						HIGHEST SEA LEVEL							
						6						30.24							
						0.25 OR MORE						ON 23rd							
						0.50 OR MORE						LOWEST SEA LEVEL							
						1						29.60							
0.10 OR MORE						ON 30th													
0						SOLAR RADIATION (LANGLEYS)													
0						AVERAGE DAILY TOTAL													
0						602.4													
0						GREATEST DAILY													
0						703													
0						ON 3rd													
26						LEAST DAILY													
26						242													
ON 22nd						MISCELLANEOUS NUMBER OF DAYS													
0						CLEAR													
0						25													
0						PARTLY CLOUDY													
0						3													
0						THUNDER													
0						4													
0						CLOUDY													
0						3													
0						DUST													
0						0													
0						REL. HUM. EXTREMES (%)													
0						HIGHEST													
0						74													
0						ON 28th													
0						LOWEST													
0						11													
0						ON 15th													

BATTELLE-NORTHWEST RICHLAND WASHINGTON CLIMATOLOGICAL DATA										HANFORD METEOROLOGY STATION 25 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N. LONGITUDE 119° 36' W. ELEVATION (GROUND) 733 FEET							MONTH SEPTEMBER 1971	
DATE	TEMPERATURE (°F., 3 FT. LEVEL)					PRECIP.		WIND (50 FT. LEVEL)					REL. HUM.		SOLAR (LANGLEYS)		FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)	
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	TOTAL (WTR EQUIVALENT IN IN.)	SNOW, ICE PELLETS (SLEET) (IN.)	PREVAILING DIRECTION	AVERAGE SPEED (MPH)	PEAK GUST SPEED (MPH)	DIRECTION	AVERAGE REL. HUM.	SOLAR (LANGLEYS)	REL. HUM. (FROM SUNRISE TO SUNSET)				
1	61	46	54	-17	11	0.43		NW	4.9	28	S	78	149	10				
2	70	54	62	-9	3	0.17		SW	12.4	32	SSW	61	236	10				
3	77	53	65	-5	0			S	6.2	15	W	52	527	3				
4	81	48	64	-6	1			SE	3.5	13	ENE	55	573	0				
5	91	56	74	+4	0	0.19		NW	9.4	35	NW	52	548	2	KFR 1425; T; DL			
6	74	53	64	-5	1	0.29		W	10.9	32	NW	57	446	4				
7	76	46	61	-8	4			W	5.2	19	WNW	48	555	2				
8	84	50	67	-2	0			NW	6.9	27	NW	47	553	1				
9	81	59	70	+2	0	T		SE	7.4	23	NW	47	483	8				
10	90	53	72	+4	0			SW	8.5	34	WSW	47	530	1				
11	78	57	68	0	0			W	8.0	26	WNW	39	553	0	KFR 0215			
12	85	48	66	-1	0			NW	8.8	29	NW	44	532	0				
13	79	54	66	-1	0			NW	17.6	35	NW	34	551	0				
14	74	49	62	-5	3			NW	6.7	19	NNE	33	542	0				
15	76	42	59	-7	6			NE	5.5	15	ENE	37	529	0				
16	74	51	62	-4	3			NE	15.0	35	NE	28	448	2	K; D			
17	75	43	59	-7	6			NE	9.2	27	NNE	30	517	2				
18	75	41	58	-7	7			W	4.1	12	WSW	32	486	3				
19	80	40	60	-5	5			NE	6.5	40	NNE	38	451	2	KFR 2215			
20	72	45	58	-7	7			NE	15.8	40	N	38	450	2				
21	74	38	56	-8	9	0.03		NE	3.9	12	ENE	39	500	1				
22	77	39	58	-6	7			W	3.5	11	ENE	39	485	0				
23	83	42	62	-2	3			SE	8.3	27	WSW	36	456	3	KFR 2240			
24	75	52	64	+1	1			W	8.3	28	SW	44	406	9				
25	71	53	62	-1	3			SW	7.1	21	WSW	46	281	10				
26	71	46	58	-5	7			W	6.1	21	WNW	49	392	4				
27	69	44	56	-6	9			SW	8.6	24	SW	46	331	9				
28	59	44	52	-10	13	0.02		S	8.5	26	SSE	58	121	10	KFR 2100			
29	63	41	52	-10	13			W	6.2	16	SW	55	403	7				
30	67	41	54	-7	11	T		NW	8.2	27	NW	54	418	0				
31																		
SUM						1.13												
AVE	75.4	47.6							8.0					3.5				

