THE EFFECTIVENESS OF ALFALFA, NUTRIENT MODEL, AND VEGETATIVE FILTER STRIPS IN REDUCTION OF NONPOINT SOURCE POLLUTION

by

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Abstract

Water quality in the United States needs to be improved. Currently, 42% (39% of rivers and streams, 45% of lakes and reservoirs) of monitored surface water is considered impaired, indicating that it is no longer suitable for its designated uses such as drinking, recreation, habitat, food supply, agriculture, and ground water recharge (USEPA, 2000, Carpenter *et al.*, 1998). Nonpoint source pollution can be associated with animal manure. This project focuses on two sources of nonpoint source pollution. The first source is runoff from soils that have been enriched in nutrients (nitrogen and phosphorus) by manure application. This project evaluates how effective Alfalfa is at removal of nitrogen and phosphorus from nutrient enriched soils. It also evaluates the use of USDA's Plant Nutrient model in association with nutrient management plans to prevent enrichment of soils. It was determined that Alfalfa is effective in reduction of nitrogen in soils; however, it was not feasible as a stand alone practice to remediate phosphorus. The use of USDA's Plant Nutrient model indicated that Corn for silage is the most effective crop for reduction of soil phosphorus while alfalfa and the yields produced in 2004 was the most effective in reduction nitrogen. However, the model tends to underestimate soil nutrient uptake, so it is important to have soil tests conducted periodically to prevent nutrient deficiencies. The second source of nonpoint pollution discussed is runoff from animal feeding operations. This paper evaluates the effects of grass filter strips in prevention of pollution transport off of animal feeding operations. It was determined that filter strips with a ratio of runoff area to filter area of 1:2 is the minimum ratio to effectively prevent nonpoint source pollution.

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CHAPTER 1 - Introduction

Animal Feeding Operations

The U.S. is the world leader in producing meat, milk, poultry, and eggs efficiently, and animal agriculture is a $100 billion/year industry (Sweeten, 2001). To maintain this type of production, concentrated animal feeding operations (CAFOs) have become necessary. In recent years the total number of animal units in the U.S. increased by about 4.5 million while the number of feeding operations decreased from 1982 to1992 (Redwine and Lacey, 2000). This means that CAFOs are becoming larger and more concentrated. Currently, 10% of the nation's beef cattle inventory and virtually 100% of swine and poultry livestock are in CAFOs (Sweeten, 2001). CAFOs are highly regulated and must meet many standards set by both state and federal governments.

To be classified as a CAFO under the EPA regulation, a facility must first meet the requirements to be an animal feeding operation (AFO). There are two requirements to define AFOs. First, they must be operations where animals have been, or will be stabled, confined, fed, or maintained for a total of 45 days or more in any 12-month period. The word "maintained" as defined by the EPA means that the animals are confined in the same area where waste is generated and/or concentrated. This also includes areas where animals are watered, cleaned, groomed, or medicated. This allows for regulation of dairy farms, stockyards, fairgrounds, and auction houses. A minimum of 45 days in a 12-month period is met if an animal is confined for any portion of a day, even if the animal is only confined for an hour for milking. Also, the same animal does not have to remain on the lot for 45 days. It only requires that some animals are fed or maintained on the lot for 45 day within any 12-month period, and the 45 days do not have to be consecutive. The second requirement for AFO classification is that vegetation is not sustained in the confinement area during the normal growing season. This part of the definition distinguishes confinement areas from pasture or grazing land. If a facility holds animals in an area without vegetation,

including dirt lots, confinement houses with constructed floors or metal slots, or dirt lots with minor vegetative growth while animals are present or during months when animals are kept elsewhere, they meet the qualification of an AFO. However, pasture and grazing-based operations may also have confinement areas (feedlots, barns, milking parlors, pens) that meet the definition of an AFO (USEPA, 2004).

Once an operation has met the requirements of an AFO, it can then be evaluated to determine if the AFO meets the requirements of a CAFO. There are three categories of CAFOs: large, medium, and small. The number of animals confined defines large CAFOs strictly. If the AFO contains at least the minimum number as described by the EPA it is considered a large CAFO. When defining a CAFO, the actual number of animals held is considered, not the capacity of the facility. This minimum number varies with species (table 1.1). Currently there are 443 large CAFOs permitted in the state of Kansas (KDHE, 2006).

To be defined as a medium CAFO, an AFO must fulfill two requirements. The first requirement is that the AFO must contain a minimum number of animals, and fewer animals than the requirements for a large CAFO. The second part requires specific discharge criteria. The required discharge criteria are that wastewater from animal confinement areas, manure storage areas, raw material storage areas, and waste containment areas can be discharged into waters of the United States. They can be discharged through man-made devices or directly into the water bodies. The animal ranges for medium CAFO requirements (table 1.1). Currently there are 1255 medium CAFO permitted in the state of Kansas (KDHE, 2006).

An AFO can be designated as a small CAFO if it has fewer animals than the maximum level set by the EPA and is determined to be a significant contributor of pollution (table 1.1). Currently there are 1634 small CAFOs certified in the state of Kansas (KDHE, 2006). Once an operation has been defined then it must meet standards set forth by the government (USEPA, 2004).

Table 1.1: Description of the EPA CAFO size threshold requirements.

Animal Sector	Size Thresholds (number of animals)		
	Large CAFOs	Medium CAFOs[1]	Small CAFOs[2]
cattle or cow/calf pairs	1,000 or more	300 - 999	less than 300
mature dairy cattle	700 or more	200 - 699	less than 200
veal calves	1,000 or more	300 - 999	less than 300
swine (weighing over 55 pounds)	2,500 or more	750 - 2,499	less than 750
swine (weighing less than 55 pounds)	10,000 or more	3,000 - 9,999	less than 3,000
horses	500 or more	150 - 499	less than 150
sheep or lambs	10,000 or more	3,000 - 9,999	less than 3,000
turkeys	55,000 or more	16,500 - 54,999	less than 16,500
laying hens or broilers (liquid manure handling systems)	30,000 or more	9,000 - 29,999	less than 9,000
chickens other than laying hens (other than a liquid manure handling systems)	125,000 or more	37,500 - 124,999	less than 37,500
laying hens (other than a liquid manure handling systems)	82,000 or more	25,000 - 81,999	less than 25,000
ducks (other than a liquid manure handling systems)	30,000 or more	10,000 - 29,999	less than 10,000
ducks (liquid manure handling systems)	5,000 or more	1,500 - 4,999	less than 1,500

CAFO Regulations

The CWA establishes requirements for the discharge of pollutants from point sources to waters of the United States. A point source is a single identifiable and localized source of pollution. Under CWA CAFOs are point source discharges and are required have National Pollutant Discharge Elimination System (NPDES) permits. NPDES permits require effluent limitations guidelines (ELGs) and standards for CAFOs. The EPA has established ELGs for Large CAFOs. Medium and small CAFO ELGs are established on a case-by-case basis. Large CAFOs must comply with ELGs for both production area and land application areas (USEPA, 2004).

The production area of the CAFO includes the animal confinement area, the manure storage area, the raw materials storage area, and the waste containment areas. No discharges of manure, litter, or wastewater from the production area of the CAFO may enter waters of the United States. Discharges caused by poor operation or

management are never allowed. The regulation requires that the production area must be properly designed, constructed, operated, and maintained. In addition, the CAFO must comply with specific record-keeping requirements (USEPA, 2004).

The CAFO ELGs require that all large beef cattle, dairy cattle, veal calf, swine, turkey, and chicken CAFOs properly apply manure, litter, or wastewater to land application areas under the control of the CAFO operator. The CAFO operators perform this part of the regulation by implementing best management practices (BMPs) developed in accordance with their nutrient management plan. The CAFO's nutrient management plan must be designed to achieve production goals, while minimizing nitrogen and phosphorus movement to surface waters (USEPA, 2004).

Large beef cattle, dairy cattle, veal calf, swine, turkey, and chicken CAFOs must also implement the following BMPs and any other BMPs required by their permits (USEPA, 2004):

- Land apply manure, litter, and process wastewater in accordance with a nutrient management plan that specifies application rates for each field.
- Representative samples of manure, litter, and other wastewater must be analyzed for nutrient content yearly.
- Representative soil samples from all fields where manure, litter, and process wastewater are applied must be analyzed for phosphorus content at least once every 5 years.
- Maintain a setback area within 100 feet of any down-gradient surface waters or establishment of a 35-foot vegetated buffer where manure, litter, and other wastewater are not applied.
- Periodically conduct leak inspections of equipment used for land application of manure, litter, or wastewater.

The EPA is able to regulate CAFOs since they are considered a point source of pollution. However, AFOs that are not being regulated as point sources and as such they contribute to nonpoint source pollution. Nonpoint source pollution is pollution due to many unidentifiable sources. Nonpoint source pollution is harder to prevent since it is not localized.

The first objective of this research is to examine the use of alfalfa to remediate nutrient enriched areas that may have developed over many years of manure application near these confined operations. The hypothesis of this research is that there will be no differences in alfalfas ability to remove excessive nutrients found in these nutrient enriched areas.

The second objective will use the USDA nutrient management model to find the crop that has the greatest potential to remove both nitrogen and phosphorus from nutrient enriches soils near these animal feeding operations.

The third objective considered in this research examines the use of a vegetative filter to remove sediments, nutrients, and bacteria running off animal feeding operations. Many of the current animal feeding operations have few practices in place to remove contaminates leaving their operation. Many of these animal feeding operations are located near water supplies such as creeks, rivers, ponds and lakes. The hypothesis of this research is that the reduction in contaminants will not change for different area ratios of the manure contributing area to buffer area.

CHAPTER 2 - Effectiveness of Alfalfa in Remediation of Nutrient Enriched Soils

Abstract

Water quality in the United States is improving due to the increase in regulations and prevention techniques. To further improvement water quality, non-point source pollution needs to be reduced. One way to do this would be to remediate nutrient enriched soils. This study evaluated the effectiveness of alfalfa in remediation of soils. Compost was applied to randomized field plots at four application rates 0, 224.2, 448.3, and 672.5 kg N/ha (0, 200, 400, and 600 lb N/ac). The alfalfa was then harvested, five times in each year for three years: 2004, 2005, and 2006. Alfalfa samples were analyzed for total nitrogen and total phosphorous uptake. Maximum yield and removal rates were achieved by irrigating the field plot to help prevent water stress. A water balance was conducted for the plots to determine how effective the irrigation was on preventing stress. Soil samples were collected at the end of the study to determine the amount of nitrogen and phosphorus remaining in the plots. The soil cores were collected at four depths: 15, 30, 60, 91 cm (6, 12, 24, 36 inches). Results of this study show that during the 2004 growing season, alfalfa effectively removed nitrogen but only removed 5% of the applied phosphorus. The results of the water balance indicated that no water stress was experience during the 2004 growing season, and water stress did occur in the 2005 and 2006 growing seasons. During 2005, alfalfa yields were significantly reduced compared to 2004. Nitrogen and phosphorus removal rates were reduced by 60%. Results from 2006 were similar to those in 2005. The results from all three years showed that there was no significant difference between treatments (α=0.05). Evaluation of the soil nitrogen and phosphorous concentrations showed no significant difference between treatments (α=0.05). This indicates that the initial soil nutrient levels were high enough to mask the treatments.

Introduction

Land applying manure is a common practice for confined feeding operations and municipal wastewater treatment facilities. This provides nutrients for crop growth while disposing of wastes (Mikhailova *et al.,* 2003; Gilley *et al.,* 2002). Some studies have shown that using animal wastes can provide a larger net benefit to society than chemical fertilizers (Kushwaha *et al*., 1999). However, over application of wastes can lead to nitrogen and phosphorus accumulation in soils (Carpenter *et al*., 1998; Sharpley *et al.*, 2006). High nitrogen and phosphorous concentrations in soils increase the risk of pollution to surface and groundwater (Carpenter *et al.,* 1998; Daniel *et al.,* 1998; Sharpley *et al.*, 2006). Currently, 42% (39% of rivers and streams, 45% of lakes and reservoirs) of monitored surface water is considered impaired, which means that it is no longer suitable for its designated uses such as drinking, recreation, habitat, food supply, agriculture, and ground water recharge (USEPA, 2000; Carpenter *et al.,* 1998). High nutrient levels associated with land application of waste can cause eutrophication of surface water (USEPA, 2000). This problem is often amplified because there is limited ground available for distribution of wastes.

Accumulation of Phosphorus

There are other problems associated with soils containing excess phosphorous. Phosphorus causes eutrophication of fresh water streams or lakes (Daniel *et al.,* 1994; Daniel *et al*., 1998; Smith *et al*., 2006; Sharpley *et al.,* 2006). Eutrophication leads to low dissolved oxygen levels in water bodies causing fish kills. Unfavorable water properties such as odor and taste problems are also associated with eutrophication. Phosphorous is introduced to water bodies through erosion. Phosphorous can be transported by runoff as particulate and dissolved forms. The particulate phosphorus compounds attach to soil particles and are transported to lakes and rivers through erosion and account for 60-90% of eroded phosphorus. The dissolved phosphorus is usually immediately available for biological uptake and can rapidly increase the rate of eutrophication, while particulate phosphorus can be a long term source of phosphorus since it is not always available for biological uptake (Carpenter *et al.,* 1998; Daniel *et al*., 1998; Sharpley *et al.,* 2006). Surface waters are considered to

have critical levels of phosphorus if the concentrations of inorganic phosphorus and total phosphorus are between 0.01 and 0.02 mg/L (Daniel *et al.,* 1998).

Accumulation of Nitrogen

Areas with high nitrogen concentrations often have problems with nitrogen leaching into groundwater or being transported to streams or lakes through runoff (Carpenter *et al.,* 1998). This can cause major health concerns, especially if nitrogen contaminates a drinking water source. Nitrogen is hazardous to human health especially infants. Nitrates can cause methemoglobinemia, a condition known as "blue baby syndrome", if it is ingested by infants (Boylston and Beer, 2002; Sandstedt, 1990; Amdur *et al.*, 1991). EPA has established a drinking water standard with a maximum level for NO^3-N of 10 mg/L. High levels of nitrogen are commonly responsible for eutrophication of salt water systems (Howarth *et al.,* 1996; Nixon *et al.,* 1996).

Choice of Alfalfa

It is important for producers who use land application of wastes to produce a crop that will accumulate large amounts of nutrients. This will allow for yearly application of wastes. Also producers need to generate a crop that will provide economic value. Alfalfa was chosen for this experiment because it is a food source for animals, and economically feasible to grow. Alfalfa also accumulates more nitrogen per unit area biomass than corn uses for silage (Russelle *et al.*, 2001). Alfalfa was used to remediate nitrogen from a fertilizer spill in North Dakota. The study showed on average alfalfa removed 97 Kg N/ha (Russelle *et al*., 2001). Other studies have shown total nitrogen harvesting at rates up to 824 kg N/ha (Kranz *et al*., 2005). Alfalfa has also been proven to remove nitrogen of depths up to 300 cm (Entz *et al*., 2001). The effectiveness of alfalfa in removing phosphorous is not documented, but studies have shown that maintaining surface residue help prevent runoff losses of phosphorous (Andraski *et al*., 2003; Grande *et al.,* 2005).

Methods and Materials

The test plot was established during the fall of 2002. The test plot was 24.3 m by 30.5 m (80 ft by 100 ft) and is divided into 6.1 m by 7.6 m (20 ft by 25 ft) subplots. The test plot consisted of four replications each having four concentrations of compost randomly applied 0, 224.2, 448.3, and 672.5 kg N/ha (0, 200, 400, and 600 lb N/ac) (figure 2.1 and table 2.1).

Figure 2.1: Plot diagram of the randomized design of the alfalfa study.

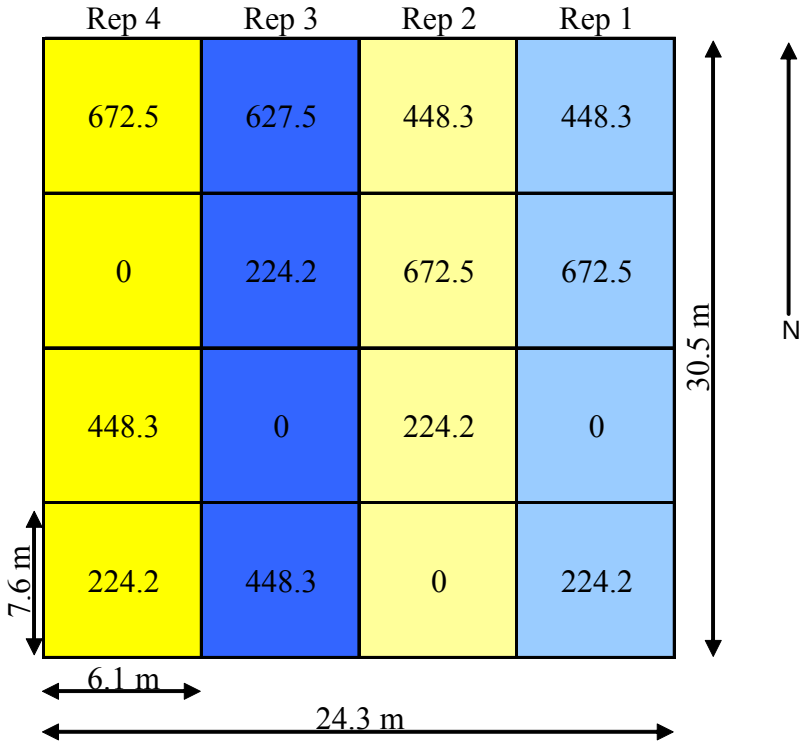


Table 2.1: Application rates of composted manure used in the alfalfa study.

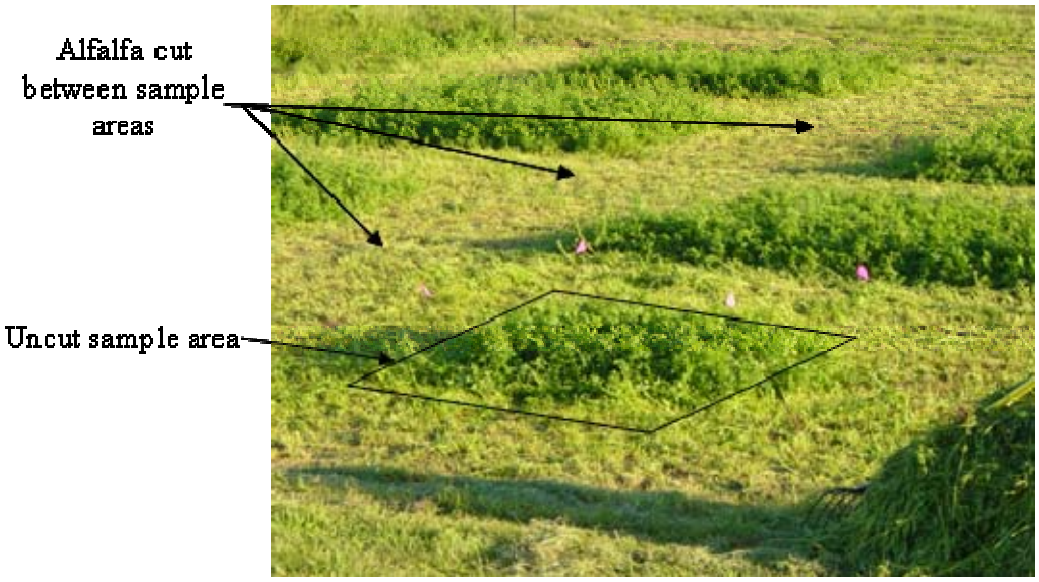
Treatment (kg N&P/ha)	Area (ha)	Treatment (kg N&P)	N&P Compost Concentration (kg N&P/ kg compost)	Compost density (kg/m^3)	N&P Density ($kg N\&P/m^3$)	Compost Needed (m^3)
0.0	0.004	0.0	0.01	800.9	8.0	0.0
224.2	0.004	0.8	0.01	800.9	8.0	0.1
448.3	0.004	1.7	0.01	800.9	8.0	0.2
672.5	0.004	2.5	0.01	800.9	8.0	0.3

Before the compost was applied, drip lines were installed and placed 1.52 m (5 ft) apart and 45.7 cm (18 in) deep. Four manifolds are located at the north end of plot and allow for the different replications to be irrigated. Soil samples were collected

and analyzed for total nitrogen, total phosphorus, and moisture content but this data was misplaced over the course of this study. The plots were established on a Tully Silty Clay Loam soil (*Fine, mixed, mesic, Pachic Argiustolls)* which comprised the following texture: sand 35%, silt 10%, and clay 55%. The permeability of the soil ranges from 0.152-0.508 cm/hr (0.06 – 0.20 in/hr). The soil has an available moisture holding capacity 0.208 cm per cm of soil (2.5 in per ft of soil). This soil type has a high shrink-swell potential.

Alfalfa (MP 1000 Multileaf Blend, Lands O'Lakes, Inc., Fort Dodge, IA) was planted in the summer of 2003. Seed was broadcasted at the recommended rate and lightly incorporated into the soil at a depth of approximately 1 cm. The alfalfa was irrigated and weeded by hand through the summer and fall of 2003. Two harvests occurred in the late summer and early fall of 2003. No samples were taken since the alfalfa in the plot was still developing. Only naturally occurring precipitation was used to irrigate the plot in 2004. The 16 subplots were cut a total of five times using a Troy-Bilt sickle bar mower (MTD Products Inc., Cleveland, OH) in the summer of 2004. Sample areas, 1.5 m by 1.5 m (5 ft by 5 ft), within each plot were marked prior to cutting. Alfalfa surrounding the sample area was mowed and removed. The alfalfa in the sample area of each plot was then cut, collected, and weighed to the nearest 0.2 kg (0.5 lb.). A representative sample of the alfalfa was gathered from each of the areas. Figure 2.2 shows a picture of the plots prepared for cutting with the surrounding alfalfa already cut and removed.

Figure 2.2: Sample area showing the surrounding alfalfa removed.



Samples were then weighed and dried at 25 – 30 °C (77-86 °F) until there was no change in the sample weight. The moisture content of the samples was calculated and the samples were ground. The ground samples were analyzed for total nitrogen and total phosphorus at the KSU Agronomy Soil Testing Laboratory. The testing lab implements salicylic-sulfuric acid digestion of the sample with simultaneous measurement through separate channels of a Technicon AAII auto analyzer using the colorimetric Industrial Method 334-74W/B (Hosomi and Sudo, 1986; Yarnell, 2005)

A water balance (eq. 1.1) was conducted for the plot area to maximize yield and to determine if the plants were experiencing stress due to lack of water.

$$S = P + I - ET - R \qquad (1.1)$$

Where:

S = Storage

P = Precipitation

I = Irrigation

ET= Evapotranspiration

R= Runoff.

The daily evapotranspiration for the alfalfa was calculated using the Penman equation (Scheduling IRR) and weather data for Manhattan, Kansas (Knapp, 2005). The ET was approximated as 15% of the reference ET until March 1, when plants emerge and begin to use more water. The percentage increase linearly until the plants reach full maturity and the actual ET equaled the reference ET. At this point, the alfalfa would be harvested and the ET would drop back to 15% and then increases linearly until the next harvest date (USBR, 2006). ET values are shown in Figure 2.3, 2.4, & 2.5, and the data is available in appendix A.

Figure 2.3: Evapotranspiration and growth trend data for 2004.

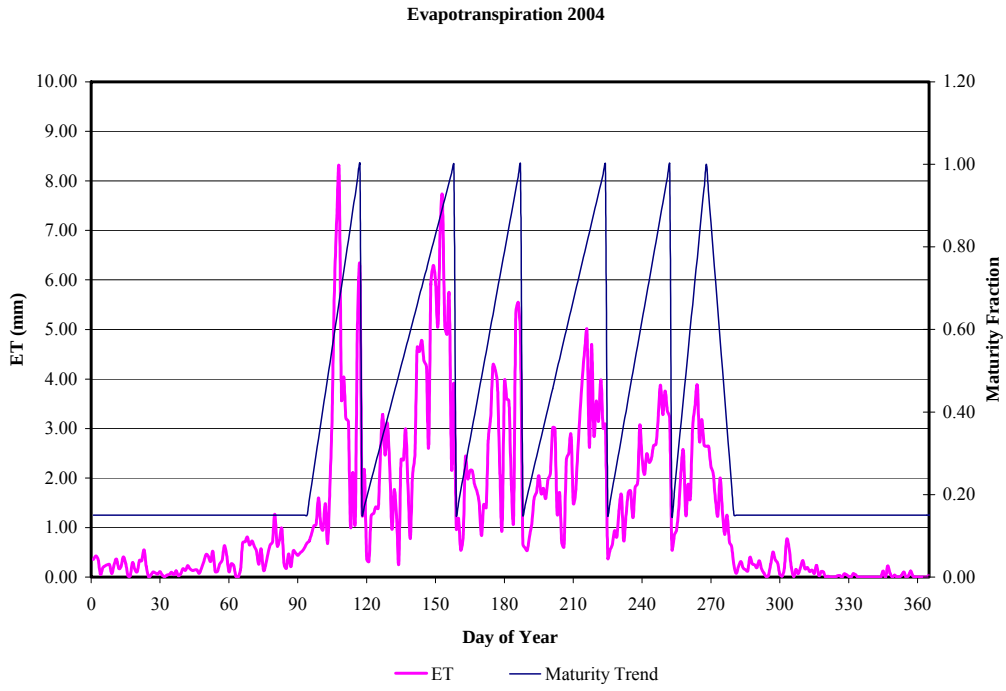


Figure 2.4: Evapotranspiration and growth trend data for 2005.

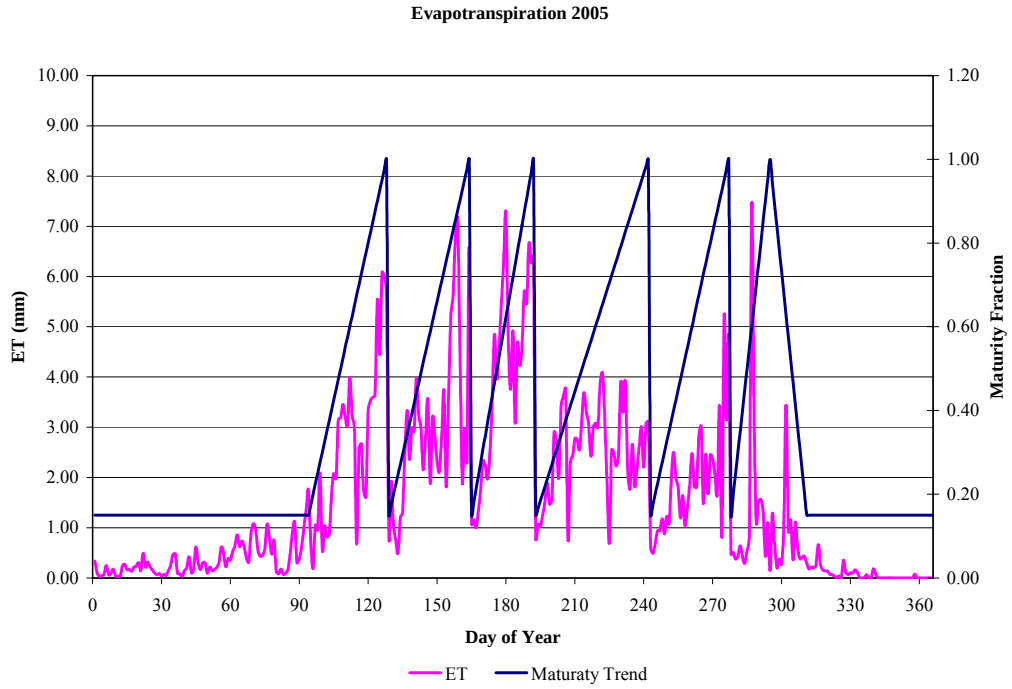
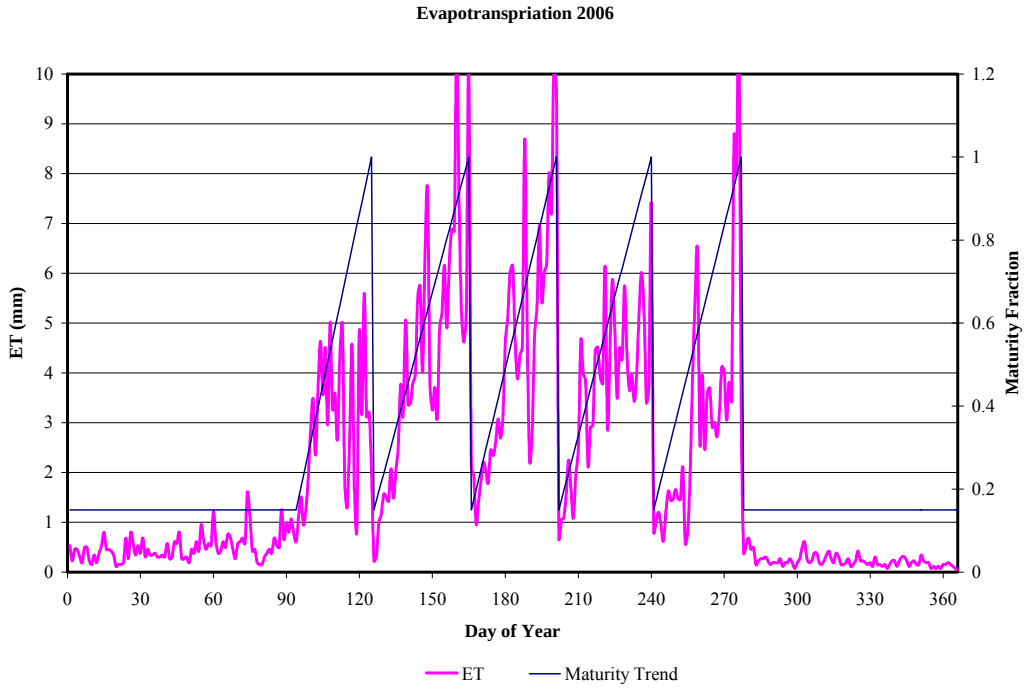


Figure 2.5: Evapotranspiration and growth trend data for 2006.



The Runoff was calculated using the following equation 1.2, and if the solution is negative, the runoff value was set to zero.

$$R = TAS + ET - P - I \qquad (1.2)$$

where:

R = Runoff

TAS = Total Available Storage

ET = Evapotranspiration

P = Precipitation

I = Irrigation.

The total available storage was approximately 20.8 cm/m (2.5 in/ft) according to Hansen *et al*. 1980. This was approximated using soil characteristics for a Tully silt clay loam soil (*Fine, mixed, superactive, mesic Pachic Argiustolls*) (Jantz *et al.,* 1975). Precipitation was determined using weather data for Manhattan, Kansas and irrigation was directly measured. It was estimated that the alfalfa roots extended down 1.2 m (4 ft) giving the plot 25 cm (10 in) of available water. Data used for these calculations are shown in appendix A.

The same procedures were followed in 2005 and 2006 except that irrigation was used to try and provide enough water to prevent water stress in the field. The plot was irrigated twice due to extreme dry conditions in 2005 and twice in 2006, based on personal observations. The 16 subplots were harvested five times each year and were dried and treated using the same method used with the 2004 samples.

Soil samples were collected at the end of growing season in 2006. A Giddings probe with a diameter of 5 cm (2 in) was used to collect the samples in each of the 16 subplots and a bulk plot near the field for comparison. Samples were taken at four depths: 15, 30, 60, and 91 cm (6, 12, 24, 36 inches). The samples were dried then ground and analyzed for total nitrogen and total phosphorous at the KSU Agronomy Soil Testing Laboratory. The data is available in appendix A.

Results and Discussion

The focus of this experiment was to determine the nutrient uptake of nitrogen and phosphorous. The information gained from this study will enable animal feeding operations and wastewater treatment facilities to land apply waste without over applying. These facilities need to apply waste year round to prevent the overflowing of the facilities or lagoons. Unfortunately, nutrients such as nitrogen and phosphorous accumulate in soils if they are not utilized by the growing crop.

Data was colleted for the five cuttings in each year: 2004, 2005, and 2006. The average yield for 2004, 2005, and 2006 were 1858 kg/ha, 677 kg/ha, and 747 kg/ha (1657, 604, and 666 lb/acre) respectable as shown in tables 2.2, 2.3, & 2.4, and the data is available in appendix A.

Table 2.2: Alfalfa yield data for plots harvested during 2004.

2004 Alfalfa Yield (kg/ha)							
Plot no.	4/28/2004	6/8/2004	7/7/2004	8/13/2004	9/10/2004	Total	Average
101	1653	2650	2433	1516	1452	9704	1941
102	1609	2228	1932	1661	1391	8821	1764
103	2177	2420	2014	1426	973	9010	1802
104	1327	1648	2044	1468	1105	7592	1518
201	1446	2984	1912	2725	1297	10364	2073
202	1333	2871	2879	2465	1058	10606	2121
203	1311	2604	1974	1927	1139	8955	1791
204	1287	2835	3080	1983	1098	10283	2057
301	1336	2782	2222	2220	1066	9626	1925
302	1861	2322	2340	2015	1182	9720	1944
303	2444	2989	2338	1917	1499	11187	2237
304	1675	3210	2315	1507	1005	9712	1942
401	1868	2370	1641	1808	1028	8715	1743
402	1057	2532	1942	2666	1101	9298	1860
403	1057	1946	1626	1944	832	7405	1481
404	1813	2542	1067	1580	667	7669	1534
						148667	1858

Table 2.3: Alfalfa yield data for plots harvested during 2005.

2005 Alfalfa Yield (kg/ha)							
Plot no.	5/9/2005	6/14/2005	7/14/2005	8/31/2005	10/7/2005	Total	Average
101	268	481	669	828	829	3075	615
102	567	380	625	506	656	2734	547
103	491	313	654	575	787	2820	564
104	351	389	496	668	898	2802	560
201	1016	373	981	749	967	4086	817
202	393	596	847	603	1009	3448	690
203	553	580	971	471	843	3418	684
204	359	482	906	518	994	3259	652
301	537	465	893	556	891	3342	668
302	507	465	1131	582	1095	3780	756
303	429	549	1234	527	930	3669	734
304	335	648	1002	303	946	3234	647
401	678	630	1045	413	908	3674	735
402	611	568	1024	500	877	3580	716
403	386	605	1628	536	833	3988	798
404	453	358	1048	775	648	3282	656
						54191	677

Table 2.4: Alfalfa yield data for plots harvested during 2006.

2006 Alfalfa Yield (kg/ha)							
Plot no.	5/16/2006	6/14/2006	7/20/2006	8/22/2006	10/4/2006	Total	Average
101	855	336	1199	874	1243	4506	901
102	1307	319	816	1181	951	4574	915
103	964	288	1048	1193	913	4406	881
104	822	190	648	1212	618	3491	698
201	1003	290	585	1209	1002	4088	818
202	961	312	579	1057	805	3714	743
203	918	384	520	920	1003	3744	749
204	808	178	601	1112	757	3457	691
301	760	166	668	1044	932	3570	714
302	820	407	365	899	761	3253	651
303	779	328	717	1399	786	4008	802
304	648	200	284	1355	946	3433	687
401	616	204	493	1091	902	3305	661
402	505	351	638	903	916	3312	662
403	567	290	613	1024	880	3374	675
404	876	253	322	1218	865	3534	707
						59770	747

The plots were also evaluated to determine if the plants experienced any stress due to lack of water. The weather data indicates that the three years were similar in every category except rainfall and relative humidity (tables 2.5, 2.6, and 2.7). The

rainfall in 2004 was much more evenly distributed throughout the summer months, while in 2005 and 2006, there were wet and dry months. The relative humidity in 2006 was slightly lower than the other two years (2.5, 2.6, and 2.7). The weather data is available in appendix A.

Table 2.5: Weather data collected for Manhattan Kansas in 2004.

Month	Minimum, C (°F)	Maximum, C (°F)	Mean, C (°F)	Total Rainfall, mm (in)	Wind Speed, m/s (mph)	Relative Humidity, %
April	6.6 (44.0)	20.2 (68.4)	13.4 (56.2)	65.5 (2.6)	3.4 (7.6)	66.9
May	13.1 (55.7)	26.6 (79.9)	19.9 (67.8)	59.7 (2.4)	3.6 (8.1)	76.9
June	15.5 (59.9)	27.7 (81.9)	21.6 (70.9)	148.6 (5.9)	2.4 (5.3)	76.3
July	17.9 (64.2)	30.0 (86.1)	24.0 (75.1)	189.0 (7.4)	1.8 (4.0)	83.2
August	15.3 (59.6)	28.7 (83.7)	22.0 (71.6)	156.5 (6.2)	1.8 (4.0)	78.1
September	13.4 (56.1)	28.5 (83.4)	20.9 (69.7)	34.3 (1.4)	1.8 (4.0)	63.1
October	6.8 (44.3)	20.6 (69.0)	13.7 (56.7)	25.7 (1.0)	2.4 (5.3)	70.9

Table 2.6: Weather data collected for Manhattan Kansas in 2005.

Month	Minimum, C (°F)	Maximum, C (°F)	Mean, C (°F)	Total Rainfall, mm (in)	Wind Speed, m/s (mph)	Relative Humidity, %
April	6.0 (42.7)	20.3 (68.6)	13.2 (55.7)	18.5 (0.7)	4.3 (9.7)	75.9
May	10.5 (50.9)	25.9 (78.6)	18.2 (64.7)	38.9 (1.5)	3.7 (8.2)	76.2
June	19.0 (66.2)	32.2 (89.9)	25.6 (78.0)	356.6 (14.0)	3.4 (7.5)	75.0
July	19.5 (67.1)	33.1 (91.6)	26.3 (79.4)	47.5 (1.9)	3.0 (6.6)	73.2
August	18.9 (66.1)	31.5 (88.7)	25.2 (77.4)	122.7 (4.8)	1.9 (4.3)	77.0
September	15.5 (59.9)	28.9 (84.0)	22.2 (71.9)	111.3 (4.4)	1.9 (4.3)	68.0
October	6.9 (44.4)	20.7 (69.3)	13.8 (56.8)	87.6 (3.5)	2.5 (5.6)	67.2

Table 2.7: Weather data collected for Manhattan Kansas in 2006.

Month	Minimum, C (°F)	Maximum, C (°F)	Mean, C (°F)	Total Rainfall, mm (in)	Wind Speed, m/s (mph)	Relative Humidity, %
April	7.3 (45.2)	22.7 (72.9)	15.0 (59.1)	70.1 (2.8)	3.7 (8.4)	62.3
May	11.9 (53.4)	25.2 (77.4)	18.5 (65.4)	73.2 (2.9)	3.0 (6.8)	64.2
June	16.8 (62.3)	31.0 (87.8)	23.9 (75.0)	36.8 (1.5)	2.5 (5.7)	59.3
July	20.6 (69.1)	33.8 (92.8)	27.2 (81.0)	94.2 (3.7)	2.3 (5.2)	60.3
August	19.5 (67.1)	32.5 (90.5)	26.0 (78.8)	283.0 (11.1)	2.0 (4.5)	56.2
September	10.8 (51.4)	24.3 (75.7)	17.5 (63.5)	50.5 (2.0)	2.6 (5.9)	68.4
October	5.7 (42.2)	19.0 (66.2)	12.3 (54.2)	63.8 (2.5)	3.1 (7.0)	67.8

This difference in distribution of rainfall and relative humidity is the most likely cause of the variation between the available plant water between the three years (figures 2.6, 2.7, and 2.8). In 2004, the available water content never dropped below 50% capacity even without supplemental irrigation. However, in 2005 and 2006, supplemental irrigation was used twice, and the available water still dropped below the

50% mark. The field dropped below the 50% mark for a longer period of time due to problems with the irrigation system in 2006.

The soil data collected from this study showed some unusual results. The concentration of TN and TP in the soils was unusually high throughout the soil profile (figures 2.9 and 2.10). The results of the TN soil concentrations were twice that of Franzluebbers *et al., 2005* in which Bermudagrass was grown and harvested or grazing occurred.

Figure 2.6: Alfalfa study water balance during 2004 growing season.

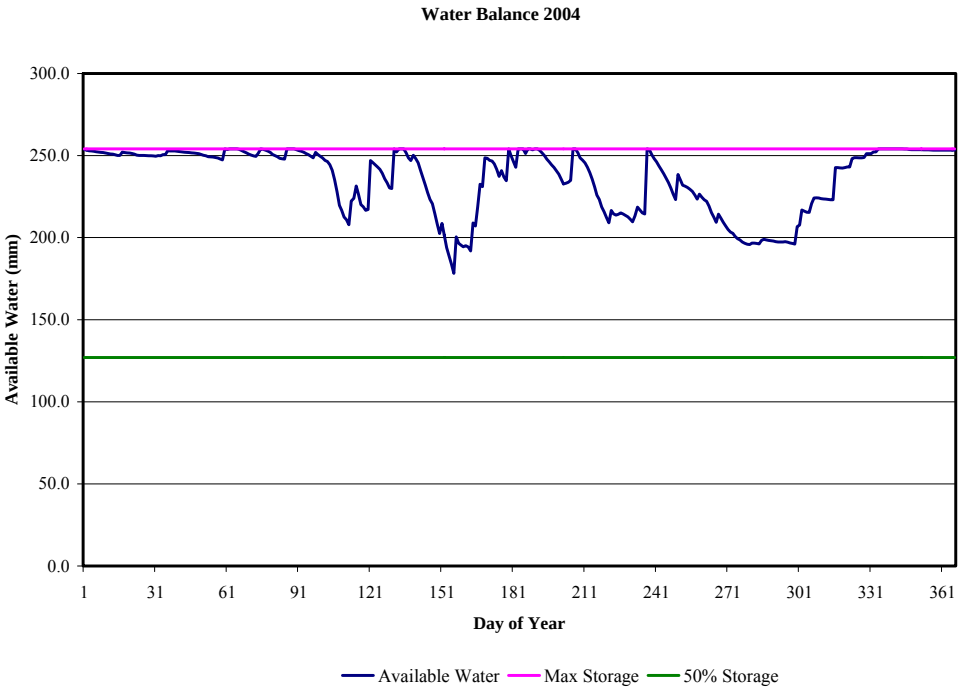


Figure 2.7: Alfalfa study water balance during 2005 growing season

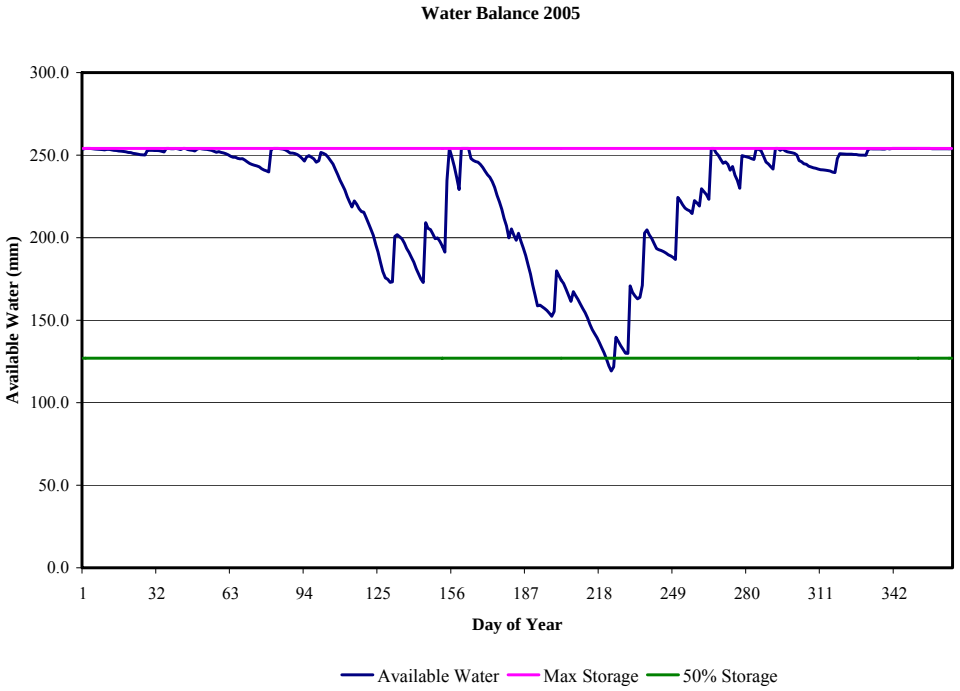


Figure 2.8: Alfalfa study water balance during 2006 growing season.

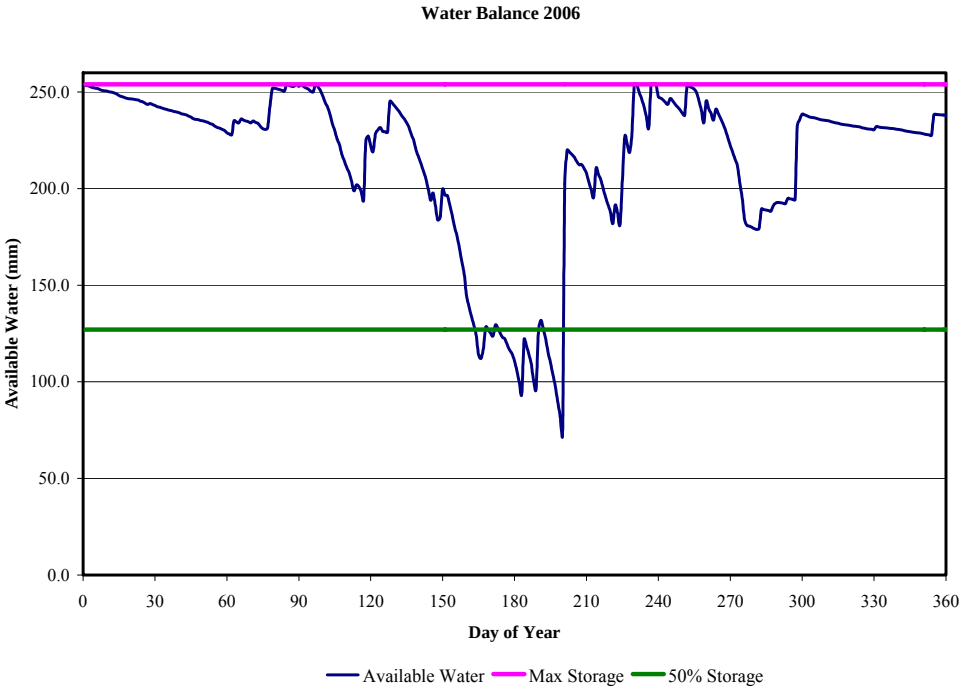


Figure 2.9: Final nitrogen concentrations in alfalfa treatment soil profiles.