NOTES:				PRECIPITATION (IN)				MISC. PHENOMENA NOTATIONS USED IN COL. 17			
(1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME.				TOTAL FOR THE MONTH				1.13			
(2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE.				DEPARTURE FROM NORMAL				+0.83			
(3) THE LANGLEY (COL. 18) IS THE UNIT USED TO DENOTE ONE GRAM CALORIE / CM ²				GREATEST IN 24 HRS.				0.52 ON 1st & 2nd			
TEMPERATURE (°F., 3 FT. LEVEL)				NUMBER OF DAYS WITH:				BAROMETRIC PRESSURE (IN.)			
AVERAGE FOR THE MONTH				TRACE OR MORE				2			
DEPARTURE FROM NORMAL				0.01 OR MORE				6			
HIGHEST				0.10 OR MORE				4			
LOWEST				SNOW, ICE PELLETS (SLEET) (INCHES)				TOTAL FOR THE MONTH			
91 ON 5th				0				0			
38 ON 21st				GREATEST IN 24 HOURS:				0 ON -			
NUMBER OF DAYS WITH:				GREATEST ON GND:				0 ON -			
MAX. 32 OR BELOW				WIND (50 FT. LEVEL)				AVERAGE DAILY TOTAL			
0				AVERAGE SPEED (MPH)				448			
MAX. 80 OR ABOVE				DEPARTURE FROM NORMAL				GREATEST DAILY			
2				+0.5				573 ON 4th			
MIN. 32 OR BELOW				PEAK GUST				LEAST DAILY			
0				40 FROM NNE ON 19th+				121 ON 28th			
MIN. 0 OR BELOW				AVERAGE PSYCHROMETRIC DATA				MISCELLANEOUS NUMBER OF DAYS			
HEATING DEGREE DAYS (BASE 65°F)				TOTAL FOR THE MONTH				CLEAR			
133				61.3				20			
DEPARTURE FROM NORMAL				REL. HUM. (°F)				PARTLY CLOUDY			
+66				45.4				3			
SEASONAL TOTAL (SINCE JULY 1)				DEW PT (°F)				THUNDER			
149				38.1				1			
SEASONAL DEPARTURE FROM NORMAL				+ DENOTES LATEST OF SEVERAL DATES				DUST			
+74								1			
								REL. HUM. EXTREMES (%)			
								HIGHEST			
								89 ON 1st			
								LOWEST			
								15 ON 17th			