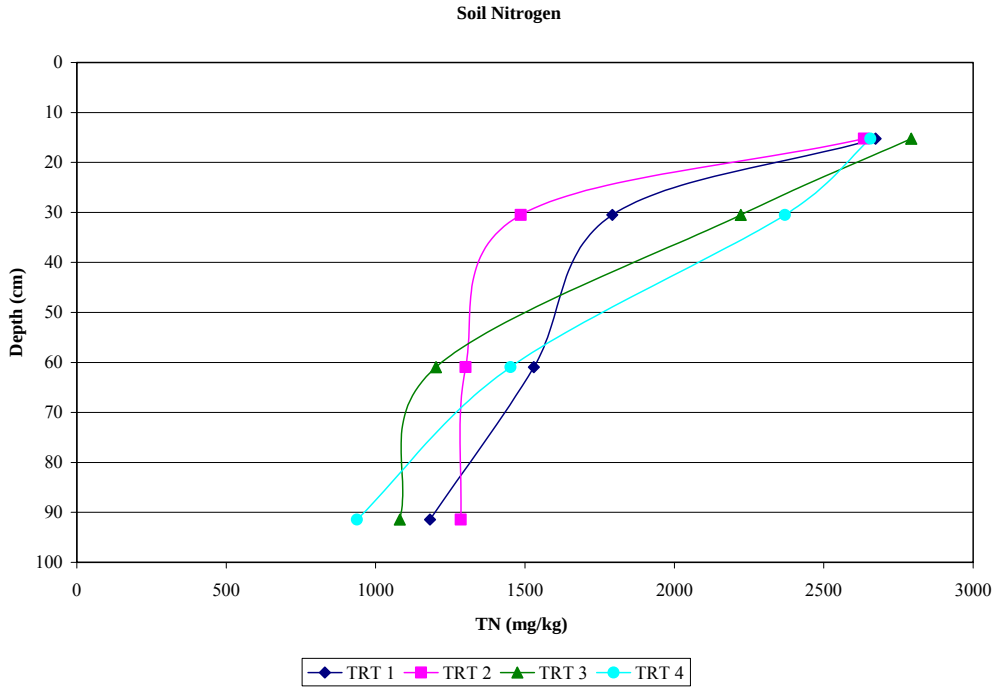
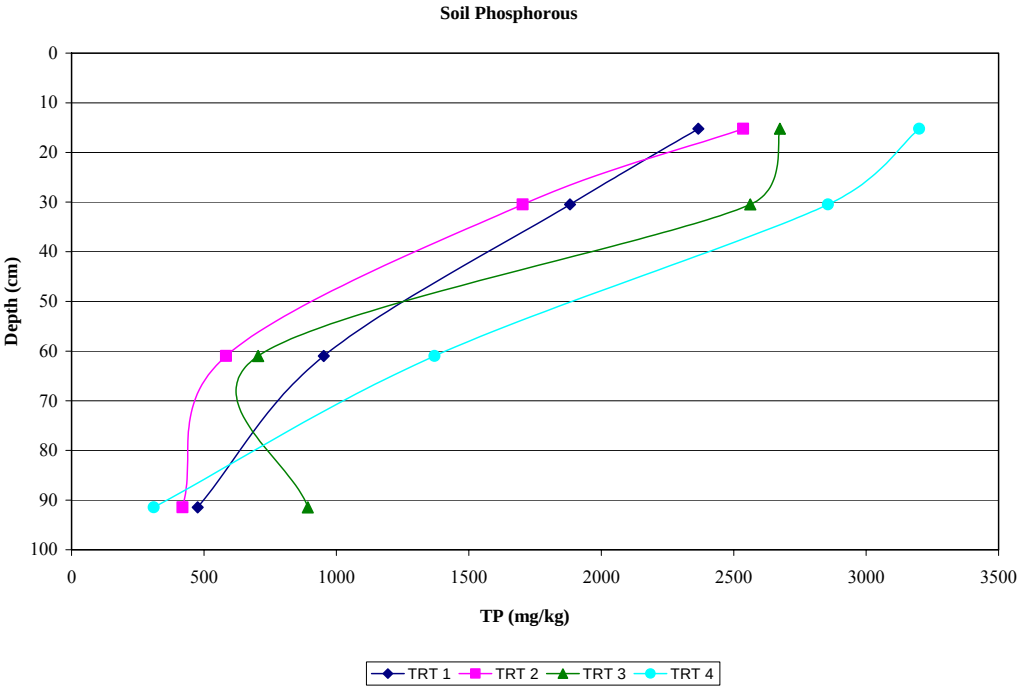


Figure 2.10: Final phosphorus concentrations in alfalfa treatment soil profiles.



McCarron *et al.* (2003) found total nitrogen concentration of 3700 mg/kg in a semi-arid grassland at the Konza Prairie in northeast Kansas within the top 15 cm of the soil profile. This indicates that the nutrient levels at this site are similar to those of an undisturbed natural prairie setting. The soil nutrient level was analyzed by treatment at a $p<0.05$ and the results are shown in Table 2.8. Results and the SAS code are available in appendix A.

Table 2.8: Mean values for the three year alfalfa study of soil nitrogen and phosphorous concentrations by treatment.

Treatment	TN (kg N)	TP (kg P)
0 kg/ha	7771.7[a†]	6211.0[a]
224.2 kg/ha	7226.8[a]	5647.0[a]
448.3 kg/ha	7864.2[a]	7363.0[a]
672.5 kg per ha.	7990.4[a]	8337.0[a]

[†] Lower case letters denote significance between means in each column.

The experiment was designed to determine the nutrient uptake of alfalfa in soils that are rich in soil phosphorus. This question originates from animal feeding areas that apply excessive amounts of manure to land near their facilities. Over time, soils become enriched with nitrogen and phosphorus and will need remediation before additional manure can be added to the land. In addition to the remediation, alfalfa may be grown in fields in rotation with other row crops to prevent buildup of nutrients in the soil.

Data collected from the five cuttings in the 2004, 2005, and 2006 growing seasons was analyzed for the biomass yield for the compost application rate and cutting.

Variation is expected in field experiments and analysis determines where the source of error occurred. The analysis resulted with no interaction between the treatment and cuttings. Another analysis of variance test used the cumulative yield for comparison of variations between repetition and treatment. While there was significant difference between treatments, differences also occurred between

repetitions in 2004; however, there were no differences in 2005 and 2006. Table 2.9 shows the means for treatments and repetitions. The lack in differences between treatments is most likely due to the extremely high initial concentration of nutrients. It is believed that high initial concentration of nutrients masked the treatment effects and this study essentially tested one treatment. SAS code and output are available in appendix A.

Table 2.9: Mean values for the three year alfalfa study of the dry weight yield (kg/ha) for treatments and repetitions.

Treatment	2004 Yield	2005 Yield	2006 Yield
0 kg per ha	9944.5[a†]	3332.0[a]	3795.8[a]
224.2 kg per ha	8484.0[b]	3320.5[a]	3505.5[a]
448.3 kg per ha	9296.3[b]	3595.8[a]	3850.3[a]
672.5 kg per ha.	9442.0[ab]	3299.5[a]	3790.8[a]

† Lower case letters denote significance between means in each column.

While the hypothesis tested for differences between means and blocking typically minimizes error and variation through randomized selection, it appears that the 2004 blocking did not prevent natural error from occurring between the treatment replications. The difference between the years is most likely caused by a combination of water stress and other environmental factors that were not measured. The significant decrease between 2004, 2005, and 2006 is probably contributed to plant stress due to lack of water, highly variable soil pH, and high concentrations of salts associated with compost application. These variables were not measured but could play a key role in alfalfa production.

In addition to yield versus the treatment, the nitrogen and phosphorus uptake by the alfalfa was examined as well. Developing a correlation for alfalfa's nitrogen and phosphorus uptake in high N and P soils is important for evaluating the plant's role in future remediation projects. Adeli and Varco (2001) hypothesized that the only way to increase the accumulation of phosphorus would be to increase the yield of the alfalfa. Unlike nitrogen which increased the concentration and the yield. Unless the

yield can be increased, then the amount of phosphorus removed would correlate only to the yield. Nitrogen and phosphorus concentrations were measured for each sample and multiplied by the yield to determine the mass of N and P removed from the soil. Cumulative totals were created for each treatment and compared.

The nutrient uptake quantities showed the same trend as the yield, which is due to the use of yield in the calculation of the uptake rate. Statistical comparisons between rates showed differences in the results beyond the $p < 0.05$ level, but did not support any expectations of increased phosphorus uptake for the heavily amended plots. These results support the idea that phosphorus is a basic structural component and cannot be enriched in the plant like nitrogen. Table 2.10 provides the phosphorus accumulation on an area basis and the concentration for the comparison between treatments. Table 2.11 provides the nitrogen accumulation on an area basis, and the concentration for comparison between treatments.

Table 2.10: Mean values of alfalfa uptake of phosphorus from nutrient rich soils.

Treatment	2004 P (kg P/ha)	2005 P (kg P/ha)	2006 P (kg P/ha)
0 kg/ha	36.0[a†]	11.1[a]	13.4[a]
224.2 kg/ha	30.6[b]	11.2[a]	12.4[a]
448.3 kg/ha	33.9[ab]	12.2[a]	13.9[a]
672.5 kg per ha.	36.0[a]	12.7[a]	14.0[a]

† Lower case letters denote significance between means in each column.

Table 2.11: Mean values of alfalfa uptake of nitrogen from nutrient rich soils.

Treatment	2004 N (kg N/ha)	2005 N (kg N/ha)	2006 N (kg N/ha)
0 kg/ha	340.6[a†]	89.5[a]	107.5[a]
224.2 kg/ha	276.1[b]	89.3[a]	102.5[a]
448.3 kg/ha	318.3[ab]	92.6[a]	109.6[a]
672.5 kg per ha.	321.8[a]	94.8[a]	115.9[a]

† Lower case letters denote significance between means in each column.

Adeli and Varco (2001) noted that in summer forage grasses, the P accumulation depended entirely upon the yield, and optimizing yield would result with

the maximum uptake of phosphorus. Further analysis of the P concentration ranged from 0.26 to 0.47, and between treatments, some significance was measured but only for the 2004 data. The high treatment rate did result with a greater P concentration in the harvested alfalfa, but on a mass basis, the total uptake of phosphorus occurred for plots receiving no treatment and the highest treatment rate.

In comparison with previous studies, Valk *et al*. (2000) measured phosphorus concentrations in the range of 2.6 to 3.5 g P per kg of dry biomass and are similar in our research. Russelle *et al*. (2001) recorded total nitrogen uptake rates of 972 kg N/ha (867 lb N/acre) over 3 years or 324 kg N/ha (289 lb N/acre) annually. Our study measured an annual nitrogen uptake rate of 314 kg N/ha (280 lb N/acre) and is similar to past research.

While the alfalfa contained nitrogen on an order of magnitude greater than phosphorus, the nitrogen would not be a limiting factor due to the plant's ability to fix nitrogen from the atmosphere. Alfalfa could effectively remove excess nitrogen from nutrient rich soils. Phosphorus on the other hand is removed more slowly. Dividing the largest application rate of 672 kg P/ha (600 lb. P/acre) by the annual alfalfa P uptake rate, this study show that it would take approximately 18.7 years to remove the phosphorus applied to the soil. Decreased yields in 2005 and 2006, showed removal rates were reduced by 60%, which could extend the P removal period.

Conclusion

Using alfalfa to remove phosphorus from enriched soils would not be practical as a stand alone practice. But an alfalfa cropping system would provide year round crop cover to reduce phosphorus runoff from storm events compared to other row crops.

The results of this study suggest that alfalfa's uptake of phosphorus can be increased with excessive phosphorus concentrations in the soil, but only marginally. This practice could be used in abandoned feedlots or where manure was stockpiled and vegetation is required to reduce runoff hazards.

Future experiments may be needed to evaluate alfalfa's response behavior to comparing nitrogen fixing alfalfa species to non-nitrogen fixing species. Other

possibilities would include developing a variety of alfalfa for increasing the uptake of phosphorus. Until uptake of phosphorus can be improved, future studies need to evaluate plant varieties for bioremediation of phosphorus rich soils. These studies should also measure pH, salinity, and other soil characteristics to account for variations in yield.

Overall this study was ineffective in determining the effects of compost treatments and alfalfas ability to remove nutrients from these excess applications. The initial soil conditions were extremely enriched and variable causing the compost treatments used in this study to be irrelevant.

CHAPTER 3 - Effectiveness of USDA Plant Nutrient Management Tool

Abstract

The use of nutrient management planning is an important step in reducing nonpoint source pollution. Using nutrients efficiently will prevent nutrient losses from agricultural sites. The goal of nutrient management planning is to apply nutrients at rates that meet crop needs but do not exceed. This paper evaluates the use of USDA Plant Nutrient Tool for the prediction of nutrient removal by different crop varieties; alfalfa, bluestem, brome, corn, sorghum and soybeans. It also evaluates if the predict values produced by the model are comparable to measured values from alfalfa test plots. These test plots consisted of four compost treatments; 0, 224.2, 448.3, and 672.5 kg N and P/ha (0, 200. 400, and 600 lb N and P/acre). Evaluation of the data indicated that the USDA Nutrient Tool tends to underestimate the removal of both nitrogen and phosphorus when compared to measured data. This could be detrimental to agricultural producers. If they use this tool, they could under apply nutrients and provide the crops with inadequate fertilizer. However, this tool could still be used if soil tests were conducted periodically to account for variations between the model and actual field data. After evaluation of the crop varieties, it was concluded that silage corn was the most effective in removal of phosphorus. Alfalfa was the most effective in removal of nitrogen if produced at the yields seen in 2004. Over all it was concluded that the Plants Nutrient Tool can be used to make nutrient management planning simpler. It should be noted that the model showed that phosphorus is removed at a much slower rate than nitrogen and if manure is applied based on nitrogen needs then phosphorus will accumulate in soils. Erosion of these soils can lead to eutrophication of fresh water ecosystems.

Introduction

Nutrient management plans have been used to reduce nonpoint source pollution from animal feeding operations (AFOs). These plans are beneficial for both AFOs and the environment (Daniel *et al.,* 1994; Beegle *et al*., 2000; Shepard, 2005; Koelsch, 2005; Jackson *et al*., 2000; Society of Chemical Industry, 2006). The state of Kansas requires that nutrient management plans be used for all CAFOs. NRCS defines a comprehensive nutrient management plan (CNMP) as a grouping of conservation practices and management activities which combine into a resource management system to ensure that both production and natural resource conservation goals are achieved (NRCS, 2006). The objective of these plans is to manage manure and organic by-products to meet the producer's goals, while protecting or improving water quality. Most CNMPs can be achieved using the 11 steps proposed by the USDA (USDA, 2005):

1. Assess operation and identify potential water quality problems and resource concerns.
2. Evaluate storage requirements.
3. Test soil and manure for nutrient concentrations.
4. Determine manure application rates, methods, and timing.
5. Calibrate application equipment.
6. Incorporate land management practices to reduce leaching and runoff and practices to address other resource concerns.
7. Consider other options for using manure.
8. Identify options for handling mortalities.
9. Consider managing feeds to reduce nutrient excretion.
10. Record keeping and operation and maintenance.
11. Review and update the plan.

This paper focuses on the fourth step; determining manure application rates, methods, and timing. The goal of step 4 is to apply manure at crop nutrient uptake levels. This minimizes nutrients accumulation in soils. Runoff from nutrient enriched soils have been identified as a cause of eutrophication in freshwater inland lakes and an important source of nutrient to estuaries in the United States (USEPA, 2000; Carpenter *et al.,* 1998; Daniel *et al*., 1994). The nutrients responsible for eutrophication are nitrogen for salt water and phosphorus for fresh water.

Nitrogen

Nitrogen is a crucial nutrient for crop growth. Studies have shown that the use of nitrogen fertilizers can increase crop yields by 9-29% (Jaynes and Colvin, 2006), 5% for soybeans (Osborne and Riedell, 2006). Unfortunately, over application of nitrogen is a major source of eutrophication of aquatic ecosystems. Eutrophication causes increased growth of algae and aquatic weeds that interfere with the use of the estuary (Carpenter *et al.,* 1998; Daniel *et al.*, 1994). Oxygen shortages caused by decomposition of plants cause fish kills. Eutrophication also leads to a decrease in aquatic habitat and a decrease in marine diversity (Carpenter et al. 1998). Nitrogen can also be harmful to human health. Nitrates in drinking water can replace oxygen causing a condition known as "blue baby syndrome" (methemoglobinemia), if it is ingested by infants (Boylston and Beer, 2002; Sandstedt, 1990; Amdur *et al.*, 1991).

Phosphorus

Phosphorous fertilizers can increase crop yields by 20-50% for alfalfa (Ottman et al. 2006), 7% for soybeans (Polito *et al*., 2000), and 2-3% for corn (Roth *et al.,* 2006). Phosphorous is the limiting nutrient in fresh water ecosystems, and excess phosphorus is the main cause of eutrophication of fresh water systems (Carpenter *et al.,* 1998). The most common problem associated with fresh water eutrophication is the unnecessary growth of canobacteria (blue-green algae). These algae can cause fish kills, odor and taste problems, and formation of trihalomethane during chlorination in treatment plants. Serious threats to livestock and human health can develop when the algae die or are ingested due to the release of water-soluble neuron- and hepatotins (Carpenter *et al.*, 1998). Preventing application of excess nutrients will reduce the amount of nutrients that can be lost from agricultural fields, therefore reducing non-point source pollution.

Methods and Materials

Acquisition and assimilation are the key factors in plant nutrient efficiency (Society of Chemical Industry, 2006). However, different plants use nutrient at

different levels. This study evaluated the use of nitrogen and phosphorus of several crops: alfalfa, bluestem, bromegrass, corn, sorghum, and soybeans.

The National Resources Conservation Services (USDA, 2005) provides a website for various crops. The model calculates the expected nutrient removal based upon a yield entered by the user, these values shown in appendix B. Since the model is based on yield it accounts for variations due to location or production methods, such as moisture stress. Alfalfa yields measured from the 2004, 2005, and 2006 growing season were entered into the website to calculate the expected nitrogen and phosphorus removal rates for comparison to measured data from a controlled alfalfa field. The controlled field consisted of four treatment levels of compost application: 0, 224.2, 448.3, and 672.5 kg N/ha (0, 200. 400, and 600 lb N and P/acre). The compost applied had a N to P ratio of 1 to 1.

Evaluation of a variety of crops was conducted to determine which crop would be the most effective in removal of nitrogen and phosphorus. The crops evaluated were alfalfa, bluestem, brome, corn, sorghum and soybeans. The alfalfa yields that were used in the model were the total yields produced in 2004, 2005, and 2006, and the moisture content used was the average for the year. The bluestem and brome yields used were the same as the alfalfa and the default moisture content was used. The default moisture content is based off of national average moisture contents that were evaluated by the creators of the model. The corn, sorghum, and soybean yields were based on the average values produced in 2006 as reported by the USDA, and the default moisture contents were used.

Results and Discussion

Comparing the measured values to the website removal rates for phosphorus, the measured values were higher in each category for phosphorus as shown in Table 3.1. Reasons behind this occurrence may be that the values provided by the website may be a conservative estimate. Comparing the measured values to the website removal rates for nitrogen, the measured values were higher in every category except for three. These three observations occurred in 2005 at the 0, 224.2, and 448.3 (0, 200, and 400 lb N and P/acre) in these cases the values were similar. The average

yield reported by USDA for 2006 was 7500 kg/ha (6691 lb/acre), which is higher than the yield produced from the test plot for 2005 and 2006 but lower than the yield produced in 2004 (USDA, 2007).

Table 3.1: Comparison of website output to actual field data.

Year	Manure Application Rate (kg/ha)	Input Yield (kg/ha)	Input Moisture Content (%)	Field Measured P Removal Rate (kg P/ha)	Website Removal Rate (kg P/ha)	Field Measured N Removal Rate (kg N/ha)	Website Removal Rate (kg N/ha)
2004	0	9944	6	36	24	341	260
2004	224.2	8484	6	31	21	276	222
2004	448.3	9296	6	34	23	318	243
2004	672.5	9442	6	36	23	322	247
2005	0	3332	2	11	9	90	91
2005	224.2	3320	2	11	8	89	90
2005	448.3	3596	2	12	9	93	98
2005	672.5	3300	2	13	8	95	90
2006	0	3796	3	13	10	108	103
2006	224.2	3505	3	12	9	103	95
2006	448.3	3850	3	14	10	110	105
2006	672.5	3791	3	14	10	116	103

Evaluation of the crop types showed that corn produced for silage would be the most effective in removal of nitrogen. Alfalfa produced at the yield seen in 2004 was most effective in removal of phosphorus as shown in Table 3.2. Soybeans and brome produced in 2004 were the second most effective in removal of both nutrients. The other grass species (bluestem and brome) were not effective in the removal of nutrients.

Table 3.2: Comparison of nitrogen and phosphorus uptake by crop varieties.

Crop		Yield (kg/ha)	Moisture Content (%)	Website Removal Rate (kg N/ha)	Website Removal Rate (kg P/ha)	Manure Application Rate (kg/ha)	Years to Remove N	Years to Remove P
Alfalfa 2004	(Hay)	9292	6	243	23	673	3	30
Alfalfa 2005	(Hay)	3387	3	92	9	673	7	78
Alfalfa 2006	(Hay)	3736	3	101	9	673	7	71
BlueStem	(Hay)	9292	11	74	NA	673	9	NA
BlueStem	(Hay)	3387	11	27	NA	673	25	NA
BlueStem	(Hay)	3736	11	30	NA	673	22	NA
Brome	(Hay)	9292	10	169	19	673	4	35
Brome	(Hay)	3387	10	61	7	673	11	96
Brome	(Hay)	3736	10	68	8	673	10	87
Corn	(Silage)	16200	70	141	41	673	5	16
Corn	(Grain)	9416	14	119	23	673	5	27
Sorghum	(Grain)	3528	11	59	10	673	11	64
Sorghum	(Silage)	13400	72	86	18	673	8	38
Soybeans	(Grain)	2699	10	170	17	673	4	39

Stover or grain moisture content is an important parameter in the model. This model allows you to use a default moisture content based on national average values. However, you are allowed to manipulate the value to more accurately represent actual field data. The amount of nitrogen and phosphorus removed decreases as moisture content increases. This is because more of the crop yield would consist of water instead of crop tissue, and the crop tissue is responsible for removal of nutrients.

Conclusions

Results from this study indicate that the use of the USDA nutrient model would be an effective tool for nutrient management plans. This tool tends to underestimate the amount of nutrients used by crops, but still gives an approximate value if the producers do not soil test annually. Soil tests should be conducted periodical to account for the variation between the model and individual fields. The crop data indicates silage corn would be the best crop for removal of phosphorus, and alfalfa in removing nitrogen. However, it is important to keep in mind the amount of runoff that occurs in each crop's production. Alfalfa provides year long coverage, while corn is a row crop and has exposed soil for several portions of the year. Another important factor when using this model to approximate nutrient needs of a field is that nitrogen is removed at a much faster rate than phosphorus. If manure is applied to

account for the nitrogen needs of crops then phosphorus will accumulate in soil and can cause environmental problems.

This study illustrates the point that effectiveness of models is dependent on validation. This model showed large amounts of variability when compared to actual data. This implies that no single nutrient management plan will be effective for every field. They should be conducted on a case-by-case basis.

CHAPTER 4 - Effectiveness of Vegetative Filter Strips in Removal of Dairy Manure Constituents in Runoff

Abstract

Runoff from animal feeding operations is a source of nonpoint source pollution. Runoff from animal feeding operations contains high concentrations of nitrogen, phosphorus, EColi and fecal bacteria, and total suspended solids. The use of grassed filter strips is a common practice for reducing of nonpoint source pollution. This study focuses on the influence of slope and the ratio of runoff area to filter strip area on pollutant removal. This study consists of four plots. Two plots were constructed on a 0.5% slope. The other two plots were constructed on a 2.0% slope. Each plot has four filter lengths: 3, 6, 9, 12 m (10, 20, 30 and 40 ft) and was 0.76 m (2.5 ft) wide, creating area ratios of 1:1, 1:2, 1:3, and 1:4. A rainfall simulator was used to create runoff. Rainfall was simulated on June 27, 2007 for the 0.5% plots and June 28, 2007 for the 2.0% slope. The rainfall was simulated until a minimum of 30L of runoff was collected from each plot, approximately 150 minutes. The runoff was collected and a representative sample was taken and analyzed for total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), EColi and fecal bacteria. Analysis of variance indicated that slope had no significant influence on pollutant concentrations. Few significant differences occurred when analysis of variance was performed for slope length. However, obvious trends occurred when the mean pollutant concentrations were compared to area ratio. It was determined that pollutant concentrations have a polynomial relationship with area ratio. To successfully prevent pollution from animal feeding operations, a minimum of 1:2 ratio of runoff area to filter strip area should be used.

Introduction

Recently animal feeding operations in the United States have become larger and more concentrated (Redwine and Lacey, 2000). The total number of animal units in the U.S. increased by about 4.5 million, while the number of animal feeding operations decreased from 1987 to 1992 (USDA, 1999). Runoff from AFO's typically contains high concentrations of nitrogen, phosphorus, suspended solids, and bacteria. Problems such as eutrophication of both fresh and salt water bodies have been associated with runoff from AFO's (Carpenter *et al*., 1998; Daniel *et al*., 1994). High concentrations of bacteria contaminate drinking water (Coyne *et al*., 1995; Coyne *et al*., 1998). Reducing the amount of water that runs off of AFO's or filtering the runoff would help reduce this form of nonpoint pollution.

Vegetated filter strips are capable of reducing runoff and filtering it before leaving an agricultural site. National Resources Conservation Service (NRCS) (2000) defines a filter strip as "a strip or area of vegetation for removing sediment, organic matter, and other pollutants from runoff and wastewater". The purpose of filter strips is to remove sediment and pollutants by filtration, deposition, infiltration, absorption, adsorption, decomposition, and volatilization (NRCS, 2000). Research has shown that vegetated filter strips can have sediment trapping efficiencies ranging from 41% to 100% and infiltration efficiencies ranging from 9% to 100%. Vegetated strips have also been proven effective in removal of nutrients. Total phosphorus removal rates ranged from 27% to 96% and nitrates were reduced from 7% to 100% (Helmers *et al*., 2006). Fecal bacteria trapping efficiencies ranged from 74% to 90% (Coyne *et al*., 1995; Coyne *et al*., 1998). Several factors can influence the efficiency of filter strips. This paper is going to focus on the efficiency of removing suspended sediment, total nitrogen, total phosphorus, EColi and fecali bacteria based on slope and filter length.

Methods and Materials

The research site is located at Kansas State University Animal Science Farm in Manhattan, Kansas, USA. The plots were established on a two year old stand of smooth bromegrass (*Bromus inermis Leyss*). The soil type of the plots is a Tully silt

clay loam (Jantz, 1975). The experiment was set up as a 2x4 factorial treatment design with two factors, slope and filter length, and four replications. Two plots are set at a 0.5% slope. The next two plots have a 2% slope. Each plot consists of four filter lengths: 3, 6, 9, 12 m (10, 20, 30, 40 ft) and is 0.76 m wide (2.5 ft) as shown in figures 4.1 and 4.2.

Figure 4.1: Design of vegetative filter strip plots with 0.5% slope.

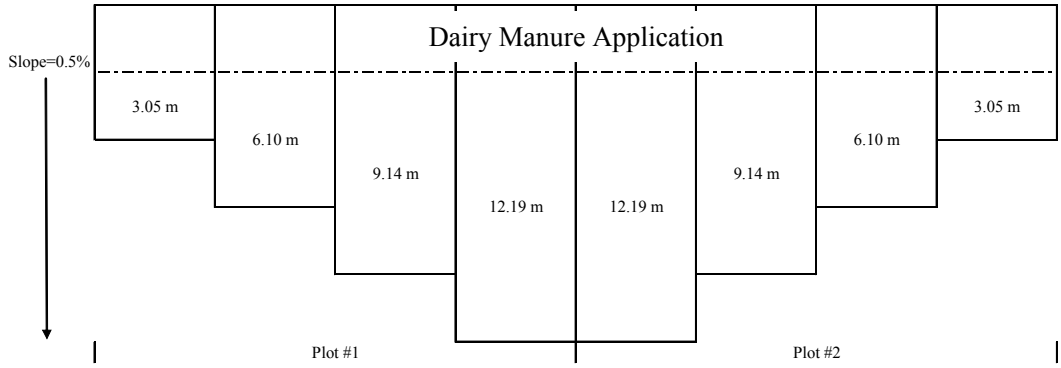
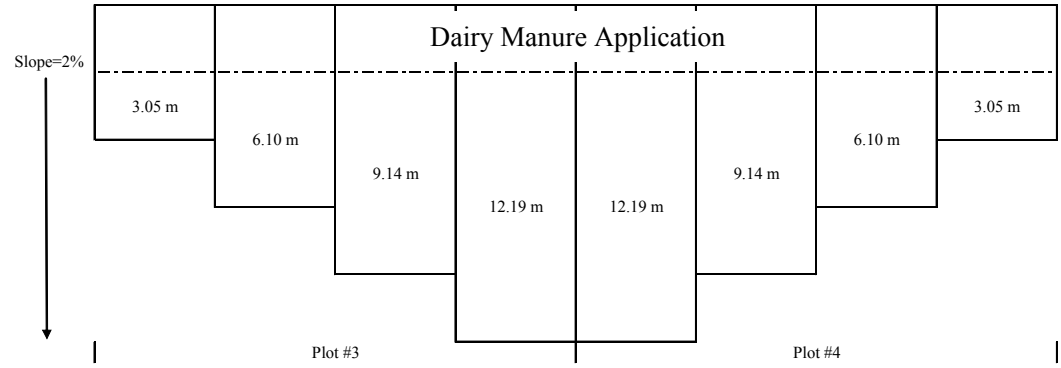


Figure 4.2: Design of vegetative filter strip plots with 2.0% slope.

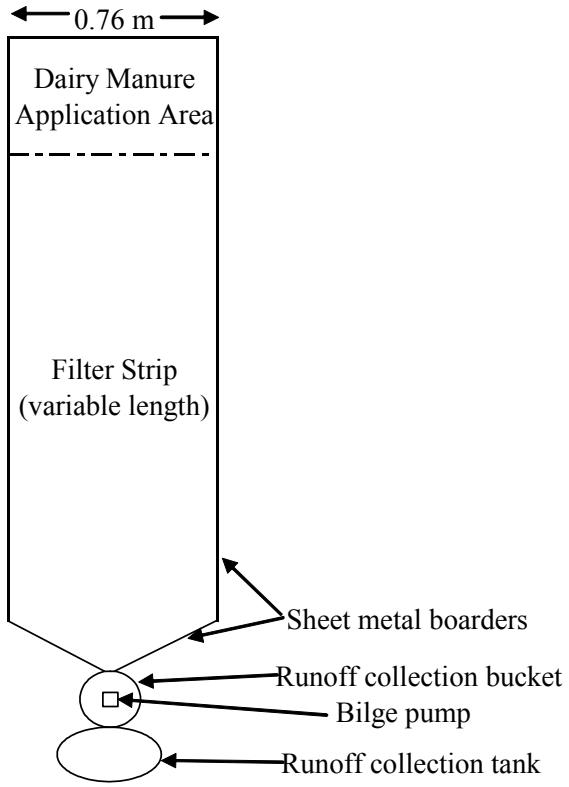


The plots are separated by sheet metal barriers inserted approximately 10 cm (4 in) and extend approximately 10 cm (4 in) from the soil surface. A 3 m (10ft) by 0.76 m (2.5 ft) area of land located directly up slope of each test plots was tilled and manure scraped from a dairy lot was applied as shown in figure 4.3. This created ratios of manure area to filter strip areas of 1:1, 1:2, 1:3, and 1:4 (table 4.1).

Table 4.1: Calculation of area ratios used in the filter strip study.

Manure Area	Filter Strip Area	Area Ratio
3 m x 0.76 m	3 m x 0.76 m	1:1
3 m x 0.76 m	6 m x 0.76 m	1:2
3 m x 0.76 m	9 m x 0.76 m	1:3
3 m x 0.76 m	12 m x 0.76 m	1:4

Figure 4.3: Design of vegetative filter strip used in the filter strip study.

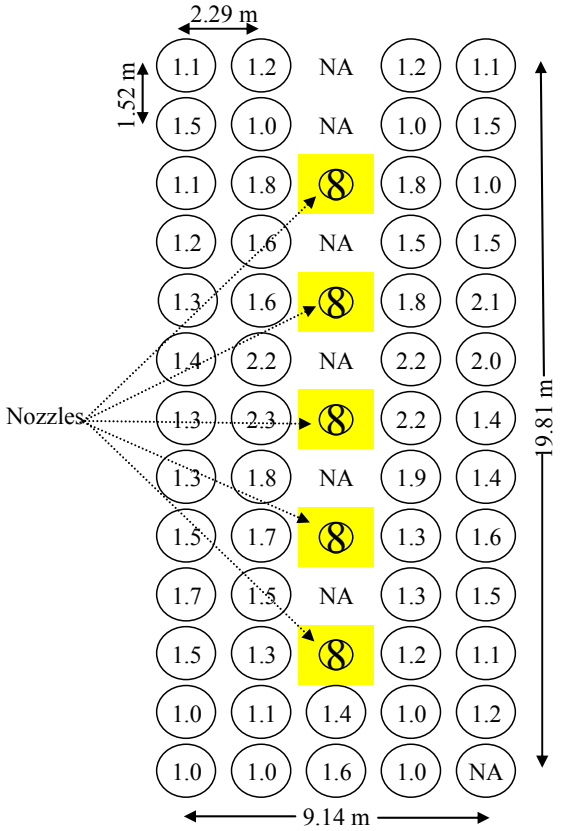


Manure samples were collected prior to each run and were analyzed for total nitrogen, total phosphorus, EColi and fecal bacteria. The manure samples were sent to Servi-Tech Laboratories in Dodge City, Kansas for TN and TP analysis. Servi-Tech Laboratories analyzes TN using SM4500-N_{org} C and SM 4500-NH^3 E methods. TP is analyzed using Nitric acid with hydrogen dioxide digestion and ICP analysis. The manure samples were analyzed for EColi and fecal bacteria using serial dilution method (Clesceri *et al*., 1998). Ten grams (0.02 lb) of manure were suspended in 100

ml (3 oz.) of water. The solution was mixed well to suspend the bacteria and the solids were allowed to settle. One milliliter (0.03 oz.) of the solution was added to 9.0 ml (0.3 oz.) of phosphate buffer. Then 1 mL (0.03 oz.) of the buffer solution was applied to a Difco m FC Agar (fecal), 1 mL was applied to the Levin eosin methylene blue (EMB) agar plate (EColi), and 1 mL was added to the second dilution vial containing 9.0 mL (0.3 oz.) of phosphate buffer. This process was repeated three times to get three dilution levels: 10^1, 10^2, and 10^3. Results from analysis of manure samples are shown in appendix C. The EMB agar is a selective and differential medium. Eosin Y and methylene blue are pH indicator dyes and serve to inhibit the growth of gram positive organisms. EColi vigorously ferment lactose to produce a green metallic sheen on the plates (Becton, 2007). The FC agar contains selective and differential agents. Rosolic acid inhibits the growth of bacteria with the exception of fecal coliforms. The fermentation of lactose by fecal coliforms causes a pH change in the medium turning the fecal coliforms blue (Becton, 2007). The agar plates are incubated at 44.5 ± 0.5 °C (113 ± 0.9 °F), and the bacteria colonies are counted at 24 and 48 hours.

A rainfall simulator was constructed with PVC pipe and wobbler irrigation nozzles and was used to create runoff. Prior to use of the rainfall simulator, a uniformity test was conducted. The uniformity test was conducted in a parking lot on Kansas State University campus. This parking lot is surrounded by buildings which minimized interference by wind. Catch pans were laid out in a grid formation, spaced 2.3 m (7.5 ft) apart on the x-axis and 1.5 m (5 ft) apart on the y-axis as shown in figure 4.4.

Figure 4.4: Design of uniformity grid to test rainfall simulator.



The rainfall simulator was allowed to run for 20 minutes. The pans were then weighed and uniformity was calculated to be 80.01% using equations 4.1 and 4.2 (Zoldoske and Solomon, 1988). Data used for uniformity calculation are shown in appendix C.

$$CU = 100 \times \left(1 - \frac{D}{M}\right) \qquad (4.1)$$

$$D = \frac{1}{n} \times \sum \left| Xi - M \right| \qquad (4.2)$$

Where:

CU = Christiansen's Coefficient of Uniformity (%)

D = Average absolute deviation from the mean (kg)

M = Mean application amount (kg)

Xi = Observed application amount (kg)

n = number of observations

The simulator consists of five irrigation nozzles set 3 m (10 ft) apart and was set down the center of the test plots (figure 4.5). The simulation began the same day as the application of the dairy manure. Replications 1 and 2 were simulated on June 27, 2007, and replications 3 and 4 were simulated on June 28, 2007. Runoff from the grass filters began approximately 60 minutes after the beginning of the simulation. Simulated rainfall was applied at a rate of 0.95 L/s (15 gpm) per nozzle, until a minimum of 30 L (8 gal) of runoff was collected from all test plots. The simulated rainfall intensity was 4.5 cm/hr (1.8 in/hr) which represent a 32 year return storm. The total period of rain simulation was 163 minutes for replications 1 and 2, 135 minutes for replication 3, and 153 minutes for replication 4.

Figure 4.5: Irrigation system used to simulate rainfall for the filter study.

The runoff was directed toward the collection bucket using sheet metal borders. Once the runoff entered the collection bucket, it was pumped into the collection tank using a bilge pump at a rate of 1.16 L/s (18 gpm) (figure 4.6).

Figure 4.6: System used to collect runoff for the filter study.

A representative sample was collected from the collection tank and analyzed for total suspended solids, total nitrogen, total phosphorus, EColi and fecal bacteria. The results from the analysis are shown in appendix C. The samples were analyses for TN and TP at Agronomy department at Kansas State University. A cadmium reduction method: where 1 to 10 mL (0.03 to 0.3 oz.) of the sample is digested with Potassium Persulfate Reagent in an autoclave and then analyzed using a Technicon AutoAnalyzer II for phosphorus and an Alpkem RFA for nitrate nitrogen (Hosomi and Sudo, 1986). Total suspended solids were analyzed by filtering 25 mL (0.8 oz.) of the sample through a 47 mm (.02 in) diameter glass fiber filter with a pore size of 1.5 µm using a vacuum. The filters were dried at 100 °C (212 °F) for 24 hours. They are then weighed and TSS is calculated using equation 4.3 (Clesceri *et al*., 1998).

$$TSS = \frac{TDW - WC - WF}{V} \qquad (4.3)$$

Where:

TSS = Total Suspended Solids (mg/L)

TDW = Total Dry Weight (Solids + Can + Filter) (mg)

WC = Weight of Can (mg)

WF = Weight of Filter (mg)

V = Volume of sample used (L)

The samples were analyzed for EColi and fecal bacteria using the same method described for the analysis of the manure samples, with the exception that the raw sample was added to the first dilution vial.

Soil samples were collected before and after the rainfall simulation. A soil probe with a 3 cm (1 in) diameter was used, and the samples were collected at a depth of 8 cm (3 in). The soil samples were collected in the center of the test plots. The samples were weighed and then dried at 25 – 30 °C (77 – 86 °F) until there was no change in the sample weight. The moisture content for the samples was calculated.

Results and Discussion

The filter strips were found to be effective in reduction of pollutants. The average removed 58% of runoff volume, 66% of TSS, 90% of EColi, and 81% of fecal. Other studies using plot scale buffer systems found results in ranges of 11-95% runoff, 59-98% TSS, 43-91% fecal, 24-95% TN, and 36-97% TP (Blanco-Canqui *et al.,* 2004; Blanco-Canqui *et al*., 2006; Blanco-Canqui *et al*., 2006; Coyne *et al*., 1995; Coyne *et al*., 1998; Lee *et al*., 1999; Lim *et al*., 1998; Schmitt *et al*., 1999; Eghball *et al.,* 2000; Abu-Zreig *et al*., 2003; Sanderson *et al*., 2001; Gilley, 2000). The pollutant reduction efficiencies are shown in table 4.2, and data used to calculate efficiencies are shown in appendix C.

Table 4.1: Pollutant reduction values based on filter length.

Filter Length (m)	Area Ratio	Volume Reduction (%)	TSS Reduction (%)	Ecoli Reduction (%)	Fecal Reduction (%)
3	1:1	55	46	71	65
6	1:2	40	64	95	84
9	1:3	57	79	97	87
12	1:4	81	76	98	90

The data was analyzed using SAS 9.0 ($\alpha = 0.5$). SAS code and output are shown in appendix C. The generalized linear model (glm) was used to determine if differences occurred between filter length, slope, and potential interactions between slope and filter length. It was determined there were no interaction effects between slope and filter length (P-values ranged from 0.365 to 0.874). Using Least Significant Difference (LSD) for mean comparison, it was determined that there were no significant differences between all parameters based on slope (table 4.3). These results differ from other studies where slope was found to have significant influence on contaminant reductions. However, these studies had greater slopes ranging from 2-10% (Helmers *et al*., 2006).

Table 4.2: Mean contaminant values based on slope.

Slope (%)	Volume (L)	TSS (mg/L)	Ecoli (CFU/100 mL)	Fecal (CFU/100 mL)	TOTAL N (mg/L)	TOTAL P (mg/L)
0.5	168.8[a†]	291.0[a]	1.78E+04[a]	2.95E+03[a]	86.8[a]	4.6[a]
2	118.1[a]	196.5[a]	8.51E+04[a]	2.01E+04[a]	85.6[a]	4.5[a]

[†] Lower case letters denote significance between means in each column

There were no significant differences between runoff volume, TSS, EColi, and fecal based on filter length (table 4.4). Significant differences were detected for TN and TP based on filter length shown. It indicated that the treatments with the shortest filter length had a higher average value of TN and TP than any other treatment.

Table 4.3: Mean contaminant values based on filter length.

Filter Length (m)	Area Ratio	Volume (L)	TSS (mg/L)	Ecoli (CFU/100 mL)	Fecal (CFU/100 mL)	TOTAL N (mg/L)	TOTAL P (mg/L)
3	1:1	97.5[a†]	393.0[a]	1.62E+05[a]	2.35E+04[a]	99.1[a]	9.4[a]
6	1:2	195[a]	260.0[a]	2.45E+04[a]	9.88E+03[a]	83.9[b]	3.8[b]
9	1:3	180[a]	148.0[a]	1.30E+04[a]	7.53E+03[a]	82.7[b]	3.1[b]
12	1:4	101.25[a]	173.8[a]	6.75E+03[a]	5.25E+03[a]	77.8[b]	1.7[b]

[†] Lower case letters denote significance between means in each column.

Though few significant differences were observed based on the SAS results, trends did appear when the mean values were plotted. With the exception of runoff

volume, all of the variables tend to have lower concentrations as filter length increases (figures 4.7, 4.8, 4.9, 4.10 and 4.11).

Figure 4.7: Graph of mean TSS verses area ratio.

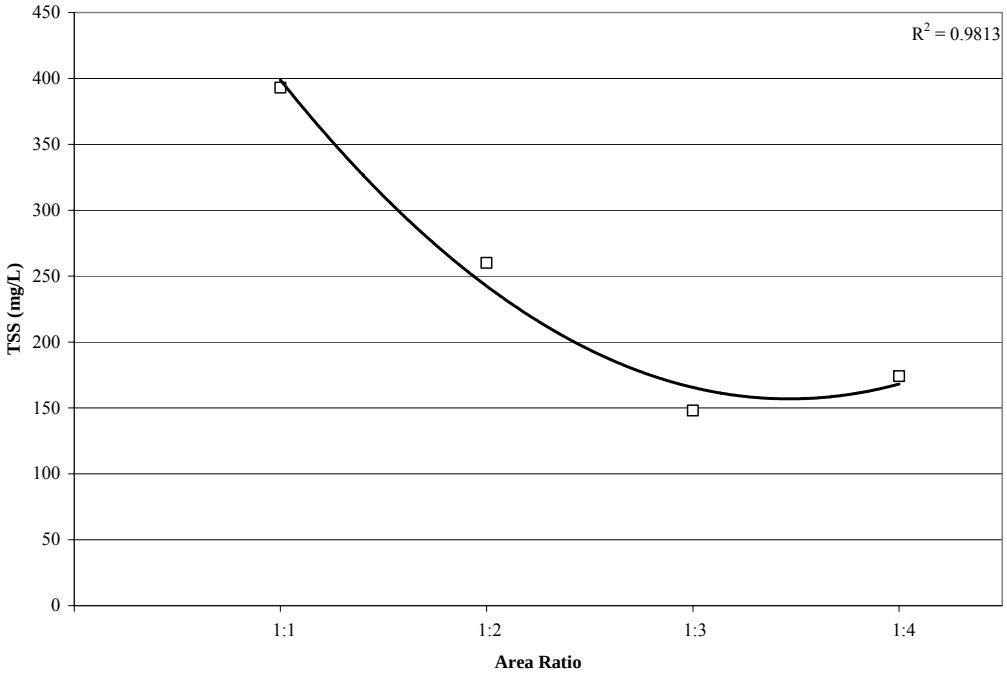


Figure 4.8: Graph of mean EColi verses area ratio.