BATTELLE-NORTHWEST RICHLAND WASHINGTON							HANFORD METEOROLOGY STATION 25 MILES N. W. OF RICHLAND, WASHINGTON LATITUDE 46° 34' N, LONGITUDE 119° 36' W, ELEVATION (GROUND) 733 FEET										MONTH OCTOBER; 1971					
CLIMATOLOGICAL DATA																						
DATE	TEMPERATURE (°F, -3 FT. LEVEL)						PRECIP. TOTAL (WTR EQUIVALENT IN IN.)	SNOW, ICE PELLETS (SLEET) (IN.)	SNOW-ICE PELLETS (SLEET) OR ICE ON GROUND AT 0400 (IN.)	WIND (50 FT. LEVEL)				AVERAGE REL HUM. %	SOLAR (LANGLEYS)	SKY COVER (TENTH FROM SUNSHINE TO SUBSET)	FRONTS AND MISC. PHENOMENA NOTE: TIMES OF FRONTAL PASSAGES ARE GIVEN AFTER THE NOTATIONS "KFR" (COLD FRONT) AND "WFR" (WARM FRONT)					
	MAXIMUM	MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	DEGREE DAYS (BASE 65°)	PREVAILING DIRECTION				AVERAGE SPEED (MPH)	PEAK GUST SPEED (MPH)	DIRECTION										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17						
1	72	44	58	-3	7				NW	7.7	25	WNW	430	43	8							
2	71	39	55	-5	10				W	3.9	12	ESE	419	52	5							
3	79	41	60	0	5				E	4.0	16	WSW	376	52	10							
4	85	52	68	+9	0				SE	4.7	18	E	392	49	4							
5	83	52	68	+9	0				NW	6.7	18	NW	396	53	1							
6	84	52	68	+10	0				NW	4.5	19	WNW	257	50	8							
7	80	51	66	+8	0				W	5.6	15	WNW	393	45	0							
8	80	50	65	+8	0				W	5.5	15	NW	395	49	0							
9	78	45	62	+5	3				SE	3.5	10	SSE	376	52	0							
10	78	46	62	+6	3				SE	2.8	14	WNW	364	55	0							
11	76	54	65	+9	0				NW	12.4	32	NW	296	45	7	KFR 0420						
12	75	42	58	+3	7				SE	5.0	20	E	311	52	9							
13	71	44	58	+3	7				NW	14.6	38	NW	267	43	5	KFR 0815						
14	61	39	50	-4	15				W	6.9	21	WSW	279	48	8							
15	61	38	50	-4	15				NE	12.8	32	NNE	254	45	4	D						
16	58	31	44	-9	21				N	11.4	27	NNE	368	35	0							
17	58	29	44	-9	21				NW	5.5	16	NW	289	38	6							
18	62	40	51	-1	14	T			SW	4.7	20	S	250	42	10							
19	66	45	56	+5	9	0.02			SW	16.0	41	SSW	188	59	9	KFR 0635						
20	61	35	48	-3	17				SW	9.6	27	WSW	299	52	6							
21	58	28	43	-7	22				W	4.4	14	WNW	286	63	6							
22	58	45	52	+2	13				W+NW	2.8	16	WSW	151	54	10							
23	55	42	48	-1	17	T			W	5.3	16	WNW	102	64	10							
24	60	33	46	-3	19				SW	5.7	15	SSW	319	50	2							
25	63	32	48	0	17				SW	10.4	39	WSW	162	58	10							
26	57	38	48	0	17				NW	13.2	35	SW	248	46	5	KFR 0335						
27	48	31	40	-7	25	T			N	16.5	38	N	316	38	5							
28	43	18	30	-17	35				N	6.7	24	NNE	302	36	2							
29	45	13	29	-17	36	0.02	0.1		SE	4.0	14	SE	247	46	10							
30	32	30	31	-15	34	0.14	0.5		NW	4.3	13	WNW	58	87	10							
31	44	23	34	-11	31				S	2.0	19	S	81	90	10	WFR 2225						
SUM						0.18	0.6															
AVE	64.6	38.8									7.2				5.8							
NOTES: (1) UNLESS OTHERWISE SPECIFIED, THE DAILY SUMMARY PERIOD IS FROM MIDNIGHT TO MIDNIGHT, PACIFIC STANDARD TIME. (2) "T" IN COLUMNS 7 - 9 DENOTES A TRACE. (3) THE LANGLEY (COL. 15) IS THE UNIT USED TO DENOTE ONE BTU PER SQUARE INCH PER HOUR. TEMPERATURE (°F, 3 FT. LEVEL)							PRECIPITATION (IN.)					MISC. PHENOMENA NOTATIONS USED IN COL. 17										
							TOTAL FOR THE MONTH					0.18					A - RAIL					
							DEPARTURE FROM NORMAL					-0.40					BD - BLOWING DUST					
							GREATEST IN 24 HRS.					0.16 ON 29&30					AD - AURORA					
							NUMBER OF DAYS WITH:										DS - DRIFTING SNOW					
							TRACE OR MORE					6 0.25 OR MORE 0					GL - GLAZE					
																	K - SMOKE					
AVERAGE FOR THE MONTH							0.01 OR MORE 3 0.50 OR MORE 0					BAROMETRIC PRESSURE (IN.)										
DEPARTURE FROM NORMAL							0.10 OR MORE 1 1.00 OR MORE 0					AVERAGE STATION 29.263										
HIGHEST 85 ON 4th							SNOW, ICE PELLETS (SLEET) (INCHES)					HIGHEST SEA LEVEL 30.58 ON 28th										
LOWEST 13 ON 29th							TOTAL FOR THE MONTH 0.6					LOWEST SEA LEVEL 29.56 ON 19th										
NUMBER OF DAYS WITH:							GREATEST IN 24 HOURS: 0.6 ON 29&30					SOLAR RADIATION (LANGLEYS)										
MAR. 32 OR BELOW 1							GREATEST ON END: 0.5 ON 20&31					AVERAGE DAILY TOTAL 286										
MAR. 80 OR ABOVE 0							WIND (50 FT. LEVEL)					GREATEST DAILY 430 ON 1st										
MIN. 32 OR BELOW 9							AVERAGE SPEED (MPH) 7.2					LEAST DAILY 58 ON 30th										
MIN. 0 OR BELOW 0							DEPARTURE FROM NORMAL +0.5					MISCELLANEOUS NUMBER OF DAYS										
HEATING DEGREE DAYS (BASE 65°F)							PEAK GUST 41 FROM SSW ON 19th					CLEAR 8 FOG 2										
TOTAL FOR THE MONTH 420							AVERAGE PSYCHROMETRIC DATA					PARTLY CLOUDY 10 THUNDER 0										
DEPARTURE FROM NORMAL +47							DRY BULB (°F) 51.9 WET BULB (°F) 43.2					CLOUDY 13 DUST 1										
SEASONAL TOTAL (SINCE JULY 1) 569							REL. HUM. (%) 51.3 DEW PT (°F) 33.2					REL. HUM. EXTREMES (%)										
SEASONAL DEPARTURE FROM NORMAL +121							+ DENOTES LATEST OF SEVERAL DATES					HIGHEST 100 ON 31st										
												LOWEST 21 ON 16th										

APPENDIX III

FIELD DATA

Aboveground Biomass Data

The ALE Site aboveground biomass data for 1971 is Grassland Biome data type number A2U00C1. The data are recorded on form NREL-01. A sample data form and a listing of these data for one sample date follow.



GRASSLAND BIOME

U.S. INTERNATIONAL BIOLOGICAL PROGRAM

FIELD DATA SHEET - ABOVEGROUND BIOMASS

DATA TYPE	SITE	INITIALS	DATE			TREATMENT	REPLICATE	PLOT SIZE	QUADRAT	CLIP - EST.	GROWTH FM	GENUS	SPECIES	SUBSPECIES	CATEGORY	WEIGHT ESTIMATE	SACK NO.	DRY WEIGHT	CROWN PLOT SIZE	CROWN WEIGHT					
			DAY	MO.	YR.																				
1-2	3-4	5-7	8-9	10-11	12-13	14	15	16-19	21-23	25	27	29-30	31-32	34	35	36-40	42-45	47-52	54-57	59-64					
01																									
DATA TYPE 01 Aboveground Biomass 02 Litter 03 Belowground Biomass 10 Vertebrate - Live Trapping 11 Vertebrate - Snap Trapping 12 Vertebrate - Collection 20 Avian Flush Census 21 Avian Road Count 22 Avian Road Count Summary 23 Avian Collection - Internal 24 Avian Collection - External 25 Avian Collection - Plumage 30 Invertebrate 40 Microbiology - Decomposition 41 Microbiology - Nitrogen 42 Microbiology - Biomass 43 Microbiology - Root Decomposition 44 Microbiology - Respiration																									
SITE 01 Ale 02 Bison 03 Bridger 04 Cottonwood 05 Dickinson 06 Hays 07 Hopland 08 Jornada 09 Osage 10 Pantex 11 Pawnee								CLIP-ESTIMATE 1 Harvested 2 Harvest and Est. 3 Estimated 4 Est. for Insect 5 Est. for Reference 6 Est. for Future Clip																	
TREATMENT 1 Ungrazed 2 Lightly grazed 3 Moderately grazed 4 Heavily grazed 5 Grazed 1969, ungrazed 1970 6 Grazed 1970, ungrazed 1971 7 8 9								GROWTH FORM 1 Perennial grass 2 Annual grass 3 Sedge, rush, etc. 4 Annual forb 5 Biennial forb 6 Perennial forb 7 Half-shrub 8 Shrub 9 Tree 0 Miscellaneous																	
CATEGORY 1 Live 2 Old dead 3 Recent dead																									

*** EXAMPLE OF DATA ***

	1	2	3	4	5	6	7	8
	12345678901	2345678901	2345678901	2345678901	2345678901	2345678901	2345678901	234567890
0101WR 22037111	.5	25	1 1 AGSP	1	25	5.83	.5	NS
0101WR 22037111	.5	25	1 1 AGSP	2	25	75.10		
0101WR 22037111	.5	25	1 1 POSE	1	25	3.24		
0101WR 22037111	.5	25	1 1 POSE	2		5.86		
0101WR 22037111	.5	25	1 6 LOMA	1	25	.05		
0101WR 22037111	2.	25	1					
0101WR 22037111	.5	26	1 1 AGSP	1	26	.79	.5	NS
0101WR 22037111	.5	26	1 1 AGSP	2	26	23.63		
0101WR 22037111	.5	26	1 1 POSE	1	26	3.56		
0101WR 22037111	.5	26	1 1 POSE	2	26	5.04		
0101WR 22037111	.5	26	1 6 LOMA	1	26	.04		
0101WR 22037111	.5	26	1 6 ASPU	1	26	.12		
0101WR 22037111	2.	26	1 8 ARTR	11	26	1.23		
0101WR 22037111	2.	26	1 8 ARTR	24	26	3.03		
0101WR 22037111	2.	26	1 8 ARTR	2	26	76.24		
0101WR 22037111	.5	27	1 1 AGSP	1	27	2.34	.5	11.13
0101WR 22037111	.5	27	1 1 AGSP	2	27	23.84		
0101WR 22037111	.5	27	1 1 POSE	1	27	1.57		
0101WR 22037111	.5	27	1 1 POSE	2	27	2.95		
0101WR 22037111	.5	27	1 6 LOMA	1	27	.26		
0101WR 22037111	2.	27	1					
0101WR 22037111	.5	28	1 1 AGSP	1	28	1.08	.5	NS
0101WR 22037111	.5	28	1 1 AGSP	2	28	31.32		
0101WR 22037111	.5	28	1 1 POSE	1	28	1.62		
0101WR 22037111	.5	28	1 1 POSE	2	28	7.01		
0101WR 22037111	2.	28	1 8 ARTR	11	28	23.86		
0101WR 22037111	2.	28	1 8 ARTR	24	28	146.00		
0101WR 22037111	2.	28	1 8 ARTR	2	28	237.60		
0101WR 22037111	.5	29	1 1 AGSP	1	29	.61	.5	31.41
0101WR 22037111	.5	29	1 1 AGSP	2	29	15.54		
0101WR 22037111	.5	29	1 1 POSE	1	29	1.54		
0101WR 22037111	.5	29	1 1 POSE	2	29	3.36		
0101WR 22037111	.5	29	1 7 PHLO	2	29	5.33		
0101WR 22037111	2.	29	1					
0101WR 22037111	.5	30	1 1 AGSP	1	30	1.39	.5	4.13
0101WR 22037111	.5	30	1 1 AGSP	2	30	8.32		
0101WR 22037111	.5	30	1 1 POSE	1	30	2.69		
0101WR 22037111	.5	30	1 1 POSE	2	30	6.71		
0101WR 22037111	.5	30	1 1 POCU	1	30	4.69		
0101WR 22037111	.5	30	1 1 POCU	2	30	17.33		