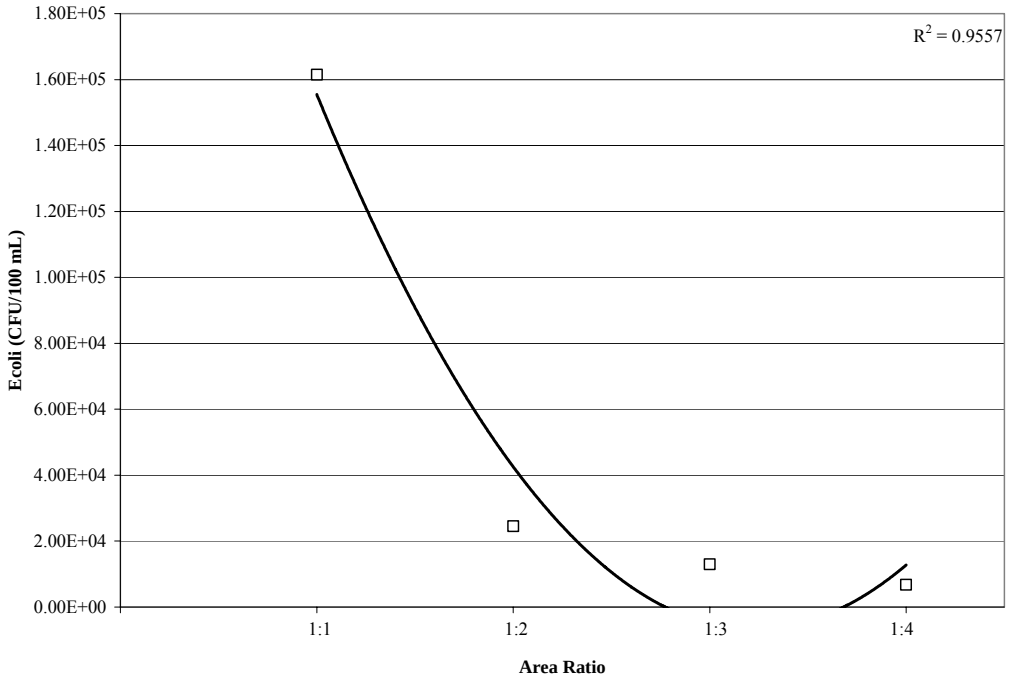


Figure 4.9: Graph of mean fecal verses area ratio.

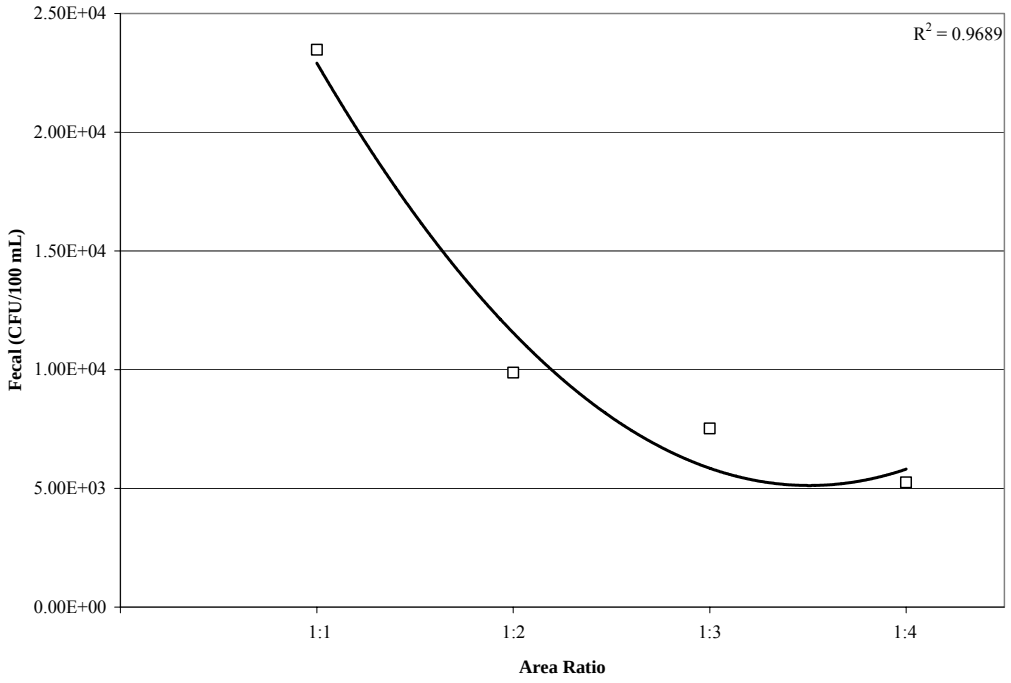


Figure 4.10: Graph of mean TN verses area ratio.

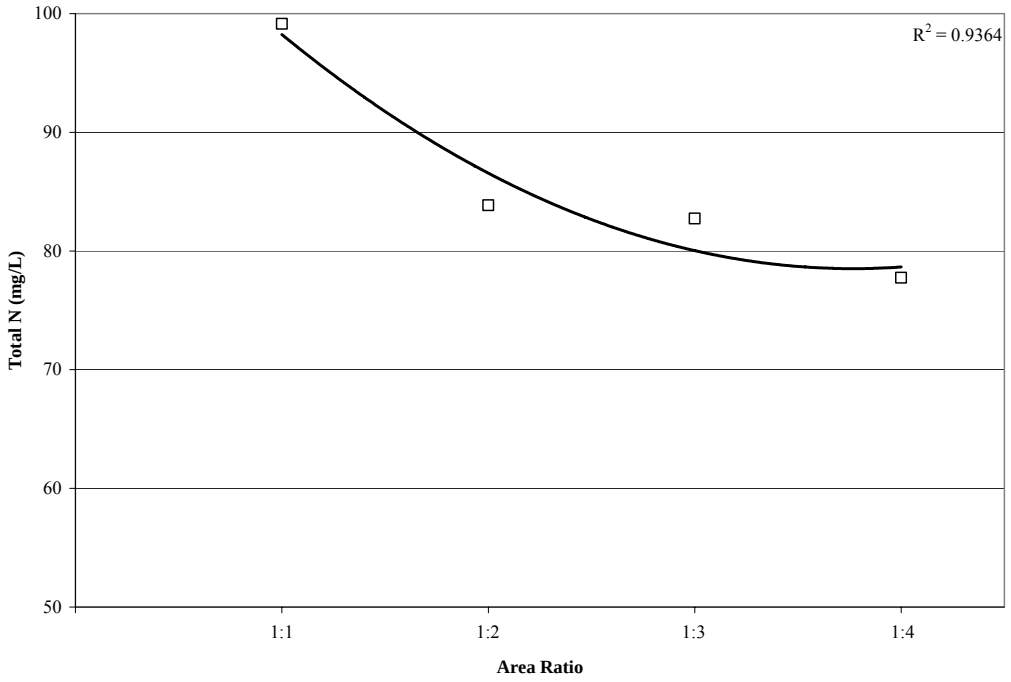
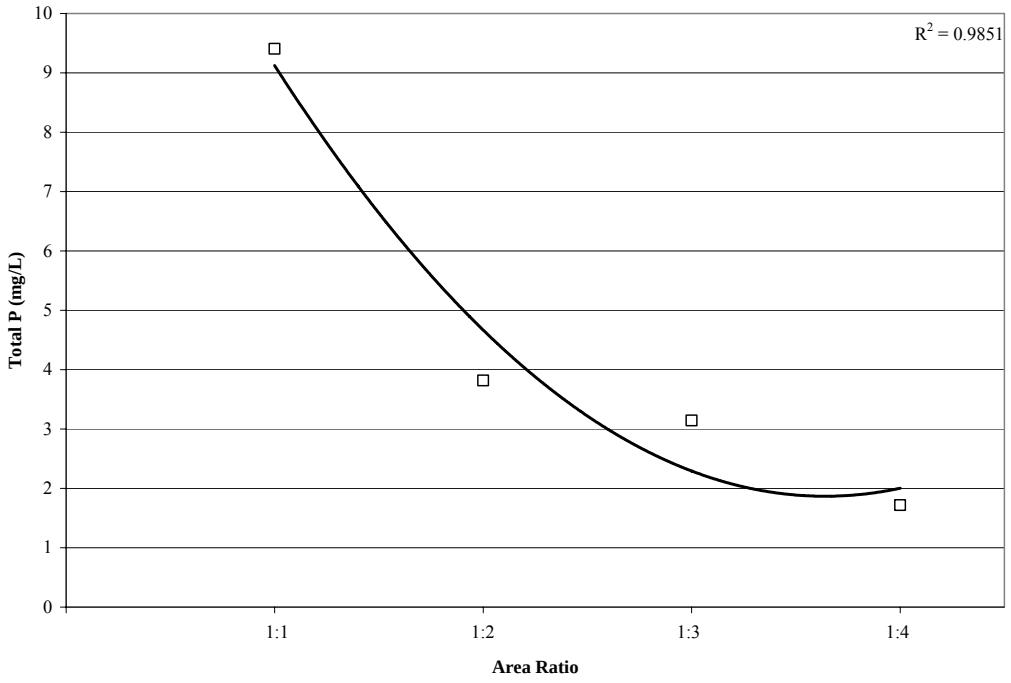


Figure 4.11: Graph of mean TP verses area ratio.



This is similar to the results of Schmitt *et al*., 1999. They determined that as the ratio of runoff area to filter length decreases (10.8:1 and 5.4:1) the concentration of all variables decreased with the exception of atrazine and alachlor. However, there research found that there was a significant difference between length using SAS (α=0.05). Lim *et al*., 1998 findings were more similar to this study. They found few significant differences using LSD, but the mean values still tended to increase as the area ratio increase (2:3, 1:1, and 2:1). Coyne *et al*., 1995 also determined that contaminant removal tends to increase as area ratio decreases (4:1 and 1.5:1). Lee *et al*., 1999 found significant differences ($P<0.05$) as filter strip length changes (40:1 to 20:1).

The lack of significant differences using the SAS analysis is based on an insufficiency of degrees of freedom. This could be corrected by increasing the number of replications

The average initial soil moisture content of the plots was found to be 23% and ranged between 16 and 32%. The final soil moisture content average at 28% and ranged between 26-36%. The average increase in soil moisture was 7% (table 4.5). Soil moisture data is shown in appendix C. There did not appear to be any trends when comparing initial soil moisture content to runoff rate or pollutant concentration.

Table 4.4: Soil moisture data collected on 6/27/2007 and 6/28/2007.

Date	Slope (%)	Area Ratio	ISM (%)	FMC (%)	Difference
6/27/2007	0.5	1:1	17	27	10
6/27/2007	0.5	1:2	19	28	10
6/27/2007	0.5	1:3	18	26	8
6/27/2007	0.5	1:4	24	28	5
6/27/2007	0.5	1:1	19	28	9
6/27/2007	0.5	1:2	27	29	2
6/27/2007	0.5	1:3	23	27	3
6/27/2007	0.5	1:4	16	27	12
6/28/2007	2.0	1:1	30	31	1
6/28/2007	2.0	1:2	26	28	2
6/28/2007	2.0	1:3	27	32	5
6/28/2007	2.0	1:4	32	33	0
6/28/2007	2.0	1:1	23	31	8
6/28/2007	2.0	1:2	26	34	8
6/28/2007	2.0	1:3	22	36	15
6/28/2007	2.0	1:4	20	29	9
			23	30	7

Conclusions

The use of vegetative filter strips to reduce nonpoint source pollution from agricultural land is feasible. The results from this study show an average removed 58% of runoff volume, 66% of TSS, 90% of EColi, and 81% of fecal. This study indicated that contaminant concentration have a polynomial relationship with area ratio. The use of filter strips will increase the reduction of pollutants. The uses of a 1:2 ratio (runoff to filter strip area) is the minimum ratio that should be used to effectively remove a majority of pollutants. No apparent relationships occurred between slope and contaminant concentration.

This study failed to produce significant differences statistically. This is due to large variability of the data and a lack of degrees of freedom. This study could have produced statistical differences if more replications were used

This study was only conducted once which allows for potential variables to be unnoticed. Only conducting the study once does not account for variation of initial soil moisture, vegetation maturity, and other environmental factors. These factors

could play a significant role in reduction of pollutant concentration since they can affect infiltration rates.

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Appendix A - Chapter 2 Data

Manhattan Kansas Weather Data

Table A.1: Weather data 2004

Date	DOY	Max Air Temp	Max Air Tem	Min Air Temp	Min Air Temp	Average Air Temp	Average Air Temp	Wind Speed	Wind Speed	Precip	Precip	RH
		F	C	F	C	F	C	mph	m/s	in	mm	%
1/1/2004	1	60.20	15.67	29.16	-1.58	44.68	7.04	8.08	3.61	0.00	0.00	78.05
1/2/2004	2	60.95	16.08	33.45	0.80	47.20	8.44	7.71	3.45	0.00	0.00	68.97
1/3/2004	3	44.83	7.13	23.02	-4.99	33.92	1.07	12.66	5.66	0.00	0.00	68.33
1/4/2004	4	24.50	-4.17	13.67	-10.19	19.08	-7.18	12.26	5.48	0.00	0.00	93.77
1/5/2004	5	13.87	-10.08	-0.87	-18.26	6.50	-14.17	11.67	5.22	0.00	0.00	78.32
1/6/2004	6	24.15	-4.36	-2.37	-19.09	10.89	-11.73	6.52	2.91	0.00	0.00	67.19
1/7/2004	7	31.18	-0.45	12.85	-10.64	22.02	-5.55	8.05	3.60	0.00	0.00	65.97
1/8/2004	8	44.41	6.89	20.44	-6.42	32.43	0.24	5.48	2.45	0.00	0.00	68.57
1/9/2004	9	31.55	-0.25	14.84	-9.53	23.20	-4.89	6.08	2.72	0.00	0.00	91.25
1/10/2004	10	47.46	8.59	12.99	-10.56	30.23	-0.99	5.70	2.55	0.00	0.00	76.98
1/11/2004	11	54.19	12.33	26.36	-3.13	40.27	4.60	5.59	2.50	0.00	0.00	64.83
1/12/2004	12	51.30	10.72	20.65	-6.31	35.97	2.21	1.55	0.69	0.00	0.00	80.79
1/13/2004	13	49.54	9.74	20.28	-6.51	34.91	1.62	3.00	1.34	0.00	0.00	77.52
1/14/2004	14	56.23	13.46	24.08	-4.40	40.15	4.53	7.59	3.39	0.00	0.00	72.84
1/15/2004	15	50.78	10.43	17.98	-7.79	34.38	1.32	4.24	1.89	0.00	0.00	69.92
1/16/2004	16	47.97	8.87	40.97	4.98	44.47	6.93	4.39	1.96	0.00	0.00	95.36
1/17/2004	17	44.14	6.74	30.72	-0.71	37.43	3.01	10.41	4.65	0.08	2.03	99.47
1/18/2004	18	31.90	-0.05	11.62	-11.32	21.76	-5.69	11.25	5.03	0.00	0.00	76.10
1/19/2004	19	27.61	-2.44	7.85	-13.42	17.73	-7.93	3.76	1.68	0.00	0.00	73.45
1/20/2004	20	32.22	0.12	20.04	-6.65	26.13	-3.26	3.53	1.58	0.00	0.00	74.84
1/21/2004	21	51.88	11.05	19.29	-7.06	35.59	1.99	4.80	2.14	0.00	0.00	75.83
1/22/2004	22	35.18	1.77	17.14	-8.25	26.16	-3.24	6.41	2.87	0.00	0.00	54.64
1/23/2004	23	58.86	14.92	24.18	-4.34	41.52	5.29	8.14	3.64	0.00	0.00	64.11
1/24/2004	24	38.69	3.71	27.31	-2.60	33.00	0.55	11.02	4.93	0.00	0.00	85.47
1/25/2004	25	30.62	-0.77	25.56	-3.58	28.09	-2.17	8.26	3.69	0.00	0.00	99.84
1/26/2004	26	25.87	-3.40	8.75	-12.92	17.31	-8.16	6.08	2.72	0.00	0.00	94.98
1/27/2004	27	18.28	-7.62	0.20	-17.66	9.24	-12.64	6.16	2.75	0.00	0.00	86.40
1/28/2004	28	13.19	-10.45	2.72	-16.27	7.96	-13.36	5.00	2.24	0.00	0.00	89.87
1/29/2004	29	9.24	-12.65	-0.63	-18.13	4.31	-15.39	5.24	2.34	0.00	0.00	88.35
1/30/2004	30	17.61	-7.99	-0.73	-18.18	8.44	-13.09	5.38	2.40	0.00	0.00	84.50
1/31/2004	31	24.04	-4.43	8.46	-13.08	16.25	-8.75	7.34	3.28	0.00	0.00	95.83
2/1/2004	32	29.73	-1.26	21.09	-6.06	25.41	-3.66	4.38	1.96	0.01	0.25	99.93
2/2/2004	33	21.81	-5.66	3.24	-15.98	12.52	-10.82	8.70	3.89	0.00	0.00	96.33
2/3/2004	34	31.27	-0.40	-5.69	-20.94	12.79	-10.67	3.23	1.44	0.03	0.76	90.53
2/4/2004	35	28.69	-1.84	21.68	-5.74	25.18	-3.79	10.81	4.83	0.00	0.00	92.00

2/5/2004	36	28.05	-2.19	20.94	-6.15	24.50	-4.17	5.43	2.43	0.10	2.54	99.50
2/6/2004	37	24.34	-4.25	12.57	-10.80	18.46	-7.52	12.64	5.65	0.00	0.00	91.86
2/7/2004	38	16.34	-8.70	-9.82	-23.23	3.26	-15.97	7.74	3.46	0.00	0.00	86.99
2/8/2004	39	37.46	3.03	-9.71	-23.17	13.88	-10.07	11.26	5.04	0.00	0.00	83.81
2/9/2004	40	34.46	1.37	10.34	-12.03	22.40	-5.33	4.41	1.97	0.00	0.00	84.43
2/10/2004	41	34.30	1.28	4.14	-15.48	19.22	-7.10	3.35	1.50	0.00	0.00	86.74
2/11/2004	42	31.68	-0.18	12.71	-10.72	22.20	-5.45	8.79	3.93	0.00	0.00	79.23
2/12/2004	43	16.31	-8.72	1.79	-16.79	9.05	-12.75	8.08	3.61	0.00	0.00	83.13
2/13/2004	44	32.86	0.47	-2.87	-19.37	14.99	-9.45	4.29	1.92	0.00	0.00	80.49
2/14/2004	45	29.31	-1.49	5.53	-14.71	17.42	-8.10	5.78	2.58	0.00	0.00	87.56
2/15/2004	46	25.67	-3.52	2.24	-16.53	13.96	-10.03	3.14	1.40	0.00	0.00	78.77
2/16/2004	47	34.69	1.49	8.11	-13.27	21.40	-5.89	1.26	0.56	0.00	0.00	92.54
2/17/2004	48	46.29	7.94	14.12	-9.93	30.21	-1.00	1.29	0.58	0.00	0.00	91.41
2/18/2004	49	52.60	11.44	33.85	1.03	43.22	6.23	5.94	2.66	0.00	0.00	82.26
2/19/2004	50	61.42	16.34	35.72	2.06	48.57	9.20	9.74	4.35	0.00	0.00	84.04
2/20/2004	51	49.69	9.83	32.34	0.19	41.01	5.01	14.29	6.39	0.00	0.00	82.70
2/21/2004	52	52.38	11.32	27.16	-2.69	39.77	4.32	4.10	1.83	0.00	0.00	77.58
2/22/2004	53	61.95	16.64	40.48	4.71	51.21	10.67	9.13	4.08	0.00	0.00	70.46
2/23/2004	54	42.76	5.98	30.82	-0.66	36.79	2.66	8.16	3.65	0.00	0.00	95.32
2/24/2004	55	35.76	2.09	29.57	-1.35	32.66	0.37	9.69	4.33	0.00	0.00	89.48
2/25/2004	56	44.28	6.82	27.98	-2.23	36.13	2.30	7.75	3.46	0.00	0.00	81.30
2/26/2004	57	52.28	11.27	22.11	-5.50	37.19	2.89	3.81	1.70	0.00	0.00	76.92
2/27/2004	58	59.40	15.22	32.04	0.02	45.72	7.62	9.15	4.09	0.00	0.00	64.06
2/28/2004	59	55.92	13.29	36.54	2.52	46.23	7.91	11.31	5.06	0.00	0.00	72.20
2/29/2004	60	52.19	11.22	41.91	5.50	47.05	8.36	15.15	6.77	0.68	17.27	93.37
3/1/2004	61	47.56	8.65	37.50	3.06	42.53	5.85	16.22	7.25	0.00	0.00	86.65
3/2/2004	62	45.01	7.23	32.36	0.20	38.69	3.72	5.40	2.41	0.02	0.51	86.00
3/3/2004	63	43.04	6.13	36.00	2.22	39.52	4.18	3.95	1.76	0.34	8.64	100.00
3/4/2004	64	44.18	6.77	38.62	3.68	41.40	5.22	7.08	3.16	1.31	33.27	100.00
3/5/2004	65	44.29	6.83	32.99	0.55	38.64	3.69	10.88	4.86	0.01	0.25	94.99
3/6/2004	66	58.72	14.84	28.81	-1.77	43.77	6.54	10.08	4.51	0.02	0.51	69.38
3/7/2004	67	49.61	9.79	30.56	-0.80	40.09	4.49	11.07	4.95	0.00	0.00	55.14
3/8/2004	68	64.81	18.23	29.70	-1.28	47.25	8.47	8.60	3.84	0.00	0.00	57.34
3/9/2004	69	56.13	13.41	32.51	0.28	44.32	6.84	8.28	3.70	0.00	0.00	62.25
3/10/2004	70	60.46	15.81	34.23	1.24	47.34	8.52	12.41	5.55	0.00	0.00	69.63
3/11/2004	71	49.99	9.99	28.31	-2.05	39.15	3.97	8.57	3.83	0.00	0.00	58.38
3/12/2004	72	56.66	13.70	22.28	-5.40	39.47	4.15	3.79	1.70	0.00	0.00	57.82
3/13/2004	73	52.59	11.44	42.47	5.82	47.53	8.63	8.44	3.77	0.00	0.00	77.11
3/14/2004	74	55.45	13.03	32.40	0.22	43.92	6.62	5.52	2.47	0.10	2.54	62.30
3/15/2004	75	49.38	9.65	33.11	0.62	41.24	5.14	8.05	3.60	0.19	4.83	90.08
3/16/2004	76	49.05	9.47	30.71	-0.72	39.88	4.38	6.75	3.02	0.00	0.00	89.55
3/17/2004	77	66.68	19.26	38.41	3.56	52.54	11.41	4.73	2.11	0.00	0.00	76.22
3/18/2004	78	60.92	16.07	36.32	2.40	48.62	9.23	5.96	2.66	0.00	0.00	66.27
3/19/2004	79	73.30	22.94	42.89	6.05	58.09	14.50	8.26	3.69	0.00	0.00	76.55
3/20/2004	80	65.29	18.49	41.03	5.02	53.16	11.76	13.29	5.94	0.00	0.00	41.93
3/21/2004	81	46.34	7.97	27.93	-2.26	37.14	2.85	7.13	3.19	0.00	0.00	48.21
3/22/2004	82	55.86	13.25	29.85	-1.20	42.85	6.03	6.98	3.12	0.00	0.00	47.92
3/23/2004	83	75.88	24.38	43.05	6.14	59.46	15.26	9.49	4.24	0.00	0.00	63.91
3/24/2004	84	67.93	19.96	57.63	14.24	62.78	17.10	10.67	4.77	0.00	0.00	89.15
3/25/2004	85	69.82	21.01	59.23	15.13	64.53	18.07	9.62	4.30	0.00	0.00	93.41
3/26/2004	86	80.21	26.78	61.06	16.14	70.63	21.46	8.68	3.88	0.40	10.16	88.11

3/27/2004	87	67.14	19.52	48.37	9.09	57.75	14.31	13.48	6.03	0.94	23.88	95.59
3/28/2004	88	62.85	17.14	41.45	5.25	52.15	11.19	7.09	3.17	0.04	1.02	76.60
3/29/2004	89	58.42	14.68	37.51	3.06	47.97	8.87	7.39	3.30	0.17	4.32	73.23
3/30/2004	90	51.07	10.59	32.65	0.36	41.86	5.48	7.56	3.38	0.00	0.00	74.46
3/31/2004	91	55.50	13.06	29.56	-1.36	42.53	5.85	4.01	1.79	0.00	0.00	68.21
4/1/2004	92	62.65	17.03	30.13	-1.04	46.39	7.99	3.04	1.36	0.00	0.00	67.32
4/2/2004	93	64.81	18.23	32.46	0.25	48.63	9.24	3.36	1.50	0.00	0.00	61.48
4/3/2004	94	62.75	17.08	34.16	1.20	48.46	9.14	7.99	3.57	0.00	0.00	67.42
4/4/2004	95	65.02	18.35	30.00	-1.11	47.51	8.62	2.80	1.25	0.00	0.00	57.80
4/5/2004	96	67.46	19.70	35.89	2.16	51.68	10.93	5.24	2.34	0.00	0.00	63.70
4/6/2004	97	76.23	24.57	47.64	8.69	61.94	16.63	3.95	1.77	0.00	0.00	75.32
4/7/2004	98	73.40	23.00	51.56	10.87	62.48	16.93	4.83	2.16	0.17	4.32	68.22
4/8/2004	99	65.46	18.59	37.77	3.20	51.61	10.90	6.11	2.73	0.01	0.25	66.21
4/9/2004	100	57.31	14.06	40.65	4.81	48.98	9.43	8.92	3.99	0.00	0.00	68.61
4/10/2004	101	53.19	11.77	33.64	0.91	43.42	6.34	10.90	4.87	0.00	0.00	85.90
4/11/2004	102	58.47	14.71	25.79	-3.45	42.13	5.63	3.41	1.53	0.00	0.00	71.37
4/12/2004	103	52.55	11.42	32.38	0.21	42.47	5.82	4.70	2.10	0.00	0.00	98.39
4/13/2004	104	60.25	15.70	36.98	2.77	48.62	9.23	4.71	2.11	0.00	0.00	74.08
4/14/2004	105	72.60	22.56	51.15	10.64	61.88	16.60	7.89	3.53	0.00	0.00	63.21
4/15/2004	106	82.00	27.78	54.61	12.56	68.30	20.17	10.39	4.65	0.00	0.00	36.05
4/16/2004	107	87.96	31.09	54.53	12.51	71.24	21.80	9.19	4.11	0.00	0.00	23.04
4/17/2004	108	88.92	31.62	54.73	12.63	71.82	22.12	10.58	4.73	0.00	0.00	28.66
4/18/2004	109	74.68	23.71	63.38	17.43	69.03	20.57	16.75	7.49	0.02	0.51	75.80
4/19/2004	110	73.42	23.01	49.95	9.97	61.69	16.49	6.67	2.98	0.00	0.00	72.55
4/20/2004	111	73.15	22.86	52.96	11.64	63.05	17.25	6.88	3.08	0.06	1.52	62.01
4/21/2004	112	72.54	22.52	44.06	6.70	58.30	14.61	3.61	1.61	0.00	0.00	69.70
4/22/2004	113	57.71	14.28	50.12	10.06	53.91	12.17	10.27	4.59	0.61	15.49	91.93
4/23/2004	114	59.62	15.35	49.67	9.82	54.64	12.58	10.10	4.52	0.15	3.81	83.27
4/24/2004	115	65.44	18.58	48.31	9.06	56.88	13.82	11.76	5.26	0.34	8.64	97.17
4/25/2004	116	67.57	19.76	41.93	5.52	54.75	12.64	9.55	4.27	0.00	0.00	72.06
4/26/2004	117	70.21	21.23	40.43	4.68	55.32	12.95	6.78	3.03	0.00	0.00	53.79
4/27/2004	118	80.84	27.13	36.37	2.43	58.60	14.78	6.61	2.96	0.00	0.00	33.13
4/28/2004	119	85.54	29.74	62.81	17.11	74.17	23.43	16.47	7.36	0.00	0.00	50.89
4/29/2004	120	65.93	18.85	50.46	10.26	58.19	14.55	7.50	3.35	0.03	0.76	84.60
4/30/2004	121	53.63	12.02	44.09	6.71	48.86	9.36	7.90	3.53	1.19	30.23	82.51
5/1/2004	122	63.18	17.32	39.55	4.20	51.37	10.76	7.39	3.30	0.00	0.00	56.80
5/2/2004	123	58.53	14.74	36.80	2.67	47.66	8.70	7.59	3.39	0.00	0.00	53.29
5/3/2004	124	65.90	18.83	31.25	-0.42	48.57	9.21	5.49	2.46	0.00	0.00	64.44
5/4/2004	125	75.12	23.96	48.44	9.13	61.78	16.54	3.89	1.74	0.00	0.00	63.11
5/5/2004	126	88.79	31.55	44.89	7.16	66.84	19.36	6.32	2.83	0.00	0.00	63.10
5/6/2004	127	94.75	34.86	60.73	15.96	77.74	25.41	8.91	3.98	0.00	0.00	58.13
5/7/2004	128	89.79	32.11	63.58	17.54	76.68	24.82	8.34	3.73	0.00	0.00	75.20
5/8/2004	129	90.82	32.68	63.90	17.72	77.36	25.20	10.46	4.68	0.00	0.00	73.04
5/9/2004	130	84.30	29.06	65.17	18.43	74.74	23.74	9.94	4.44	0.07	1.78	82.58
5/10/2004	131	77.47	25.26	61.05	16.14	69.26	20.70	5.30	2.37	1.03	26.16	93.95
5/11/2004	132	81.49	27.49	63.38	17.43	72.43	22.46	9.31	4.16	0.00	0.00	90.66
5/12/2004	133	78.49	25.83	58.35	14.64	68.42	20.23	9.11	4.07	0.30	7.62	90.56
5/13/2004	134	60.10	15.61	42.31	5.73	51.20	10.67	9.75	4.36	0.23	5.84	98.00
5/14/2004	135	61.72	16.51	40.71	4.84	51.21	10.67	7.83	3.50	0.11	2.79	77.61
5/15/2004	136	71.36	21.87	38.97	3.87	55.16	12.87	4.26	1.91	0.00	0.00	79.69
5/16/2004	137	78.17	25.65	51.29	10.72	64.73	18.18	9.24	4.13	0.00	0.00	86.25

5/17/2004	138	82.68	28.16	63.59	17.55	73.13	22.85	8.62	3.85	0.00	0.00	94.58
5/18/2004	139	73.84	23.24	60.12	15.62	66.98	19.43	6.65	2.97	0.16	4.06	98.56
5/19/2004	140	85.50	29.72	64.92	18.29	75.21	24.00	7.97	3.56	0.00	0.00	91.97
5/20/2004	141	88.41	31.34	68.74	20.41	78.57	25.87	7.00	3.13	0.00	0.00	96.61
5/21/2004	142	88.01	31.12	70.49	21.38	79.25	26.25	11.52	5.15	0.00	0.00	77.92
5/22/2004	143	88.62	31.46	69.29	20.72	78.95	26.09	11.48	5.13	0.00	0.00	78.57
5/23/2004	144	85.06	29.48	63.67	17.60	74.36	23.54	8.31	3.71	0.01	0.25	73.92
5/24/2004	145	86.66	30.37	60.62	15.90	73.64	23.13	10.11	4.52	0.00	0.00	82.48
5/25/2004	146	74.10	23.39	54.74	12.64	64.42	18.01	8.23	3.68	0.00	0.00	71.89
5/26/2004	147	72.57	22.54	54.44	12.47	63.50	17.50	5.73	2.56	0.00	0.00	82.04
5/27/2004	148	91.28	32.93	59.30	15.17	75.29	24.05	6.26	2.80	0.00	0.00	64.35
5/28/2004	149	89.99	32.22	53.99	12.22	71.99	22.22	6.45	2.88	0.00	0.00	59.84
5/29/2004	150	89.16	31.76	68.57	20.32	78.87	26.04	12.90	5.77	0.00	0.00	75.19
5/30/2004	151	79.00	26.11	52.77	11.54	65.88	18.82	9.22	4.12	0.44	11.18	73.63
5/31/2004	152	82.42	28.01	50.14	10.08	66.28	19.04	7.88	3.52	0.00	0.00	54.83
6/1/2004	153	84.68	29.27	54.51	12.50	69.59	20.89	6.71	3.00	0.00	0.00	44.63
6/2/2004	154	80.36	26.87	53.81	12.12	67.09	19.49	4.82	2.16	0.00	0.00	65.99
6/3/2004	155	80.73	27.07	49.94	9.97	65.34	18.52	3.06	1.37	0.00	0.00	66.70
6/4/2004	156	85.68	29.82	54.21	12.34	69.94	21.08	3.69	1.65	0.00	0.00	65.93
6/5/2004	157	77.62	25.35	59.15	15.08	68.39	20.21	3.25	1.45	0.96	24.38	85.38
6/6/2004	158	85.74	29.85	64.42	18.01	75.08	23.93	4.36	1.95	0.00	0.00	83.84
6/7/2004	159	84.97	29.43	70.12	21.18	77.54	25.30	9.78	4.37	0.00	0.00	74.60
6/8/2004	160	89.09	31.72	71.55	21.97	80.32	26.84	9.16	4.10	0.00	0.00	73.80
6/9/2004	161	78.63	25.91	69.24	20.69	73.93	23.30	7.48	3.34	0.05	1.27	89.71
6/10/2004	162	81.71	27.61	68.45	20.25	75.08	23.93	6.75	3.02	0.00	0.00	85.23
6/11/2004	163	90.42	32.46	67.57	19.76	79.00	26.11	7.71	3.45	0.00	0.00	50.55
6/12/2004	164	88.97	31.65	61.51	16.39	75.24	24.02	9.94	4.44	0.75	19.05	76.28
6/13/2004	165	89.08	31.71	61.86	16.59	75.47	24.15	7.31	3.27	0.01	0.25	72.70
6/14/2004	166	90.58	32.55	68.45	20.25	79.51	26.40	5.39	2.41	0.54	13.72	76.03
6/15/2004	167	85.75	29.86	64.47	18.04	75.11	23.95	4.78	2.14	0.62	15.75	83.64
6/16/2004	168	86.78	30.43	65.20	18.44	75.99	24.44	3.93	1.76	0.01	0.25	82.91
6/17/2004	169	77.56	25.31	59.27	15.15	68.41	20.23	3.71	1.66	0.75	19.05	86.42
6/18/2004	170	72.16	22.31	60.53	15.85	66.35	19.08	7.20	3.22	0.02	0.51	98.61
6/19/2004	171	69.03	20.57	57.15	13.97	63.09	17.27	4.87	2.18	0.01	0.25	77.63
6/20/2004	172	77.58	25.32	58.83	14.91	68.20	20.11	2.72	1.21	0.04	1.02	85.26
6/21/2004	173	80.51	26.95	63.00	17.22	71.75	22.08	5.96	2.67	0.04	1.02	81.16
6/22/2004	174	81.97	27.76	58.29	14.61	70.13	21.18	2.08	0.93	0.00	0.00	59.92
6/23/2004	175	88.30	31.28	56.42	13.57	72.36	22.42	5.30	2.37	0.00	0.00	67.20
6/24/2004	176	86.28	30.16	52.91	11.61	69.59	20.89	7.57	3.38	0.30	7.62	79.43
6/25/2004	177	74.60	23.66	51.42	10.79	63.01	17.23	5.63	2.52	0.00	0.00	65.70
6/26/2004	178	75.72	24.29	50.91	10.51	63.31	17.40	3.91	1.75	0.00	0.00	88.03
6/27/2004	179	70.02	21.12	58.81	14.89	64.41	18.01	3.38	1.51	1.75	44.45	93.64
6/28/2004	180	78.00	25.55	56.81	13.78	67.40	19.67	3.74	1.67	0.00	0.00	70.21
6/29/2004	181	79.93	26.63	51.92	11.06	65.92	18.85	2.22	0.99	0.00	0.00	77.07
6/30/2004	182	85.82	29.90	57.59	14.22	71.70	22.06	2.23	1.00	0.00	0.00	79.93
7/1/2004	183	80.07	26.71	67.91	19.95	73.99	23.33	4.07	1.82	1.00	25.40	93.64
7/2/2004	184	76.96	24.98	66.90	19.39	71.93	22.18	4.46	1.99	1.94	49.28	98.66
7/3/2004	185	90.47	32.48	65.12	18.40	77.80	25.44	4.98	2.22	0.33	8.38	76.77
7/4/2004	186	89.77	32.09	65.80	18.78	77.78	25.43	3.80	1.70	0.11	2.79	70.87
7/5/2004	187	90.27	32.37	64.25	17.92	77.26	25.14	5.41	2.42	0.34	8.64	87.68
7/6/2004	188	81.07	27.26	59.07	15.04	70.07	21.15	6.10	2.73	1.14	28.96	86.23

7/7/2004	189	86.96	30.53	55.05	12.81	71.00	21.67	3.47	1.55	0.00	0.00	92.43
7/8/2004	190	87.93	31.07	68.03	20.01	77.98	25.54	3.98	1.78	0.12	3.05	91.24
7/9/2004	191	86.09	30.05	64.81	18.23	75.45	24.14	4.17	1.86	0.84	21.34	87.38
7/10/2004	192	92.07	33.37	68.32	20.18	80.19	26.77	3.62	1.62	0.01	0.25	87.91
7/11/2004	193	96.21	35.67	72.40	22.44	84.30	29.06	5.31	2.37	0.00	0.00	80.91
7/12/2004	194	96.83	36.02	72.26	22.36	84.54	29.19	3.74	1.67	0.00	0.00	74.94
7/13/2004	195	100.48	38.05	70.81	21.56	85.65	29.80	3.94	1.76	0.00	0.00	74.29
7/14/2004	196	89.91	32.17	68.20	20.11	79.05	26.14	3.79	1.69	0.00	0.00	76.96
7/15/2004	197	93.51	34.17	65.24	18.47	79.38	26.32	2.92	1.30	0.00	0.00	82.22
7/16/2004	198	89.68	32.05	67.86	19.92	78.77	25.99	4.26	1.91	0.00	0.00	84.59
7/17/2004	199	84.20	29.00	63.75	17.64	73.97	23.32	4.00	1.79	0.00	0.00	79.31
7/18/2004	200	89.51	31.95	59.66	15.37	74.59	23.66	2.26	1.01	0.00	0.00	77.77
7/19/2004	201	97.81	36.56	66.96	19.42	82.38	27.99	5.23	2.34	0.00	0.00	71.76
7/20/2004	202	98.28	36.82	68.26	20.14	83.27	28.48	3.08	1.38	0.00	0.00	60.58
7/21/2004	203	82.24	27.91	73.50	23.06	77.87	25.48	3.97	1.78	0.07	1.78	84.34
7/22/2004	204	86.68	30.38	67.68	19.82	77.18	25.10	4.91	2.19	0.09	2.29	91.73
7/23/2004	205	73.92	23.29	66.64	19.24	70.28	21.27	4.49	2.01	0.07	1.78	91.96
7/24/2004	206	68.71	20.40	58.50	14.72	63.61	17.56	9.30	4.16	1.15	29.21	98.29
7/25/2004	207	75.06	23.92	57.01	13.89	66.03	18.91	5.34	2.39	0.23	5.84	82.68
7/26/2004	208	77.99	25.55	51.80	11.00	64.89	18.27	1.69	0.75	0.00	0.00	76.06
7/27/2004	209	81.82	27.68	53.94	12.19	67.88	19.93	2.98	1.33	0.00	0.00	76.36
7/28/2004	210	77.72	25.40	58.68	14.82	68.20	20.11	4.06	1.81	0.00	0.00	93.93
7/29/2004	211	75.56	24.20	61.57	16.43	68.57	20.31	1.82	0.81	0.00	0.00	82.78
7/30/2004	212	83.02	28.34	60.61	15.89	71.81	22.12	1.79	0.80	0.00	0.00	80.85
7/31/2004	213	87.01	30.56	60.21	15.67	73.61	23.12	3.77	1.68	0.00	0.00	84.13
8/1/2004	214	91.35	32.97	67.30	19.61	79.33	26.29	4.81	2.15	0.00	0.00	77.72
8/2/2004	215	95.02	35.01	73.61	23.12	84.32	29.06	5.75	2.57	0.00	0.00	71.70
8/3/2004	216	95.27	35.15	74.53	23.63	84.90	29.39	5.24	2.34	0.00	0.00	69.39
8/4/2004	217	83.93	28.85	68.02	20.01	75.97	24.43	6.58	2.94	0.00	0.00	86.52
8/5/2004	218	85.93	29.96	59.80	15.44	72.86	22.70	5.58	2.49	0.00	0.00	70.98
8/6/2004	219	77.27	25.15	57.15	13.97	67.21	19.56	3.45	1.54	0.00	0.00	81.74
8/7/2004	220	81.86	27.70	52.82	11.57	67.34	19.63	3.66	1.64	0.00	0.00	81.32
8/8/2004	221	85.61	29.78	64.18	17.88	74.90	23.83	4.87	2.18	0.00	0.00	86.62
8/9/2004	222	86.86	30.48	61.82	16.57	74.34	23.52	3.26	1.46	0.45	11.43	81.02
8/10/2004	223	78.54	25.85	57.15	13.97	67.84	19.91	4.00	1.79	0.04	1.02	86.14
8/11/2004	224	71.76	22.09	50.46	10.26	61.11	16.17	3.86	1.73	0.09	2.29	81.12
8/12/2004	225	74.50	23.61	46.88	8.27	60.69	15.94	1.24	0.55	0.03	0.76	81.41
8/13/2004	226	73.91	23.28	52.83	11.57	63.37	17.43	2.56	1.15	0.06	1.52	72.04
8/14/2004	227	76.10	24.50	47.95	8.86	62.02	16.68	2.17	0.97	0.00	0.00	73.55
8/15/2004	228	79.72	26.51	50.91	10.51	65.31	18.51	3.95	1.77	0.00	0.00	73.46
8/16/2004	229	82.52	28.07	57.52	14.18	70.02	21.12	3.40	1.52	0.00	0.00	86.90
8/17/2004	230	91.39	33.00	63.20	17.33	77.30	25.16	3.12	1.39	0.00	0.00	71.77
8/18/2004	231	93.94	34.41	63.33	17.40	78.63	25.91	5.55	2.48	0.00	0.00	79.31
8/19/2004	232	68.78	20.43	55.27	12.93	62.03	16.68	5.31	2.37	0.17	4.32	76.61
8/20/2004	233	78.76	25.98	52.49	11.38	65.62	18.68	2.11	0.94	0.26	6.60	73.01
8/21/2004	234	80.06	26.70	47.61	8.67	63.83	17.68	3.59	1.61	0.00	0.00	67.81
8/22/2004	235	86.93	30.52	58.77	14.87	72.85	22.69	4.04	1.80	0.00	0.00	83.10
8/23/2004	236	83.33	28.52	63.85	17.69	73.59	23.10	5.84	2.61	0.02	0.51	88.21
8/24/2004	237	85.46	29.70	63.19	17.33	74.33	23.52	6.26	2.80	4.98	126.49	87.27
8/25/2004	238	89.20	31.78	68.29	20.16	78.74	25.97	4.20	1.88	0.06	1.52	81.02
8/26/2004	239	93.47	34.15	64.84	18.24	79.16	26.20	5.63	2.51	0.00	0.00	77.11

8/27/2004	240	89.83	32.13	66.91	19.39	78.37	25.76	3.80	1.70	0.00	0.00	75.63
8/28/2004	241	77.62	25.34	60.22	15.68	68.92	20.51	5.27	2.36	0.00	0.00	81.53
8/29/2004	242	81.65	27.58	54.08	12.27	67.86	19.92	1.92	0.86	0.00	0.00	74.17
8/30/2004	243	86.67	30.37	58.64	14.80	72.65	22.58	2.48	1.11	0.00	0.00	70.67
8/31/2004	244	87.14	30.63	62.49	16.94	74.82	23.79	1.27	0.57	0.00	0.00	71.26
9/1/2004	245	88.69	31.49	61.57	16.43	75.13	23.96	1.49	0.67	0.00	0.00	65.06
9/2/2004	246	85.79	29.88	59.90	15.50	72.84	22.69	1.40	0.63	0.00	0.00	65.78
9/3/2004	247	86.64	30.35	62.59	16.99	74.61	23.67	3.23	1.44	0.00	0.00	65.03
9/4/2004	248	88.15	31.20	66.09	18.94	77.12	25.07	5.20	2.32	0.00	0.00	68.98
9/5/2004	249	88.19	31.22	61.62	16.46	74.91	23.84	6.42	2.87	0.00	0.00	77.68
9/6/2004	250	81.71	27.62	53.77	12.09	67.74	19.86	4.52	2.02	0.75	19.05	65.56
9/7/2004	251	80.56	26.98	48.92	9.40	64.74	18.19	3.09	1.38	0.00	0.00	63.83
9/8/2004	252	79.60	26.44	48.07	8.93	63.84	17.69	2.58	1.15	0.00	0.00	67.09
9/9/2004	253	82.76	28.20	49.23	9.57	66.00	18.89	3.17	1.41	0.00	0.00	59.02
9/10/2004	254	85.51	29.73	53.76	12.09	69.64	20.91	3.28	1.46	0.00	0.00	53.07
9/11/2004	255	86.45	30.25	55.51	13.06	70.98	21.66	3.15	1.41	0.00	0.00	64.60
9/12/2004	256	88.47	31.37	59.09	15.05	73.78	23.21	4.61	2.06	0.00	0.00	64.94
9/13/2004	257	89.76	32.09	65.40	18.55	77.58	25.32	6.86	3.06	0.00	0.00	55.95
9/14/2004	258	92.98	33.88	69.53	20.85	81.26	27.36	6.85	3.06	0.00	0.00	57.82
9/15/2004	259	79.11	26.17	55.52	13.07	67.31	19.62	4.43	1.98	0.17	4.32	77.51
9/16/2004	260	80.91	27.17	48.60	9.22	64.75	18.20	3.30	1.48	0.00	0.00	59.52
9/17/2004	261	81.22	27.34	53.07	11.71	67.14	19.52	4.72	2.11	0.00	0.00	74.54
9/18/2004	262	90.73	32.63	64.91	18.29	77.82	25.46	7.03	3.14	0.08	2.03	70.15
9/19/2004	263	89.06	31.70	66.98	19.43	78.02	25.57	5.57	2.49	0.02	0.51	57.13
9/20/2004	264	86.83	30.46	64.59	18.10	75.71	24.28	5.76	2.57	0.00	0.00	49.10
9/21/2004	265	77.36	25.20	65.95	18.86	71.66	22.03	5.87	2.62	0.00	0.00	68.82
9/22/2004	266	82.45	28.03	60.58	15.88	71.52	21.95	5.26	2.35	0.00	0.00	65.56
9/23/2004	267	75.56	24.20	51.87	11.04	63.72	17.62	4.97	2.22	0.30	7.62	66.52
9/24/2004	268	83.01	28.34	46.52	8.06	64.76	18.20	2.01	0.90	0.01	0.25	59.33
9/25/2004	269	82.65	28.14	50.82	10.45	66.73	19.30	2.46	1.10	0.00	0.00	53.81
9/26/2004	270	82.65	28.14	48.05	8.92	65.35	18.53	2.14	0.96	0.00	0.00	58.01
9/27/2004	271	82.08	27.82	49.64	9.80	65.86	18.81	2.94	1.32	0.00	0.00	64.20
9/28/2004	272	69.62	20.90	45.77	7.65	57.69	14.27	4.29	1.92	0.00	0.00	66.66
9/29/2004	273	70.70	21.50	44.63	7.02	57.66	14.26	2.44	1.09	0.02	0.51	56.57
9/30/2004	274	81.30	27.39	49.04	9.47	65.17	18.43	4.53	2.03	0.00	0.00	52.52
10/1/2004	275	66.78	19.32	35.15	1.75	50.96	10.53	7.10	3.17	0.00	0.00	70.91
10/2/2004	276	66.42	19.12	29.42	-1.43	47.92	8.84	2.39	1.07	0.00	0.00	47.82
10/3/2004	277	82.65	28.14	38.25	3.47	60.45	15.81	3.64	1.63	0.00	0.00	49.15
10/4/2004	278	66.74	19.30	38.51	3.62	52.63	11.46	4.38	1.96	0.00	0.00	51.51
10/5/2004	279	76.15	24.53	33.92	1.07	55.04	12.80	3.44	1.54	0.00	0.00	51.95
10/6/2004	280	59.77	15.43	46.77	8.21	53.27	11.82	4.19	1.87	0.00	0.00	63.90
10/7/2004	281	74.03	23.35	56.60	13.67	65.32	18.51	4.50	2.01	0.04	1.02	94.98
10/8/2004	282	77.58	25.32	49.53	9.74	63.55	17.53	1.86	0.83	0.01	0.25	71.83
10/9/2004	283	74.38	23.55	43.62	6.45	59.00	15.00	3.43	1.53	0.00	0.00	59.57
10/10/2004	284	70.79	21.55	45.19	7.33	57.99	14.44	3.69	1.65	0.00	0.00	79.94
10/11/2004	285	59.04	15.02	47.92	8.85	53.48	11.93	4.89	2.18	0.09	2.29	77.22
10/12/2004	286	58.23	14.57	46.45	8.03	52.34	11.30	4.25	1.90	0.03	0.76	78.69
10/13/2004	287	67.51	19.73	41.82	5.46	54.66	12.59	8.19	3.66	0.00	0.00	67.95
10/14/2004	288	56.36	13.53	33.52	0.84	44.94	7.19	6.12	2.74	0.00	0.00	60.97
10/15/2004	289	60.58	15.88	37.57	3.09	49.07	9.48	5.79	2.59	0.00	0.00	67.75
10/16/2004	290	60.76	15.98	30.88	-0.62	45.82	7.68	3.55	1.59	0.00	0.00	63.89

10/17/2004	291	70.81	21.56	37.63	3.13	54.22	12.34	5.30	2.37	0.00	0.00	64.08
10/18/2004	292	62.23	16.80	48.27	9.04	55.25	12.92	7.04	3.15	0.00	0.00	80.26
10/19/2004	293	60.37	15.76	44.80	7.11	52.59	11.44	5.78	2.58	0.00	0.00	89.40
10/20/2004	294	55.58	13.10	49.62	9.79	52.60	11.44	5.45	2.44	0.00	0.00	95.24
10/21/2004	295	68.08	20.05	52.33	11.29	60.21	15.67	5.16	2.31	0.01	0.25	97.27
10/22/2004	296	78.55	25.86	59.22	15.12	68.88	20.49	7.84	3.50	0.00	0.00	82.91
10/23/2004	297	72.85	22.70	39.86	4.36	56.35	13.53	8.31	3.71	0.00	0.00	57.61
10/24/2004	298	76.96	24.98	36.51	2.51	56.74	13.74	4.57	2.04	0.00	0.00	56.19
10/25/2004	299	73.21	22.90	43.67	6.49	58.44	14.69	5.00	2.24	0.00	0.00	65.87
10/26/2004	300	73.20	22.89	56.50	13.61	64.85	18.25	3.39	1.52	0.42	10.67	90.52
10/27/2004	301	67.08	19.49	59.28	15.15	63.18	17.32	6.74	3.01	0.04	1.02	95.76
10/28/2004	302	83.06	28.37	62.36	16.87	72.71	22.62	5.92	2.65	0.37	9.40	86.27
10/29/2004	303	80.63	27.02	50.05	10.03	65.34	18.52	11.01	4.92	0.00	0.00	57.19
10/30/2004	304	68.98	20.55	40.38	4.66	54.68	12.60	10.17	4.55	0.00	0.00	48.82
10/31/2004	305	70.69	21.49	36.72	2.62	53.70	12.06	4.08	1.82	0.00	0.00	73.22
11/1/2004	306	59.24	15.13	45.80	7.66	52.52	11.40	6.47	2.89	0.21	5.33	96.75
11/2/2004	307	51.14	10.63	36.43	2.46	43.79	6.55	9.84	4.40	0.14	3.56	79.91
11/3/2004	308	49.70	9.83	31.50	-0.28	40.60	4.78	5.98	2.67	0.01	0.25	85.16
11/4/2004	309	59.77	15.43	30.42	-0.88	45.09	7.27	6.41	2.86	0.00	0.00	64.85
11/5/2004	310	70.67	21.48	26.74	-2.92	48.70	9.28	5.72	2.56	0.00	0.00	60.53
11/6/2004	311	71.17	21.76	32.81	0.45	51.99	11.11	3.02	1.35	0.00	0.00	55.07
11/7/2004	312	68.43	20.24	34.86	1.59	51.64	10.91	4.61	2.06	0.00	0.00	59.94
11/8/2004	313	66.49	19.16	33.95	1.09	50.22	10.12	3.16	1.41	0.00	0.00	60.23
11/9/2004	314	66.55	19.19	43.09	6.16	54.82	12.68	4.90	2.19	0.00	0.00	63.94
11/10/2004	315	57.39	14.11	40.69	4.83	49.04	9.47	5.58	2.49	0.00	0.00	81.84
11/11/2004	316	46.84	8.24	30.53	-0.82	38.68	3.71	12.60	5.63	0.78	19.81	72.14
11/12/2004	317	50.90	10.50	26.79	-2.90	38.85	3.80	4.39	1.96	0.00	0.00	68.41
11/13/2004	318	51.18	10.66	24.52	-4.16	37.85	3.25	4.89	2.18	0.00	0.00	59.31
11/14/2004	319	58.47	14.71	33.92	1.07	46.20	7.89	3.61	1.61	0.00	0.00	65.91
11/15/2004	320	58.76	14.87	42.36	5.76	50.56	10.31	2.40	1.07	0.01	0.25	91.24
11/16/2004	321	67.71	19.84	50.13	10.07	58.92	14.96	4.32	1.93	0.02	0.51	90.54
11/17/2004	322	72.14	22.30	54.19	12.33	63.17	17.31	2.82	1.26	0.00	0.00	89.76
11/18/2004	323	58.49	14.72	49.46	9.70	53.97	12.21	3.16	1.41	0.20	5.08	98.36
11/19/2004	324	52.40	11.33	44.93	7.18	48.66	9.26	5.63	2.52	0.02	0.51	93.76
11/20/2004	325	53.48	11.93	36.72	2.62	45.10	7.28	7.02	3.14	0.00	0.00	76.69
11/21/2004	326	45.77	7.65	35.27	1.81	40.52	4.73	5.46	2.44	0.00	0.00	79.03
11/22/2004	327	49.07	9.48	37.04	2.80	43.05	6.14	2.52	1.12	0.00	0.00	92.35
11/23/2004	328	47.11	8.39	31.12	-0.49	39.11	3.95	8.72	3.90	0.01	0.25	88.22
11/24/2004	329	41.98	5.55	23.80	-4.56	32.89	0.50	7.15	3.20	0.09	2.29	70.78
11/25/2004	330	59.96	15.53	24.27	-4.29	42.12	5.62	4.53	2.02	0.00	0.00	74.56
11/26/2004	331	55.72	13.18	34.61	1.45	45.16	7.31	3.41	1.53	0.00	0.00	83.72
11/27/2004	332	46.45	8.03	24.99	-3.90	35.72	2.07	11.57	5.17	0.05	1.27	80.95
11/28/2004	333	36.69	2.60	25.39	-3.67	31.04	-0.53	6.56	2.93	0.00	0.00	84.65
11/29/2004	334	34.65	1.47	25.19	-3.78	29.92	-1.16	9.89	4.42	0.12	3.05	95.67
11/30/2004	335	32.92	0.51	16.79	-8.45	24.85	-3.97	6.55	2.93	0.15	3.81	85.63
12/1/2004	336	45.93	7.74	14.42	-9.77	30.18	-1.01	3.40	1.52	0.00	0.00	78.05
12/2/2004	337	47.69	8.72	19.42	-6.99	33.55	0.86	5.64	2.52	0.00	0.00	80.76
12/3/2004	338	51.08	10.60	19.32	-7.05	35.20	1.78	3.98	1.78	0.00	0.00	78.07
12/4/2004	339	61.23	16.24	25.82	-3.43	43.52	6.40	5.22	2.33	0.00	0.00	63.97
12/5/2004	340	43.82	6.57	26.62	-2.99	35.22	1.79	2.95	1.32	0.00	0.00	97.24
12/6/2004	341	44.80	7.11	33.90	1.06	39.35	4.08	2.80	1.25	0.46	11.68	99.24

12/7/2004	342	51.26	10.70	26.69	-2.95	38.98	3.88	5.97	2.67	0.00	0.00	85.47
12/8/2004	343	53.27	11.82	29.23	-1.54	41.25	5.14	5.32	2.38	0.00	0.00	85.12
12/9/2004	344	60.74	15.97	25.80	-3.44	43.27	6.26	4.73	2.11	0.00	0.00	76.55
12/10/2004	345	43.70	6.50	23.86	-4.52	33.78	0.99	11.65	5.21	0.00	0.00	78.94
12/11/2004	346	56.34	13.52	23.87	-4.52	40.11	4.50	4.87	2.18	0.00	0.00	75.11
12/12/2004	347	52.55	11.42	31.00	-0.56	41.77	5.43	10.29	4.60	0.00	0.00	56.08
12/13/2004	348	39.19	3.99	14.17	-9.91	26.68	-2.96	10.82	4.84	0.00	0.00	62.20
12/14/2004	349	38.16	3.42	8.52	-13.04	23.34	-4.81	4.17	1.86	0.00	0.00	63.31
12/15/2004	350	48.82	9.34	23.24	-4.87	36.03	2.24	7.27	3.25	0.00	0.00	50.92
12/16/2004	351	51.85	11.03	22.82	-5.10	37.33	2.96	4.40	1.97	0.00	0.00	72.55
12/17/2004	352	51.60	10.89	18.24	-7.64	34.92	1.62	3.53	1.58	0.00	0.00	69.93
12/18/2004	353	54.93	12.74	25.25	-3.75	40.09	4.49	10.12	4.52	0.00	0.00	61.82
12/19/2004	354	27.42	-2.55	11.10	-11.61	19.26	-7.08	7.15	3.20	0.00	0.00	48.77
12/20/2004	355	61.39	16.33	20.06	-6.64	40.72	4.84	6.34	2.83	0.00	0.00	61.62
12/21/2004	356	33.29	0.72	18.95	-7.25	26.12	-3.27	6.85	3.06	0.00	0.00	68.87
12/22/2004	357	21.15	-6.03	3.27	-15.96	12.21	-10.99	7.77	3.47	0.00	0.00	69.29
12/23/2004	358	19.02	-7.21	-0.38	-17.99	9.32	-12.60	6.50	2.91	0.00	0.00	69.49
12/24/2004	359	31.94	-0.04	-2.74	-19.30	14.60	-9.67	6.80	3.04	0.00	0.00	62.52
12/25/2004	360	48.44	9.14	15.12	-9.38	31.78	-0.12	3.49	1.56	0.00	0.00	60.30
12/26/2004	361	43.86	6.59	17.99	-7.78	30.92	-0.60	5.04	2.25	0.00	0.00	76.58
12/27/2004	362	53.80	12.11	27.38	-2.57	40.59	4.77	7.93	3.54	0.00	0.00	69.04
12/28/2004	363	58.92	14.95	23.56	-4.69	41.24	5.13	7.39	3.30	0.00	0.00	71.83
12/29/2004	364	55.99	13.33	18.82	-7.32	37.40	3.00	4.32	1.93	0.00	0.00	80.61
12/30/2004	365	68.30	20.17	42.07	5.59	55.18	12.88	11.75	5.25	0.00	0.00	64.53
12/31/2004	366	65.29	18.49	24.94	-3.92	45.12	7.29	4.26	1.90	0.00	0.00	58.34

Table A.2: Weather data 2005

Date	DOY	Max Air Temp	Max Air Temp	Min Air Temp	Min Air Temp	Average Air Temp	Average Air Temp	Wind Speed	Wind Speed	Precip	Precip	RH
		F	C	F	C	F	C	mph	m/s	in	mm	%
1/1/2005	1	65.79	18.77	36.17	2.32	50.98	10.54	10.78	4.82	0.00	0.00	88.27
1/2/2005	2	37.19	2.88	29.86	-1.19	33.53	0.85	8.89	3.97	0.06	1.52	87.39
1/3/2005	3	32.85	0.47	26.45	-3.08	29.65	-1.31	3.27	1.46	0.37	9.40	92.14
1/4/2005	4	27.91	-2.27	19.21	-7.11	23.56	-4.69	5.09	2.28	0.02	0.51	90.19
1/5/2005	5	9.91	-12.27	-1.08	-18.38	4.42	-15.33	8.08	3.61	0.00	0.00	80.30
1/6/2005	6	28.87	-1.74	-2.18	-18.99	13.35	-10.36	5.33	2.38	0.00	0.00	57.60
1/7/2005	7	27.72	-2.38	4.91	-15.05	16.32	-8.71	4.82	2.15	T	T	89.27
1/8/2005	8	33.92	1.07	4.96	-15.02	19.44	-6.98	5.37	2.40	T	T	83.79
1/9/2005	9	45.01	7.23	25.14	-3.81	35.08	1.71	6.06	2.71	0.00	0.00	89.25
1/10/2005	10	28.01	-2.22	21.51	-5.83	24.76	-4.02	6.93	3.10	0.00	0.00	92.38
1/11/2005	11	26.81	-2.88	20.90	-6.17	23.86	-4.53	3.52	1.57	0.01	0.25	93.22
1/12/2005	12	30.01	-1.11	26.89	-2.84	28.45	-1.97	4.39	1.96	0.00	0.00	90.33
1/13/2005	13	21.88	-5.62	8.22	-13.21	15.05	-9.42	8.46	3.78	0.00	0.00	73.49
1/14/2005	14	15.86	-8.97	3.00	-16.11	9.43	-12.54	8.81	3.94	0.00	0.00	65.10
1/15/2005	15	13.89	-10.06	1.74	-16.81	7.82	-13.44	6.23	2.78	0.00	0.00	72.31
1/16/2005	16	21.76	-5.69	1.02	-17.21	11.39	-11.45	4.80	2.15	0.00	0.00	72.34
1/17/2005	17	30.12	-1.04	13.80	-10.11	21.96	-5.58	5.93	2.65	0.00	0.00	83.60
1/18/2005	18	40.96	4.98	14.34	-9.81	27.65	-2.42	11.12	4.97	0.00	0.00	87.36

1/19/2005	19	52.05	11.14	26.04	-3.31	39.05	3.91	5.64	2.52	0.00	0.00	83.74
1/20/2005	20	61.09	16.16	28.86	-1.74	44.98	7.21	5.76	2.57	0.00	0.00	85.73
1/21/2005	21	39.84	4.36	17.04	-8.31	28.44	-1.98	6.21	2.78	0.00	0.00	87.31
1/22/2005	22	37.16	2.87	8.04	-13.31	22.60	-5.22	14.69	6.57	0.00	0.00	63.94
1/23/2005	23	37.40	3.00	9.70	-12.39	23.55	-4.69	5.45	2.44	0.00	0.00	70.32
1/24/2005	24	60.15	15.64	25.37	-3.68	42.76	5.98	5.07	2.27	0.00	0.00	78.38
1/25/2005	25	54.01	12.23	28.88	-1.73	41.45	5.25	5.37	2.40	0.00	0.00	83.57
1/26/2005	26	44.09	6.72	26.03	-3.32	35.06	1.70	6.61	2.95	0.00	0.00	89.45
1/27/2005	27	35.95	2.19	26.99	-2.78	31.47	-0.29	7.97	3.56	0.00	0.00	87.28
1/28/2005	28	40.03	4.46	27.90	-2.28	33.97	1.09	6.22	2.78	0.12	3.05	92.39
1/29/2005	29	38.12	3.40	26.93	-2.82	32.53	0.29	6.39	2.86	0.00	0.00	89.19
1/30/2005	30	39.15	3.97	32.31	0.17	35.73	2.07	4.56	2.04	0.00	0.00	92.15
1/31/2005	31	40.05	4.47	32.31	0.17	36.18	2.32	4.46	1.99	0.00	0.00	88.46
2/1/2005	32	39.08	3.93	24.61	-4.11	31.85	-0.09	3.06	1.37	0.00	0.00	90.25
2/2/2005	33	44.10	6.72	19.80	-6.78	31.95	-0.03	3.62	1.62	0.00	0.00	83.79
2/3/2005	34	58.39	14.66	23.51	-4.72	40.95	4.97	3.46	1.55	0.00	0.00	83.26
2/4/2005	35	62.78	17.10	22.92	-5.04	42.85	6.03	7.19	3.21	0.00	0.00	78.79
2/5/2005	36	60.21	15.67	37.04	2.80	48.63	9.24	12.91	5.77	0.42	10.67	78.56
2/6/2005	37	50.72	10.40	26.14	-3.26	38.43	3.57	4.74	2.12	0.78	19.81	90.61
2/7/2005	38	31.54	-0.26	15.32	-9.27	23.43	-4.76	6.49	2.90	0.00	0.00	88.26
2/8/2005	39	19.92	-6.71	0.90	-17.28	10.41	-11.99	2.99	1.34	0.00	0.00	89.27
2/9/2005	40	31.90	-0.06	4.26	-15.41	18.08	-7.73	3.47	1.55	0.28	7.11	80.57
2/10/2005	41	44.10	6.72	11.93	-11.15	28.02	-2.21	3.70	1.65	0.00	0.00	80.51
2/11/2005	42	58.08	14.49	17.94	-7.81	38.01	3.34	5.81	2.60	0.00	0.00	76.20
2/12/2005	43	50.02	10.01	33.39	0.77	41.71	5.39	4.42	1.98	1.02	25.91	90.28
2/13/2005	44	51.08	10.60	28.93	-1.71	40.01	4.45	7.51	3.36	0.04	1.02	89.23
2/14/2005	45	68.00	20.00	30.66	-0.74	49.33	9.63	6.37	2.85	0.00	0.00	64.09
2/15/2005	46	51.08	10.60	24.90	-3.94	37.99	3.33	9.65	4.31	0.00	0.00	87.90
2/16/2005	47	46.06	7.81	22.92	-5.04	34.49	1.38	3.25	1.45	0.00	0.00	85.13
2/17/2005	48	53.06	11.70	20.99	-6.12	37.03	2.79	6.64	2.97	0.00	0.00	83.68
2/18/2005	49	48.04	8.91	21.41	-5.88	34.73	1.51	6.44	2.88	0.06	1.52	78.11
2/19/2005	50	46.12	7.84	38.07	3.37	42.10	5.61	7.24	3.24	0.14	3.56	90.43
2/20/2005	51	57.11	13.95	32.02	0.01	44.57	6.98	4.30	1.92	0.00	0.00	87.91
2/21/2005	52	46.08	7.82	31.14	-0.48	38.61	3.67	3.63	1.62	0.00	0.00	80.21
2/22/2005	53	43.50	6.39	33.69	0.94	38.60	3.66	4.11	1.84	0.00	0.00	81.25
2/23/2005	54	46.06	7.81	29.73	-1.26	37.90	3.28	5.20	2.32	0.00	0.00	73.40
2/24/2005	55	45.63	7.57	23.32	-4.82	34.48	1.38	4.49	2.01	0.00	0.00	75.19
2/25/2005	56	65.01	18.34	24.02	-4.43	44.52	6.95	5.36	2.40	0.00	0.00	58.00
2/26/2005	57	61.05	16.14	39.18	3.99	50.12	10.06	6.23	2.78	0.00	0.00	61.52
2/27/2005	58	48.97	9.43	20.81	-6.22	34.89	1.61	4.89	2.19	0.02	0.51	72.31
2/28/2005	59	39.41	4.12	12.92	-10.60	26.17	-3.24	10.93	4.89	0.00	0.00	68.55
3/1/2005	60	45.03	7.24	12.18	-11.01	28.61	-1.89	3.40	1.52	0.00	0.00	58.36
3/2/2005	61	60.10	15.61	21.91	-5.61	41.01	5.00	3.94	1.76	0.00	0.00	50.86
3/3/2005	62	75.85	24.36	24.97	-3.91	50.41	10.23	3.77	1.69	0.00	0.00	63.06
3/4/2005	63	70.59	21.44	28.22	-2.10	49.41	9.67	7.04	3.15	0.00	0.00	50.80
3/5/2005	64	63.10	17.28	26.42	-3.10	44.76	7.09	6.01	2.69	0.00	0.00	62.55
3/6/2005	65	72.95	22.75	43.01	6.12	57.98	14.43	6.37	2.85	0.03	0.76	58.84
3/7/2005	66	54.00	12.22	21.92	-5.60	37.96	3.31	10.71	4.79	0.00	0.00	61.76
3/8/2005	67	52.25	11.25	22.67	-5.18	37.46	3.03	5.92	2.65	0.00	0.00	67.35
3/9/2005	68	42.93	6.07	32.47	0.26	37.70	3.17	6.23	2.78	0.02	0.51	67.66
3/10/2005	69	62.10	16.72	31.59	-0.23	46.85	8.25	13.04	5.83	0.00	0.00	58.31

3/11/2005	70	66.06	18.92	30.61	-0.77	48.34	9.08	11.29	5.05	0.00	0.00	46.56
3/12/2005	71	75.06	23.92	32.17	0.09	53.62	12.01	6.43	2.87	0.00	0.00	43.63
3/13/2005	72	53.31	11.84	29.30	-1.50	41.31	5.17	6.36	2.84	0.00	0.00	53.52
3/14/2005	73	53.04	11.69	27.31	-2.61	40.18	4.54	3.70	1.65	0.00	0.00	58.87
3/15/2005	74	53.98	12.21	26.31	-3.16	40.15	4.53	5.57	2.49	0.00	0.00	58.20
3/16/2005	75	59.97	15.54	22.99	-5.01	41.48	5.27	6.04	2.70	0.00	0.00	63.93
3/17/2005	76	61.70	16.50	36.57	2.54	49.14	9.52	11.06	4.94	0.00	0.00	38.86
3/18/2005	77	56.03	13.35	28.07	-2.18	42.05	5.58	11.26	5.03	0.00	0.00	53.71
3/19/2005	78	50.16	10.09	27.57	-2.46	38.87	3.81	7.16	3.20	0.00	0.00	67.56
3/20/2005	79	63.00	17.22	33.30	0.72	48.15	8.97	10.81	4.83	0.00	0.00	65.71
3/21/2005	80	48.94	9.41	39.94	4.41	44.44	6.91	14.03	6.27	0.54	13.72	93.24
3/22/2005	81	41.64	5.36	33.05	0.58	37.35	2.97	9.83	4.39	0.03	0.76	93.20
3/23/2005	82	51.87	11.04	33.24	0.69	42.56	5.86	6.22	2.78	0.03	0.76	87.13
3/24/2005	83	45.09	7.27	36.12	2.29	40.61	4.78	5.34	2.39	0.03	0.76	93.90
3/25/2005	84	37.61	3.12	37.69	3.16	37.65	3.14	7.15	3.20	0.00	0.00	89.27
3/26/2005	85	47.11	8.39	28.24	-2.09	37.68	3.15	5.10	2.28	0.00	0.00	89.25
3/27/2005	86	59.77	15.43	27.79	-2.34	43.78	6.54	4.47	2.00	0.00	0.00	78.86
3/28/2005	87	73.06	22.81	32.98	0.54	53.02	11.68	8.92	3.99	0.00	0.00	65.70
3/29/2005	88	75.00	23.89	53.49	11.94	64.25	17.91	15.05	6.73	0.00	0.00	65.44
3/30/2005	89	61.02	16.12	36.08	2.27	48.55	9.19	9.31	4.16	0.01	0.25	85.80
3/31/2005	90	54.01	12.23	28.01	-2.22	41.01	5.01	7.37	3.29	0.01	0.25	73.10
4/1/2005	91	61.05	16.14	29.98	-1.12	45.52	7.51	6.90	3.08	0.00	0.00	70.70
4/2/2005	92	70.07	21.15	24.89	-3.95	47.48	8.60	8.70	3.89	0.00	0.00	58.19
4/3/2005	93	80.96	27.20	38.99	3.88	59.98	15.54	11.09	4.96	0.00	0.00	54.88
4/4/2005	94	82.09	27.83	55.96	13.31	69.03	20.57	17.78	7.95	0.00	0.00	55.35
4/5/2005	95	72.97	22.76	55.29	12.94	64.13	17.85	11.87	5.31	0.13	3.30	78.88
4/6/2005	96	57.94	14.41	47.84	8.80	52.89	11.61	9.32	4.17	0.04	1.02	93.11
4/7/2005	97	69.96	21.09	38.10	3.39	54.03	12.24	7.32	3.27	0.00	0.00	78.52
4/8/2005	98	69.21	20.67	37.29	2.94	53.25	11.81	8.20	3.67	0.00	0.00	79.89
4/9/2005	99	77.49	25.27	53.33	11.85	65.41	18.56	15.95	7.13	0.00	0.00	73.20
4/10/2005	100	71.82	22.12	52.34	11.30	62.08	16.71	10.78	4.82	0.06	1.52	89.61
4/11/2005	101	73.09	22.83	46.92	8.29	60.01	15.56	10.79	4.82	0.24	6.10	90.80
4/12/2005	102	52.50	11.39	35.29	1.83	43.90	6.61	12.09	5.40	0.01	0.25	86.32
4/13/2005	103	63.07	17.26	36.09	2.27	49.58	9.77	6.74	3.01	0.00	0.00	89.00
4/14/2005	104	69.10	20.61	33.43	0.79	51.27	10.70	4.80	2.15	0.00	0.00	70.34
4/15/2005	105	76.98	24.99	43.20	6.22	60.09	15.61	5.97	2.67	0.00	0.00	69.90
4/16/2005	106	75.63	24.24	50.77	10.43	63.20	17.33	7.92	3.54	0.00	0.00	77.83
4/17/2005	107	80.67	27.04	48.00	8.89	64.34	17.96	10.30	4.60	0.00	0.00	73.43
4/18/2005	108	78.08	25.60	61.03	16.13	69.56	20.86	17.72	7.92	0.00	0.00	78.30
4/19/2005	109	80.06	26.70	62.96	17.20	71.51	21.95	16.02	7.16	0.00	0.00	80.11
4/20/2005	110	85.03	29.46	60.89	16.05	72.96	22.76	13.12	5.86	0.01	0.25	83.79
4/21/2005	111	81.12	27.29	57.33	14.07	69.23	20.68	8.31	3.71	0.00	0.00	78.70
4/22/2005	112	67.21	19.56	43.46	6.37	55.34	12.96	13.54	6.05	0.00	0.00	68.50
4/23/2005	113	60.10	15.61	38.56	3.64	49.33	9.63	8.51	3.80	0.00	0.00	65.42
4/24/2005	114	63.21	17.34	28.99	-1.67	46.10	7.83	5.19	2.32	0.00	0.00	65.88
4/25/2005	115	56.03	13.35	34.33	1.29	45.18	7.32	3.85	1.72	0.17	4.32	89.23
4/26/2005	116	56.30	13.50	32.35	0.19	44.33	6.85	9.03	4.04	0.02	0.51	72.37
4/27/2005	117	62.15	16.75	33.16	0.64	47.66	8.70	4.93	2.20	0.00	0.00	67.55
4/28/2005	118	51.93	11.07	39.81	4.34	45.87	7.71	10.16	4.54	0.00	0.00	78.22
4/29/2005	119	54.03	12.24	37.17	2.87	45.60	7.56	7.95	3.55	0.05	1.27	89.28
4/30/2005	120	59.02	15.01	24.14	-4.37	41.58	5.32	5.80	2.59	0.00	0.00	68.43

5/1/2005	121	58.15	14.53	33.29	0.72	45.72	7.62	6.22	2.78	0.00	0.00	68.05
5/2/2005	122	57.38	14.10	28.27	-2.07	42.83	6.01	5.71	2.55	0.00	0.00	63.72
5/3/2005	123	64.87	18.26	31.74	-0.14	48.31	9.06	4.11	1.84	0.00	0.00	65.21
5/4/2005	124	72.63	22.57	33.18	0.66	52.91	11.61	7.59	3.39	0.00	0.00	68.76
5/5/2005	125	71.06	21.70	37.11	2.84	54.09	12.27	7.97	3.56	0.00	0.00	78.21
5/6/2005	126	81.05	27.25	52.92	11.62	66.99	19.44	10.47	4.68	0.00	0.00	73.66
5/7/2005	127	80.06	26.70	62.08	16.71	71.07	21.71	17.04	7.62	0.01	0.25	79.70
5/8/2005	128	80.10	26.72	59.90	15.50	70.00	21.11	12.74	5.69	0.07	1.78	78.44
5/9/2005	129	80.24	26.80	54.28	12.38	67.26	19.59	6.93	3.10	0.00	0.00	78.80
5/10/2005	130	95.25	35.14	59.41	15.23	77.33	25.18	13.24	5.92	0.00	0.00	70.27
5/11/2005	131	84.61	29.23	61.11	16.17	72.86	22.70	16.02	7.16	0.06	1.52	82.60
5/12/2005	132	84.11	28.95	57.27	14.04	70.69	21.49	9.10	4.07	1.11	28.19	89.20
5/13/2005	133	68.25	20.14	51.46	10.81	59.86	15.48	6.46	2.89	0.06	1.52	86.79
5/14/2005	134	69.17	20.65	44.96	7.20	57.07	13.93	6.23	2.78	0.00	0.00	82.50
5/15/2005	135	66.96	19.42	35.14	1.74	51.05	10.58	4.25	1.90	0.00	0.00	76.85
5/16/2005	136	75.74	24.30	44.06	6.70	59.90	15.50	11.86	5.30	0.00	0.00	68.79
5/17/2005	137	79.18	26.21	58.41	14.67	68.80	20.44	17.63	7.88	0.00	0.00	67.19
5/18/2005	138	82.76	28.20	57.94	14.41	70.35	21.31	8.12	3.63	0.00	0.00	76.27
5/19/2005	139	93.81	34.34	54.50	12.50	74.16	23.42	5.00	2.24	0.00	0.00	67.89
5/20/2005	140	89.11	31.73	62.94	17.19	76.03	24.46	5.43	2.43	0.00	0.00	70.60
5/21/2005	141	93.06	33.92	59.56	15.31	76.31	24.62	9.83	4.39	0.00	0.00	65.74
5/22/2005	142	87.66	30.92	56.52	13.62	72.09	22.27	6.84	3.06	0.00	0.00	67.25
5/23/2005	143	88.20	31.22	64.99	18.33	76.60	24.78	6.18	2.76	0.00	0.00	76.87
5/24/2005	144	82.94	28.30	59.74	15.41	71.34	21.86	5.28	2.36	0.00	0.00	96.70
5/25/2005	145	84.94	29.41	47.23	8.46	66.09	18.94	7.26	3.25	0.04	1.02	87.55
5/26/2005	146	78.93	26.07	49.53	9.74	64.23	17.91	5.22	2.33	0.00	0.00	58.93
5/27/2005	147	73.60	23.11	50.16	10.09	61.88	16.60	5.24	2.34	0.05	1.27	81.30
5/28/2005	148	79.38	26.32	47.03	8.35	63.21	17.34	4.80	2.15	0.02	0.51	70.39
5/29/2005	149	82.04	27.80	54.61	12.56	68.33	20.18	7.66	3.42	0.00	0.00	83.78
5/30/2005	150	69.24	20.69	52.02	11.12	60.63	15.91	8.27	3.70	0.11	2.79	85.20
5/31/2005	151	82.96	28.31	55.04	12.80	69.00	20.56	6.44	2.88	0.00	0.00	96.30
6/1/2005	152	78.21	25.67	56.16	13.42	67.19	19.55	5.38	2.40	0.00	0.00	92.80
6/2/2005	153	81.70	27.61	57.34	14.08	69.52	20.84	10.35	4.63	0.00	0.00	80.13
6/3/2005	154	77.59	25.33	60.19	15.66	68.89	20.49	12.02	5.37	1.78	45.21	89.55
6/4/2005	155	86.49	30.27	59.00	15.00	72.75	22.64	8.24	3.68	1.79	45.47	87.25
6/5/2005	156	85.24	29.58	60.98	16.10	73.11	22.84	6.29	2.81	0.00	0.00	75.22
6/6/2005	157	89.91	32.17	65.82	18.79	77.87	25.48	8.14	3.64	0.00	0.00	78.30
6/7/2005	158	88.56	31.42	73.08	22.82	80.82	27.12	13.55	6.06	0.00	0.00	80.50
6/8/2005	159	93.18	33.99	68.41	20.23	80.80	27.11	12.61	5.64	0.00	0.00	78.60
6/9/2005	160	82.99	28.33	63.00	17.22	73.00	22.78	14.40	6.44	1.36	34.54	90.00
6/10/2005	161	78.69	25.94	62.37	16.87	70.53	21.41	8.93	3.99	5.32	135.13	96.00
6/11/2005	162	80.51	26.95	61.54	16.41	71.03	21.68	6.83	3.05	0.55	13.97	93.90
6/12/2005	163	75.85	24.36	61.59	16.44	68.72	20.40	5.92	2.65	0.82	20.83	89.29
6/13/2005	164	82.20	27.89	56.71	13.73	69.46	20.81	8.01	3.58	0.02	0.51	78.21
6/14/2005	165	82.99	28.33	60.06	15.59	71.53	21.96	7.84	3.50	0.00	0.00	73.20
6/15/2005	166	84.97	29.43	61.16	16.20	73.07	22.81	5.14	2.30	0.02	0.51	68.21
6/16/2005	167	84.97	29.43	63.09	17.27	74.03	23.35	5.14	2.30	0.02	0.51	89.09
6/17/2005	168	85.32	29.62	64.08	17.82	74.70	23.72	6.22	2.78	0.00	0.00	90.00
6/18/2005	169	85.01	29.45	62.17	16.76	73.59	23.11	4.66	2.08	0.00	0.00	66.45
6/19/2005	170	88.99	31.66	65.82	18.79	77.41	25.23	10.61	4.74	0.00	0.00	78.32
6/20/2005	171	90.03	32.24	67.08	19.49	78.56	25.86	5.27	2.36	0.00	0.00	76.22

6/21/2005	172	89.73	32.07	65.12	18.40	77.43	25.24	5.29	2.36	0.02	0.51	78.58
6/22/2005	173	91.78	33.21	67.50	19.72	79.64	26.47	4.75	2.12	0.00	0.00	74.00
6/23/2005	174	91.49	33.05	66.43	19.13	78.96	26.09	10.01	4.47	0.00	0.00	72.80
6/24/2005	175	97.99	36.66	72.25	22.36	85.12	29.51	11.37	5.08	0.00	0.00	64.45
6/25/2005	176	95.41	35.23	70.48	21.38	82.95	28.30	6.86	3.07	0.00	0.00	60.72
6/26/2005	177	95.47	35.26	74.64	23.69	85.06	29.48	7.49	3.35	0.00	0.00	56.30
6/27/2005	178	99.73	37.63	73.15	22.86	86.44	30.24	9.26	4.14	0.00	0.00	60.24
6/28/2005	179	98.06	36.70	73.38	22.99	85.72	29.84	12.13	5.42	0.07	1.78	60.23
6/29/2005	180	99.66	37.59	76.35	24.64	88.01	31.11	12.22	5.46	0.00	0.00	54.43
6/30/2005	181	99.12	37.29	68.38	20.21	83.75	28.75	8.72	3.90	0.40	10.16	74.70
7/1/2005	182	89.13	31.74	65.46	18.59	77.30	25.16	4.23	1.89	0.00	0.00	80.30
7/2/2005	183	88.90	31.61	67.03	19.46	77.97	25.54	8.92	3.99	0.07	1.78	76.70
7/3/2005	184	94.33	34.63	63.68	17.60	79.01	26.11	9.79	4.38	0.29	7.37	85.70
7/4/2005	185	86.09	30.05	65.64	18.69	75.87	24.37	6.04	2.70	0.00	0.00	78.21
7/5/2005	186	87.17	30.65	59.94	15.52	73.56	23.09	4.13	1.85	0.00	0.00	78.35
7/6/2005	187	87.98	31.10	66.02	18.90	77.00	25.00	4.93	2.20	0.00	0.00	78.03
7/7/2005	188	89.24	31.80	69.19	20.66	79.22	26.23	6.60	2.95	0.00	0.00	78.23
7/8/2005	189	91.11	32.84	69.37	20.76	80.24	26.80	6.39	2.86	0.00	0.00	78.29
7/9/2005	190	94.05	34.47	68.43	20.24	81.24	27.36	7.84	3.50	0.00	0.00	77.40
7/10/2005	191	91.94	33.30	68.83	20.46	80.39	26.88	7.12	3.18	0.00	0.00	79.50
7/11/2005	192	93.04	33.91	66.38	19.10	79.71	26.51	5.50	2.46	0.00	0.00	80.70
7/12/2005	193	91.62	33.12	65.05	18.36	78.34	25.74	4.11	1.84	0.05	1.27	78.28
7/13/2005	194	90.52	32.51	67.51	19.73	79.02	26.12	5.91	2.64	0.00	0.00	74.14
7/14/2005	195	91.78	33.21	68.85	20.47	80.32	26.84	3.34	1.49	0.00	0.00	71.82
7/15/2005	196	92.73	33.74	70.07	21.15	81.40	27.44	4.35	1.94	0.00	0.00	70.39
7/16/2005	197	96.10	35.61	69.82	21.01	82.96	28.31	6.99	3.12	0.00	0.00	78.23
7/17/2005	198	97.02	36.12	71.92	22.18	84.47	29.15	10.03	4.48	0.00	0.00	76.21
7/18/2005	199	88.30	31.28	68.36	20.20	78.33	25.74	6.05	2.70	0.17	4.32	79.86
7/19/2005	200	89.98	32.21	69.42	20.79	79.70	26.50	11.16	4.99	1.03	26.16	87.24
7/20/2005	201	101.26	38.48	75.51	24.17	88.39	31.33	11.33	5.06	0.00	0.00	68.60
7/21/2005	202	100.53	38.07	74.97	23.87	87.75	30.97	9.22	4.12	0.00	0.00	70.90
7/22/2005	203	98.98	37.21	72.46	22.48	85.72	29.84	3.97	1.77	0.00	0.00	71.00
7/23/2005	204	99.07	37.26	74.37	23.54	86.72	30.40	9.48	4.24	0.00	0.00	53.57
7/24/2005	205	95.81	35.45	74.95	23.86	85.38	29.66	11.00	4.92	0.00	0.00	54.46
7/25/2005	206	96.87	36.04	74.28	23.49	85.58	29.76	13.03	5.82	0.00	0.00	65.10
7/26/2005	207	79.32	26.29	57.63	14.24	68.48	20.26	3.55	1.59	0.26	6.60	83.86
7/27/2005	208	77.07	25.04	53.76	12.09	65.42	18.56	5.60	2.50	0.00	0.00	68.50
7/28/2005	209	84.92	29.40	51.17	10.65	68.05	20.03	4.41	1.97	0.00	0.00	70.46
7/29/2005	210	89.89	32.16	59.85	15.47	74.87	23.82	4.73	2.11	0.00	0.00	60.35
7/30/2005	211	91.29	32.94	64.08	17.82	77.69	25.38	3.76	1.68	0.00	0.00	56.40
7/31/2005	212	94.48	34.71	65.93	18.85	80.21	26.78	2.52	1.13	0.00	0.00	57.70
8/1/2005	213	97.63	36.46	68.49	20.27	83.06	28.37	3.38	1.51	0.00	0.00	51.31
8/2/2005	214	101.12	38.40	70.23	21.24	85.68	29.82	4.38	1.96	0.00	0.00	49.32
8/3/2005	215	98.96	37.20	73.06	22.81	86.01	30.01	3.32	1.48	0.00	0.00	51.64
8/4/2005	216	89.98	32.21	63.59	17.55	76.79	24.88	5.27	2.36	0.02	0.51	65.67
8/5/2005	217	89.98	32.21	63.64	17.58	76.81	24.89	5.26	2.35	0.00	0.00	65.67
8/6/2005	218	89.80	32.11	55.60	13.11	72.70	22.61	3.32	1.48	0.00	0.00	65.74
8/7/2005	219	94.03	34.46	66.15	18.97	80.09	26.72	3.86	1.73	0.00	0.00	73.31
8/8/2005	220	96.15	35.64	67.91	19.95	82.03	27.79	2.31	1.03	0.00	0.00	73.62
8/9/2005	221	96.06	35.59	69.49	20.83	82.78	28.21	3.78	1.69	0.00	0.00	55.35
8/10/2005	222	96.06	35.59	69.46	20.81	82.76	28.20	4.29	1.92	0.00	0.00	55.35