0101WR	22037111	2.	30	1										
0101WR	22037111	.5	31	1	1	AGSP	1	31	4.10	.5		NS		
0101WR	22037111	.5	31	1	1	AGSP	2	31	57.59					
0101WR	22037111	.5	31	1	1	POSE	1	31	2.06					
0101WR	22037111	.5	31	1	1	POSE	2	31	4.13					
0101WR	22037111	2.	31	1	8	ARTR	2	31	298.40					
0101WR	22037111	.5	32	1	1	AGSP	1	32	1.14	.5		18.27		
0101WR	22037111	.5	32	1	1	AGSP	2	32	11.55					
0101WR	22037111	.5	32	1	1	POSE	1	32	4.74					
0101WR	22037111	.5	32	1	1	POSE	2	32	4.84					
0101WR	22037111	.5	32	1	7	ERFI	1	32	1.30					
0101WR	22037111	.5	32	1	6	RRDO	1	32	.06					
0101WR	22037111	.5	32	1	6	LOMA	1	32	.23					
0101WR	22037111	2.	32	1	8	ARTR	2	32	76.33					
0101WR	22037111	.5	33	1	1	AGSP	1	33	2.16	.5		NS		
0101WR	22037111	.5	33	1	1	AGSP	2	33	32.06					
0101WR	22037111	.5	33	1	1	POSE	1	33	2.89					
0101WR	22037111	.5	33	1	1	POSE	2	33	4.53					
0101WR	22037111	.5	33	1	7	ERFI	1	33	3.62					
0101WR	22037111	.5	33	1	7	ERFI	2	33	1.23					
0101WR	22037111	.5	33	1	6	LOMA	1	33	.04					
0101WR	22037111	2.	33	1	8	ARTR	11	33	60.65					
0101WR	22037111	2.	33	1	8	ARTR	24	33	520.70					
0101WR	22037111	2.	33	1	8	ARTR	2	33	38.65					
0101WR	22037111	.5	34	1	1	AGSP	1	34	2.24	.5		25.2		
0101WR	22037111	.5	34	1	1	AGSP	2	34	40.10					
0101WR	22037111	.5	34	1	1	POSE	1	34	2.68					
0101WR	22037111	.5	34	1	1	POSE	2	34	5.14					
0101WR	22037111	.5	34	1	7	ERFI	1	34	.08					
0101WR	22037111	.5	34	1	7	ANDI	1	34	5.49					
0101WR	22037111	2.	34	1										
0101WR	22037111	.5	35	1	1	AGSP	1	35	.29	.5		7.53		
0101WR	22037111	.5	35	1	1	AGSP	2	35	5.57					
0101WR	22037111	.5	35	1	1	POSE	1	35	1.91					
0101WR	22037111	.5	35</											

0101WR 22037112	2.	37	1						
0101WR 22037112	.5	38	1	1	AGSP	1	38	9.31	.5 NS
0101WR 22037112	.5	38	1	1	AGSP	2	38	77.15	
0101WR 22037112	.5	38	1	1	POSE	1	38	4.87	
0101WR 22037112	.5	38	1	1	POSE	2	38	7.78	
0101WR 22037112	.5	38	1	7	ERFI	1	38	.26	
0101WR 22037112	2.	38	1						
0101WR 22037112	.5	39	1	1	AGSP	1	39	1.28	.5 NS
0101WR 22037112	.5	39	1	1	AGSP	2	39	47.68	
0101WR 22037112	.5	39	1	1	POSE	1	39	2.17	
0101WR 22037112	.5	39	1	1	POSE	2	39	5.36	
0101WR 22037112	.5	39	1	7	ERFI	1	39	3.60	
0101WR 22037112	.5	39	1	7	ERFI	2	39	1.94	
0101WR 22037112	.5	39	1	6	CRAT	1	39	.25	
0101WR 22037112	.5	39	1	6	CRAT	2	39	5.27	
0101WR 22037112	2.	39	1	8	ARTR	11	39	1.69	
0101WR 22037112	2.	39	1	8	ARTR	24	39	16.29	
0101WR 22037112	.5	40	1	1	AGSP	1	40	.00	.5 0
0101WR 22037112	.5	40	1	1	AGSP	2	40	.00	
0101WR 22037112	.5	40	1	1	POSE	1	40	1.77	
0101WR 22037112	.5	40	1	1	POSE	2	40	4.73	
0101WR 22037112	.5	40	1	6	RRDO	1	40	.06	
0101WR 22037112	2.	40	1						
0101WR 22037112	.5	41	1	1	AGSP	1	41	.23	.5 0
0101WR 22037112	.5	41	1	1	AGSP	2	41	.24	
0101WR 22037112	.5	41	1	1	POSE	1	41	3.34	
0101WR 22037112	.5	41	1	1	POSE	2	41	5.25	
0101WR 22037112	.5	41	1	7	PHLO	1	41	.68	
0101WR 22037112	.5	41	1		LOMA	1	41	.06	
0101WR 22037112	.5	41	1	7	ANDI	1	41	3.31	
0101WR 22037112	.5	41	1	7	ERFI	2	41	2.62	
0101WR 22037112	2.	41	1						
0101WR 22037112	.5	42	1	1	AGSP	1	42	4.14	.5 NS
0101WR 22037112	.5	42	1	1	AGSP	2	42	58.57	
0101WR 22037112	.5	42	1	1	POSE	1	42	5.45	
0101WR 22037112	.5	42	1	1	POSE	2	42	6.00	