8/11/2005	223	92.82	33.79	71.31	21.84	82.07	27.81	3.20	1.43	0.00	0.00	59.80
8/12/2005	224	86.77	30.43	70.63	21.46	78.70	25.94	3.32	1.48	0.18	4.57	80.45
8/13/2005	225	76.80	24.89	63.43	17.46	70.12	21.18	3.48	1.56	0.73	18.54	94.36
8/14/2005	226	76.30	24.61	59.58	15.32	67.94	19.97	4.95	2.21	0.00	0.00	73.98
8/15/2005	227	78.46	25.81	59.38	15.21	68.92	20.51	3.72	1.66	0.00	0.00	76.83
8/16/2005	228	83.26	28.48	61.34	16.30	72.30	22.39	2.31	1.03	0.00	0.00	77.26
8/17/2005	229	86.92	30.51	69.73	20.96	78.33	25.74	3.34	1.49	0.00	0.00	78.87
8/18/2005	230	95.61	35.34	70.92	21.62	83.27	28.48	3.61	1.61	0.15	3.81	72.07
8/19/2005	231	86.54	30.30	66.85	19.36	76.70	24.83	5.13	2.29	1.74	44.20	86.49
8/20/2005	232	89.51	31.95	61.34	16.30	75.43	24.13	5.13	2.29	0.00	0.00	77.65
8/21/2005	233	82.90	28.28	68.90	20.50	75.90	24.39	5.13	2.29	0.00	0.00	86.26
8/22/2005	234	82.54	28.08	69.22	20.68	75.88	24.38	3.80	1.70	0.00	0.00	96.50
8/23/2005	235	84.18	28.99	66.49	19.16	75.34	24.08	5.29	2.36	0.14	3.56	93.40
8/24/2005	236	82.99	28.33	67.39	19.66	75.19	23.99	7.60	3.40	0.36	9.14	97.10
8/25/2005	237	85.71	29.84	66.56	19.20	76.14	24.52	10.16	4.54	1.33	33.78	98.20
8/26/2005	238	87.03	30.57	68.18	20.10	77.61	25.34	4.73	2.11	0.18	4.57	94.90
8/27/2005	239	88.18	31.21	67.77	19.87	77.98	25.54	3.83	1.71	0.00	0.00	90.20
8/28/2005	240	88.72	31.51	63.18	17.32	75.95	24.42	3.72	1.66	0.00	0.00	94.10
8/29/2005	241	87.62	30.90	61.30	16.28	74.46	23.59	2.21	0.99	0.00	0.00	84.00
8/30/2005	242	86.49	30.27	63.23	17.35	74.86	23.81	3.20	1.43	0.00	0.00	85.60
8/31/2005	243	89.56	31.98	63.36	17.42	76.46	24.70	5.78	2.58	0.00	0.00	82.30
9/1/2005	244	82.92	28.29	63.97	17.76	73.45	23.03	5.76	2.57	0.00	0.00	85.30
9/2/2005	245	85.01	29.45	65.25	18.47	75.13	23.96	7.31	3.27	0.00	0.00	88.10
9/3/2005	246	91.45	33.03	65.70	18.72	78.58	25.88	2.83	1.27	0.00	0.00	67.48
9/4/2005	247	89.31	31.84	65.82	18.79	77.57	25.31	2.29	1.02	0.00	0.00	65.71
9/5/2005	248	88.30	31.28	63.50	17.50	75.90	24.39	3.15	1.41	0.02	0.51	57.59
9/6/2005	249	84.11	28.95	63.36	17.42	73.74	23.19	1.65	0.74	0.00	0.00	69.87
9/7/2005	250	86.56	30.31	65.70	18.72	76.13	24.52	4.56	2.04	0.00	0.00	69.24
9/8/2005	251	90.21	32.34	68.99	20.55	79.60	26.44	2.31	1.03	0.02	0.51	64.97
9/9/2005	252	90.36	32.42	66.29	19.05	78.33	25.74	4.86	2.17	0.00	0.00	52.83
9/10/2005	253	90.27	32.37	69.69	20.94	79.98	26.66	6.65	2.97	0.00	0.00	49.98
9/11/2005	254	89.04	31.69	68.63	20.35	78.84	26.02	5.19	2.32	0.00	0.00	60.75
9/12/2005	255	89.31	31.84	72.63	22.57	80.97	27.21	4.75	2.12	0.03	0.76	64.04
9/13/2005	256	83.61	28.67	59.85	15.47	71.73	22.07	3.83	1.71	0.02	0.51	71.30
9/14/2005	257	77.40	25.22	52.07	11.15	64.74	18.19	4.17	1.86	0.00	0.00	59.90
9/15/2005	258	70.41	21.34	50.79	10.44	60.60	15.89	6.31	2.82	0.35	8.89	78.50
9/16/2005	259	77.52	25.29	47.47	8.59	62.50	16.94	2.29	1.02	0.00	0.00	71.54
9/17/2005	260	79.81	26.56	52.38	11.32	66.10	18.94	4.51	2.02	0.00	0.00	71.08
9/18/2005	261	88.99	31.66	63.66	17.59	76.33	24.63	5.94	2.66	0.51	12.95	72.30
9/19/2005	262	87.53	30.85	61.63	16.46	74.58	23.66	3.10	1.39	0.00	0.00	74.80
9/20/2005	263	88.93	31.63	63.55	17.53	76.24	24.58	1.42	0.63	0.00	0.00	77.50
9/21/2005	264	94.50	34.72	63.25	17.36	78.88	26.04	4.72	2.11	0.00	0.00	65.37
9/22/2005	265	83.23	28.46	60.44	15.80	71.84	22.13	6.59	2.95	1.81	45.97	62.16
9/23/2005	266	74.59	23.66	58.10	14.50	66.35	19.08	6.50	2.91	1.50	38.10	83.86
9/24/2005	267	88.56	31.42	67.05	19.47	77.81	25.45	4.42	1.98	0.00	0.00	71.71
9/25/2005	268	87.57	30.87	64.38	17.99	75.98	24.43	2.08	0.93	0.00	0.00	74.60
9/26/2005	269	77.67	25.37	53.19	11.77	65.43	18.57	5.42	2.42	0.00	0.00	66.80
9/27/2005	270	83.79	28.77	50.97	10.54	67.38	19.66	2.93	1.31	0.00	0.00	63.00
9/28/2005	271	68.94	20.52	44.85	7.14	56.90	13.83	6.97	3.12	0.12	3.05	70.80
9/29/2005	272	68.52	20.29	34.51	1.39	51.52	10.84	2.11	0.94	0.00	0.00	56.86
9/30/2005	273	82.27	27.93	48.18	8.99	65.23	18.46	4.78	2.14	0.00	0.00	52.19

10/1/2005	274	71.92	22.18	61.59	16.44	66.76	19.31	6.96	3.11	0.12	3.05	90.50
10/2/2005	275	91.17	32.87	64.96	18.31	78.07	25.59	9.68	4.33	0.00	0.00	67.50
10/3/2005	276	88.74	31.52	73.67	23.15	81.21	27.34	5.68	2.54	0.00	0.00	69.80
10/4/2005	277	86.95	30.53	73.67	23.15	80.31	26.84	9.26	4.14	0.00	0.00	65.28
10/5/2005	278	75.65	24.25	46.71	8.17	61.18	16.21	7.21	3.22	0.80	20.32	66.90
10/6/2005	279	57.27	14.04	37.60	3.11	47.44	8.58	7.41	3.31	0.00	0.00	56.98
10/7/2005	280	58.19	14.55	33.64	0.91	45.92	7.73	3.82	1.71	0.00	0.00	64.15
10/8/2005	281	63.75	17.64	34.36	1.31	49.06	9.48	2.94	1.31	0.00	0.00	65.81
10/9/2005	282	67.39	19.66	39.19	3.99	53.29	11.83	4.29	1.92	0.00	0.00	68.30
10/10/2005	283	64.45	18.03	43.81	6.56	54.13	12.29	2.95	1.32	0.00	0.00	74.30
10/11/2005	284	64.24	17.91	47.47	8.59	55.86	13.25	2.99	1.34	0.27	6.86	86.60
10/12/2005	285	67.73	19.85	47.23	8.46	57.48	14.16	3.83	1.71	0.00	0.00	80.50
10/13/2005	286	75.36	24.09	41.63	5.35	58.50	14.72	2.37	1.06	0.00	0.00	68.84
10/14/2005	287	85.64	29.80	45.68	7.60	65.66	18.70	13.42	6.00	0.16	4.06	10.00
10/15/2005	288	76.42	24.68	49.28	9.60	62.85	17.14	11.22	5.02	0.00	0.00	53.58
10/16/2005	289	79.25	26.25	50.25	10.14	64.75	18.19	2.57	1.15	0.00	0.00	66.07
10/17/2005	290	83.14	28.41	51.17	10.65	67.16	19.53	3.09	1.38	0.00	0.00	59.96
10/18/2005	291	88.36	31.31	45.57	7.54	66.97	19.43	2.02	0.90	0.00	0.00	59.42
10/19/2005	292	65.86	18.81	50.61	10.34	58.24	14.58	7.70	3.44	0.93	23.62	78.00
10/20/2005	293	56.88	13.82	44.72	7.07	50.80	10.44	7.10	3.17	1.10	27.94	90.90
10/21/2005	294	62.47	16.93	40.10	4.50	51.29	10.71	5.33	2.38	0.00	0.00	73.10
10/22/2005	295	57.74	14.30	37.77	3.21	47.76	8.75	1.34	0.60	0.06	1.52	83.00
10/23/2005	296	49.82	9.90	31.92	-0.04	40.87	4.93	9.28	4.15	0.00	0.00	73.40
10/24/2005	297	53.94	12.19	28.19	-2.12	41.07	5.04	4.76	2.13	0.00	0.00	71.80
10/25/2005	298	57.38	14.10	26.29	-3.17	41.84	5.46	1.53	0.68	0.00	0.00	71.79
10/26/2005	299	62.89	17.16	30.26	-0.97	46.58	8.10	1.95	0.87	0.00	0.00	65.60
10/27/2005	300	61.97	16.65	30.29	-0.95	46.13	7.85	1.98	0.89	0.00	0.00	68.50
10/28/2005	301	70.25	21.25	34.19	1.22	52.22	11.23	4.23	1.89	0.00	0.00	62.08
10/29/2005	302	68.70	20.39	52.68	11.49	60.69	15.94	15.33	6.85	0.00	0.00	51.95
10/30/2005	303	71.08	21.71	49.53	9.74	60.31	15.73	5.04	2.25	0.01	0.25	61.20
10/31/2005	304	62.15	16.75	32.53	0.29	47.34	8.52	6.39	2.86	0.00	0.00	58.10
11/1/2005	305	70.34	21.30	29.80	-1.22	50.07	10.04	2.65	1.18	0.00	0.00	66.87
11/2/2005	306	79.74	26.52	39.06	3.92	59.40	15.22	5.09	2.28	0.00	0.00	45.32
11/3/2005	307	74.70	23.72	48.92	9.40	61.81	16.56	5.98	2.67	0.00	0.00	62.59
11/4/2005	308	67.62	19.79	37.43	3.02	52.53	11.40	4.04	1.81	0.00	0.00	80.30
11/5/2005	309	61.92	16.62	36.42	2.46	49.17	9.54	4.99	2.23	0.00	0.00	70.39
11/6/2005	310	66.09	18.94	28.75	-1.81	47.42	8.57	3.64	1.63	0.00	0.00	55.15
11/7/2005	311	76.06	24.48	44.96	7.20	60.51	15.84	7.64	3.42	0.00	0.00	71.80
11/8/2005	312	78.89	26.05	53.46	11.92	66.18	18.99	8.69	3.88	0.00	0.00	86.60
11/9/2005	313	57.88	14.38	35.09	1.72	46.49	8.05	7.20	3.22	0.00	0.00	60.35
11/10/2005	314	61.07	16.15	27.36	-2.58	44.22	6.79	7.03	3.14	0.00	0.00	63.66
11/11/2005	315	71.94	22.19	38.30	3.50	55.12	12.84	4.96	2.22	0.00	0.00	50.11
11/12/2005	316	78.06	25.59	52.84	11.58	65.45	18.58	13.06	5.84	0.00	0.00	64.46
11/13/2005	317	56.70	13.72	34.11	1.17	45.41	7.45	6.92	3.09	0.00	0.00	47.85
11/14/2005	318	51.30	10.72	37.43	3.02	44.37	6.87	6.63	2.96	0.34	8.64	66.30
11/15/2005	319	40.22	4.57	28.58	-1.90	34.40	1.33	15.28	6.83	0.12	3.05	84.20
11/16/2005	320	34.40	1.33	18.68	-7.40	26.54	-3.03	8.72	3.90	0.00	0.00	60.74
11/17/2005	321	44.22	6.79	20.03	-6.65	32.13	0.07	3.20	1.43	0.00	0.00	56.75
11/18/2005	322	57.00	13.89	23.68	-4.62	40.34	4.63	4.57	2.04	0.00	0.00	60.25
11/19/2005	323	51.82	11.01	31.11	-0.49	41.47	5.26	7.87	3.52	0.00	0.00	84.90
11/20/2005	324	47.12	8.40	28.76	-1.80	37.94	3.30	3.20	1.43	0.00	0.00	81.20

11/21/2005	325	59.76	15.42	24.44	-4.20	42.10	5.61	4.41	1.97	0.00	0.00	72.10
11/22/2005	326	56.37	13.54	27.30	-2.61	41.84	5.46	2.31	1.03	0.00	0.00	65.61
11/23/2005	327	69.03	20.57	34.83	1.57	51.93	11.07	7.61	3.40	0.00	0.00	46.97
11/24/2005	328	41.31	5.17	27.43	-2.54	34.37	1.32	6.42	2.87	0.00	0.00	53.49
11/25/2005	329	56.50	13.61	22.18	-5.46	39.34	4.08	4.09	1.83	0.00	0.00	45.23
11/26/2005	330	65.64	18.69	33.14	0.63	49.39	9.66	6.65	2.97	0.00	0.00	69.40
11/27/2005	331	58.42	14.68	40.26	4.59	49.34	9.63	7.69	3.44	0.15	3.81	86.50
11/28/2005	332	41.41	5.23	24.26	-4.30	32.84	0.46	15.19	6.79	0.02	0.51	84.20
11/29/2005	333	30.68	-0.73	19.54	-6.92	25.11	-3.83	12.51	5.59	0.00	0.00	72.30
11/30/2005	334	34.17	1.21	15.03	-9.43	24.60	-4.11	4.36	1.95	0.00	0.00	78.40
12/1/2005	335	29.23	-1.54	14.67	-9.63	21.95	-5.58	8.14	3.64	0.00	0.00	74.20
12/2/2005	336	38.88	3.82	20.49	-6.39	29.69	-1.29	6.82	3.05	0.00	0.00	68.51
12/3/2005	337	29.59	-1.34	14.95	-9.47	22.27	-5.41	8.11	3.63	0.00	0.00	82.37
12/4/2005	338	24.19	-4.34	7.20	-13.78	15.70	-9.06	5.09	2.28	0.00	0.00	77.50
12/5/2005	339	32.71	0.39	7.88	-13.40	20.30	-6.50	7.01	3.13	0.02	0.51	71.30
12/6/2005	340	16.67	-8.52	3.27	-15.96	9.97	-12.24	9.59	4.29	0.00	0.00	67.46
12/7/2005	341	10.09	-12.17	5.94	-14.48	8.02	-13.33	6.94	3.10	0.05	1.27	82.60
12/8/2005	342	13.28	-10.40	-7.73	-22.07	2.78	-16.24	4.00	1.79	0.00	0.00	84.10
12/9/2005	343	27.38	-2.57	-9.36	-22.98	9.01	-12.77	2.88	1.29	0.00	0.00	74.40
12/10/2005	344	41.99	5.55	9.14	-12.70	25.57	-3.58	6.96	3.11	0.00	0.00	72.30
12/11/2005	345	48.18	8.99	27.24	-2.64	37.71	3.17	6.72	3.00	0.00	0.00	70.90
12/12/2005	346	48.07	8.93	26.75	-2.92	37.41	3.01	3.99	1.78	0.00	0.00	77.60
12/13/2005	347	43.66	6.48	26.60	-3.00	35.13	1.74	5.45	2.44	0.10	2.54	78.70
12/14/2005	348	44.60	7.00	30.56	-0.80	37.58	3.10	7.53	3.37	0.00	0.00	76.20
12/15/2005	349	36.90	2.72	24.91	-3.94	30.91	-0.61	10.28	4.60	0.00	0.00	69.70
12/16/2005	350	33.99	1.11	20.50	-6.39	27.25	-2.64	7.01	3.13	0.08	2.03	66.60
12/17/2005	351	25.31	-3.72	20.28	-6.51	22.80	-5.11	8.39	3.75	0.45	11.43	89.70
12/18/2005	352	20.88	-6.18	3.81	-15.66	12.35	-10.92	5.75	2.57	0.00	0.00	81.70
12/19/2005	353	30.80	-0.67	12.81	-10.66	21.81	-5.66	1.97	0.88	0.00	0.00	80.06
12/20/2005	354	35.39	1.88	17.17	-8.24	26.28	-3.18	2.99	1.34	0.00	0.00	83.10
12/21/2005	355	36.95	2.75	12.15	-11.03	24.55	-4.14	3.48	1.56	0.00	0.00	84.53
12/22/2005	356	50.32	10.18	21.67	-5.74	36.00	2.22	4.40	1.97	0.00	0.00	76.75
12/23/2005	357	51.17	10.65	34.28	1.27	42.73	5.96	4.78	2.14	0.00	0.00	75.56
12/24/2005	358	48.47	9.15	32.38	0.21	40.43	4.68	10.16	4.54	0.00	0.00	82.18
12/25/2005	359	50.31	10.17	28.65	-1.86	39.48	4.16	4.83	2.16	0.00	0.00	83.19
12/26/2005	360	59.95	15.53	29.28	-1.51	44.62	7.01	3.92	1.75	0.00	0.00	77.50
12/27/2005	361	54.63	12.57	29.54	-1.37	42.09	5.60	5.70	2.55	0.00	0.00	77.29
12/28/2005	362	54.19	12.33	31.25	-0.42	42.72	5.96	6.88	3.08	0.00	0.00	76.10
12/29/2005	363	44.93	7.18	25.70	-3.50	35.32	1.84	4.62	2.07	0.00	0.00	87.80
12/30/2005	364	48.09	8.94	26.55	-3.03	37.32	2.96	7.74	3.46	0.00	0.00	73.50
12/31/2005	365	51.04	10.58	21.99	-5.56	36.52	2.51	6.46	2.89	0.00	0.00	67.11

Table A.3: Weather data 2006

Date	DOY	Max Air Temp	Max Air Tem	Min Air Temp	Min Air Temp	Average Air Temp	Average Air Temp	Wind Speed	Wind Speed	Precip	Precip	RH
		F	C	F	C	F	C	mph	m/s	in	mm	%
1/1/2006	1	59.60	15.33	32.30	0.17	45.95	7.75	10.22	5.76	0.00	0.00	67.20
1/2/2006	2	47.60	8.67	26.90	-2.83	37.25	2.92	10.55	4.30	0.00	0.00	82.70

1/3/2006	3	67.30	19.61	29.20	-1.56	48.25	9.03	10.08	2.43	0.00	0.00	71.80
1/4/2006	4	56.30	13.50	33.90	1.06	45.10	7.28	7.42	3.17	0.00	0.00	62.60
1/5/2006	5	47.90	8.83	25.70	-3.50	36.80	2.67	6.94	1.38	0.00	0.00	68.20
1/6/2006	6	49.20	9.56	22.90	-5.06	36.05	2.25	4.61	2.04	0.00	0.00	74.40
1/7/2006	7	68.90	20.50	25.90	-3.39	47.40	8.56	6.91	2.33	0.00	0.00	55.60
1/8/2006	8	53.50	11.94	32.80	0.44	43.15	6.19	9.91	2.71	0.00	0.00	65.10
1/9/2006	9	37.80	3.22	23.40	-4.78	30.60	-0.78	6.59	3.04	0.00	0.00	73.10
1/10/2006	10	42.70	5.94	18.30	-7.61	30.50	-0.83	4.53	1.67	0.00	0.00	77.60
1/11/2006	11	62.70	17.06	26.00	-3.33	44.35	6.86	4.78	2.24	0.00	0.00	60.20
1/12/2006	12	55.70	13.17	24.50	-4.17	40.10	4.50	6.12	3.48	0.00	0.00	82.00
1/13/2006	13	55.70	13.17	24.50	-4.17	40.10	4.50	7.37	2.07	0.00	0.00	65.10
1/14/2006	14	58.90	14.94	21.00	-6.11	39.95	4.42	7.93	4.57	0.00	0.00	49.90
1/15/2006	15	65.70	18.72	38.30	3.50	52.00	11.11	7.55	4.75	0.00	0.00	38.40
1/16/2006	16	45.70	7.61	24.40	-4.22	35.05	1.69	10.94	3.36	0.00	0.00	66.70
1/17/2006	17	43.40	6.33	17.30	-8.17	30.35	-0.92	9.24	2.96	0.00	0.00	54.80
1/18/2006	18	64.10	17.83	17.50	-8.06	40.80	4.89	4.40	2.27	0.00	0.00	43.20
1/19/2006	19	49.40	9.67	27.30	-2.61	38.35	3.53	5.17	6.06	0.00	0.00	54.50
1/20/2006	20	36.90	2.72	25.40	-3.67	31.15	-0.47	8.13	5.55	0.00	0.00	90.10
1/21/2006	21	46.30	7.94	24.40	-4.22	35.35	1.86	4.49	4.88	0.00	0.00	80.50
1/22/2006	22	47.30	8.50	22.80	-5.11	35.05	1.69	3.10	3.64	0.00	0.00	79.80
1/23/2006	23	48.50	9.17	26.70	-2.94	37.60	3.11	4.82	1.75	0.00	0.00	76.30
1/24/2006	24	58.60	14.78	26.20	-3.22	42.40	5.78	8.37	2.56	0.00	0.00	45.30
1/25/2006	25	55.70	13.17	18.20	-7.67	36.95	2.75	2.74	1.50	0.00	0.00	47.70
1/26/2006	26	60.80	16.00	33.90	1.06	47.35	8.53	8.76	2.97	0.00	0.00	41.00
1/27/2006	27	59.20	15.11	37.70	3.17	48.45	9.14	10.54	1.58	0.00	0.00	69.80
1/28/2006	28	55.90	13.28	38.20	3.44	47.05	8.36	12.89	3.73	0.03	0.76	85.50
1/29/2006	29	54.20	12.33	28.90	-1.72	41.55	5.31	9.62	4.34	0.00	0.00	63.30
1/30/2006	30	49.50	9.72	26.50	-3.06	38.00	3.33	5.43	1.84	0.00	0.00	60.50
1/31/2006	31	64.10	17.83	26.10	-3.28	45.10	7.28	7.09	1.94	0.00	0.00	40.60
2/1/2006	32	56.30	13.50	26.20	-3.22	41.25	5.14	3.08	1.43	0.00	0.00	60.10
2/2/2006	33	60.40	15.78	27.10	-2.72	43.75	6.53	4.56	5.14	0.00	0.00	48.40
2/3/2006	34	44.30	6.83	24.20	-4.33	34.25	1.25	5.21	2.63	0.00	0.00	59.70
2/4/2006	35	39.40	4.11	15.30	-9.28	27.35	-2.58	6.07	1.45	0.00	0.00	54.00
2/5/2006	36	37.70	3.17	18.50	-7.50	28.10	-2.17	6.81	6.61	0.00	0.00	54.10
2/6/2006	37	42.00	5.56	21.20	-6.00	31.60	-0.22	3.73	2.74	0.00	0.00	50.40
2/7/2006	38	48.50	9.17	18.30	-7.61	33.40	0.78	5.01	1.72	0.00	0.00	60.90
2/8/2006	39	36.10	2.28	16.00	-8.89	26.05	-3.31	7.78	3.64	0.00	0.00	60.30
2/9/2006	40	45.70	7.61	12.40	-10.89	29.05	-1.64	4.62	4.38	0.00	0.00	55.20
2/10/2006	41	43.10	6.17	22.70	-5.17	32.90	0.50	10.22	4.38	0.00	0.00	53.60
2/11/2006	42	31.30	-0.39	12.40	-10.89	21.85	-5.64	10.64	2.05	0.00	0.00	74.10
2/12/2006	43	37.40	3.00	10.90	-11.72	24.15	-4.36	7.52	3.37	0.00	0.00	63.20
2/13/2006	44	64.90	18.28	10.10	-12.17	37.50	3.06	6.61	3.79	0.00	0.00	35.30
2/14/2006	45	65.40	18.56	20.70	-6.28	43.05	6.14	5.08	5.72	0.00	0.00	34.90
2/15/2006	46	42.70	5.94	32.10	0.06	37.40	3.00	13.55	1.94	0.00	0.00	50.70
2/16/2006	47	35.30	1.83	14.70	-9.61	25.00	-3.89	12.42	7.67	0.00	0.00	76.90
2/17/2006	48	15.30	-9.28	2.60	-16.33	8.95	-12.81	10.92	6.49	0.00	0.00	59.20
2/18/2006	49	17.00	-8.33	1.20	-17.11	9.10	-12.72	8.14	3.12	0.00	0.00	43.00
2/19/2006	50	23.50	-4.72	8.00	-13.33	15.75	-9.03	3.91	4.37	0.00	0.00	44.50

2/20/2006	51	46.90	8.28	16.60	-8.56	31.75	-0.14	5.73	4.91	0.00	0.00	44.20
2/21/2006	52	55.10	12.83	14.00	-10.00	34.55	1.42	3.35	4.77	0.00	0.00	41.30
2/22/2006	53	55.20	12.89	15.50	-9.17	35.35	1.86	6.63	4.16	0.00	0.00	36.30
2/23/2006	54	61.20	16.22	14.40	-9.78	37.80	3.22	3.55	3.15	0.00	0.00	40.40
2/24/2006	55	65.90	18.83	32.10	0.06	49.00	9.44	8.35	3.29	0.00	0.00	34.20
2/25/2006	56	43.80	6.56	18.10	-7.72	30.95	-0.58	9.72	3.06	0.00	0.00	44.50
2/26/2006	57	54.50	12.50	12.00	-11.11	33.25	0.69	4.12	2.99	0.00	0.00	35.40
2/27/2006	58	70.20	21.22	33.80	1.00	52.00	11.11	4.34	3.21	0.00	0.00	47.60
2/28/2006	59	80.30	26.83	27.60	-2.44	53.95	12.19	3.20	5.82	0.00	0.00	38.70
3/1/2006	60	81.10	27.28	50.70	10.39	65.90	18.83	11.50	2.21	0.00	0.00	57.20
3/2/2006	61	61.00	16.11	35.90	2.17	48.45	9.14	5.89	7.00	0.00	0.00	51.60
3/3/2006	62	51.10	10.61	17.20	-8.22	34.15	1.19	3.25	5.18	0.00	0.00	48.30
3/4/2006	63	51.50	10.83	36.50	2.50	44.00	6.67	14.78	4.52	0.30	7.62	83.40
3/5/2006	64	65.90	18.83	30.40	-0.89	48.15	8.97	6.14	2.87	0.00	0.00	52.80
3/6/2006	65	62.20	16.78	25.80	-3.44	44.00	6.67	3.85	6.43	0.00	0.00	51.40
3/7/2006	66	75.60	24.22	37.70	3.17	56.65	13.69	8.14	4.09	0.11	2.79	58.90
3/8/2006	67	69.30	20.72	41.70	5.39	55.50	13.06	9.79	1.65	0.00	0.00	70.10
3/9/2006	68	51.90	11.06	39.00	3.89	45.45	7.47	9.79	3.33	0.00	0.00	68.60
3/10/2006	69	60.70	15.94	32.80	0.44	46.75	8.19	4.59	4.69	0.00	0.00	86.30
3/11/2006	70	60.80	16.00	34.10	1.17	47.45	8.58	7.53	6.32	0.00	0.00	70.20
3/12/2006	71	70.30	21.28	35.80	2.11	53.05	11.69	8.48	2.63	0.06	1.52	68.60
3/13/2006	72	47.10	8.39	24.70	-4.06	35.90	2.17	12.80	2.94	0.00	0.00	60.60
3/14/2006	73	59.70	15.39	18.00	-7.78	38.85	3.81	4.33	3.98	0.00	0.00	38.10
3/15/2006	74	61.00	16.11	34.80	1.56	47.90	8.83	17.15	4.75	0.00	0.00	38.30
3/16/2006	75	56.50	13.61	30.00	-1.11	43.25	6.25	14.52	1.87	0.00	0.00	50.20
3/17/2006	76	47.70	8.72	31.60	-0.22	39.65	4.25	6.99	3.25	0.00	0.00	65.80
3/18/2006	77	45.20	7.33	33.50	0.83	39.35	4.08	9.78	3.94	0.05	1.27	68.10
3/19/2006	78	39.50	4.17	32.70	0.39	36.10	2.28	10.98	3.49	0.45	11.43	91.30
3/20/2006	79	36.40	2.44	31.00	-0.56	33.70	0.94	10.68	5.08	0.37	9.40	90.20
3/21/2006	80	33.20	0.67	28.00	-2.22	30.60	-0.78	9.31	3.83	0.01	0.25	92.20
3/22/2006	81	33.80	1.00	37.10	2.83	35.45	1.92	7.05	6.31	0.00	0.00	79.20
3/23/2006	82	42.40	5.78	24.80	-4.00	33.60	0.89	7.35	2.52	0.00	0.00	78.80
3/24/2006	83	47.60	8.67	19.60	-6.89	33.60	0.89	6.84	3.16	0.00	0.00	70.00
3/25/2006	84	48.20	9.00	22.20	-5.44	35.20	1.78	6.69	1.31	0.00	0.00	82.10
3/26/2006	85	61.30	16.28	29.70	-1.28	45.50	7.50	7.18	3.05	0.22	5.59	55.20
3/27/2006	86	55.80	13.22	35.80	2.11	45.80	7.67	13.02	3.81	0.00	0.00	86.70
3/28/2006	87	63.20	17.33	27.00	-2.78	45.10	7.28	4.94	4.60	0.00	0.00	76.90
3/29/2006	88	73.00	22.78	43.20	6.22	58.10	14.50	15.66	4.86	0.05	1.27	62.20
3/30/2006	89	71.00	21.67	50.70	10.39	60.85	16.03	11.60	1.97	0.82	20.83	74.70
3/31/2006	90	67.00	19.44	43.30	6.28	55.15	12.86	10.12	4.10	0.00	0.00	62.70
4/1/2006	91	76.40	24.67	37.20	2.89	56.80	13.78	6.43	3.74	0.88	22.35	60.90
4/2/2006	92	68.10	20.06	50.60	10.33	59.35	15.19	14.38	2.73	0.00	0.00	69.90
4/3/2006	93	57.80	14.33	37.00	2.78	47.40	8.56	9.15	4.74	0.00	0.00	60.90
4/4/2006	94	65.40	18.56	30.90	-0.61	48.15	8.97	3.68	1.81	0.00	0.00	52.00
4/5/2006	95	79.30	26.28	46.60	8.11	62.95	17.19	7.46	2.95	0.00	0.00	56.80
4/6/2006	96	82.50	28.06	54.60	12.56	68.55	20.31	10.49	3.70	0.05	1.27	60.80
4/7/2006	97	58.60	14.78	44.10	6.72	51.35	10.75	14.15	2.75	0.21	5.33	76.30
4/8/2006	98	55.60	13.11	34.30	1.28	44.95	7.19	5.88	1.56	0.00	0.00	56.30
4/9/2006	99	71.00	21.67	34.70	1.50	52.85	11.58	6.57	1.26	0.00	0.00	45.40
4/10/2006	100	78.50	25.83	51.30	10.72	64.90	18.28	8.90	2.02	0.00	0.00	44.50
4/11/2006	101	82.80	28.22	56.00	13.33	69.40	20.78	10.64	3.10	0.00	0.00	43.60

4/12/2006	102	80.90	27.17	44.30	6.83	62.60	17.00	4.19	2.22	0.00	0.00	46.40
4/13/2006	103	96.40	35.78	51.60	10.89	74.00	23.33	7.27	4.53	0.00	0.00	45.80
4/14/2006	104	90.80	32.67	58.90	14.94	74.85	23.81	8.81	4.94	0.00	0.00	38.90
4/15/2006	105	84.60	29.22	57.90	14.39	71.25	21.81	7.81	2.19	0.00	0.00	51.60
4/16/2006	106	78.50	25.83	53.30	11.83	65.90	18.83	11.37	3.40	0.00	0.00	58.40
4/17/2006	107	76.10	24.50	47.20	8.44	61.65	16.47	8.56	4.28	0.00	0.00	75.20
4/18/2006	108	75.60	24.22	47.30	8.50	61.45	16.36	14.11	3.76	0.00	0.00	63.60
4/19/2006	109	70.60	21.44	34.00	1.11	52.30	11.28	5.63	3.51	0.00	0.00	49.70
4/20/2006	110	71.50	21.94	34.90	1.61	53.20	11.78	7.06	3.58	0.00	0.00	55.90
4/21/2006	111	76.70	24.83	35.70	2.06	56.20	13.44	2.94	2.13	0.00	0.00	59.70
4/22/2006	112	81.10	27.28	41.50	5.28	61.30	16.28	6.83	3.26	0.00	0.00	54.00
4/23/2006	113	82.50	28.06	56.70	13.72	69.60	20.89	8.52	2.69	0.00	0.00	61.10
4/24/2006	114	73.50	23.06	49.60	9.78	61.55	16.42	10.29	2.29	0.19	4.83	96.10
4/25/2006	115	50.50	10.28	39.20	4.00	44.85	7.14	10.88	3.47	0.02	0.51	86.90
4/26/2006	116	59.60	15.33	36.10	2.28	47.85	8.81	4.41	3.47	0.00	0.00	68.30
4/27/2006	117	74.20	23.44	37.60	3.11	55.90	13.28	9.16	2.97	0.00	0.00	69.70
4/28/2006	118	60.50	15.83	51.80	11.00	56.15	13.42	8.37	2.97	1.28	32.51	85.90
4/29/2006	119	61.40	16.33	52.30	11.28	56.85	13.81	6.11	2.58	0.13	3.30	99.70
4/30/2006	120	66.90	19.39	48.30	9.06	57.60	14.22	10.60	4.37	0.00	0.00	73.90
5/1/2006	121	68.10	20.06	43.10	6.17	55.60	13.11	4.06	4.85	0.00	0.00	71.90
5/2/2006	122	79.60	26.44	44.70	7.06	62.15	16.75	6.59	2.90	0.58	14.73	62.80
5/3/2006	123	66.90	19.39	53.30	11.83	60.10	15.61	8.27	2.44	0.20	5.08	80.40
5/4/2006	124	57.70	14.28	51.50	10.83	54.60	12.56	6.16	1.84	0.18	4.57	70.80
5/5/2006	125	59.20	15.11	47.60	8.67	53.40	11.89	3.50	2.46	0.00	0.00	83.50
5/6/2006	126	57.80	14.33	44.80	7.11	51.30	10.72	2.82	1.36	0.00	0.00	89.30
5/7/2006	127	61.80	16.56	47.70	8.72	54.75	12.64	4.51	2.23	0.00	0.00	84.90
5/8/2006	128	79.10	26.17	50.60	10.33	64.85	18.25	6.94	3.17	0.67	17.02	75.90
5/9/2006	129	76.60	24.78	55.90	13.28	66.25	19.03	4.97	2.72	0.01	0.25	71.90
5/10/2006	130	65.80	18.78	47.70	8.72	56.75	13.75	10.14	1.95	0.00	0.00	60.60
5/11/2006	131	65.20	18.44	45.00	7.22	55.10	12.83	11.05	2.01	0.00	0.00	76.50
5/12/2006	132	72.00	22.22	41.20	5.11	56.60	13.67	4.91	1.87	0.00	0.00	74.10
5/13/2006	133	73.30	22.94	43.30	6.28	58.30	14.61	7.62	3.60	0.00	0.00	56.20
5/14/2006	134	63.50	17.50	44.00	6.67	53.75	12.08	9.57	3.75	0.00	0.00	77.20
5/15/2006	135	68.60	20.33	47.00	8.33	57.80	14.33	8.42	3.62	0.00	0.00	63.90
5/16/2006	136	73.40	23.00	45.60	7.56	59.50	15.28	7.84	2.47	0.00	0.00	59.40
5/17/2006	137	84.50	29.17	46.60	8.11	65.55	18.64	8.00	1.36	0.00	0.00	42.40
5/18/2006	138	82.40	28.00	47.70	8.72	65.05	18.36	4.76	3.15	0.00	0.00	38.20
5/19/2006	139	98.50	36.94	57.70	14.28	78.10	25.61	7.29	4.81	0.00	0.00	32.30
5/20/2006	140	81.50	27.50	58.00	14.44	69.75	20.97	6.02	4.23	0.00	0.00	49.90
5/21/2006	141	85.00	29.44	55.10	12.83	70.05	21.14	5.13	2.71	0.00	0.00	60.20
5/22/2006	142	85.00	29.44	60.20	15.67	72.60	22.56	7.76	1.56	0.00	0.00	64.90
5/23/2006	143	85.00	29.44	60.20	15.67	72.60	22.56	7.76	1.69	0.00	0.00	64.30
5/24/2006	144	92.70	33.72	63.10	17.28	77.90	25.50	6.64	3.32	0.00	0.00	44.10
5/25/2006	145	91.60	33.11	57.30	14.06	74.45	23.58	6.65	2.39	0.00	0.00	42.30
5/26/2006	146	90.60	32.56	59.40	15.22	75.00	23.89	5.76	2.29	0.31	7.87	57.30
5/27/2006	147	92.40	33.56	66.60	19.22	79.50	26.39	9.78	2.33	0.00	0.00	59.60
5/28/2006	148	91.70	33.17	74.20	23.44	82.95	28.31	10.85	2.18	0.00	0.00	55.40
5/29/2006	149	84.40	29.11	68.30	20.17	76.35	24.64	6.49	2.71	0.20	5.08	69.90
5/30/2006	150	80.40	26.89	63.40	17.44	71.90	22.17	5.46	2.34	0.70	17.78	74.30
5/31/2006	151	85.20	29.56	63.40	17.44	74.30	23.50	4.13	1.25	0.03	0.76	76.00
6/1/2006	152	83.20	28.44	61.30	16.28	72.25	22.36	5.50	1.56	0.11	2.79	91.30

6/2/2006	153	87.70	30.94	57.50	14.17	72.60	22.56	3.04	2.43	0.00	0.00	55.10
6/3/2006	154	85.00	29.44	60.50	15.83	72.75	22.64	5.00	2.38	0.00	0.00	52.40
6/4/2006	155	84.50	29.17	62.70	17.06	73.60	23.11	7.08	2.83	0.00	0.00	60.90
6/5/2006	156	84.20	29.00	65.30	18.50	74.75	23.75	6.08	3.17	0.01	0.25	68.00
6/6/2006	157	91.80	33.22	62.50	16.94	77.15	25.08	4.37	2.29	0.00	0.00	58.50
6/7/2006	158	92.10	33.39	57.40	14.11	74.75	23.75	4.49	2.60	0.00	0.00	47.80
6/8/2006	159	93.80	34.33	65.40	18.56	79.60	26.44	4.17	2.10	0.00	0.00	48.60
6/9/2006	160	97.90	36.61	66.60	19.22	82.25	27.92	8.05	2.25	0.00	0.00	42.50
6/10/2006	161	88.90	31.61	69.00	20.56	78.95	26.08	8.39	2.88	0.07	1.78	66.40
6/11/2006	162	78.20	25.67	60.00	15.56	69.10	20.61	8.10	2.04	0.01	0.25	78.50
6/12/2006	163	76.70	24.83	58.30	14.61	67.50	19.72	5.54	2.00	0.00	0.00	74.00
6/13/2006	164	55.20	12.89	55.20	12.89	55.20	12.89	3.05	1.76	0.00	0.00	56.50
6/14/2006	165	92.20	33.44	59.20	15.11	75.70	24.28	7.04	2.10	0.00	0.00	47.40
6/15/2006	166	95.30	35.17	71.70	22.06	83.50	28.61	10.77	2.09	0.00	0.00	42.80
6/16/2006	167	93.90	34.39	64.90	18.28	79.40	26.33	9.47	4.01	0.28	7.11	52.00
6/17/2006	168	81.20	27.33	63.40	17.44	72.30	22.39	6.06	1.19	0.48	12.19	77.10
6/18/2006	169	89.80	32.11	61.20	16.22	75.50	24.17	3.50	1.65	0.00	0.00	63.10
6/19/2006	170	94.70	34.83	65.70	18.72	80.20	26.78	3.77	0.87	0.00	0.00	57.10
6/20/2006	171	91.00	32.78	72.40	22.44	81.70	27.61	7.43	2.22	0.03	0.76	60.00
6/21/2006	172	91.10	32.83	71.70	22.06	81.40	27.44	5.35	2.16	0.30	7.62	64.10
6/22/2006	173	87.80	31.00	64.80	18.22	76.30	24.61	5.11	2.92	0.01	0.25	74.10
6/23/2006	174	86.10	30.06	63.30	17.39	74.70	23.72	5.20	2.46	0.00	0.00	65.80
6/24/2006	175	89.00	31.67	61.20	16.22	75.10	23.94	4.88	2.61	0.00	0.00	66.00
6/25/2006	176	79.40	26.33	58.20	14.56	68.80	20.44	6.05	2.33	0.07	1.78	66.40
6/26/2006	177	82.30	27.94	54.40	12.44	68.35	20.19	5.24	1.04	0.00	0.00	55.80
6/27/2006	178	87.80	31.00	53.70	12.06	70.75	21.53	2.80	1.83	0.00	0.00	52.90
6/28/2006	179	93.90	34.39	57.20	14.00	75.55	24.19	3.50	3.16	0.04	1.02	51.80
6/29/2006	180	99.20	37.33	62.70	17.06	80.95	27.19	5.44	2.08	0.04	1.02	43.00
6/30/2006	181	99.30	37.39	60.10	15.61	79.70	26.50	5.33	1.39	0.00	0.00	38.10
7/1/2006	182	97.60	36.44	69.50	20.83	83.55	28.64	6.33	2.38	0.00	0.00	37.10
7/2/2006	183	96.90	36.06	69.80	21.00	83.35	28.53	7.10	2.13	0.00	0.00	45.00
7/3/2006	184	97.10	36.17	73.00	22.78	85.05	29.47	5.12	3.89	1.30	33.02	58.70
7/4/2006	185	87.90	31.06	65.80	18.78	76.85	24.92	5.82	3.73	0.01	0.25	81.20
7/5/2006	186	82.00	27.78	60.30	15.72	71.15	21.75	4.70	3.55	0.00	0.00	60.40
7/6/2006	187	82.50	28.06	54.50	12.50	68.50	20.28	5.03	2.30	0.00	0.00	64.50
7/7/2006	188	87.50	30.83	62.70	17.06	75.10	23.94	6.44	2.15	0.00	0.00	0.00
7/8/2006	189	89.70	32.06	66.30	19.06	78.00	25.56	4.55	2.30	0.00	0.00	51.70
7/9/2006	190	78.60	25.89	66.60	19.22	72.60	22.56	4.47	2.29	1.27	32.26	79.40
7/10/2006	191	83.70	28.72	69.20	20.67	76.45	24.69	3.93	2.80	0.34	8.64	85.20
7/11/2006	192	90.20	32.33	71.60	22.00	80.90	27.17	4.70	1.94	0.02	0.51	79.80
7/12/2006	193	89.60	32.00	70.50	21.39	80.05	26.69	4.68	1.94	0.00	0.00	78.20
7/13/2006	194	99.90	37.72	72.90	22.72	86.40	30.22	8.97	2.48	0.00	0.00	75.20
7/14/2006	195	95.10	35.06	66.70	19.28	80.90	27.17	2.67	1.69	0.00	0.00	70.50
7/15/2006	196	95.40	35.22	67.40	19.67	81.40	27.44	3.68	1.48	0.00	0.00	71.20
7/16/2006	197	96.20	35.67	72.00	22.22	84.10	28.94	1.96	2.80	0.00	0.00	74.70
7/17/2006	198	98.50	36.94	76.70	24.83	87.60	30.89	4.96	2.52	0.00	0.00	56.90
7/18/2006	199	96.90	36.06	71.10	21.72	84.00	28.89	4.83	2.18	0.00	0.00	64.10
7/19/2006	200	106.60	41.44	73.20	22.89	89.90	32.17	6.54	1.49	0.00	0.00	52.10
7/20/2006	201	100.20	37.89	82.80	28.22	91.50	33.06	5.51	2.15	0.00	0.00	52.80
7/21/2006	202	81.40	27.44	63.40	17.44	72.40	22.44	5.83	1.90	0.72	18.29	72.60
7/22/2006	203	86.50	30.28	58.30	14.61	72.40	22.44	5.20	2.22	0.00	0.00	69.90

7/23/2006	204	88.50	31.39	59.00	15.00	73.75	23.19	2.33	1.75	0.00	0.00	49.70
7/24/2006	205	91.90	33.28	63.10	17.28	77.50	25.28	4.09	1.72	0.00	0.00	46.00
7/25/2006	206	101.30	38.50	76.70	24.83	89.00	31.67	7.08	0.90	0.00	0.00	54.30
7/26/2006	207	96.40	35.78	74.40	23.56	85.40	29.67	4.64	1.56	0.00	0.00	61.30
7/27/2006	208	83.30	28.50	69.80	21.00	76.55	24.75	3.10	2.13	0.05	1.27	62.00
7/28/2006	209	96.30	35.72	64.10	17.83	80.20	26.78	5.32	2.04	0.00	0.00	67.30
7/29/2006	210	97.50	36.39	71.70	22.06	84.60	29.22	4.76	2.01	0.00	0.00	53.70
7/30/2006	211	102.90	39.39	80.50	26.94	91.70	33.17	8.71	1.28	0.00	0.00	39.20
7/31/2006	212	99.00	37.22	78.60	25.89	88.80	31.56	8.34	1.27	0.00	0.00	53.30
8/1/2006	213	99.90	37.72	79.90	26.61	89.90	32.17	7.94	2.71	0.00	0.00	57.80
8/2/2006	214	95.70	35.39	69.00	20.56	82.35	27.97	5.13	1.57	0.67	17.02	67.50
8/3/2006	215	86.60	30.33	65.40	18.56	76.00	24.44	4.82	1.30	0.00	0.00	56.80
8/4/2006	216	89.80	32.11	62.00	16.67	75.90	24.39	5.15	2.48	0.00	0.00	62.70
8/5/2006	217	102.20	39.00	72.50	22.50	87.35	30.75	5.11	1.45	0.00	0.00	50.60
8/6/2006	218	105.40	40.78	69.90	21.06	87.65	30.92	6.27	2.55	0.00	0.00	52.70
8/7/2006	219	99.30	37.39	73.80	23.22	86.55	30.31	4.34	2.02	0.00	0.00	60.10
8/8/2006	220	97.80	36.56	72.60	22.56	85.20	29.56	4.34	2.21	0.00	0.00	60.10
8/9/2006	221	108.10	42.28	70.80	21.56	89.45	31.92	5.56	2.01	0.00	0.00	43.40
8/10/2006	222	96.70	35.94	73.50	23.06	85.10	29.50	3.79	1.88	0.49	12.45	54.40
8/11/2006	223	93.20	34.00	65.90	18.83	79.55	26.42	3.30	1.01	0.01	0.25	44.70
8/12/2006	224	98.80	37.11	70.00	21.11	84.40	29.11	6.27	1.97	0.00	0.00	58.00
8/13/2006	225	97.30	36.28	73.60	23.11	85.45	29.69	5.64	2.09	1.11	28.19	46.80
8/14/2006	226	83.40	28.56	61.10	16.17	72.25	22.36	4.88	2.24	1.02	25.91	67.60
8/15/2006	227	86.50	30.28	53.70	12.06	70.10	21.17	3.33	2.54	0.01	0.25	43.10
8/16/2006	228	88.20	31.22	66.10	18.94	77.15	25.08	4.81	0.51	0.01	0.25	51.80
8/17/2006	229	97.50	36.39	71.50	21.94	84.50	29.17	4.25	1.36	0.60	15.24	37.30
8/18/2006	230	87.30	30.72	70.40	21.33	78.85	26.03	4.96	3.58	3.42	86.87	59.20
8/19/2006	231	81.40	27.44	67.00	19.44	74.20	23.44	3.91	4.87	0.20	5.08	57.30
8/20/2006	232	82.10	27.83	64.50	18.06	73.30	22.94	3.85	4.99	0.00	0.00	54.40
8/21/2006	233	85.00	29.44	64.30	17.94	74.65	23.69	2.01	3.81	0.00	0.00	55.90
8/22/2006	234	86.10	30.06	60.80	16.00	73.45	23.03	3.48	5.11	0.00	0.00	75.50
8/23/2006	235	91.60	33.11	69.00	20.56	80.30	26.83	4.77	1.58	0.00	0.00	70.50
8/24/2006	236	94.40	34.67	71.70	22.06	83.05	28.36	4.56	3.13	0.00	0.00	57.30
8/25/2006	237	92.20	33.44	66.80	19.33	79.50	26.39	4.50	5.62	1.43	36.32	61.40
8/26/2006	238	77.60	25.33	67.10	19.50	72.35	22.42	2.87	2.54	1.83	46.48	58.50
8/27/2006	239	80.40	26.89	68.80	20.44	74.60	23.67	2.84	3.67	0.30	7.62	55.70
8/28/2006	240	77.70	25.39	61.20	16.22	69.45	20.81	6.05	1.28	0.04	1.02	52.60
8/29/2006	241	79.90	26.61	60.10	15.61	70.00	21.11	3.51	1.59	0.00	0.00	50.20
8/30/2006	242	81.90	27.72	55.90	13.28	68.90	20.50	2.90	3.55	0.00	0.00	49.30
8/31/2006	243	82.60	28.11	60.80	16.00	71.70	22.06	5.56	3.73	0.00	0.00	68.50
9/1/2006	244	78.20	25.67	59.90	15.50	69.05	20.58	3.24	2.15	0.00	0.00	69.10
9/2/2006	245	62.80	17.11	57.60	14.22	60.20	15.67	5.69	2.94	0.14	3.56	86.70
9/3/2006	246	77.20	25.11	50.20	10.11	63.70	17.61	4.52	1.45	0.00	0.00	74.80
9/4/2006	247	74.30	23.50	51.00	10.56	62.65	17.03	4.95	3.84	0.00	0.00	51.50
9/5/2006	248	79.10	26.17	50.80	10.44	64.95	18.31	4.49	3.47	0.00	0.00	75.80
9/6/2006	249	82.90	28.28	50.20	10.11	66.55	19.19	4.21	4.69	0.00	0.00	74.20
9/7/2006	250	85.40	29.67	50.60	10.33	68.00	20.00	2.25	2.73	0.00	0.00	60.30
9/8/2006	251	80.90	27.17	52.10	11.17	66.50	19.17	4.41	1.97	0.01	0.25	73.70
9/9/2006	252	72.70	22.61	63.20	17.33	67.95	19.97	4.68	2.65	0.82	20.83	62.80
9/10/2006	253	81.60	27.56	62.50	16.94	72.05	22.25	5.02	2.95	0.04	1.02	56.80
9/11/2006	254	66.40	19.11	61.10	16.17	63.75	17.64	5.68	1.64	0.00	0.00	93.60

9/12/2006	255	68.20	20.11	51.60	10.89	59.90	15.50	1.13	3.81	0.00	0.00	81.10
9/13/2006	256	79.00	26.11	45.30	7.39	62.15	16.75	3.05	2.60	0.00	0.00	73.40
9/14/2006	257	85.00	29.44	54.60	12.56	69.80	21.00	8.00	2.77	0.00	0.00	60.10
9/15/2006	258	87.80	31.00	58.20	14.56	73.00	22.78	10.89	3.33	0.02	0.51	54.70
9/16/2006	259	91.50	33.06	70.50	21.39	81.00	27.22	11.17	1.95	0.00	0.00	57.80
9/17/2006	260	69.20	20.67	49.10	9.50	59.15	15.08	8.52	1.80	0.55	13.97	70.20
9/18/2006	261	68.40	20.22	43.00	6.11	55.70	13.17	11.43	3.76	0.00	0.00	67.10
9/19/2006	262	68.30	20.17	42.00	5.56	55.15	12.86	3.55	2.26	0.00	0.00	69.40
9/20/2006	263	79.10	26.17	46.10	7.83	62.60	17.00	7.01	2.34	0.00	0.00	61.40
9/21/2006	264	71.20	21.78	57.80	14.33	64.50	18.06	12.57	2.87	0.37	9.40	68.50
9/22/2006	265	74.00	23.33	53.80	12.11	63.90	17.72	5.67	2.07	0.03	0.76	78.30
9/23/2006	266	67.00	19.44	51.90	11.06	59.45	15.25	8.20	2.89	0.01	0.25	71.10
9/24/2006	267	70.40	21.33	44.70	7.06	57.55	14.19	2.87	4.11	0.00	0.00	58.80
9/25/2006	268	79.00	26.11	42.80	6.00	60.90	16.06	3.57	2.87	0.00	0.00	65.50
9/26/2006	269	81.40	27.44	43.30	6.28	62.35	16.86	7.94	1.03	0.00	0.00	72.00
9/27/2006	270	70.70	21.50	49.00	9.44	59.85	15.47	8.34	2.31	0.00	0.00	67.20
9/28/2006	271	61.60	16.44	41.80	5.44	51.70	10.94	4.80	3.47	0.00	0.00	70.00
9/29/2006	272	76.50	24.72	40.90	4.94	58.70	14.83	6.59	4.26	0.00	0.00	66.10
9/30/2006	273	80.10	26.72	46.10	7.83	63.10	17.28	3.25	4.96	0.00	0.00	60.50
10/1/2006	274	95.10	35.06	57.10	13.94	76.10	24.50	8.59	2.62	0.00	0.00	45.90
10/2/2006	275	89.90	32.17	68.70	20.39	79.30	26.28	7.77	3.58	0.00	0.00	53.40
10/3/2006	276	95.60	35.33	63.30	17.39	79.45	26.36	10.49	5.87	0.00	0.00	45.20
10/4/2006	277	77.40	25.22	59.70	15.39	68.55	20.31	6.12	4.86	0.00	0.00	66.20
10/5/2006	278	71.90	22.17	53.80	12.11	62.85	17.14	4.40	1.69	0.00	0.00	56.60
10/6/2006	279	78.90	26.06	52.40	11.33	65.65	18.69	5.93	2.39	0.00	0.00	60.20
10/7/2006	280	86.80	30.44	55.50	13.06	71.15	21.75	6.61	4.28	0.00	0.00	51.20
10/8/2006	281	77.60	25.33	50.20	10.11	63.90	17.72	3.68	3.76	0.00	0.00	57.20
10/9/2006	282	64.60	18.11	50.30	10.17	57.45	14.14	8.52	2.13	0.04	1.02	43.30
10/10/2006	283	52.80	11.56	44.90	7.17	48.85	9.36	5.81	3.48	0.40	10.16	82.20
10/11/2006	284	54.40	12.44	39.20	4.00	46.80	8.22	6.20	2.56	0.00	0.00	75.40
10/12/2006	285	53.80	12.11	30.30	-0.94	42.05	5.58	7.45	1.71	0.00	0.00	73.80
10/13/2006	286	59.30	15.17	29.00	-1.67	44.15	6.75	4.37	3.62	0.00	0.00	66.20
10/14/2006	287	62.70	17.06	26.60	-3.00	44.65	7.03	4.02	6.91	0.00	0.00	57.10
10/15/2006	288	63.70	17.61	47.20	8.44	55.45	13.03	8.42	2.51	0.12	3.05	74.50
10/16/2006	289	58.70	14.83	53.70	12.06	56.20	13.44	5.05	5.19	0.06	1.52	88.50
10/17/2006	290	66.40	19.11	52.50	11.39	59.45	15.25	5.24	3.44	0.02	0.51	80.80
10/18/2006	291	50.20	10.11	37.50	3.06	43.85	6.58	6.41	3.01	0.00	0.00	75.20
10/19/2006	292	57.20	14.00	25.20	-3.78	41.20	5.11	4.63	4.29	0.00	0.00	71.20
10/20/2006	293	73.50	23.06	30.20	-1.00	51.85	11.03	6.46	3.68	0.00	0.00	79.20
10/21/2006	294	55.80	13.22	33.70	0.94	44.75	7.08	9.20	3.08	0.11	2.79	90.70
10/22/2006	295	50.50	10.28	28.60	-1.89	39.55	4.19	6.42	1.55	0.00	0.00	78.50
10/23/2006	296	52.10	11.17	22.30	-5.39	37.20	2.89	2.30	1.39	0.00	0.00	74.20
10/24/2006	297	61.20	16.22	25.20	-3.78	43.20	6.22	5.17	3.22	0.00	0.00	62.40
10/25/2006	298	62.60	17.00	47.40	8.56	55.00	12.78	7.77	4.71	1.51	38.35	82.80
10/26/2006	299	55.80	13.22	44.80	7.11	50.30	10.17	9.53	2.91	0.13	3.30	97.30
10/27/2006	300	57.20	14.00	43.00	6.11	50.10	10.06	11.09	3.05	0.12	3.05	82.90
10/28/2006	301	69.50	20.83	35.60	2.00	52.55	11.42	5.87	2.30	0.00	0.00	70.10
10/29/2006	302	81.00	27.22	39.30	4.06	60.15	15.64	8.01	1.92	0.00	0.00	58.20
10/30/2006	303	70.50	21.39	36.20	2.33	53.35	11.86	13.14	2.54	0.00	0.00	45.40
10/31/2006	304	44.90	7.17	25.80	-3.44	35.35	1.86	10.88	1.42	0.00	0.00	56.30
11/1/2006	305	46.80	8.22	22.20	-5.44	34.50	1.39	3.77	6.68	0.00	0.00	60.00

11/2/2006	306	52.60	11.44	19.00	-7.22	35.80	2.11	5.34	6.66	0.00	0.00	66.40
11/3/2006	307	57.10	13.94	24.40	-4.22	40.75	4.86	9.57	6.55	0.00	0.00	46.40
11/4/2006	308	62.70	17.06	36.10	2.28	49.40	9.67	8.41	1.88	0.00	0.00	52.00
11/5/2006	309	65.10	18.39	32.00	0.00	48.55	9.19	4.77	3.18	0.00	0.00	81.20
11/6/2006	310	59.20	15.11	38.10	3.39	48.65	9.25	7.78	2.23	0.00	0.00	88.40
11/7/2006	311	68.90	20.50	32.70	0.39	50.80	10.44	5.73	1.87	0.00	0.00	81.10
11/8/2006	312	82.00	27.78	38.00	3.33	60.00	15.56	3.83	3.89	0.00	0.00	60.70
11/9/2006	313	69.70	20.94	44.80	7.11	57.25	14.03	8.11	3.23	0.00	0.00	53.10
11/10/2006	314	53.70	12.06	33.30	0.72	43.50	6.39	15.46	3.59	0.00	0.00	68.10
11/11/2006	315	50.10	10.06	22.10	-5.50	36.10	2.28	5.63	5.70	0.00	0.00	66.30
11/12/2006	316	59.10	15.06	37.70	3.17	48.40	9.11	11.60	4.23	0.00	0.00	53.70
11/13/2006	317	59.20	15.11	36.30	2.39	47.75	8.75	7.70	5.91	0.00	0.00	54.70
11/14/2006	318	54.80	12.67	32.10	0.06	43.45	6.36	6.73	4.33	0.00	0.00	81.10
11/15/2006	319	43.40	6.33	34.20	1.22	38.80	3.78	9.60	2.58	0.00	0.00	74.10
11/16/2006	320	45.20	7.33	29.60	-1.33	37.40	3.00	8.23	1.90	0.00	0.00	67.00
11/17/2006	321	59.70	15.39	29.70	-1.28	44.70	7.06	6.89	1.97	0.00	0.00	58.10
11/18/2006	322	45.40	7.44	20.60	-6.33	33.00	0.56	3.48	1.23	0.00	0.00	66.30
11/19/2006	323	52.00	11.11	23.60	-4.67	37.80	3.22	3.12	4.24	0.00	0.00	65.50
11/20/2006	324	54.20	12.33	19.60	-6.89	36.90	2.72	7.21	4.82	0.00	0.00	58.10
11/21/2006	325	63.20	17.33	38.20	3.44	50.70	10.39	10.54	2.62	0.00	0.00	51.30
11/22/2006	326	63.00	17.22	32.50	0.28	47.75	8.75	6.51	2.15	0.00	0.00	71.50
11/23/2006	327	68.70	20.39	30.30	-0.94	49.50	9.72	6.83	2.15	0.00	0.00	70.20
11/24/2006	328	59.40	15.22	36.60	2.56	48.00	8.89	5.15	4.27	0.00	0.00	74.00
11/25/2006	329	58.50	14.72	35.80	2.11	47.15	8.42	4.30	2.89	0.00	0.00	72.20
11/26/2006	330	65.10	18.39	38.10	3.39	51.60	10.89	5.68	2.63	0.00	0.00	74.40
11/27/2006	331	58.10	14.50	39.70	4.28	48.90	9.39	3.18	2.66	0.07	1.78	84.60
11/28/2006	332	70.00	21.11	37.60	3.11	53.80	12.11	14.93	1.24	0.00	0.00	76.70
11/29/2006	333	36.00	2.22	24.80	-4.00	30.40	-0.89	14.89	5.11	0.00	0.00	74.90
11/30/2006	334	22.60	-5.22	17.10	-8.28	19.85	-6.75	14.65	2.23	0.00	0.00	57.00
12/1/2006	335	39.90	4.39	8.50	-13.06	24.20	-4.33	4.20	3.19	0.00	0.00	61.40
12/2/2006	336	34.30	1.28	20.00	-6.67	27.15	-2.69	7.12	2.41	0.00	0.00	53.10
12/3/2006	337	29.90	-1.17	8.20	-13.22	19.05	-7.19	5.00	3.30	0.00	0.00	65.00
12/4/2006	338	50.30	10.17	19.10	-7.17	34.70	1.50	4.19	4.36	0.00	0.00	59.10
12/5/2006	339	59.00	15.00	16.80	-8.44	37.90	3.28	8.69	4.20	0.00	0.00	63.00
12/6/2006	340	53.50	11.94	26.80	-2.89	40.15	4.53	7.22	0.00	0.00	0.00	59.10
12/7/2006	341	25.00	-3.89	5.30	-14.83	15.15	-9.36	8.04	0.00	0.00	0.00	56.50
12/8/2006	342	41.30	5.17	6.80	-14.00	24.05	-4.42	12.74	0.00	0.00	0.00	53.30
12/9/2006	343	59.00	15.00	32.20	0.11	45.60	7.56	9.46	0.00	0.00	0.00	58.40
12/10/2006	344	52.00	11.11	36.30	2.39	44.15	6.75	13.22	0.00	0.00	0.00	56.60
12/11/2006	345	59.40	15.22	38.40	3.56	48.90	9.39	9.68	0.00	0.00	0.00	75.30
12/12/2006	346	52.50	11.39	26.60	-3.00	39.55	4.19	5.78	0.00	0.00	0.00	80.50
12/13/2006	347	61.40	16.33	25.40	-3.67	43.40	6.33	4.24	0.00	0.00	0.00	59.80
12/14/2006	348	62.70	17.06	35.20	1.78	48.95	9.42	4.40	0.00	0.00	0.00	49.70
12/15/2006	349	61.00	16.11	26.00	-3.33	43.50	6.39	2.74	0.00	0.00	0.00	60.30
12/16/2006	350	59.30	15.17	35.60	2.00	47.45	8.58	9.49	0.00	0.00	0.00	81.10
12/17/2006	351	44.70	7.06	35.80	2.11	40.25	4.58	10.77	0.00	0.00	0.00	40.20
12/18/2006	352	44.90	7.17	24.40	-4.22	34.65	1.47	5.85	0.00	0.00	0.00	45.20
12/19/2006	353	44.80	7.11	21.80	-5.67	33.30	0.72	4.81	0.00	0.00	0.00	50.50
12/19/2006	354	44.80	7.11	21.80	-5.67	33.30	0.72	4.81	0.00	0.00	0.00	50.50
12/20/2006	355	52.60	11.44	37.20	2.89	44.90	7.17	9.56	0.00	0.42	10.67	94.30
12/21/2006	356	47.70	8.72	33.90	1.06	40.80	4.89	6.46	0.00	0.01	0.25	86.00

12/22/2006	357	41.40	5.22	26.40	-3.11	33.90	1.06	5.88	0.00	0.00	0.00	87.00
12/23/2006	358	45.00	7.22	22.90	-5.06	33.95	1.08	5.95	0.00	0.00	0.00	79.60
12/24/2006	359	45.40	7.44	20.00	-6.67	32.70	0.39	2.77	0.00	0.00	0.00	87.40
12/25/2006	360	41.10	5.06	28.20	-2.11	34.65	1.47	11.44	0.00	0.00	0.00	75.60
12/26/2006	361	48.20	9.00	18.80	-7.33	33.50	0.83	4.99	0.00	0.00	0.00	64.50
12/27/2006	362	56.50	13.61	22.10	-5.50	39.30	4.06	7.13	0.00	0.00	0.00	62.70
12/28/2006	363	53.60	12.00	34.80	1.56	44.20	6.78	5.39	0.00	0.00	0.00	76.60
12/29/2006	364	54.00	12.22	46.60	8.11	50.30	10.17	7.39	0.00	0.00	0.00	89.20
12/30/2006	365	54.50	12.50	39.70	4.28	47.10	8.39	9.76	0.00	0.00	0.00	93.80
12/31/2006	366	50.70	10.39	26.10	-3.28	38.40	3.56	9.39	0.00	0.00	0.00	96.20

Evapotranspiration and Available Water Calculations

Table A.4: ET and AW 2004

DATE	DOY	AW	AW	ET Ref	Alf Ref	ET Alf	ET Alf	Precip	Irrigation	AW-ET+P+I	Runoff	AW New	AW New	Max AW	50% AW
		in	mm	in	%	in	mm	in	in	in	in	in	mm	mm	mm
1/1/04	1	10.0	254.0	0.09	0.15	0.01	0.36	0.00	0.00	9.99	0.00	10.0	253.6	254.0	127.0
1/2/04	2	10.0	253.6	0.11	0.15	0.02	0.43	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
1/3/04	3	10.0	253.2	0.10	0.15	0.01	0.36	0.00	0.00	9.95	0.00	10.0	252.9	254.0	127.0
1/4/04	4	10.0	252.9	0.01	0.15	0.00	0.05	0.00	0.00	9.95	0.00	10.0	252.8	254.0	127.0
1/5/04	5	10.0	252.8	0.05	0.15	0.01	0.19	0.00	0.00	9.95	0.00	9.9	252.6	254.0	127.0
1/6/04	6	9.9	252.6	0.06	0.15	0.01	0.22	0.00	0.00	9.94	0.00	9.9	252.4	254.0	127.0
1/7/04	7	9.9	252.4	0.07	0.15	0.01	0.25	0.00	0.00	9.93	0.00	9.9	252.1	254.0	127.0
1/8/04	8	9.9	252.1	0.07	0.15	0.01	0.25	0.00	0.00	9.92	0.00	9.9	251.9	254.0	127.0
1/9/04	9	9.9	251.9	0.02	0.15	0.00	0.07	0.00	0.00	9.91	0.00	9.9	251.8	254.0	127.0
1/10/04	10	9.9	251.8	0.07	0.15	0.01	0.26	0.00	0.00	9.90	0.00	9.9	251.6	254.0	127.0
1/11/04	11	9.9	251.6	0.10	0.15	0.01	0.37	0.00	0.00	9.89	0.00	9.9	251.2	254.0	127.0
1/12/04	12	9.9	251.2	0.04	0.15	0.01	0.17	0.00	0.00	9.88	0.00	9.9	251.0	254.0	127.0
1/13/04	13	9.9	251.0	0.05	0.15	0.01	0.21	0.00	0.00	9.87	0.00	9.9	250.8	254.0	127.0
1/14/04	14	9.9	250.8	0.11	0.15	0.02	0.41	0.00	0.00	9.86	0.00	9.9	250.4	254.0	127.0
1/15/04	15	9.9	250.4	0.07	0.15	0.01	0.28	0.00	0.00	9.85	0.00	9.8	250.1	254.0	127.0
1/16/04	16	9.8	250.1	0.01	0.15	0.00	0.03	0.00	0.00	9.85	0.00	9.8	250.1	254.0	127.0
1/17/04	17	9.8	250.1	0.01	0.15	0.00	0.03	0.08	0.00	9.93	0.00	9.9	252.1	254.0	127.0
1/18/04	18	9.9	252.1	0.08	0.15	0.01	0.29	0.00	0.00	9.91	0.00	9.9	251.8	254.0	127.0
1/19/04	19	9.9	251.8	0.04	0.15	0.01	0.16	0.00	0.00	9.91	0.00	9.9	251.6	254.0	127.0
1/20/04	20	9.9	251.6	0.03	0.15	0.00	0.11	0.00	0.00	9.90	0.00	9.9	251.5	254.0	127.0
1/21/04	21	9.9	251.5	0.09	0.15	0.01	0.34	0.00	0.00	9.89	0.00	9.9	251.2	254.0	127.0
1/22/04	22	9.9	251.2	0.09	0.15	0.01	0.33	0.00	0.00	9.88	0.00	9.9	250.9	254.0	127.0
1/23/04	23	9.9	250.9	0.14	0.15	0.02	0.55	0.00	0.00	9.86	0.00	9.9	250.3	254.0	127.0
1/24/04	24	9.9	250.3	0.06	0.15	0.01	0.21	0.00	0.00	9.85	0.00	9.8	250.1	254.0	127.0
1/25/04	25	9.8	250.1	0.00	0.15	0.00	0.01	0.00	0.00	9.85	0.00	9.8	250.1	254.0	127.0
1/26/04	26	9.8	250.1	0.01	0.15	0.00	0.04	0.00	0.00	9.84	0.00	9.8	250.1	254.0	127.0
1/27/04	27	9.8	250.1	0.03	0.15	0.00	0.10	0.00	0.00	9.84	0.00	9.8	250.0	254.0	127.0
1/28/04	28	9.8	250.0	0.02	0.15	0.00	0.08	0.00	0.00	9.84	0.00	9.8	249.9	254.0	127.0
1/29/04	29	9.8	249.9	0.02	0.15	0.00	0.06	0.00	0.00	9.84	0.00	9.8	249.8	254.0	127.0
1/30/04	30	9.8	249.8	0.03	0.15	0.00	0.11	0.00	0.00	9.83	0.00	9.8	249.7	254.0	127.0
1/31/04	31	9.8	249.7	0.01	0.15	0.00	0.04	0.00	0.00	9.83	0.00	9.8	249.7	254.0	127.0
2/1/04	32	9.8	249.7	0.00	0.15	0.00	0.01	0.01	0.00	9.84	0.00	9.8	249.9	254.0	127.0

2/2/04	33	9.8	249.9	0.01	0.15	0.00	0.04	0.00	0.00	9.84	0.00	9.8	249.9	254.0	127.0
2/3/04	34	9.8	249.9	0.01	0.15	0.00	0.05	0.03	0.00	9.87	0.00	9.9	250.6	254.0	127.0
2/4/04	35	9.9	250.6	0.03	0.15	0.00	0.10	0.00	0.00	9.86	0.00	9.9	250.5	254.0	127.0
2/5/04	36	9.9	250.5	0.01	0.15	0.00	0.05	0.10	0.00	9.96	0.00	10.0	253.0	254.0	127.0
2/6/04	37	10.0	253.0	0.03	0.15	0.01	0.13	0.00	0.00	9.95	0.00	10.0	252.8	254.0	127.0
2/7/04	38	10.0	252.8	0.01	0.15	0.00	0.03	0.00	0.00	9.95	0.00	10.0	252.8	254.0	127.0
2/8/04	39	10.0	252.8	0.02	0.15	0.00	0.07	0.00	0.00	9.95	0.00	10.0	252.7	254.0	127.0
2/9/04	40	10.0	252.7	0.05	0.15	0.01	0.17	0.00	0.00	9.94	0.00	9.9	252.6	254.0	127.0
2/10/04	41	9.9	252.6	0.04	0.15	0.01	0.14	0.00	0.00	9.94	0.00	9.9	252.4	254.0	127.0
2/11/04	42	9.9	252.4	0.06	0.15	0.01	0.23	0.00	0.00	9.93	0.00	9.9	252.2	254.0	127.0
2/12/04	43	9.9	252.2	0.05	0.15	0.01	0.17	0.00	0.00	9.92	0.00	9.9	252.0	254.0	127.0
2/13/04	44	9.9	252.0	0.04	0.15	0.01	0.13	0.00	0.00	9.92	0.00	9.9	251.9	254.0	127.0
2/14/04	45	9.9	251.9	0.04	0.15	0.01	0.14	0.00	0.00	9.91	0.00	9.9	251.8	254.0	127.0
2/15/04	46	9.9	251.8	0.04	0.15	0.01	0.15	0.00	0.00	9.91	0.00	9.9	251.6	254.0	127.0
2/16/04	47	9.9	251.6	0.02	0.15	0.00	0.08	0.00	0.00	9.90	0.00	9.9	251.5	254.0	127.0
2/17/04	48	9.9	251.5	0.05	0.15	0.01	0.17	0.00	0.00	9.90	0.00	9.9	251.4	254.0	127.0
2/18/04	49	9.9	251.4	0.08	0.15	0.01	0.31	0.00	0.00	9.88	0.00	9.9	251.1	254.0	127.0
2/19/04	50	9.9	251.1	0.12	0.15	0.02	0.46	0.00	0.00	9.87	0.00	9.9	250.6	254.0	127.0
2/20/04	51	9.9	250.6	0.11	0.15	0.02	0.42	0.00	0.00	9.85	0.00	9.8	250.2	254.0	127.0
2/21/04	52	9.8	250.2	0.08	0.15	0.01	0.31	0.00	0.00	9.84	0.00	9.8	249.9	254.0	127.0
2/22/04	53	9.8	249.9	0.14	0.15	0.02	0.52	0.00	0.00	9.82	0.00	9.8	249.3	254.0	127.0
2/23/04	54	9.8	249.3	0.03	0.15	0.00	0.11	0.00	0.00	9.81	0.00	9.8	249.2	254.0	127.0
2/24/04	55	9.8	249.2	0.03	0.15	0.00	0.12	0.00	0.00	9.81	0.00	9.8	249.1	254.0	127.0
2/25/04	56	9.8	249.1	0.07	0.15	0.01	0.26	0.00	0.00	9.80	0.00	9.8	248.8	254.0	127.0
2/26/04	57	9.8	248.8	0.09	0.15	0.01	0.34	0.00	0.00	9.78	0.00	9.8	248.5	254.0	127.0
2/27/04	58	9.8	248.5	0.17	0.15	0.02	0.63	0.00	0.00	9.76	0.00	9.8	247.9	254.0	127.0
2/28/04	59	9.8	247.9	0.12	0.15	0.02	0.46	0.00	0.00	9.74	0.00	9.7	247.4	254.0	127.0
2/29/04	60	9.7	247.4	0.03	0.15	0.00	0.11	0.68	0.00	10.42	0.42	10.0	254.0	254.0	127.0
3/1/04	61	10.0	254.0	0.07	0.15	0.01	0.27	0.00	0.00	9.99	0.00	10.0	253.7	254.0	127.0
3/2/04	62	10.0	253.7	0.06	0.15	0.01	0.24	0.02	0.00	10.00	0.00	10.0	254.0	254.0	127.0
3/3/04	63	10.0	254.0	0.01	0.15	0.00	0.02	0.34	0.00	10.34	0.34	10.0	254.0	254.0	127.0
3/4/04	64	10.0	254.0	0.00	0.15	0.00	0.00	1.31	0.00	11.31	1.31	10.0	254.0	254.0	127.0
3/5/04	65	10.0	254.0	0.04	0.15	0.01	0.15	0.01	0.00	10.00	0.00	10.0	254.0	254.0	127.0
3/6/04	66	10.0	254.0	0.18	0.15	0.03	0.69	0.02	0.00	9.99	0.00	10.0	253.8	254.0	127.0
3/7/04	67	10.0	253.8	0.19	0.15	0.03	0.71	0.00	0.00	9.96	0.00	10.0	253.1	254.0	127.0
3/8/04	68	10.0	253.1	0.21	0.15	0.03	0.81	0.00	0.00	9.93	0.00	9.9	252.3	254.0	127.0
3/9/04	69	9.9	252.3	0.17	0.15	0.03	0.65	0.00	0.00	9.91	0.00	9.9	251.6	254.0	127.0
3/10/04	70	9.9	251.6	0.19	0.15	0.03	0.73	0.00	0.00	9.88	0.00	9.9	250.9	254.0	127.0
3/11/04	71	9.9	250.9	0.16	0.15	0.02	0.63	0.00	0.00	9.85	0.00	9.9	250.3	254.0	127.0
3/12/04	72	9.9	250.3	0.14	0.15	0.02	0.53	0.00	0.00	9.83	0.00	9.8	249.8	254.0	127.0
3/13/04	73	9.8	249.8	0.07	0.15	0.01	0.26	0.00	0.00	9.82	0.00	9.8	249.5	254.0	127.0
3/14/04	74	9.8	249.5	0.15	0.15	0.02	0.57	0.10	0.00	9.90	0.00	9.9	251.5	254.0	127.0
3/15/04	75	9.9	251.5	0.04	0.15	0.01	0.14	0.19	0.00	10.08	0.08	10.0	254.0	254.0	127.0
3/16/04	76	10.0	254.0	0.07	0.15	0.01	0.25	0.00	0.00	9.99	0.00	10.0	253.7	254.0	127.0
3/17/04	77	10.0	253.7	0.12	0.15	0.02	0.47	0.00	0.00	9.97	0.00	10.0	253.3	254.0	127.0
3/18/04	78	10.0	253.3	0.17	0.15	0.03	0.65	0.00	0.00	9.95	0.00	9.9	252.6	254.0	127.0
3/19/04	79	9.9	252.6	0.19	0.15	0.03	0.71	0.00	0.00	9.92	0.00	9.9	251.9	254.0	127.0
3/20/04	80	9.9	251.9	0.33	0.15	0.05	1.27	0.00	0.00	9.87	0.00	9.9	250.6	254.0	127.0
3/21/04	81	9.9	250.6	0.17	0.15	0.02	0.63	0.00	0.00	9.84	0.00	9.8	250.0	254.0	127.0
3/22/04	82	9.8	250.0	0.20	0.15	0.03	0.75	0.00	0.00	9.81	0.00	9.8	249.3	254.0	127.0
3/23/04	83	9.8	249.3	0.26	0.15	0.04	0.98	0.00	0.00	9.78	0.00	9.8	248.3	254.0	127.0

3/24/04	84	9.8	248.3	0.07	0.15	0.01	0.27	0.00	0.00	9.76	0.00	9.8	248.0	254.0	127.0
3/25/04	85	9.8	248.0	0.05	0.15	0.01	0.17	0.00	0.00	9.76	0.00	9.8	247.8	254.0	127.0
3/26/04	86	9.8	247.8	0.12	0.15	0.02	0.47	0.40	0.00	10.14	0.14	10.0	254.0	254.0	127.0
3/27/04	87	10.0	254.0	0.06	0.15	0.01	0.21	0.94	0.00	10.93	0.93	10.0	254.0	254.0	127.0
3/28/04	88	10.0	254.0	0.14	0.15	0.02	0.53	0.04	0.00	10.02	0.02	10.0	254.0	254.0	127.0
3/29/04	89	10.0	254.0	0.13	0.15	0.02	0.49	0.17	0.00	10.15	0.15	10.0	254.0	254.0	127.0
3/30/04	90	10.0	254.0	0.12	0.15	0.02	0.44	0.00	0.00	9.98	0.00	10.0	253.6	254.0	127.0
3/31/04	91	10.0	253.6	0.13	0.15	0.02	0.49	0.00	0.00	9.96	0.00	10.0	253.1	254.0	127.0
4/1/04	92	10.0	253.1	0.14	0.15	0.02	0.53	0.00	0.00	9.94	0.00	9.9	252.5	254.0	127.0
4/2/04	93	9.9	252.5	0.16	0.15	0.02	0.59	0.00	0.00	9.92	0.00	9.9	251.9	254.0	127.0
4/3/04	94	9.9	251.9	0.18	0.15	0.03	0.69	0.00	0.00	9.89	0.00	9.9	251.3	254.0	127.0
4/4/04	95	9.9	251.3	0.15	0.19	0.03	0.73	0.00	0.00	9.86	0.00	9.9	250.5	254.0	127.0
4/5/04	96	9.9	250.5	0.16	0.22	0.03	0.89	0.00	0.00	9.83	0.00	9.8	249.6	254.0	127.0
4/6/04	97	9.8	249.6	0.16	0.26	0.04	1.04	0.00	0.00	9.79	0.00	9.8	248.6	254.0	127.0
4/7/04	98	9.8	248.6	0.14	0.30	0.04	1.06	0.17	0.00	9.92	0.00	9.9	251.9	254.0	127.0
4/8/04	99	9.9	251.9	0.19	0.33	0.06	1.60	0.01	0.00	9.86	0.00	9.9	250.5	254.0	127.0
4/9/04	100	9.9	250.5	0.11	0.37	0.04	1.05	0.00	0.00	9.82	0.00	9.8	249.5	254.0	127.0
4/10/04	101	9.8	249.5	0.09	0.41	0.04	0.95	0.00	0.00	9.78	0.00	9.8	248.5	254.0	127.0
4/11/04	102	9.8	248.5	0.13	0.45	0.06	1.48	0.00	0.00	9.73	0.00	9.7	247.0	254.0	127.0
4/12/04	103	9.7	247.0	0.06	0.48	0.03	0.68	0.00	0.00	9.70	0.00	9.7	246.4	254.0	127.0
4/13/04	104	9.7	246.4	0.14	0.52	0.08	1.91	0.00	0.00	9.62	0.00	9.6	244.4	254.0	127.0
4/14/04	105	9.6	244.4	0.24	0.56	0.13	3.39	0.00	0.00	9.49	0.00	9.5	241.1	254.0	127.0
4/15/04	106	9.5	241.1	0.39	0.59	0.23	5.84	0.00	0.00	9.26	0.00	9.3	235.2	254.0	127.0
4/16/04	107	9.3	235.2	0.45	0.63	0.29	7.28	0.00	0.00	8.97	0.00	9.0	227.9	254.0	127.0
4/17/04	108	9.0	227.9	0.48	0.67	0.32	8.21	0.00	0.00	8.65	0.00	8.7	219.7	254.0	127.0
4/18/04	109	8.7	219.7	0.20	0.70	0.14	3.61	0.02	0.00	8.53	0.00	8.5	216.6	254.0	127.0
4/19/04	110	8.5	216.6	0.21	0.74	0.16	4.04	0.00	0.00	8.37	0.00	8.4	212.6	254.0	127.0
4/20/04	111	8.4	212.6	0.16	0.78	0.13	3.20	0.06	0.00	8.30	0.00	8.3	210.9	254.0	127.0
4/21/04	112	8.3	210.9	0.15	0.82	0.12	3.14	0.00	0.00	8.18	0.00	8.2	207.8	254.0	127.0
4/22/04	113	8.2	207.8	0.05	0.85	0.04	1.01	0.61	0.00	8.75	0.00	8.8	222.3	254.0	127.0
4/23/04	114	8.8	222.3	0.09	0.89	0.08	2.11	0.15	0.00	8.82	0.00	8.8	224.0	254.0	127.0
4/24/04	115	8.8	224.0	0.05	0.93	0.04	1.14	0.34	0.00	9.11	0.00	9.1	231.5	254.0	127.0
4/25/04	116	9.1	231.5	0.21	0.96	0.20	5.09	0.00	0.00	8.91	0.00	8.9	226.4	254.0	127.0
4/26/04	117	8.9	226.4	0.25	1.00	0.25	6.25	0.00	0.00	8.67	0.00	8.7	220.1	254.0	127.0
4/27/04	118	8.7	220.1	0.34	0.15	0.05	1.31	0.00	0.00	8.61	0.00	8.6	218.8	254.0	127.0
4/28/04	119	8.6	218.8	0.50	0.17	0.09	2.17	0.00	0.00	8.53	0.00	8.5	216.6	254.0	127.0
4/29/04	120	8.5	216.6	0.07	0.19	0.01	0.36	0.03	0.00	8.55	0.00	8.5	217.0	254.0	127.0
4/30/04	121	8.5	217.0	0.06	0.21	0.01	0.31	1.19	0.00	9.72	0.00	9.7	247.0	254.0	127.0
5/1/04	122	9.7	247.0	0.21	0.24	0.05	1.24	0.00	0.00	9.67	0.00	9.7	245.7	254.0	127.0
5/2/04	123	9.7	245.7	0.20	0.26	0.05	1.28	0.00	0.00	9.62	0.00	9.6	244.4	254.0	127.0
5/3/04	124	9.6	244.4	0.20	0.28	0.06	1.42	0.00	0.00	9.57	0.00	9.6	243.0	254.0	127.0
5/4/04	125	9.6	243.0	0.18	0.30	0.05	1.39	0.00	0.00	9.51	0.00	9.5	241.6	254.0	127.0
5/5/04	126	9.5	241.6	0.31	0.32	0.10	2.50	0.00	0.00	9.41	0.00	9.4	239.1	254.0	127.0
5/6/04	127	9.4	239.1	0.38	0.34	0.13	3.29	0.00	0.00	9.29	0.00	9.3	235.9	254.0	127.0
5/7/04	128	9.3	235.9	0.27	0.36	0.10	2.46	0.00	0.00	9.19	0.00	9.2	233.4	254.0	127.0
5/8/04	129	9.2	233.4	0.32	0.38	0.12	3.11	0.00	0.00	9.07	0.00	9.1	230.3	254.0	127.0
5/9/04	130	9.1	230.3	0.22	0.41	0.09	2.22	0.07	0.00	9.05	0.00	9.0	229.8	254.0	127.0
5/10/04	131	9.0	229.8	0.09	0.43	0.04	0.97	1.03	0.00	10.04	0.04	10.0	254.0	254.0	127.0
5/11/04	132	10.0	254.0	0.16	0.45	0.07	1.77	0.00	0.00	9.93	0.00	9.9	252.2	254.0	127.0
5/12/04	133	9.9	252.2	0.10	0.47	0.05	1.22	0.30	0.00	10.18	0.18	10.0	254.0	254.0	127.0
5/13/04	134	10.0	254.0	0.02	0.49	0.01	0.28	0.23	0.00	10.22	0.22	10.0	254.0	254.0	127.0

5/14/04	135	10.0	254.0	0.18	0.51	0.09	2.38	0.11	0.00	10.02	0.02	10.0	254.0	254.0	127.0
5/15/04	136	10.0	254.0	0.17	0.53	0.09	2.36	0.00	0.00	9.91	0.00	9.9	251.6	254.0	127.0
5/16/04	137	9.9	251.6	0.21	0.55	0.12	2.98	0.00	0.00	9.79	0.00	9.8	248.7	254.0	127.0
5/17/04	138	9.8	248.7	0.12	0.58	0.07	1.78	0.00	0.00	9.72	0.00	9.7	246.9	254.0	127.0
5/18/04	139	9.7	246.9	0.05	0.60	0.03	0.78	0.16	0.00	9.85	0.00	9.8	250.2	254.0	127.0
5/19/04	140	9.8	250.2	0.13	0.62	0.08	2.05	0.00	0.00	9.77	0.00	9.8	248.1	254.0	127.0
5/20/04	141	9.8	248.1	0.15	0.64	0.10	2.51	0.00	0.00	9.67	0.00	9.7	245.6	254.0	127.0
5/21/04	142	9.7	245.6	0.28	0.66	0.18	4.64	0.00	0.00	9.49	0.00	9.5	241.0	254.0	127.0
5/22/04	143	9.5	241.0	0.26	0.68	0.18	4.55	0.00	0.00	9.31	0.00	9.3	236.4	254.0	127.0
5/23/04	144	9.3	236.4	0.27	0.70	0.19	4.78	0.01	0.00	9.13	0.00	9.1	231.9	254.0	127.0
5/24/04	145	9.1	231.9	0.24	0.72	0.17	4.36	0.00	0.00	8.96	0.00	9.0	227.5	254.0	127.0
5/25/04	146	9.0	227.5	0.22	0.75	0.17	4.25	0.00	0.00	8.79	0.00	8.8	223.3	254.0	127.0
5/26/04	147	8.8	223.3	0.14	0.77	0.10	2.63	0.00	0.00	8.69	0.00	8.7	220.6	254.0	127.0
5/27/04	148	8.7	220.6	0.30	0.79	0.23	5.91	0.00	0.00	8.45	0.00	8.5	214.7	254.0	127.0
5/28/04	149	8.5	214.7	0.31	0.81	0.25	6.29	0.00	0.00	8.21	0.00	8.2	208.4	254.0	127.0
5/29/04	150	8.2	208.4	0.28	0.83	0.24	5.97	0.00	0.00	7.97	0.00	8.0	202.5	254.0	127.0
5/30/04	151	8.0	202.5	0.23	0.85	0.20	5.07	0.44	0.00	8.21	0.00	8.2	208.6	254.0	127.0
5/31/04	152	8.2	208.6	0.32	0.87	0.28	7.00	0.00	0.00	7.94	0.00	7.9	201.6	254.0	127.0
6/1/04	153	7.9	201.6	0.34	0.89	0.30	7.68	0.00	0.00	7.63	0.00	7.6	193.9	254.0	127.0
6/2/04	154	7.6	193.9	0.22	0.92	0.20	5.08	0.00	0.00	7.43	0.00	7.4	188.8	254.0	127.0
6/3/04	155	7.4	188.8	0.21	0.94	0.19	4.90	0.00	0.00	7.24	0.00	7.2	183.9	254.0	127.0
6/4/04	156	7.2	183.9	0.23	0.96	0.22	5.67	0.00	0.00	7.02	0.00	7.0	178.3	254.0	127.0
6/5/04	157	7.0	178.3	0.09	0.98	0.09	2.18	0.96	0.00	7.89	0.00	7.9	200.5	254.0	127.0
6/6/04	158	7.9	200.5	0.15	1.00	0.15	3.91	0.00	0.00	7.74	0.00	7.7	196.6	254.0	127.0
6/7/04	159	7.7	196.6	0.26	0.15	0.04	0.98	0.00	0.00	7.70	0.00	7.7	195.6	254.0	127.0
6/8/04	160	7.7	195.6	0.26	0.18	0.05	1.19	0.00	0.00	7.65	0.00	7.7	194.4	254.0	127.0
6/9/04	161	7.7	194.4	0.10	0.21	0.02	0.54	0.05	0.00	7.68	0.00	7.7	195.1	254.0	127.0
6/10/04	162	7.7	195.1	0.13	0.24	0.03	0.79	0.00	0.00	7.65	0.00	7.7	194.3	254.0	127.0
6/11/04	163	7.7	194.3	0.35	0.27	0.09	2.40	0.00	0.00	7.56	0.00	7.6	191.9	254.0	127.0
6/12/04	164	7.6	191.9	0.26	0.30	0.08	1.98	0.75	0.00	8.23	0.00	8.2	209.0	254.0	127.0
6/13/04	165	8.2	209.0	0.26	0.33	0.08	2.15	0.01	0.00	8.15	0.00	8.2	207.1	254.0	127.0
6/14/04	166	8.2	207.1	0.23	0.36	0.08	2.15	0.54	0.00	8.61	0.00	8.6	218.7	254.0	127.0
6/15/04	167	8.6	218.7	0.19	0.39	0.07	1.87	0.62	0.00	9.15	0.00	9.2	232.5	254.0	127.0
6/16/04	168	9.2	232.5	0.16	0.42	0.07	1.73	0.01	0.00	9.10	0.00	9.1	231.1	254.0	127.0
6/17/04	169	9.1	231.1	0.13	0.45	0.06	1.51	0.75	0.00	9.79	0.00	9.8	248.6	254.0	127.0
6/18/04	170	9.8	248.6	0.07	0.48	0.03	0.84	0.02	0.00	9.77	0.00	9.8	248.3	254.0	127.0
6/19/04	171	9.8	248.3	0.11	0.51	0.06	1.47	0.01	0.00	9.73	0.00	9.7	247.0	254.0	127.0
6/20/04	172	9.7	247.0	0.10	0.54	0.06	1.41	0.04	0.00	9.71	0.00	9.7	246.7	254.0	127.0
6/21/04	173	9.7	246.7	0.19	0.58	0.11	2.82	0.04	0.00	9.64	0.00	9.6	244.9	254.0	127.0
6/22/04	174	9.6	244.9	0.21	0.61	0.13	3.20	0.00	0.00	9.51	0.00	9.5	241.7	254.0	127.0
6/23/04	175	9.5	241.7	0.27	0.64	0.17	4.29	0.00	0.00	9.34	0.00	9.3	237.4	254.0	127.0
6/24/04	176	9.3	237.4	0.25	0.67	0.16	4.19	0.30	0.00	9.48	0.00	9.5	240.8	254.0	127.0
6/25/04	177	9.5	240.8	0.22	0.70	0.15	3.89	0.00	0.00	9.33	0.00	9.3	236.9	254.0	127.0
6/26/04	178	9.3	236.9	0.12	0.73	0.08	2.14	0.00	0.00	9.24	0.00	9.2	234.8	254.0	127.0
6/27/04	179	9.2	234.8	0.05	0.76	0.04	0.98	1.75	0.00	10.95	0.95	10.0	254.0	254.0	127.0
6/28/04	180	10.0	254.0	0.20	0.79	0.16	3.95	0.00	0.00	9.84	0.00	9.8	250.0	254.0	127.0
6/29/04	181	9.8	250.0	0.17	0.82	0.14	3.59	0.00	0.00	9.70	0.00	9.7	246.5	254.0	127.0
6/30/04	182	9.7	246.5	0.17	0.85	0.14	3.56	0.00	0.00	9.56	0.00	9.6	242.9	254.0	127.0
7/1/04	183	9.6	242.9	0.08	0.88	0.07	1.89	1.00	0.00	10.49	0.49	10.0	254.0	254.0	127.0
7/2/04	184	10.0	254.0	0.05	0.91	0.05	1.15	1.94	0.00	11.89	1.89	10.0	254.0	254.0	127.0
7/3/04	185	10.0	254.0	0.22	0.94	0.21	5.32	0.33	0.00	10.12	0.12	10.0	254.0	254.0	127.0