0101WR	22037112	2.	42	1								
0101WR	22037112	.5	43	1	1	AGSP	1	43	1.65	.5	13.85	
0101WR	22037112	.5	43	1	1	AGSP	2	43	7.67			
0101WR	22037112	.5	43	1	1	POSE	1	43	2.13			
0101WR	22037112	.5	43	1	1	POSE	2	43	3.74			
0101WR	22037112	.5	43	1	7	PHLO	1	43	8.03			
0101WR	22037112	.5	43	1	6	LULA	1	43	2.79			
0101WR	22037112	.5	43	1	7	ERFI	1	43	2.27			
0101WR	22037112	.5	43	1	7	ERFI	2	43	1.25			
0101WR	22037112	.5	43	1	6	CRAT	1	43	.31			
0101WR	22037112	2.0	43	1	8	ARTR	11		80.21			
0101WR	22037112	2.0	43	1	8	ARTR	24		1089.5			
0101WR	22037112	.5	44	1	1	AGSP	1	44	2.53	.5	NS	
0101WR	22037112	.5	44	1	1	AGSP	2	44	28.20			
0101WR	22037112	.5	44	1	1	POSE	1	44	4.62			
0101WR	22037112	.5	44	1	1	POSE	2	44	6.39			
0101WR	22037112	.5	44	1	7	ERFI	1	44	7.59			
0101WR	22037112	.5	44	1	7	ERFI	2	44	1.89			
0101WR	22037112	.5	44	1	7	PHLO	1	44	3.69			
0101WR	22037112	2.	44	1	8	ARTR	2	44	246.50			
0101WR	22037112	.5	45	1	1	AGSP	1	45	8.85	.5	45.29	
0101WR	22037112	.5	45	1	1	AGSP	2	45	54.80			
0101WR	22037112	.5	45	1	1	POSE	1	45	6.31			
0101WR	22037112	.5	45	1	1	POSE	2	45	14.01			
0101WR	22037112	.5	45	1	6	CRAT	1	45	.16			
0101WR	22037112	.5	45	1	6	CRAT	2	45	.61			
0101WR	22037112	2.	45	1								
0101WR	22037112	.5	46	1	1	AGSP	1	46	1.37	.5	NS	
0101WR	22037112	.5	46	1	1	AGSP	2	46	8.06			
0101WR	22037112	.5	46	1	1	POSE	1	46	2.68			
0101WR	22037112	.5	46	1	1	POSE	2	46	3.92			
0101WR	22037112	.5	46	1	7	PHLO	1	46	.15			
0101WR	22037112	.5	46	1	6	LOMA	1	46	.26			
0101WR	22037112	2.	46	1	8	ARTR	11	46	12.26			
0101WR	22037112	2.	46	1	8	ARTR	24	46	75.79			
0101WR	22037112	2.	46	1	8	ARTR	2	46	134.50			
0101WR	22037112	.5	47	1	1	AGSP	1	47	3.60	.5	32.26	
0101WR	22037112	.5	47	1	1	AGSP	2	47	64.36			
0101WR	22037112	.5	47	1	1	POSE	1	47	3.73			
0101WR	22037112	.5	47	1	1	POSE	2	47	5.89			
0101WR	22037112	.5	47	1	1	POCU	1	47	0.44			
0101WR	22037112	.5	47	1	1	POCU	2	47	.00			
0101WR	22037112	.5	47	1	7	ERFI	1	47	1.01			
0101WR	22037112	.5	47	1	7	ERFI	2	47	2.94			
0101WR	22037112	.5	47	1	7	PHLO	1	47	1.08			
0101WR	22037112	2.	47	1								
0101WR	22037112	.5	48	1	1	AGSP	1	48	2.49	.5	21.57	
0101WR	22037112	.5	48	1	1	AGSP	2	48	14.89			
0101WR	22037112	.5	48	1	1	POSE	1	48	7.90			
0101WR	22037112	.5	48	1	1	POSE	2	48	8.97			
0101WR	22037112	.5	48	1	1	POCU	1	48	9.39	.5	82.82	
0101WR	22037112	.5	48	1	1	POCU	2	48	24.28			
0101WR	22037112	.5	48	1	7	PHLO	1	48	1.17			