7/4/04	186	10.0	254.0	0.23	0.97	0.22	5.55	0.11	0.00	9.89	0.00	9.9	251.2	254.0	127.0
7/5/04	187	9.9	251.2	0.19	1.00	0.19	4.84	0.34	0.00	10.04	0.04	10.0	254.0	254.0	127.0
7/6/04	188	10.0	254.0	0.18	0.15	0.03	0.67	1.14	0.00	11.11	1.11	10.0	254.0	254.0	127.0
7/7/04	189	10.0	254.0	0.13	0.17	0.02	0.59	0.00	0.00	9.98	0.00	10.0	253.4	254.0	127.0
7/8/04	190	10.0	253.4	0.11	0.20	0.02	0.54	0.12	0.00	10.08	0.08	10.0	254.0	254.0	127.0
7/9/04	191	10.0	254.0	0.15	0.22	0.03	0.84	0.84	0.00	10.81	0.81	10.0	254.0	254.0	127.0
7/10/04	192	10.0	254.0	0.18	0.24	0.04	1.11	0.01	0.00	9.97	0.00	10.0	253.1	254.0	127.0
7/11/04	193	10.0	253.1	0.23	0.27	0.06	1.59	0.00	0.00	9.90	0.00	9.9	251.6	254.0	127.0
7/12/04	194	9.9	251.6	0.23	0.29	0.07	1.72	0.00	0.00	9.84	0.00	9.8	249.8	254.0	127.0
7/13/04	195	9.8	249.8	0.26	0.32	0.08	2.05	0.00	0.00	9.76	0.00	9.8	247.8	254.0	127.0
7/14/04	196	9.8	247.8	0.20	0.34	0.07	1.68	0.00	0.00	9.69	0.00	9.7	246.1	254.0	127.0
7/15/04	197	9.7	246.1	0.19	0.36	0.07	1.79	0.00	0.00	9.62	0.00	9.6	244.3	254.0	127.0
7/16/04	198	9.6	244.3	0.16	0.39	0.06	1.59	0.00	0.00	9.56	0.00	9.6	242.7	254.0	127.0
7/17/04	199	9.6	242.7	0.19	0.41	0.08	1.98	0.00	0.00	9.48	0.00	9.5	240.7	254.0	127.0
7/18/04	200	9.5	240.7	0.19	0.43	0.08	2.08	0.00	0.00	9.40	0.00	9.4	238.7	254.0	127.0
7/19/04	201	9.4	238.7	0.26	0.46	0.12	3.02	0.00	0.00	9.28	0.00	9.3	235.6	254.0	127.0
7/20/04	202	9.3	235.6	0.25	0.48	0.12	3.00	0.00	0.00	9.16	0.00	9.2	232.6	254.0	127.0
7/21/04	203	9.2	232.6	0.10	0.50	0.05	1.29	0.07	0.00	9.18	0.00	9.2	233.1	254.0	127.0
7/22/04	204	9.2	233.1	0.13	0.53	0.07	1.71	0.09	0.00	9.20	0.00	9.2	233.7	254.0	127.0
7/23/04	205	9.2	233.7	0.05	0.55	0.03	0.69	0.07	0.00	9.24	0.00	9.2	234.8	254.0	127.0
7/24/04	206	9.2	234.8	0.04	0.58	0.02	0.61	1.15	0.00	10.37	0.37	10.0	254.0	254.0	127.0
7/25/04	207	10.0	254.0	0.16	0.60	0.09	2.38	0.23	0.00	10.14	0.14	10.0	254.0	254.0	127.0
7/26/04	208	10.0	254.0	0.16	0.62	0.10	2.49	0.00	0.00	9.90	0.00	9.9	251.5	254.0	127.0
7/27/04	209	9.9	251.5	0.17	0.65	0.11	2.86	0.00	0.00	9.79	0.00	9.8	248.7	254.0	127.0
7/28/04	210	9.8	248.7	0.09	0.67	0.06	1.50	0.00	0.00	9.73	0.00	9.7	247.1	254.0	127.0
7/29/04	211	9.7	247.1	0.10	0.69	0.07	1.69	0.00	0.00	9.66	0.00	9.7	245.5	254.0	127.0
7/30/04	212	9.7	245.5	0.14	0.72	0.10	2.57	0.00	0.00	9.56	0.00	9.6	242.9	254.0	127.0
7/31/04	213	9.6	242.9	0.18	0.74	0.13	3.35	0.00	0.00	9.43	0.00	9.4	239.5	254.0	127.0
8/1/04	214	9.4	239.5	0.21	0.76	0.16	4.03	0.00	0.00	9.27	0.00	9.3	235.5	254.0	127.0
8/2/04	215	9.3	235.5	0.23	0.79	0.18	4.60	0.00	0.00	9.09	0.00	9.1	230.9	254.0	127.0
8/3/04	216	9.1	230.9	0.24	0.81	0.20	4.97	0.00	0.00	8.89	0.00	8.9	225.9	254.0	127.0
8/4/04	217	8.9	225.9	0.12	0.83	0.10	2.62	0.00	0.00	8.79	0.00	8.8	223.3	254.0	127.0
8/5/04	218	8.8	223.3	0.22	0.86	0.18	4.69	0.00	0.00	8.61	0.00	8.6	218.6	254.0	127.0
8/6/04	219	8.6	218.6	0.13	0.88	0.11	2.86	0.00	0.00	8.49	0.00	8.5	215.8	254.0	127.0
8/7/04	220	8.5	215.8	0.15	0.91	0.14	3.55	0.00	0.00	8.35	0.00	8.4	212.2	254.0	127.0
8/8/04	221	8.4	212.2	0.13	0.93	0.12	3.15	0.00	0.00	8.23	0.00	8.2	209.1	254.0	127.0
8/9/04	222	8.2	209.1	0.16	0.95	0.16	3.98	0.45	0.00	8.52	0.00	8.5	216.5	254.0	127.0
8/10/04	223	8.5	216.5	0.12	0.98	0.12	3.00	0.04	0.00	8.45	0.00	8.4	214.5	254.0	127.0
8/11/04	224	8.4	214.5	0.12	1.00	0.12	3.08	0.09	0.00	8.41	0.00	8.4	213.7	254.0	127.0
8/12/04	225	8.4	213.7	0.10	0.15	0.02	0.39	0.03	0.00	8.43	0.00	8.4	214.1	254.0	127.0
8/13/04	226	8.4	214.1	0.12	0.18	0.02	0.55	0.06	0.00	8.47	0.00	8.5	215.1	254.0	127.0
8/14/04	227	8.5	215.1	0.12	0.21	0.03	0.65	0.00	0.00	8.44	0.00	8.4	214.4	254.0	127.0
8/15/04	228	8.4	214.4	0.15	0.24	0.04	0.94	0.00	0.00	8.40	0.00	8.4	213.5	254.0	127.0
8/16/04	229	8.4	213.5	0.12	0.28	0.03	0.81	0.00	0.00	8.37	0.00	8.4	212.7	254.0	127.0
8/17/04	230	8.4	212.7	0.18	0.31	0.06	1.40	0.00	0.00	8.32	0.00	8.3	211.3	254.0	127.0
8/18/04	231	8.3	211.3	0.19	0.34	0.07	1.65	0.00	0.00	8.25	0.00	8.3	209.6	254.0	127.0
8/19/04	232	8.3	209.6	0.08	0.37	0.03	0.73	0.17	0.00	8.39	0.00	8.4	213.2	254.0	127.0
8/20/04	233	8.4	213.2	0.12	0.40	0.05	1.27	0.26	0.00	8.60	0.00	8.6	218.5	254.0	127.0
8/21/04	234	8.6	218.5	0.16	0.43	0.07	1.71	0.00	0.00	8.54	0.00	8.5	216.8	254.0	127.0
8/22/04	235	8.5	216.8	0.15	0.46	0.07	1.74	0.00	0.00	8.47	0.00	8.5	215.1	254.0	127.0
8/23/04	236	8.5	215.1	0.09	0.50	0.05	1.20	0.02	0.00	8.44	0.00	8.4	214.4	254.0	127.0

8/24/04	237	8.4	214.4	0.14	0.53	0.07	1.81	4.98	0.00	13.35	3.35	10.0	254.0	254.0	127.0
8/25/04	238	10.0	254.0	0.13	0.56	0.07	1.90	0.06	0.00	9.99	0.00	10.0	253.6	254.0	127.0
8/26/04	239	10.0	253.6	0.20	0.59	0.12	3.07	0.00	0.00	9.86	0.00	9.9	250.6	254.0	127.0
8/27/04	240	9.9	250.6	0.15	0.62	0.09	2.40	0.00	0.00	9.77	0.00	9.8	248.2	254.0	127.0
8/28/04	241	9.8	248.2	0.12	0.65	0.08	2.07	0.00	0.00	9.69	0.00	9.7	246.1	254.0	127.0
8/29/04	242	9.7	246.1	0.14	0.69	0.10	2.49	0.00	0.00	9.59	0.00	9.6	243.6	254.0	127.0
8/30/04	243	9.6	243.6	0.13	0.72	0.09	2.32	0.00	0.00	9.50	0.00	9.5	241.3	254.0	127.0
8/31/04	244	9.5	241.3	0.13	0.75	0.09	2.38	0.00	0.00	9.41	0.00	9.4	238.9	254.0	127.0
9/1/04	245	9.4	238.9	0.13	0.78	0.10	2.66	0.00	0.00	9.30	0.00	9.3	236.2	254.0	127.0
9/2/04	246	9.3	236.2	0.13	0.81	0.11	2.69	0.00	0.00	9.20	0.00	9.2	233.6	254.0	127.0
9/3/04	247	9.2	233.6	0.15	0.84	0.13	3.22	0.00	0.00	9.07	0.00	9.1	230.3	254.0	127.0
9/4/04	248	9.1	230.3	0.17	0.87	0.15	3.88	0.00	0.00	8.92	0.00	8.9	226.5	254.0	127.0
9/5/04	249	8.9	226.5	0.14	0.91	0.13	3.28	0.00	0.00	8.79	0.00	8.8	223.2	254.0	127.0
9/6/04	250	8.8	223.2	0.16	0.94	0.15	3.76	0.75	0.00	9.39	0.00	9.4	238.5	254.0	127.0
9/7/04	251	9.4	238.5	0.14	0.97	0.13	3.34	0.00	0.00	9.26	0.00	9.3	235.1	254.0	127.0
9/8/04	252	9.3	235.1	0.13	1.00	0.13	3.20	0.00	0.00	9.13	0.00	9.1	231.9	254.0	127.0
9/9/04	253	9.1	231.9	0.15	0.15	0.02	0.57	0.00	0.00	9.11	0.00	9.1	231.3	254.0	127.0
9/10/04	254	9.1	231.3	0.16	0.21	0.03	0.85	0.00	0.00	9.07	0.00	9.1	230.5	254.0	127.0
9/11/04	255	9.1	230.5	0.14	0.26	0.04	0.95	0.00	0.00	9.04	0.00	9.0	229.5	254.0	127.0
9/12/04	256	9.0	229.5	0.17	0.32	0.05	1.39	0.00	0.00	8.98	0.00	9.0	228.1	254.0	127.0
9/13/04	257	9.0	228.1	0.23	0.38	0.09	2.18	0.00	0.00	8.90	0.00	8.9	226.0	254.0	127.0
9/14/04	258	8.9	226.0	0.23	0.43	0.10	2.54	0.00	0.00	8.80	0.00	8.8	223.4	254.0	127.0
9/15/04	259	8.8	223.4	0.10	0.49	0.05	1.25	0.17	0.00	8.92	0.00	8.9	226.5	254.0	127.0
9/16/04	260	8.9	226.5	0.14	0.55	0.07	1.88	0.00	0.00	8.84	0.00	8.8	224.6	254.0	127.0
9/17/04	261	8.8	224.6	0.10	0.60	0.06	1.59	0.00	0.00	8.78	0.00	8.8	223.0	254.0	127.0
9/18/04	262	8.8	223.0	0.18	0.66	0.12	3.04	0.08	0.00	8.74	0.00	8.7	222.0	254.0	127.0
9/19/04	263	8.7	222.0	0.19	0.72	0.14	3.44	0.02	0.00	8.63	0.00	8.6	219.1	254.0	127.0
9/20/04	264	8.6	219.1	0.20	0.77	0.15	3.86	0.00	0.00	8.47	0.00	8.5	215.2	254.0	127.0
9/21/04	265	8.5	215.2	0.13	0.83	0.11	2.74	0.00	0.00	8.37	0.00	8.4	212.5	254.0	127.0
9/22/04	266	8.4	212.5	0.14	0.89	0.13	3.18	0.00	0.00	8.24	0.00	8.2	209.3	254.0	127.0
9/23/04	267	8.2	209.3	0.11	0.94	0.10	2.66	0.30	0.00	8.44	0.00	8.4	214.3	254.0	127.0
9/24/04	268	8.4	214.3	0.10	1.00	0.10	2.64	0.01	0.00	8.34	0.00	8.3	211.9	254.0	127.0
9/25/04	269	8.3	211.9	0.11	0.93	0.10	2.64	0.00	0.00	8.24	0.00	8.2	209.3	254.0	127.0
9/26/04	270	8.2	209.3	0.10	0.86	0.09	2.23	0.00	0.00	8.15	0.00	8.2	207.0	254.0	127.0
9/27/04	271	8.2	207.0	0.10	0.79	0.08	2.08	0.00	0.00	8.07	0.00	8.1	204.9	254.0	127.0
9/28/04	272	8.1	204.9	0.08	0.72	0.06	1.52	0.00	0.00	8.01	0.00	8.0	203.4	254.0	127.0
9/29/04	273	8.0	203.4	0.08	0.65	0.05	1.24	0.02	0.00	7.98	0.00	8.0	202.7	254.0	127.0
9/30/04	274	8.0	202.7	0.14	0.58	0.08	2.00	0.00	0.00	7.90	0.00	7.9	200.7	254.0	127.0
10/1/04	275	7.9	200.7	0.10	0.50	0.05	1.29	0.00	0.00	7.85	0.00	7.9	199.4	254.0	127.0
10/2/04	276	7.9	199.4	0.08	0.43	0.03	0.86	0.00	0.00	7.82	0.00	7.8	198.5	254.0	127.0
10/3/04	277	7.8	198.5	0.14	0.36	0.05	1.25	0.00	0.00	7.77	0.00	7.8	197.3	254.0	127.0
10/4/04	278	7.8	197.3	0.10	0.29	0.03	0.72	0.00	0.00	7.74	0.00	7.7	196.6	254.0	127.0
10/5/04	279	7.7	196.6	0.11	0.22	0.02	0.61	0.00	0.00	7.71	0.00	7.7	195.9	254.0	127.0
10/6/04	280	7.7	195.9	0.06	0.15	0.01	0.23	0.00	0.00	7.71	0.00	7.7	195.7	254.0	127.0
10/7/04	281	7.7	195.7	0.02	0.15	0.00	0.07	0.04	0.00	7.74	0.00	7.7	196.7	254.0	127.0
10/8/04	282	7.7	196.7	0.06	0.15	0.01	0.21	0.01	0.00	7.74	0.00	7.7	196.7	254.0	127.0
10/9/04	283	7.7	196.7	0.08	0.15	0.01	0.31	0.00	0.00	7.73	0.00	7.7	196.4	254.0	127.0
10/10/04	284	7.7	196.4	0.05	0.15	0.01	0.19	0.00	0.00	7.72	0.00	7.7	196.2	254.0	127.0
10/11/04	285	7.7	196.2	0.04	0.15	0.01	0.15	0.09	0.00	7.81	0.00	7.8	198.3	254.0	127.0
10/12/04	286	7.8	198.3	0.03	0.15	0.00	0.12	0.03	0.00	7.83	0.00	7.8	199.0	254.0	127.0
10/13/04	287	7.8	199.0	0.10	0.15	0.02	0.40	0.00	0.00	7.82	0.00	7.8	198.6	254.0	127.0

10/14/04	288	7.8	198.6	0.07	0.15	0.01	0.27	0.00	0.00	7.81	0.00	7.8	198.3	254.0	127.0
10/15/04	289	7.8	198.3	0.07	0.15	0.01	0.25	0.00	0.00	7.80	0.00	7.8	198.1	254.0	127.0
10/16/04	290	7.8	198.1	0.05	0.15	0.01	0.19	0.00	0.00	7.79	0.00	7.8	197.9	254.0	127.0
10/17/04	291	7.8	197.9	0.09	0.15	0.01	0.33	0.00	0.00	7.78	0.00	7.8	197.5	254.0	127.0
10/18/04	292	7.8	197.5	0.05	0.15	0.01	0.17	0.00	0.00	7.77	0.00	7.8	197.4	254.0	127.0
10/19/04	293	7.8	197.4	0.02	0.15	0.00	0.08	0.00	0.00	7.77	0.00	7.8	197.3	254.0	127.0
10/20/04	294	7.8	197.3	0.00	0.15	0.00	0.01	0.00	0.00	7.77	0.00	7.8	197.3	254.0	127.0
10/21/04	295	7.8	197.3	0.01	0.15	0.00	0.03	0.01	0.00	7.78	0.00	7.8	197.5	254.0	127.0
10/22/04	296	7.8	197.5	0.07	0.15	0.01	0.26	0.00	0.00	7.77	0.00	7.8	197.2	254.0	127.0
10/23/04	297	7.8	197.2	0.13	0.15	0.02	0.51	0.00	0.00	7.75	0.00	7.7	196.7	254.0	127.0
10/24/04	298	7.7	196.7	0.09	0.15	0.01	0.36	0.00	0.00	7.73	0.00	7.7	196.4	254.0	127.0
10/25/04	299	7.7	196.4	0.07	0.15	0.01	0.28	0.00	0.00	7.72	0.00	7.7	196.1	254.0	127.0
10/26/04	300	7.7	196.1	0.02	0.15	0.00	0.06	0.42	0.00	8.14	0.00	8.1	206.7	254.0	127.0
10/27/04	301	8.1	206.7	0.01	0.15	0.00	0.02	0.04	0.00	8.18	0.00	8.2	207.7	254.0	127.0
10/28/04	302	8.2	207.7	0.05	0.15	0.01	0.19	0.37	0.00	8.54	0.00	8.5	216.9	254.0	127.0
10/29/04	303	8.5	216.9	0.20	0.15	0.03	0.76	0.00	0.00	8.51	0.00	8.5	216.1	254.0	127.0
10/30/04	304	8.5	216.1	0.15	0.15	0.02	0.58	0.00	0.00	8.49	0.00	8.5	215.6	254.0	127.0
10/31/04	305	8.5	215.6	0.05	0.15	0.01	0.20	0.00	0.00	8.48	0.00	8.5	215.4	254.0	127.0
11/1/04	306	8.5	215.4	0.00	0.15	0.00	0.02	0.21	0.00	8.69	0.00	8.7	220.7	254.0	127.0
11/2/04	307	8.7	220.7	0.04	0.15	0.01	0.16	0.14	0.00	8.82	0.00	8.8	224.1	254.0	127.0
11/3/04	308	8.8	224.1	0.02	0.15	0.00	0.07	0.01	0.00	8.83	0.00	8.8	224.3	254.0	127.0
11/4/04	309	8.8	224.3	0.05	0.15	0.01	0.20	0.00	0.00	8.82	0.00	8.8	224.1	254.0	127.0
11/5/04	310	8.8	224.1	0.09	0.15	0.01	0.34	0.00	0.00	8.81	0.00	8.8	223.7	254.0	127.0
11/6/04	311	8.8	223.7	0.04	0.15	0.01	0.17	0.00	0.00	8.80	0.00	8.8	223.6	254.0	127.0
11/7/04	312	8.8	223.6	0.05	0.15	0.01	0.20	0.00	0.00	8.79	0.00	8.8	223.4	254.0	127.0
11/8/04	313	8.8	223.4	0.03	0.15	0.00	0.11	0.00	0.00	8.79	0.00	8.8	223.3	254.0	127.0
11/9/04	314	8.8	223.3	0.04	0.15	0.01	0.14	0.00	0.00	8.78	0.00	8.8	223.1	254.0	127.0
11/10/04	315	8.8	223.1	0.02	0.15	0.00	0.07	0.00	0.00	8.78	0.00	8.8	223.0	254.0	127.0
11/11/04	316	8.8	223.0	0.06	0.15	0.01	0.23	0.78	0.00	9.55	0.00	9.6	242.6	254.0	127.0
11/12/04	317	9.6	242.6	0.01	0.15	0.00	0.03	0.00	0.00	9.55	0.00	9.6	242.6	254.0	127.0
11/13/04	318	9.6	242.6	0.03	0.15	0.00	0.11	0.00	0.00	9.55	0.00	9.5	242.5	254.0	127.0
11/14/04	319	9.5	242.5	0.03	0.15	0.00	0.10	0.00	0.00	9.54	0.00	9.5	242.4	254.0	127.0
11/15/04	320	9.5	242.4	0.00	0.15	0.00	0.00	0.01	0.00	9.55	0.00	9.6	242.6	254.0	127.0
11/16/04	321	9.6	242.6	0.01	0.15	0.00	0.02	0.02	0.00	9.57	0.00	9.6	243.1	254.0	127.0
11/17/04	322	9.6	243.1	0.00	0.15	0.00	0.00	0.00	0.00	9.57	0.00	9.6	243.1	254.0	127.0
11/18/04	323	9.6	243.1	0.00	0.15	0.00	0.00	0.20	0.00	9.77	0.00	9.8	248.2	254.0	127.0
11/19/04	324	9.8	248.2	0.00	0.15	0.00	0.00	0.02	0.00	9.79	0.00	9.8	248.7	254.0	127.0
11/20/04	325	9.8	248.7	0.01	0.15	0.00	0.02	0.00	0.00	9.79	0.00	9.8	248.7	254.0	127.0
11/21/04	326	9.8	248.7	0.01	0.15	0.00	0.03	0.00	0.00	9.79	0.00	9.8	248.6	254.0	127.0
11/22/04	327	9.8	248.6	0.00	0.15	0.00	0.00	0.00	0.00	9.79	0.00	9.8	248.6	254.0	127.0
11/23/04	328	9.8	248.6	0.02	0.15	0.00	0.07	0.01	0.00	9.80	0.00	9.8	248.8	254.0	127.0
11/24/04	329	9.8	248.8	0.01	0.15	0.00	0.05	0.09	0.00	9.88	0.00	9.9	251.1	254.0	127.0
11/25/04	330	9.9	251.1	0.00	0.15	0.00	0.02	0.00	0.00	9.88	0.00	9.9	251.1	254.0	127.0
11/26/04	331	9.9	251.1	0.00	0.15	0.00	0.00	0.00	0.00	9.88	0.00	9.9	251.1	254.0	127.0
11/27/04	332	9.9	251.1	0.02	0.15	0.00	0.07	0.05	0.00	9.93	0.00	9.9	252.3	254.0	127.0
11/28/04	333	9.9	252.3	0.01	0.15	0.00	0.04	0.00	0.00	9.93	0.00	9.9	252.2	254.0	127.0
11/29/04	334	9.9	252.2	0.00	0.15	0.00	0.00	0.12	0.00	10.05	0.05	10.0	254.0	254.0	127.0
11/30/04	335	10.0	254.0	0.00	0.15	0.00	0.00	0.15	0.00	10.15	0.15	10.0	254.0	254.0	127.0
12/1/04	336	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	254.0	254.0	127.0
12/2/04	337	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	254.0	254.0	127.0
12/3/04	338	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	254.0	254.0	127.0

12/4/04	339	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	254.0	254.0	127.0
12/5/04	340	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	254.0	254.0	127.0
12/6/04	341	10.0	254.0	0.00	0.15	0.00	0.00	0.46	0.00	10.46	0.46	10.0	254.0	254.0	127.0
12/7/04	342	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	254.0	254.0	127.0
12/8/04	343	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	254.0	254.0	127.0
12/9/04	344	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	254.0	254.0	127.0
12/10/04	345	10.0	254.0	0.03	0.15	0.00	0.12	0.00	0.00	10.00	0.00	10.0	253.9	254.0	127.0
12/11/04	346	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.00	0.00	10.0	253.9	254.0	127.0
12/12/04	347	10.0	253.9	0.06	0.15	0.01	0.23	0.00	0.00	9.99	0.00	10.0	253.7	254.0	127.0
12/13/04	348	10.0	253.7	0.02	0.15	0.00	0.07	0.00	0.00	9.98	0.00	10.0	253.6	254.0	127.0
12/14/04	349	10.0	253.6	0.00	0.15	0.00	0.00	0.00	0.00	9.98	0.00	10.0	253.6	254.0	127.0
12/15/04	350	10.0	253.6	0.01	0.15	0.00	0.04	0.00	0.00	9.98	0.00	10.0	253.5	254.0	127.0
12/16/04	351	10.0	253.5	0.00	0.15	0.00	0.00	0.00	0.00	9.98	0.00	10.0	253.5	254.0	127.0
12/17/04	352	10.0	253.5	0.00	0.15	0.00	0.00	0.00	0.00	9.98	0.00	10.0	253.5	254.0	127.0
12/18/04	353	10.0	253.5	0.01	0.15	0.00	0.03	0.00	0.00	9.98	0.00	10.0	253.5	254.0	127.0
12/19/04	354	10.0	253.5	0.03	0.15	0.00	0.10	0.00	0.00	9.98	0.00	10.0	253.4	254.0	127.0
12/20/04	355	10.0	253.4	0.00	0.15	0.00	0.00	0.00	0.00	9.98	0.00	10.0	253.4	254.0	127.0
12/21/04	356	10.0	253.4	0.01	0.15	0.00	0.03	0.00	0.00	9.98	0.00	10.0	253.4	254.0	127.0
12/22/04	357	10.0	253.4	0.03	0.15	0.00	0.12	0.00	0.00	9.97	0.00	10.0	253.3	254.0	127.0
12/23/04	358	10.0	253.3	0.01	0.15	0.00	0.02	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
12/24/04	359	10.0	253.2	0.00	0.15	0.00	0.00	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
12/25/04	360	10.0	253.2	0.00	0.15	0.00	0.00	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
12/26/04	361	10.0	253.2	0.00	0.15	0.00	0.00	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
12/27/04	362	10.0	253.2	0.00	0.15	0.00	0.00	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
12/28/04	363	10.0	253.2	0.00	0.15	0.00	0.00	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
12/29/04	364	10.0	253.2	0.00	0.15	0.00	0.00	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
12/30/04	365	10.0	253.2	0.01	0.15	0.00	0.04	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
12/31/04	365	10.0	253.2	0.00	0.15	0.00	0.00	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0

Table A.5: ET and AW 2005

Date	DOY	AW	AW	ET Ref	Alf Ref	ET Alf	ET Alf	Precip	Irrigation	AW-ET+P+I	Runoff	AW New	AW New	Max AW	50% AW
		in	mm	in	%	in	mm	in	in	in	in	in	mm	mm	mm
1/1/05	1	10.0	254.0	0.09	0.15	0.01	0.34	0.00	0.00	10.0	0.00	10.0	253.7	254.0	127.0
1/2/05	2	10.0	253.7	0.02	0.15	0.00	0.09	0.06	0.00	10.0	0.04	10.0	254.0	254.0	127.0
1/3/05	3	10.0	254.0	0.01	0.15	0.00	0.03	0.37	0.00	10.4	0.37	10.0	254.0	254.0	127.0
1/4/05	4	10.0	254.0	0.01	0.15	0.00	0.04	0.02	0.00	10.0	0.02	10.0	254.0	254.0	127.0
1/5/05	5	10.0	254.0	0.02	0.15	0.00	0.08	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
1/6/05	6	10.0	253.9	0.06	0.15	0.01	0.25	0.00	0.00	10.0	0.00	10.0	253.7	254.0	127.0
1/7/05	7	10.0	253.7	0.02	0.15	0.00	0.06	0.00	0.00	10.0	0.00	10.0	253.6	254.0	127.0
1/8/05	8	10.0	253.6	0.03	0.15	0.00	0.10	0.00	0.00	10.0	0.00	10.0	253.5	254.0	127.0
1/9/05	9	10.0	253.5	0.05	0.15	0.01	0.17	0.00	0.00	10.0	0.00	10.0	253.3	254.0	127.0
1/10/05	10	10.0	253.3	0.01	0.15	0.00	0.04	0.00	0.00	10.0	0.00	10.0	253.3	254.0	127.0
1/11/05	11	10.0	253.3	0.01	0.15	0.00	0.03	0.01	0.00	10.0	0.00	10.0	253.5	254.0	127.0
1/12/05	12	10.0	253.5	0.01	0.15	0.00	0.05	0.00	0.00	10.0	0.00	10.0	253.5	254.0	127.0
1/13/05	13	10.0	253.5	0.06	0.15	0.01	0.25	0.00	0.00	10.0	0.00	10.0	253.2	254.0	127.0
1/14/05	14	10.0	253.2	0.07	0.15	0.01	0.27	0.00	0.00	10.0	0.00	10.0	253.0	254.0	127.0
1/15/05	15	10.0	253.0	0.04	0.15	0.01	0.16	0.00	0.00	10.0	0.00	10.0	252.8	254.0	127.0

1/16/05	16	10.0	252.8	0.04	0.15	0.01	0.17	0.00	0.00	9.9	0.00	9.9	252.6	254.0	127.0
1/17/05	17	9.9	252.6	0.04	0.15	0.01	0.14	0.00	0.00	9.9	0.00	9.9	252.5	254.0	127.0
1/18/05	18	9.9	252.5	0.06	0.15	0.01	0.22	0.00	0.00	9.9	0.00	9.9	252.3	254.0	127.0
1/19/05	19	9.9	252.3	0.06	0.15	0.01	0.24	0.00	0.00	9.9	0.00	9.9	252.0	254.0	127.0
1/20/05	20	9.9	252.0	0.08	0.15	0.01	0.31	0.00	0.00	9.9	0.00	9.9	251.7	254.0	127.0
1/21/05	21	9.9	251.7	0.04	0.15	0.01	0.15	0.00	0.00	9.9	0.00	9.9	251.6	254.0	127.0
1/22/05	22	9.9	251.6	0.13	0.15	0.02	0.49	0.00	0.00	9.9	0.00	9.9	251.1	254.0	127.0
1/23/05	23	9.9	251.1	0.06	0.15	0.01	0.22	0.00	0.00	9.9	0.00	9.9	250.9	254.0	127.0
1/24/05	24	9.9	250.9	0.08	0.15	0.01	0.32	0.00	0.00	9.9	0.00	9.9	250.6	254.0	127.0
1/25/05	25	9.9	250.6	0.06	0.15	0.01	0.22	0.00	0.00	9.9	0.00	9.9	250.3	254.0	127.0
1/26/05	26	9.9	250.3	0.04	0.15	0.01	0.16	0.00	0.00	9.8	0.00	9.8	250.2	254.0	127.0
1/27/05	27	9.8	250.2	0.03	0.15	0.00	0.10	0.00	0.00	9.8	0.00	9.8	250.1	254.0	127.0
1/28/05	28	9.8	250.1	0.02	0.15	0.00	0.07	0.12	0.00	10.0	0.00	10.0	253.1	254.0	127.0
1/29/05	29	10.0	253.1	0.02	0.15	0.00	0.09	0.00	0.00	10.0	0.00	10.0	253.0	254.0	127.0
1/30/05	30	10.0	253.0	0.01	0.15	0.00	0.04	0.00	0.00	10.0	0.00	10.0	252.9	254.0	127.0
1/31/05	31	10.0	252.9	0.02	0.15	0.00	0.07	0.00	0.00	10.0	0.00	10.0	252.9	254.0	127.0
2/1/05	32	10.0	252.9	0.01	0.15	0.00	0.05	0.00	0.00	10.0	0.00	10.0	252.8	254.0	127.0
2/2/05	33	10.0	252.8	0.04	0.15	0.01	0.15	0.00	0.00	9.9	0.00	9.9	252.7	254.0	127.0
2/3/05	34	9.9	252.7	0.07	0.15	0.01	0.25	0.00	0.00	9.9	0.00	9.9	252.4	254.0	127.0
2/4/05	35	9.9	252.4	0.12	0.15	0.02	0.46	0.00	0.00	9.9	0.00	9.9	251.9	254.0	127.0
2/5/05	36	9.9	251.9	0.13	0.15	0.02	0.48	0.42	0.00	10.3	0.32	10.0	254.0	254.0	127.0
2/6/05	37	10.0	254.0	0.02	0.15	0.00	0.09	0.78	0.00	10.8	0.78	10.0	254.0	254.0	127.0
2/7/05	38	10.0	254.0	0.02	0.15	0.00	0.08	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
2/8/05	39	10.0	253.9	0.01	0.15	0.00	0.03	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
2/9/05	40	10.0	253.9	0.04	0.15	0.01	0.14	0.28	0.00	10.3	0.27	10.0	254.0	254.0	127.0
2/10/05	41	10.0	254.0	0.06	0.15	0.01	0.21	0.00	0.00	10.0	0.00	10.0	253.8	254.0	127.0
2/11/05	42	10.0	253.8	0.11	0.15	0.02	0.42	0.00	0.00	10.0	0.00	10.0	253.4	254.0	127.0
2/12/05	43	10.0	253.4	0.03	0.15	0.00	0.10	1.02	0.00	11.0	0.99	10.0	254.0	254.0	127.0
2/13/05	44	10.0	254.0	0.05	0.15	0.01	0.17	0.04	0.00	10.0	0.03	10.0	254.0	254.0	127.0
2/14/05	45	10.0	254.0	0.16	0.15	0.02	0.62	0.00	0.00	10.0	0.00	10.0	253.4	254.0	127.0
2/15/05	46	10.0	253.4	0.08	0.15	0.01	0.29	0.00	0.00	10.0	0.00	10.0	253.1	254.0	127.0
2/16/05	47	10.0	253.1	0.04	0.15	0.01	0.17	0.00	0.00	10.0	0.00	10.0	252.9	254.0	127.0
2/17/05	48	10.0	252.9	0.08	0.15	0.01	0.30	0.00	0.00	9.9	0.00	9.9	252.6	254.0	127.0
2/18/05	49	9.9	252.6	0.08	0.15	0.01	0.30	0.06	0.00	10.0	0.00	10.0	253.9	254.0	127.0
2/19/05	50	10.0	253.9	0.02	0.15	0.00	0.09	0.14	0.00	10.1	0.13	10.0	254.0	254.0	127.0
2/20/05	51	10.0	254.0	0.06	0.15	0.01	0.22	0.00	0.00	10.0	0.00	10.0	253.8	254.0	127.0
2/21/05	52	10.0	253.8	0.04	0.15	0.01	0.15	0.00	0.00	10.0	0.00	10.0	253.6	254.0	127.0
2/22/05	53	10.0	253.6	0.04	0.15	0.01	0.16	0.00	0.00	10.0	0.00	10.0	253.5	254.0	127.0
2/23/05	54	10.0	253.5	0.06	0.15	0.01	0.21	0.00	0.00	10.0	0.00	10.0	253.3	254.0	127.0
2/24/05	55	10.0	253.3	0.08	0.15	0.01	0.30	0.00	0.00	10.0	0.00	10.0	253.0	254.0	127.0
2/25/05	56	10.0	253.0	0.16	0.15	0.02	0.61	0.00	0.00	9.9	0.00	9.9	252.3	254.0	127.0
2/26/05	57	9.9	252.3	0.13	0.15	0.02	0.50	0.00	0.00	9.9	0.00	9.9	251.8	254.0	127.0
2/27/05	58	9.9	251.8	0.06	0.15	0.01	0.23	0.02	0.00	9.9	0.00	9.9	252.1	254.0	127.0
2/28/05	59	9.9	252.1	0.10	0.15	0.02	0.39	0.00	0.00	9.9	0.00	9.9	251.7	254.0	127.0
3/1/05	60	9.9	251.7	0.09	0.15	0.01	0.36	0.00	0.00	9.9	0.00	9.9	251.4	254.0	127.0
3/2/05	61	9.9	251.4	0.14	0.15	0.02	0.54	0.00	0.00	9.9	0.00	9.9	250.8	254.0	127.0
3/3/05	62	9.9	250.8	0.17	0.15	0.03	0.64	0.00	0.00	9.9	0.00	9.9	250.2	254.0	127.0
3/4/05	63	9.9	250.2	0.23	0.15	0.03	0.86	0.00	0.00	9.8	0.00	9.8	249.3	254.0	127.0
3/5/05	64	9.8	249.3	0.16	0.15	0.02	0.62	0.00	0.00	9.8	0.00	9.8	248.7	254.0	127.0
3/6/05	65	9.8	248.7	0.19	0.15	0.03	0.74	0.03	0.00	9.8	0.00	9.8	248.7	254.0	127.0
3/7/05	66	9.8	248.7	0.17	0.15	0.02	0.63	0.00	0.00	9.8	0.00	9.8	248.1	254.0	127.0

3/8/05	67	9.8	248.1	0.10	0.15	0.02	0.39	0.00	0.00	9.8	0.00	9.8	247.7	254.0	127.0
3/9/05	68	9.8	247.7	0.08	0.15	0.01	0.32	0.02	0.00	9.8	0.00	9.8	247.9	254.0	127.0
3/10/05	69	9.8	247.9	0.24	0.15	0.04	0.92	0.00	0.00	9.7	0.00	9.7	247.0	254.0	127.0
3/11/05	70	9.7	247.0	0.28	0.15	0.04	1.08	0.00	0.00	9.7	0.00	9.7	245.9	254.0	127.0
3/12/05	71	9.7	245.9	0.26	0.15	0.04	0.98	0.00	0.00	9.6	0.00	9.6	244.9	254.0	127.0
3/13/05	72	9.6	244.9	0.14	0.15	0.02	0.54	0.00	0.00	9.6	0.00	9.6	244.4	254.0	127.0
3/14/05	73	9.6	244.4	0.11	0.15	0.02	0.44	0.00	0.00	9.6	0.00	9.6	244.0	254.0	127.0
3/15/05	74	9.6	244.0	0.12	0.15	0.02	0.46	0.00	0.00	9.6	0.00	9.6	243.5	254.0	127.0
3/16/05	75	9.6	243.5	0.15	0.15	0.02	0.58	0.00	0.00	9.6	0.00	9.6	242.9	254.0	127.0
3/17/05	76	9.6	242.9	0.28	0.15	0.04	1.07	0.00	0.00	9.5	0.00	9.5	241.9	254.0	127.0
3/18/05	77	9.5	241.9	0.21	0.15	0.03	0.79	0.00	0.00	9.5	0.00	9.5	241.1	254.0	127.0
3/19/05	78	9.5	241.1	0.12	0.15	0.02	0.47	0.00	0.00	9.5	0.00	9.5	240.6	254.0	127.0
3/20/05	79	9.5	240.6	0.20	0.15	0.03	0.75	0.00	0.00	9.4	0.00	9.4	239.8	254.0	127.0
3/21/05	80	9.4	239.8	0.03	0.15	0.00	0.13	0.54	0.00	10.0	0.00	10.0	253.4	254.0	127.0
3/22/05	81	10.0	253.4	0.02	0.15	0.00	0.08	0.03	0.00	10.0	0.00	10.0	254.0	254.0	127.0
3/23/05	82	10.0	254.0	0.05	0.15	0.01	0.18	0.03	0.00	10.0	0.02	10.0	254.0	254.0	127.0
3/24/05	83	10.0	254.0	0.02	0.15	0.00	0.07	0.03	0.00	10.0	0.03	10.0	254.0	254.0	127.0
3/25/05	84	10.0	254.0	0.02	0.15	0.00	0.09	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
3/26/05	85	10.0	253.9	0.04	0.15	0.01	0.17	0.00	0.00	10.0	0.00	10.0	253.7	254.0	127.0
3/27/05	86	10.0	253.7	0.12	0.15	0.02	0.47	0.00	0.00	10.0	0.00	10.0	253.3	254.0	127.0
3/28/05	87	10.0	253.3	0.24	0.15	0.04	0.91	0.00	0.00	9.9	0.00	9.9	252.4	254.0	127.0
3/29/05	88	9.9	252.4	0.29	0.15	0.04	1.11	0.00	0.00	9.9	0.00	9.9	251.2	254.0	127.0
3/30/05	89	9.9	251.2	0.08	0.15	0.01	0.31	0.01	0.00	9.9	0.00	9.9	251.2	254.0	127.0
3/31/05	90	9.9	251.2	0.10	0.15	0.02	0.39	0.01	0.00	9.9	0.00	9.9	251.1	254.0	127.0
4/1/05	91	9.9	251.1	0.16	0.15	0.02	0.61	0.00	0.00	9.9	0.00	9.9	250.5	254.0	127.0
4/2/05	92	9.9	250.5	0.26	0.15	0.04	0.99	0.00	0.00	9.8	0.00	9.8	249.5	254.0	127.0
4/3/05	93	9.8	249.5	0.36	0.15	0.05	1.37	0.00	0.00	9.8	0.00	9.8	248.1	254.0	127.0
4/4/05	94	9.8	248.1	0.46	0.15	0.07	1.75	0.00	0.00	9.7	0.00	9.7	246.4	254.0	127.0
4/5/05	95	9.7	246.4	0.15	0.18	0.03	0.68	0.13	0.00	9.8	0.00	9.8	249.0	254.0	127.0
4/6/05	96	9.8	249.0	0.04	0.20	0.01	0.19	0.04	0.00	9.8	0.00	9.8	249.8	254.0	127.0
4/7/05	97	9.8	249.8	0.18	0.23	0.04	1.05	0.00	0.00	9.8	0.00	9.8	248.7	254.0	127.0
4/8/05	98	9.8	248.7	0.15	0.25	0.04	0.96	0.00	0.00	9.8	0.00	9.8	247.8	254.0	127.0
4/9/05	99	9.8	247.8	0.30	0.28	0.08	2.09	0.00	0.00	9.7	0.00	9.7	245.7	254.0	127.0
4/10/05	100	9.7	245.7	0.07	0.30	0.02	0.55	0.06	0.00	9.7	0.00	9.7	246.7	254.0	127.0
4/11/05	101	9.7	246.7	0.13	0.33	0.04	1.04	0.24	0.00	9.9	0.00	9.9	251.7	254.0	127.0
4/12/05	102	9.9	251.7	0.09	0.35	0.03	0.82	0.01	0.00	9.9	0.00	9.9	251.2	254.0	127.0
4/13/05	103	9.9	251.2	0.09	0.38	0.03	0.87	0.00	0.00	9.9	0.00	9.9	250.3	254.0	127.0
4/14/05	104	9.9	250.3	0.16	0.40	0.06	1.61	0.00	0.00	9.8	0.00	9.8	248.7	254.0	127.0
4/15/05	105	9.8	248.7	0.19	0.43	0.08	2.08	0.00	0.00	9.7	0.00	9.7	246.6	254.0	127.0
4/16/05	106	9.7	246.6	0.17	0.45	0.08	1.98	0.00	0.00	9.6	0.00	9.6	244.6	254.0	127.0
4/17/05	107	9.6	244.6	0.26	0.48	0.12	3.15	0.00	0.00	9.5	0.00	9.5	241.5	254.0	127.0
4/18/05	108	9.5	241.5	0.25	0.50	0.13	3.19	0.00	0.00	9.4	0.00	9.4	238.3	254.0	127.0
4/19/05	109	9.4	238.3	0.26	0.53	0.14	3.45	0.00	0.00	9.2	0.00	9.2	234.8	254.0	127.0
4/20/05	110	9.2	234.8	0.23	0.55	0.13	3.22	0.01	0.00	9.1	0.00	9.1	231.9	254.0	127.0
4/21/05	111	9.1	231.9	0.21	0.58	0.12	3.03	0.00	0.00	9.0	0.00	9.0	228.8	254.0	127.0
4/22/05	112	9.0	228.8	0.26	0.60	0.16	3.99	0.00	0.00	8.9	0.00	8.9	224.9	254.0	127.0
4/23/05	113	8.9	224.9	0.20	0.63	0.13	3.22	0.00	0.00	8.7	0.00	8.7	221.6	254.0	127.0
4/24/05	114	8.7	221.6	0.18	0.65	0.12	2.99	0.00	0.00	8.6	0.00	8.6	218.6	254.0	127.0
4/25/05	115	8.6	218.6	0.04	0.68	0.03	0.67	0.17	0.00	8.8	0.00	8.8	222.3	254.0	127.0
4/26/05	116	8.8	222.3	0.14	0.70	0.10	2.57	0.02	0.00	8.7	0.00	8.7	220.2	254.0	127.0
4/27/05	117	8.7	220.2	0.14	0.73	0.11	2.67	0.00	0.00	8.6	0.00	8.6	217.6	254.0	127.0