0101WR 22037112	2.	48	1			01	0.07	.5	0
0101WR 22037131	.5	01	1	1	AGSP	1	01	7.40	
0101WR 22037131	.5	01	1	1	AGSP	2	01	1.62	
0101WR 22037131	.5	01	1	1	POSE	1	01	2.55	
0101WR 22037131	.5	01	1	1	POSE	2	01	6.95	
0101WR 22037131	.5	01	1	7	FRFI	1	01	0.08	
0101WR 22037131	.5	01	1	7	ANDI	1			
0101WR 22037131	2.	01	1						
0101WR 22037131	.5	02	1	1	AGSP	1	02	1.38	.5 7.44
0101WR 22037131	.5	02	1	1	AGSP	2	02	38.31	
0101WR 22037131	.5	02	1	1	POSE	1	02	2.72	
0101WR 22037131	.5	02	1	1	POSE	2	02	6.10	
0101WR 22037131	.5	02	1	7	FRFI	1	02	1.34	
0101WR 22037131	2.	02	1	8	ARTR	11	02	4.60	
0101WR 22037131	2.	02	1	8	ARTR	24	02	239.75	
0101WR 22037131	.5	03	1	1	AGSP	1	03	2.45	.5 80.64
0101WR 22037131	.5	03	1	1	AGSP	2	03	84.37	
0101WR 22037131	.5	03	1	1	POSE	1	03	1.94	
0101WR 22037131	.5	03	1	1	POSE	2	03	2.60	
0101WR 22037131	.5	03	1	7	FRFI	1	03	1.08	
0101WR 22037131	.5	03	1	4	MISC	1	03	1.40	
0101WR 22037131	2.	03	1	8	ARTR	11	03	1.02	
0101WR 22037131	2.	03	1	8	ARTR	24	03	133.05	
0101WR 22037131	.5	04	1	1	AGSP	1	04	1.50	.5 11.55
0101WR 22037131	.5	04	1	1	AGSP	2	04	70.96	
0101WR 22037131	.5	04	1	1	POSE	1	04	4.44	
0101WR 22037131	.5	04	1	1	POSE	2	04	5.82	
0101WR 22037131	.5	04	1	6	CRAT	1	04	1.65	
0101WR 22037131	.5	04	1	6	LOMA	1	04	0.02	
0101WR 22037131	2.	04	1	8	ARTR	11	04	19.52	
0101WR 22037131	2.	04	1	8	ARTR	24	04	196.99	
0101WR 22037131	.5	05	1	1	AGSP	1	05	2.18	.5 36.79
0101WR 22037131	.5	05	1	1	AGSP	2	05	74.78	
0101WR 22037131	.5	05	1	1	POSE	1	05	4.12	
0101WR 22037131	.5	05	1	1	POSE	2	05	6.52	
0101WR 22037131	.5	05	1	6	BRDO	1	05	0.05	
0101WR 22037131	2.0	05	1	8	ARTR	11	05	63.21	
0101WR 22037131	2.0	05	1	8	ARTR	24	05	816.77	
0101WR 22037131	.5	06	1	1	AGSP	1	06	2.70	.5 45.40
0101WR 22037131	.5	06	1	1	AGSP	2	06	27.85	
0101WR 22037131	.5	06	1	1	POSE	1	06	3.55	
0101WR 22037131	.5	06	1	1	POSE	2	06	5.18	
0101WR 22037131	.5	06	1	1	ANDI	1	06	6.00	
0101WR 22037131	2.	06	1						
0101WR 22037131	.5	07	1	1	AGSP	1	07	4.25	.5 148.35
0101WR 22037131	.5	07	1	1	AGSP	2	07	110.68	
0101WR 22037131	.5	07	1	1	POSE	1	07	2.86	
0101WR 22037131	.5	07	1	1	POSE	2	07	4.05	
0101WR 22037131	.5	07	1		STTH	1	07	1.48	
0101WR 22037131	.5	07	1		STTH	2	07	3.82	
0101WR 22037131	.5	07	1		LOMA	1	07	0.10	
0101WR 22037131	.5	07	1		BRDO	1	07	0.12	

0101WR 22037131	2.	07	1			0A	1.32	.5	42.20
0101WR 22037131	.5	08	1	1	AGSP	0A	32.52		
0101WR 22037131	.5	08	1	1	AGSP	0A	2.65		
0101WR 22037131	.5	08	1	1	POSE	0A	5.82		
0101WR 22037131	.5	08	1	1	POSE	0A	20.0A		
0101WR 22037131	2.	08	1	8	ARTR	0A	55.00		
0101WR 22037131	2.	08	1	8	ARTR	0A	138.25		
0101WR 22037131	2.	08	1	8	ARTR	09	2.40	.5	51.45
0101WR 22037131	.5	09	1	1	AGSP	09	67.10		
0101WR 22037131	.5	09	1	1	AGSP	09	2.71		
0101WR 22037131	.5	09	1	1	POSE	09	2.38		
0101WR 22037131	.5	09	1	1	POSE	09	0.0A		
0101WR 22037131	.5	09	1		CRAT	09	0.22		
0101WR 22037131	.5	09	1		CRAT	09	0.06		
0101WR 22037131	.5	09	1		BRDO	09	26.00		
0101WR 22037131	2.	09	1	8	ARTR	09	86.40		
0101WR 22037131	2.	09	1	8	ARTR	09	102.64		
0101WR 22037131	2.	09	1	8	ARTR	10	0.10	.5	0
0101WR 22037131	.5	10	1	1	AGSP	10	1.12		
0101WR 22037131	.5	10	1	1	AGSP	10	5.29		
0101WR 22037131	.5	10	1	1	POSE	10	8.35		
0101WR 22037131	.5	10	1	1	POSE	10	0.26		
0101WR 22037131	.5	10	1		LOMA	10	0.88		
0101WR 22037131	.5	10	1		CRAT	10	0.64		
0101WR 22037131	2.	10	1	8	ARTR	10	0.5A		
0101WR 22037131	2.	10	1	8	ARTR	11	0.25	.5	13.90
0101WR 22037131	.5	11	1	1	AGSP	11	28.80		
0101WR 22037131	.5	11	1	1	AGSP	11	4.38		
0101WR 22037131	.5	11	1	1	POSE	11	13.45		
0101WR 22037131	.5	11	1	1	POSE	11	2.92		
0101WR 22037131	.5	11	1		ANDI				
0101WR 22037131	2.	11	1						
0101WR 22037131	.5	12	1	1	AGSP	12	0.09	.5	0
0101WR 22037131	.5	12	1	1	AGSP	12	0.10		
0101WR 22037131	.5	12	1	1	POSE	12	2.16		
0101WR 22037131	.5	12	1	1	POSE	12	3.24		
0101WR 22037131	.5	12	1	1	POSE	12	0.52		
0101WR 22037131	.5	12	1		ERFI	12	202.69		
0101WR 22037131	2.	12	1	8	ARTR	13	4.6A	.5	NS
0101WR 22037132	.5	13	1	1	AGSP	13	45.98		
0101WR 22037132	.5	13	1	1	AGSP	13	4.67		
0101WR 22037132	.5	13	1	1	POSE	13	8.93		
0101WR 22037132	.5	13	1	1	POSE	13	7.77		
0101WR 22037132	.5	13	1	1	POCU	13	22.32		
0101WR 22037132	.5	13	1	1	POCU	13	3.12		
0101WR 22037132	.5	13	1	7	ERFI				

[illegible]

0101WR 22037132	2.	20	1						
0101WR 22037132	.5	21	1	1	AGSP	1			
0101WR 22037132	.5	21	1	1	AGSP	2	21	2.87	.5 NS
0101WR 22037132	.5	21	1	1	POSE	1	21	38.34	
0101WR 22037132	.5	21	1	1	POSE	2	21	1.90	
0101WR 22037132	.5	21	1	6	HRDO	1	21	6.80	
0101WR 22037132	2.	21	1	8	ARTR	2	21	.08	
0101WR 22037132	.5	22	1	1	AGSP	1	21	156.90	
0101WR 22037132	.5	22	1	1	AGSP	2	22	.19	.5 0
0101WR 22037132	.5	22	1	1	POSE	1	22	.17	
0101WR 22037132	.5	22	1	1	POSE	2	22	2.66	
0101WR 22037132	.5	22	1	7	ERFI	1	22	5.88	
0101WR 22037132	.5	22	1	6	LOMA	1	22	1.52	
0101WR 22037132	.5	22	1	7	ANDI	1	22	.49	
0101WR 22037132	2.	22	1				22	.83	
0101WR 22037132	.5	23	1	1	AGSP	1	23	3.47	.5 69.24
0101WR 22037132	.5	23	1	1	AGSP	2	23	22.20	
0101WR 22037132	.5	23	1	1	POSE	1	23	4.17	
0101WR 22037132	.5	23	1	1	POSE	2	23	4.20	
0101WR 22037132	.5	23	1	1	POCU	1	23	.83	
0101WR 22037132	.5	23	1	1	POCU	2	23	1.72	
0101WR 22037132	2.	23	1	8	ARTR	2	23	95.10	
0101WR 22037132	2.	23	1	8	ARTR	11	23	16.24	
0101WR 22037132	2.	23	1	8	ARTR	24	23	167.20	
0101WR 22037132	.5	24	1	1	AGSP	1	24	1.10	.5 12.38
0101WR 22037132	.5	24	1	1	AGSP	2	24	21.72	
0101WR 22037132	.5	24	1	1	POSE	1	24	2.53	
0101WR 22037132	.5	24	1	1	POSE	2	24	4.50	
0101WR 22037132	.5	24	1	6	CRAT	2	24	.69	
0101WR 22037132	.5	24	1	6	CRAT	1	24	.24	
0101WR 22037132	.5	24	1	7	ERFI	1	24	10.04	
0101WR 22037132	.5	24	1	6	LOMA	1	24	.12	
0101WR 22037132	.5	24	1	7	ERFI	2	24	3.33	
0101WR 22037132	2.	24	1	8	ARTR	11	24	2.34	
0101WR 22037132	2.	24	1	8	ARTR	24	24	3.79	