4/28/05	118	8.6	217.6	0.09	0.75	0.07	1.75	0.00	0.00	8.5	0.00	8.5	215.8	254.0	127.0
4/29/05	119	8.5	215.8	0.08	0.78	0.06	1.62	0.05	0.00	8.5	0.00	8.5	215.5	254.0	127.0
4/30/05	120	8.5	215.5	0.16	0.80	0.13	3.31	0.00	0.00	8.4	0.00	8.4	212.1	254.0	127.0
5/1/05	121	8.4	212.1	0.17	0.83	0.14	3.54	0.00	0.00	8.2	0.00	8.2	208.6	254.0	127.0
5/2/05	122	8.2	208.6	0.17	0.85	0.14	3.59	0.00	0.00	8.1	0.00	8.1	205.0	254.0	127.0
5/3/05	123	8.1	205.0	0.16	0.88	0.14	3.64	0.00	0.00	7.9	0.00	7.9	201.4	254.0	127.0
5/4/05	124	7.9	201.4	0.24	0.90	0.22	5.55	0.00	0.00	7.7	0.00	7.7	195.8	254.0	127.0
5/5/05	125	7.7	195.8	0.19	0.93	0.18	4.45	0.00	0.00	7.5	0.00	7.5	191.4	254.0	127.0
5/6/05	126	7.5	191.4	0.25	0.95	0.24	6.08	0.00	0.00	7.3	0.00	7.3	185.3	254.0	127.0
5/7/05	127	7.3	185.3	0.24	0.98	0.24	6.01	0.01	0.00	7.1	0.00	7.1	179.5	254.0	127.0
5/8/05	128	7.1	179.5	0.22	1.00	0.22	5.68	0.07	0.00	6.9	0.00	6.9	175.6	254.0	127.0
5/9/05	129	6.9	175.6	0.22	0.15	0.03	0.84	0.00	0.00	6.9	0.00	6.9	174.8	254.0	127.0
5/10/05	130	6.9	174.8	0.43	0.17	0.08	1.92	0.00	0.00	6.8	0.00	6.8	172.9	254.0	127.0
5/11/05	131	6.8	172.9	0.22	0.20	0.04	1.09	0.06	0.00	6.8	0.00	6.8	173.3	254.0	127.0
5/12/05	132	6.8	173.3	0.13	0.22	0.03	0.74	1.11	0.00	7.9	0.00	7.9	200.8	254.0	127.0
5/13/05	133	7.9	200.8	0.08	0.25	0.02	0.49	0.06	0.00	7.9	0.00	7.9	201.8	254.0	127.0
5/14/05	134	7.9	201.8	0.17	0.27	0.05	1.21	0.00	0.00	7.9	0.00	7.9	200.6	254.0	127.0
5/15/05	135	7.9	200.6	0.17	0.30	0.05	1.31	0.00	0.00	7.8	0.00	7.8	199.3	254.0	127.0
5/16/05	136	7.8	199.3	0.30	0.32	0.10	2.48	0.00	0.00	7.7	0.00	7.7	196.8	254.0	127.0
5/17/05	137	7.7	196.8	0.38	0.34	0.13	3.34	0.00	0.00	7.6	0.00	7.6	193.5	254.0	127.0
5/18/05	138	7.6	193.5	0.25	0.37	0.09	2.36	0.00	0.00	7.5	0.00	7.5	191.1	254.0	127.0
5/19/05	139	7.5	191.1	0.30	0.39	0.12	2.99	0.00	0.00	7.4	0.00	7.4	188.1	254.0	127.0
5/20/05	140	7.4	188.1	0.28	0.42	0.12	2.92	0.00	0.00	7.3	0.00	7.3	185.2	254.0	127.0
5/21/05	141	7.3	185.2	0.35	0.44	0.16	3.97	0.00	0.00	7.1	0.00	7.1	181.2	254.0	127.0
5/22/05	142	7.1	181.2	0.27	0.47	0.13	3.24	0.00	0.00	7.0	0.00	7.0	178.0	254.0	127.0
5/23/05	143	7.0	178.0	0.24	0.49	0.12	2.98	0.00	0.00	6.9	0.00	6.9	175.0	254.0	127.0
5/24/05	144	6.9	175.0	0.16	0.51	0.08	2.15	0.00	0.00	6.8	0.00	6.8	172.8	254.0	127.0
5/25/05	145	6.8	172.8	0.21	0.54	0.11	2.83	0.04	1.50	8.2	0.00	8.2	209.1	254.0	127.0
5/26/05	146	8.2	209.1	0.25	0.56	0.14	3.55	0.00	0.00	8.1	0.00	8.1	205.6	254.0	127.0
5/27/05	147	8.1	205.6	0.13	0.59	0.07	1.88	0.05	0.00	8.1	0.00	8.1	205.0	254.0	127.0
5/28/05	148	8.1	205.0	0.21	0.61	0.13	3.19	0.02	0.00	8.0	0.00	8.0	202.3	254.0	127.0
5/29/05	149	8.0	202.3	0.18	0.64	0.11	2.87	0.00	0.00	7.9	0.00	7.9	199.4	254.0	127.0
5/30/05	150	7.9	199.4	0.14	0.66	0.09	2.32	0.11	0.00	7.9	0.00	7.9	199.9	254.0	127.0
5/31/05	151	7.9	199.9	0.12	0.68	0.08	2.12	0.00	0.00	7.8	0.00	7.8	197.8	254.0	127.0
6/1/05	152	7.8	197.8	0.16	0.71	0.11	2.85	0.00	0.00	7.7	0.00	7.7	194.9	254.0	127.0
6/2/05	153	7.7	194.9	0.20	0.73	0.15	3.72	0.00	0.00	7.5	0.00	7.5	191.2	254.0	127.0
6/3/05	154	7.5	191.2	0.09	0.76	0.07	1.81	1.78	0.00	9.2	0.00	9.2	234.6	254.0	127.0
6/4/05	155	9.2	234.6	0.18	0.78	0.14	3.67	1.79	0.00	10.9	0.88	10.0	254.0	254.0	127.0
6/5/05	156	10.0	254.0	0.25	0.81	0.21	5.22	0.00	0.00	9.8	0.00	9.8	248.8	254.0	127.0
6/6/05	157	9.8	248.8	0.27	0.83	0.22	5.61	0.00	0.00	9.6	0.00	9.6	243.2	254.0	127.0
6/7/05	158	9.6	243.2	0.31	0.85	0.27	6.81	0.00	0.00	9.3	0.00	9.3	236.4	254.0	127.0
6/8/05	159	9.3	236.4	0.32	0.88	0.28	7.15	0.00	0.00	9.0	0.00	9.0	229.2	254.0	127.0
6/9/05	160	9.0	229.2	0.19	0.90	0.17	4.33	1.36	0.00	10.2	0.21	10.0	254.0	254.0	127.0
6/10/05	161	10.0	254.0	0.08	0.93	0.08	1.91	5.32	0.00	15.2	5.24	10.0	254.0	254.0	127.0
6/11/05	162	10.0	254.0	0.12	0.95	0.12	2.97	0.55	0.00	10.4	0.43	10.0	254.0	254.0	127.0
6/12/05	163	10.0	254.0	0.09	0.98	0.09	2.34	0.82	0.00	10.7	0.73	10.0	254.0	254.0	127.0
6/13/05	164	10.0	254.0	0.26	1.00	0.26	6.58	0.02	0.00	9.8	0.00	9.8	247.9	254.0	127.0
6/14/05	165	9.8	247.9	0.28	0.15	0.04	1.07	0.00	0.00	9.7	0.00	9.7	246.9	254.0	127.0
6/15/05	166	9.7	246.9	0.25	0.18	0.05	1.15	0.02	0.00	9.7	0.00	9.7	246.2	254.0	127.0
6/16/05	167	9.7	246.2	0.19	0.21	0.04	1.01	0.02	0.00	9.7	0.00	9.7	245.7	254.0	127.0
6/17/05	168	9.7	245.7	0.22	0.24	0.05	1.35	0.00	0.00	9.6	0.00	9.6	244.4	254.0	127.0

6/18/05	169	9.6	244.4	0.25	0.28	0.07	1.77	0.00	0.00	9.6	0.00	9.6	242.6	254.0	127.0
6/19/05	170	9.6	242.6	0.30	0.31	0.09	2.33	0.00	0.00	9.5	0.00	9.5	240.3	254.0	127.0
6/20/05	171	9.5	240.3	0.26	0.34	0.09	2.23	0.00	0.00	9.4	0.00	9.4	238.0	254.0	127.0
6/21/05	172	9.4	238.0	0.21	0.37	0.08	1.97	0.02	0.00	9.3	0.00	9.3	236.6	254.0	127.0
6/22/05	173	9.3	236.6	0.25	0.40	0.10	2.50	0.00	0.00	9.2	0.00	9.2	234.1	254.0	127.0
6/23/05	174	9.2	234.1	0.32	0.43	0.14	3.53	0.00	0.00	9.1	0.00	9.1	230.6	254.0	127.0
6/24/05	175	9.1	230.6	0.41	0.46	0.19	4.85	0.00	0.00	8.9	0.00	8.9	225.7	254.0	127.0
6/25/05	176	8.9	225.7	0.31	0.50	0.16	3.96	0.00	0.00	8.7	0.00	8.7	221.7	254.0	127.0
6/26/05	177	8.7	221.7	0.34	0.53	0.18	4.55	0.00	0.00	8.6	0.00	8.6	217.2	254.0	127.0
6/27/05	178	8.6	217.2	0.39	0.56	0.22	5.50	0.00	0.00	8.3	0.00	8.3	211.7	254.0	127.0
6/28/05	179	8.3	211.7	0.42	0.59	0.25	6.32	0.07	0.00	8.2	0.00	8.2	207.2	254.0	127.0
6/29/05	180	8.2	207.2	0.46	0.62	0.29	7.26	0.00	0.00	7.9	0.00	7.9	199.9	254.0	127.0
6/30/05	181	7.9	199.9	0.29	0.65	0.19	4.75	0.40	0.00	8.1	0.00	8.1	205.3	254.0	127.0
7/1/05	182	8.1	205.3	0.22	0.69	0.15	3.75	0.00	0.00	7.9	0.00	7.9	201.5	254.0	127.0
7/2/05	183	7.9	201.5	0.27	0.72	0.19	4.91	0.07	0.00	7.8	0.00	7.8	198.4	254.0	127.0
7/3/05	184	7.8	198.4	0.16	0.75	0.12	3.08	0.29	0.00	8.0	0.00	8.0	202.7	254.0	127.0
7/4/05	185	8.0	202.7	0.24	0.78	0.18	4.67	0.00	0.00	7.8	0.00	7.8	198.0	254.0	127.0
7/5/05	186	7.8	198.0	0.21	0.81	0.17	4.23	0.00	0.00	7.6	0.00	7.6	193.8	254.0	127.0
7/6/05	187	7.6	193.8	0.21	0.84	0.18	4.60	0.00	0.00	7.4	0.00	7.4	189.2	254.0	127.0
7/7/05	188	7.4	189.2	0.26	0.87	0.22	5.70	0.00	0.00	7.2	0.00	7.2	183.5	254.0	127.0
7/8/05	189	7.2	183.5	0.24	0.91	0.22	5.47	0.00	0.00	7.0	0.00	7.0	178.0	254.0	127.0
7/9/05	190	7.0	178.0	0.28	0.94	0.26	6.65	0.00	0.00	6.7	0.00	6.7	171.4	254.0	127.0
7/10/05	191	6.7	171.4	0.25	0.97	0.25	6.27	0.00	0.00	6.5	0.00	6.5	165.1	254.0	127.0
7/11/05	192	6.5	165.1	0.25	1.00	0.25	6.40	0.00	0.00	6.2	0.00	6.2	158.7	254.0	127.0
7/12/05	193	6.2	158.7	0.21	0.15	0.03	0.78	0.05	0.00	6.3	0.00	6.3	159.2	254.0	127.0
7/13/05	194	6.3	159.2	0.25	0.17	0.04	1.07	0.00	0.00	6.2	0.00	6.2	158.1	254.0	127.0
7/14/05	195	6.2	158.1	0.22	0.18	0.04	1.03	0.00	0.00	6.2	0.00	6.2	157.1	254.0	127.0
7/15/05	196	6.2	157.1	0.25	0.20	0.05	1.26	0.00	0.00	6.1	0.00	6.1	155.8	254.0	127.0
7/16/05	197	6.1	155.8	0.27	0.22	0.06	1.53	0.00	0.00	6.1	0.00	6.1	154.3	254.0	127.0
7/17/05	198	6.1	154.3	0.31	0.24	0.07	1.89	0.00	0.00	6.0	0.00	6.0	152.4	254.0	127.0
7/18/05	199	6.0	152.4	0.23	0.25	0.06	1.47	0.17	0.00	6.1	0.00	6.1	155.3	254.0	127.0
7/19/05	200	6.1	155.3	0.23	0.27	0.06	1.56	1.03	0.00	7.1	0.00	7.1	179.9	254.0	127.0
7/20/05	201	7.1	179.9	0.39	0.29	0.11	2.89	0.00	0.00	7.0	0.00	7.0	177.0	254.0	127.0
7/21/05	202	7.0	177.0	0.35	0.31	0.11	2.70	0.00	0.00	6.9	0.00	6.9	174.3	254.0	127.0
7/22/05	203	6.9	174.3	0.24	0.32	0.08	1.99	0.00	0.00	6.8	0.00	6.8	172.3	254.0	127.0
7/23/05	204	6.8	172.3	0.40	0.34	0.13	3.43	0.00	0.00	6.6	0.00	6.6	168.9	254.0	127.0
7/24/05	205	6.6	168.9	0.40	0.36	0.14	3.61	0.00	0.00	6.5	0.00	6.5	165.2	254.0	127.0
7/25/05	206	6.5	165.2	0.40	0.38	0.15	3.77	0.00	0.00	6.4	0.00	6.4	161.5	254.0	127.0
7/26/05	207	6.4	161.5	0.08	0.39	0.03	0.76	0.26	0.00	6.6	0.00	6.6	167.3	254.0	127.0
7/27/05	208	6.6	167.3	0.22	0.41	0.09	2.29	0.00	0.00	6.5	0.00	6.5	165.0	254.0	127.0
7/28/05	209	6.5	165.0	0.22	0.43	0.10	2.43	0.00	0.00	6.4	0.00	6.4	162.6	254.0	127.0
7/29/05	210	6.4	162.6	0.25	0.44	0.11	2.78	0.00	0.00	6.3	0.00	6.3	159.8	254.0	127.0
7/30/05	211	6.3	159.8	0.24	0.46	0.11	2.77	0.00	0.00	6.2	0.00	6.2	157.1	254.0	127.0
7/31/05	212	6.2	157.1	0.21	0.48	0.10	2.55	0.00	0.00	6.1	0.00	6.1	154.5	254.0	127.0
8/1/05	213	6.1	154.5	0.25	0.50	0.12	3.14	0.00	0.00	6.0	0.00	6.0	151.4	254.0	127.0
8/2/05	214	6.0	151.4	0.28	0.51	0.15	3.69	0.00	0.00	5.8	0.00	5.8	147.7	254.0	127.0
8/3/05	215	5.8	147.7	0.24	0.53	0.13	3.29	0.00	0.00	5.7	0.00	5.7	144.4	254.0	127.0
8/4/05	216	5.7	144.4	0.22	0.55	0.12	3.07	0.02	0.00	5.6	0.00	5.6	141.8	254.0	127.0
8/5/05	217	5.6	141.8	0.17	0.57	0.10	2.42	0.00	0.00	5.5	0.00	5.5	139.4	254.0	127.0
8/6/05	218	5.5	139.4	0.20	0.58	0.12	2.99	0.00	0.00	5.4	0.00	5.4	136.4	254.0	127.0
8/7/05	219	5.4	136.4	0.20	0.60	0.12	3.08	0.00	0.00	5.2	0.00	5.2	133.3	254.0	127.0

8/8/05	220	5.2	133.3	0.19	0.62	0.12	2.99	0.00	0.00	5.1	0.00	5.1	130.3	254.0	127.0
8/9/05	221	5.1	130.3	0.24	0.64	0.15	3.85	0.00	0.00	5.0	0.00	5.0	126.5	254.0	127.0
8/10/05	222	5.0	126.5	0.25	0.65	0.16	4.08	0.00	0.00	4.8	0.00	4.8	122.4	254.0	127.0
8/11/05	223	4.8	122.4	0.19	0.67	0.13	3.19	0.00	0.00	4.7	0.00	4.7	119.2	254.0	127.0
8/12/05	224	4.7	119.2	0.11	0.69	0.08	1.95	0.18	0.00	4.8	0.00	4.8	121.8	254.0	127.0
8/13/05	225	4.8	121.8	0.04	0.71	0.03	0.69	0.73	0.00	5.5	0.00	5.5	139.7	254.0	127.0
8/14/05	226	5.5	139.7	0.14	0.72	0.10	2.55	0.00	0.00	5.4	0.00	5.4	137.1	254.0	127.0
8/15/05	227	5.4	137.1	0.13	0.74	0.10	2.50	0.00	0.00	5.3	0.00	5.3	134.6	254.0	127.0
8/16/05	228	5.3	134.6	0.12	0.76	0.09	2.23	0.00	0.00	5.2	0.00	5.2	132.4	254.0	127.0
8/17/05	229	5.2	132.4	0.12	0.77	0.10	2.44	0.00	0.00	5.1	0.00	5.1	130.0	254.0	127.0
8/18/05	230	5.1	130.0	0.19	0.79	0.15	3.90	0.15	0.00	5.1	0.00	5.1	129.9	254.0	127.0
8/19/05	231	5.1	129.9	0.16	0.81	0.13	3.31	1.74	0.00	6.7	0.00	6.7	170.8	254.0	127.0
8/20/05	232	6.7	170.8	0.19	0.83	0.15	3.90	0.00	0.00	6.6	0.00	6.6	166.9	254.0	127.0
8/21/05	233	6.6	166.9	0.10	0.84	0.08	2.15	0.00	0.00	6.5	0.00	6.5	164.7	254.0	127.0
8/22/05	234	6.5	164.7	0.08	0.86	0.07	1.77	0.00	0.00	6.4	0.00	6.4	162.9	254.0	127.0
8/23/05	235	6.4	162.9	0.12	0.88	0.10	2.66	0.14	0.00	6.5	0.00	6.5	163.8	254.0	127.0
8/24/05	236	6.5	163.8	0.08	0.90	0.07	1.83	0.36	0.00	6.7	0.00	6.7	171.2	254.0	127.0
8/25/05	237	6.7	171.2	0.09	0.91	0.08	2.15	1.33	0.00	8.0	0.00	8.0	202.8	254.0	127.0
8/26/05	238	8.0	202.8	0.11	0.93	0.10	2.62	0.18	0.00	8.1	0.00	8.1	204.7	254.0	127.0
8/27/05	239	8.1	204.7	0.12	0.95	0.12	3.01	0.00	0.00	7.9	0.00	7.9	201.7	254.0	127.0
8/28/05	240	7.9	201.7	0.09	0.97	0.09	2.21	0.00	0.00	7.9	0.00	7.9	199.5	254.0	127.0
8/29/05	241	7.9	199.5	0.12	0.98	0.12	3.08	0.00	0.00	7.7	0.00	7.7	196.4	254.0	127.0
8/30/05	242	7.7	196.4	0.12	1.00	0.12	3.11	0.00	0.00	7.6	0.00	7.6	193.3	254.0	127.0
8/31/05	243	7.6	193.3	0.15	0.15	0.02	0.59	0.00	0.00	7.6	0.00	7.6	192.7	254.0	127.0
9/1/05	244	7.6	192.7	0.11	0.18	0.02	0.49	0.00	0.00	7.6	0.00	7.6	192.2	254.0	127.0
9/2/05	245	7.6	192.2	0.13	0.20	0.03	0.68	0.00	0.00	7.5	0.00	7.5	191.6	254.0	127.0
9/3/05	246	7.5	191.6	0.17	0.23	0.04	0.94	0.00	0.00	7.5	0.00	7.5	190.6	254.0	127.0
9/4/05	247	7.5	190.6	0.15	0.25	0.04	0.95	0.00	0.00	7.5	0.00	7.5	189.7	254.0	127.0
9/5/05	248	7.5	189.7	0.17	0.28	0.05	1.18	0.02	0.00	7.4	0.00	7.4	189.0	254.0	127.0
9/6/05	249	7.4	189.0	0.12	0.30	0.03	0.88	0.00	0.00	7.4	0.00	7.4	188.1	254.0	127.0
9/7/05	250	7.4	188.1	0.15	0.33	0.05	1.23	0.00	0.00	7.4	0.00	7.4	186.9	254.0	127.0
9/8/05	251	7.4	186.9	0.12	0.35	0.04	1.08	0.02	1.50	8.8	0.00	8.8	224.4	254.0	127.0
9/9/05	252	8.8	224.4	0.21	0.38	0.08	1.95	0.00	0.00	8.8	0.00	8.8	222.5	254.0	127.0
9/10/05	253	8.8	222.5	0.25	0.40	0.10	2.50	0.00	0.00	8.7	0.00	8.7	220.0	254.0	127.0
9/11/05	254	8.7	220.0	0.18	0.43	0.08	2.00	0.00	0.00	8.6	0.00	8.6	218.0	254.0	127.0
9/12/05	255	8.6	218.0	0.16	0.45	0.07	1.80	0.03	0.00	8.5	0.00	8.5	216.9	254.0	127.0
9/13/05	256	8.5	216.9	0.10	0.48	0.05	1.19	0.02	0.00	8.5	0.00	8.5	216.3	254.0	127.0
9/14/05	257	8.5	216.3	0.13	0.50	0.06	1.64	0.00	0.00	8.4	0.00	8.4	214.6	254.0	127.0
9/15/05	258	8.4	214.6	0.08	0.53	0.04	1.04	0.35	0.00	8.8	0.00	8.8	222.5	254.0	127.0
9/16/05	259	8.8	222.5	0.10	0.55	0.06	1.40	0.00	0.00	8.7	0.00	8.7	221.1	254.0	127.0
9/17/05	260	8.7	221.1	0.13	0.58	0.07	1.84	0.00	0.00	8.6	0.00	8.6	219.2	254.0	127.0
9/18/05	261	8.6	219.2	0.16	0.60	0.10	2.48	0.51	0.00	9.0	0.00	9.0	229.7	254.0	127.0
9/19/05	262	9.0	229.7	0.12	0.63	0.07	1.83	0.00	0.00	9.0	0.00	9.0	227.9	254.0	127.0
9/20/05	263	9.0	227.9	0.11	0.65	0.07	1.80	0.00	0.00	8.9	0.00	8.9	226.1	254.0	127.0
9/21/05	264	8.9	226.1	0.16	0.68	0.11	2.83	0.00	0.00	8.8	0.00	8.8	223.3	254.0	127.0
9/22/05	265	8.8	223.3	0.17	0.70	0.12	3.01	1.81	0.00	10.5	0.48	10.0	254.0	254.0	127.0
9/23/05	266	10.0	254.0	0.08	0.73	0.06	1.48	1.50	0.00	11.4	1.44	10.0	254.0	254.0	127.0
9/24/05	267	10.0	254.0	0.13	0.75	0.10	2.46	0.00	0.00	9.9	0.00	9.9	251.5	254.0	127.0
9/25/05	268	9.9	251.5	0.09	0.78	0.07	1.68	0.00	0.00	9.8	0.00	9.8	249.9	254.0	127.0
9/26/05	269	9.8	249.9	0.12	0.80	0.10	2.45	0.00	0.00	9.7	0.00	9.7	247.4	254.0	127.0
9/27/05	270	9.7	247.4	0.11	0.83	0.09	2.38	0.00	0.00	9.6	0.00	9.6	245.0	254.0	127.0

9/28/05	271	9.6	245.0	0.10	0.85	0.08	2.07	0.12	0.00	9.7	0.00	9.7	246.0	254.0	127.0
9/29/05	272	9.7	246.0	0.08	0.88	0.07	1.67	0.00	0.00	9.6	0.00	9.6	244.3	254.0	127.0
9/30/05	273	9.6	244.3	0.15	0.90	0.14	3.43	0.00	0.00	9.5	0.00	9.5	240.9	254.0	127.0
10/1/05	274	9.5	240.9	0.04	0.93	0.03	0.83	0.12	0.00	9.6	0.00	9.6	243.1	254.0	127.0
10/2/05	275	9.6	243.1	0.22	0.95	0.21	5.21	0.00	0.00	9.4	0.00	9.4	237.9	254.0	127.0
10/3/05	276	9.4	237.9	0.13	0.98	0.12	3.15	0.00	0.00	9.2	0.00	9.2	234.8	254.0	127.0
10/4/05	277	9.2	234.8	0.19	1.00	0.19	4.79	0.00	0.00	9.1	0.00	9.1	230.0	254.0	127.0
10/5/05	278	9.1	230.0	0.12	0.15	0.02	0.47	0.80	0.00	9.8	0.00	9.8	249.8	254.0	127.0
10/6/05	279	9.8	249.8	0.10	0.20	0.02	0.51	0.00	0.00	9.8	0.00	9.8	249.3	254.0	127.0
10/7/05	280	9.8	249.3	0.06	0.25	0.01	0.38	0.00	0.00	9.8	0.00	9.8	248.9	254.0	127.0
10/8/05	281	9.8	248.9	0.06	0.30	0.02	0.43	0.00	0.00	9.8	0.00	9.8	248.5	254.0	127.0
10/9/05	282	9.8	248.5	0.07	0.35	0.03	0.64	0.00	0.00	9.8	0.00	9.8	247.9	254.0	127.0
10/10/05	283	9.8	247.9	0.04	0.40	0.02	0.42	0.00	0.00	9.7	0.00	9.7	247.5	254.0	127.0
10/11/05	284	9.7	247.5	0.03	0.45	0.01	0.29	0.27	0.00	10.0	0.00	10.0	254.0	254.0	127.0
10/12/05	285	10.0	254.0	0.04	0.50	0.02	0.55	0.00	0.00	10.0	0.00	10.0	253.5	254.0	127.0
10/13/05	286	10.0	253.5	0.06	0.55	0.03	0.81	0.00	0.00	9.9	0.00	9.9	252.6	254.0	127.0
10/14/05	287	9.9	252.6	0.49	0.60	0.29	7.44	0.16	0.00	9.8	0.00	9.8	249.3	254.0	127.0
10/15/05	288	9.8	249.3	0.21	0.65	0.14	3.47	0.00	0.00	9.7	0.00	9.7	245.8	254.0	127.0
10/16/05	289	9.7	245.8	0.06	0.70	0.04	1.11	0.00	0.00	9.6	0.00	9.6	244.7	254.0	127.0
10/17/05	290	9.6	244.7	0.08	0.75	0.06	1.53	0.00	0.00	9.6	0.00	9.6	243.2	254.0	127.0
10/18/05	291	9.6	243.2	0.08	0.80	0.06	1.57	0.00	0.00	9.5	0.00	9.5	241.6	254.0	127.0
10/19/05	292	9.5	241.6	0.06	0.85	0.05	1.34	0.93	0.00	10.4	0.39	10.0	254.0	254.0	127.0
10/20/05	293	10.0	254.0	0.02	0.90	0.02	0.43	1.10	0.00	11.1	1.08	10.0	254.0	254.0	127.0
10/21/05	294	10.0	254.0	0.05	0.95	0.04	1.10	0.00	0.00	10.0	0.00	10.0	252.9	254.0	127.0
10/22/05	295	10.0	252.9	0.01	1.00	0.01	0.15	0.06	0.00	10.0	0.01	10.0	254.0	254.0	127.0
10/23/05	296	10.0	254.0	0.05	0.95	0.05	1.28	0.00	0.00	9.9	0.00	9.9	252.7	254.0	127.0
10/24/05	297	9.9	252.7	0.03	0.89	0.03	0.68	0.00	0.00	9.9	0.00	9.9	252.0	254.0	127.0
10/25/05	298	9.9	252.0	0.01	0.84	0.01	0.20	0.00	0.00	9.9	0.00	9.9	251.8	254.0	127.0
10/26/05	299	9.9	251.8	0.02	0.79	0.01	0.38	0.00	0.00	9.9	0.00	9.9	251.5	254.0	127.0
10/27/05	300	9.9	251.5	0.01	0.73	0.01	0.28	0.00	0.00	9.9	0.00	9.9	251.2	254.0	127.0
10/28/05	301	9.9	251.2	0.06	0.68	0.04	1.04	0.00	0.00	9.8	0.00	9.8	250.1	254.0	127.0
10/29/05	302	9.8	250.1	0.22	0.63	0.14	3.44	0.00	0.00	9.7	0.00	9.7	246.7	254.0	127.0
10/30/05	303	9.7	246.7	0.06	0.58	0.04	0.93	0.01	0.00	9.7	0.00	9.7	246.0	254.0	127.0
10/31/05	304	9.7	246.0	0.09	0.52	0.05	1.16	0.00	0.00	9.6	0.00	9.6	244.9	254.0	127.0
11/1/05	305	9.6	244.9	0.03	0.47	0.01	0.36	0.00	0.00	9.6	0.00	9.6	244.5	254.0	127.0
11/2/05	306	9.6	244.5	0.11	0.42	0.04	1.11	0.00	0.00	9.6	0.00	9.6	243.4	254.0	127.0
11/3/05	307	9.6	243.4	0.07	0.36	0.02	0.62	0.00	0.00	9.6	0.00	9.6	242.8	254.0	127.0
11/4/05	308	9.6	242.8	0.05	0.31	0.02	0.38	0.00	0.00	9.5	0.00	9.5	242.4	254.0	127.0
11/5/05	309	9.5	242.4	0.06	0.26	0.02	0.40	0.00	0.00	9.5	0.00	9.5	242.0	254.0	127.0
11/6/05	310	9.5	242.0	0.08	0.20	0.02	0.44	0.00	0.00	9.5	0.00	9.5	241.5	254.0	127.0
11/7/05	311	9.5	241.5	0.08	0.15	0.01	0.29	0.00	0.00	9.5	0.00	9.5	241.3	254.0	127.0
11/8/05	312	9.5	241.3	0.05	0.15	0.01	0.18	0.00	0.00	9.5	0.00	9.5	241.1	254.0	127.0
11/9/05	313	9.5	241.1	0.06	0.15	0.01	0.22	0.00	0.00	9.5	0.00	9.5	240.9	254.0	127.0
11/10/05	314	9.5	240.9	0.05	0.15	0.01	0.20	0.00	0.00	9.5	0.00	9.5	240.7	254.0	127.0
11/11/05	315	9.5	240.7	0.06	0.15	0.01	0.25	0.00	0.00	9.5	0.00	9.5	240.4	254.0	127.0
11/12/05	316	9.5	240.4	0.17	0.15	0.03	0.66	0.00	0.00	9.4	0.00	9.4	239.7	254.0	127.0
11/13/05	317	9.4	239.7	0.07	0.15	0.01	0.26	0.00	0.00	9.4	0.00	9.4	239.5	254.0	127.0
11/14/05	318	9.4	239.5	0.04	0.15	0.01	0.15	0.34	0.00	9.8	0.00	9.8	248.0	254.0	127.0
11/15/05	319	9.8	248.0	0.04	0.15	0.01	0.14	0.12	0.00	9.9	0.00	9.9	250.9	254.0	127.0
11/16/05	320	9.9	250.9	0.04	0.15	0.01	0.14	0.00	0.00	9.9	0.00	9.9	250.7	254.0	127.0
11/17/05	321	9.9	250.7	0.02	0.15	0.00	0.07	0.00	0.00	9.9	0.00	9.9	250.7	254.0	127.0

11/18/05	322	9.9	250.7	0.02	0.15	0.00	0.07	0.00	0.00	9.9	0.00	9.9	250.6	254.0	127.0
11/19/05	323	9.9	250.6	0.01	0.15	0.00	0.04	0.00	0.00	9.9	0.00	9.9	250.5	254.0	127.0
11/20/05	324	9.9	250.5	0.00	0.15	0.00	0.01	0.00	0.00	9.9	0.00	9.9	250.5	254.0	127.0
11/21/05	325	9.9	250.5	0.01	0.15	0.00	0.04	0.00	0.00	9.9	0.00	9.9	250.5	254.0	127.0
11/22/05	326	9.9	250.5	0.00	0.15	0.00	0.00	0.00	0.00	9.9	0.00	9.9	250.5	254.0	127.0
11/23/05	327	9.9	250.5	0.09	0.15	0.01	0.35	0.00	0.00	9.8	0.00	9.8	250.1	254.0	127.0
11/24/05	328	9.8	250.1	0.03	0.15	0.00	0.11	0.00	0.00	9.8	0.00	9.8	250.0	254.0	127.0
11/25/05	329	9.8	250.0	0.02	0.15	0.00	0.07	0.00	0.00	9.8	0.00	9.8	250.0	254.0	127.0
11/26/05	330	9.8	250.0	0.03	0.15	0.00	0.10	0.00	0.00	9.8	0.00	9.8	249.9	254.0	127.0
11/27/05	331	9.8	249.9	0.03	0.15	0.00	0.10	0.15	0.00	10.0	0.00	10.0	253.6	254.0	127.0
11/28/05	332	10.0	253.6	0.04	0.15	0.01	0.16	0.02	0.00	10.0	0.00	10.0	253.9	254.0	127.0
11/29/05	333	10.0	253.9	0.03	0.15	0.00	0.12	0.00	0.00	10.0	0.00	10.0	253.8	254.0	127.0
11/30/05	334	10.0	253.8	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.8	254.0	127.0
12/1/05	335	10.0	253.8	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.8	254.0	127.0
12/2/05	336	10.0	253.8	0.00	0.15	0.00	0.01	0.00	0.00	10.0	0.00	10.0	253.8	254.0	127.0
12/3/05	337	10.0	253.8	0.02	0.15	0.00	0.06	0.00	0.00	10.0	0.00	10.0	253.7	254.0	127.0
12/4/05	338	10.0	253.7	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.7	254.0	127.0
12/5/05	339	10.0	253.7	0.00	0.15	0.00	0.00	0.02	0.00	10.0	0.01	10.0	254.0	254.0	127.0
12/6/05	340	10.0	254.0	0.05	0.15	0.01	0.18	0.00	0.00	10.0	0.00	10.0	253.8	254.0	127.0
12/7/05	341	10.0	253.8	0.02	0.15	0.00	0.09	0.05	0.00	10.0	0.04	10.0	254.0	254.0	127.0
12/8/05	342	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/9/05	343	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/10/05	344	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/11/05	345	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/12/05	346	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/13/05	347	10.0	254.0	0.00	0.15	0.00	0.00	0.10	0.00	10.1	0.10	10.0	254.0	254.0	127.0
12/14/05	348	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/15/05	349	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/16/05	350	10.0	254.0	0.00	0.15	0.00	0.00	0.08	0.00	10.1	0.08	10.0	254.0	254.0	127.0
12/17/05	351	10.0	254.0	0.00	0.15	0.00	0.00	0.45	0.00	10.5	0.45	10.0	254.0	254.0	127.0
12/18/05	352	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/19/05	353	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/20/05	354	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/21/05	355	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/22/05	356	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/23/05	357	10.0	254.0	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	254.0	254.0	127.0
12/24/05	358	10.0	254.0	0.02	0.15	0.00	0.07	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
12/25/05	359	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
12/26/05	360	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
12/27/05	361	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
12/28/05	362	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
12/29/05	363	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
12/30/05	364	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
12/31/05	365	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0
1/1/06	365	10.0	253.9	0.00	0.15	0.00	0.00	0.00	0.00	10.0	0.00	10.0	253.9	254.0	127.0

Table A.6: ET and AW 2006

DATE	DOY	AW	AW	ET Ref	Alf Ref	ET Alf	ET Alf	Precip	Irrigation	AW-ET+P+I	Runoff	AW New	AW New	Max AW	50% AW

		in	mm	in	%	in	mm	in	in	in	in	in	mm	mm	mm
1/1/06	1	10.0	254.0	0.14	0.15	0.02	0.53	0.00	0.00	9.98	0.00	10.0	253.5	254.0	127.0
1/2/06	2	10.0	253.5	0.06	0.15	0.01	0.23	0.00	0.00	9.97	0.00	10.0	253.2	254.0	127.0
1/3/06	3	10.0	253.2	0.12	0.15	0.02	0.46	0.00	0.00	9.95	0.00	10.0	252.8	254.0	127.0
1/4/06	4	10.0	252.8	0.12	0.15	0.02	0.46	0.00	0.00	9.93	0.00	9.9	252.3	254.0	127.0
1/5/06	5	9.9	252.3	0.08	0.15	0.01	0.30	0.00	0.00	9.92	0.00	9.9	252.0	254.0	127.0
1/6/06	6	9.9	252.0	0.05	0.15	0.01	0.19	0.00	0.00	9.91	0.00	9.9	251.8	254.0	127.0
1/7/06	7	9.9	251.8	0.13	0.15	0.02	0.50	0.00	0.00	9.90	0.00	9.9	251.3	254.0	127.0
1/8/06	8	9.9	251.3	0.13	0.15	0.02	0.50	0.00	0.00	9.88	0.00	9.9	250.8	254.0	127.0
1/9/06	9	9.9	250.8	0.06	0.15	0.01	0.23	0.00	0.00	9.87	0.00	9.9	250.6	254.0	127.0
1/10/06	10	9.9	250.6	0.04	0.15	0.01	0.15	0.00	0.00	9.86	0.00	9.9	250.5	254.0	127.0
1/11/06	11	9.9	250.5	0.09	0.15	0.01	0.34	0.00	0.00	9.85	0.00	9.8	250.1	254.0	127.0
1/12/06	12	9.8	250.1	0.05	0.15	0.01	0.19	0.00	0.00	9.84	0.00	9.8	249.9	254.0	127.0
1/13/06	13	9.8	249.9	0.10	0.15	0.02	0.38	0.00	0.00	9.82	0.00	9.8	249.5	254.0	127.0
1/14/06	14	9.8	249.5	0.14	0.15	0.02	0.53	0.00	0.00	9.80	0.00	9.8	249.0	254.0	127.0
1/15/06	15	9.8	249.0	0.21	0.15	0.03	0.80	0.00	0.00	9.77	0.00	9.8	248.2	254.0	127.0
1/16/06	16	9.8	248.2	0.12	0.15	0.02	0.46	0.00	0.00	9.75	0.00	9.8	247.8	254.0	127.0
1/17/06	17	9.8	247.8	0.12	0.15	0.02	0.46	0.00	0.00	9.74	0.00	9.7	247.3	254.0	127.0
1/18/06	18	9.7	247.3	0.11	0.15	0.02	0.42	0.00	0.00	9.72	0.00	9.7	246.9	254.0	127.0
1/19/06	19	9.7	246.9	0.09	0.15	0.01	0.34	0.00	0.00	9.71	0.00	9.7	246.5	254.0	127.0
1/20/06	20	9.7	246.5	0.03	0.15	0.00	0.11	0.00	0.00	9.70	0.00	9.7	246.4	254.0	127.0
1/21/06	21	9.7	246.4	0.04	0.15	0.01	0.15	0.00	0.00	9.70	0.00	9.7	246.3	254.0	127.0
1/22/06	22	9.7	246.3	0.04	0.15	0.01	0.15	0.00	0.00	9.69	0.00	9.7	246.1	254.0	127.0
1/23/06	23	9.7	246.1	0.05	0.15	0.01	0.19	0.00	0.00	9.68	0.00	9.7	245.9	254.0	127.0
1/24/06	24	9.7	245.9	0.18	0.15	0.03	0.69	0.00	0.00	9.65	0.00	9.7	245.2	254.0	127.0
1/25/06	25	9.7	245.2	0.07	0.15	0.01	0.27	0.00	0.00	9.64	0.00	9.6	245.0	254.0	127.0
1/26/06	26	9.6	245.0	0.21	0.15	0.03	0.80	0.00	0.00	9.61	0.00	9.6	244.2	254.0	127.0
1/27/06	27	9.6	244.2	0.15	0.15	0.02	0.57	0.00	0.00	9.59	0.00	9.6	243.6	254.0	127.0
1/28/06	28	9.6	243.6	0.09	0.15	0.01	0.34	0.03	0.00	9.61	0.00	9.6	244.0	254.0	127.0
1/29/06	29	9.6	244.0	0.14	0.15	0.02	0.53	0.00	0.00	9.59	0.00	9.6	243.5	254.0	127.0
1/30/06	30	9.6	243.5	0.10	0.15	0.02	0.38	0.00	0.00	9.57	0.00	9.6	243.1	254.0	127.0
1/31/06	31	9.6	243.1	0.18	0.15	0.03	0.69	0.00	0.00	9.54	0.00	9.5	242.4	254.0	127.0
2/1/06	32	9.5	242.4	0.08	0.15	0.01	0.30	0.00	0.00	9.53	0.00	9.5	242.1	254.0	127.0
2/2/06	33	9.5	242.1	0.12	0.15	0.02	0.46	0.00	0.00	9.51	0.00	9.5	241.7	254.0	127.0
2/3/06	34	9.5	241.7	0.09	0.15	0.01	0.34	0.00	0.00	9.50	0.00	9.5	241.3	254.0	127.0
2/4/06	35	9.5	241.3	0.09	0.15	0.01	0.34	0.00	0.00	9.49	0.00	9.5	241.0	254.0	127.0
2/5/06	36	9.5	241.0	0.10	0.15	0.02	0.38	0.00	0.00	9.47	0.00	9.5	240.6	254.0	127.0
2/6/06	37	9.5	240.6	0.08	0.15	0.01	0.30	0.00	0.00	9.46	0.00	9.5	240.3	254.0	127.0
2/7/06	38	9.5	240.3	0.08	0.15	0.01	0.30	0.00	0.00	9.45	0.00	9.4	240.0	254.0	127.0
2/8/06	39	9.4	240.0	0.09	0.15	0.01	0.34	0.00	0.00	9.43	0.00	9.4	239.6	254.0	127.0
2/9/06	40	9.4	239.6	0.08	0.15	0.01	0.30	0.00	0.00	9.42	0.00	9.4	239.3	254.0	127.0
2/10/06	41	9.4	239.3	0.15	0.15	0.02	0.57	0.00	0.00	9.40	0.00	9.4	238.8	254.0	127.0
2/11/06	42	9.4	238.8	0.07	0.15	0.01	0.27	0.00	0.00	9.39	0.00	9.4	238.5	254.0	127.0
2/12/06	43	9.4	238.5	0.08	0.15	0.01	0.30	0.00	0.00	9.38	0.00	9.4	238.2	254.0	127.0
2/13/06	44	9.4	238.2	0.16	0.15	0.02	0.61	0.00	0.00	9.35	0.00	9.4	237.6	254.0	127.0
2/14/06	45	9.4	237.6	0.15	0.15	0.02	0.57	0.00	0.00	9.33	0.00	9.3	237.0	254.0	127.0
2/15/06	46	9.3	237.0	0.21	0.15	0.03	0.80	0.00	0.00	9.30	0.00	9.3	236.2	254.0	127.0
2/16/06	47	9.3	236.2	0.07	0.15	0.01	0.27	0.00	0.00	9.29	0.00	9.3	235.9	254.0	127.0
2/17/06	48	9.3	235.9	0.07	0.15	0.01	0.27	0.00	0.00	9.28	0.00	9.3	235.7	254.0	127.0
2/18/06	49	9.3	235.7	0.08	0.15	0.01	0.30	0.00	0.00	9.27	0.00	9.3	235.4	254.0	127.0
2/19/06	50	9.3	235.4	0.05	0.15	0.01	0.19	0.00	0.00	9.26	0.00	9.3	235.2	254.0	127.0

2/20/06	51	9.3	235.2	0.12	0.15	0.02	0.46	0.00	0.00	9.24	0.00	9.2	234.7	254.0	127.0
2/21/06	52	9.2	234.7	0.10	0.15	0.02	0.38	0.00	0.00	9.23	0.00	9.2	234.3	254.0	127.0
2/22/06	53	9.2	234.3	0.16	0.15	0.02	0.61	0.00	0.00	9.20	0.00	9.2	233.7	254.0	127.0
2/23/06	54	9.2	233.7	0.11	0.15	0.02	0.42	0.00	0.00	9.19	0.00	9.2	233.3	254.0	127.0
2/24/06	55	9.2	233.3	0.25	0.15	0.04	0.95	0.00	0.00	9.15	0.00	9.1	232.4	254.0	127.0
2/25/06	56	9.1	232.4	0.17	0.15	0.03	0.65	0.00	0.00	9.12	0.00	9.1	231.7	254.0	127.0
2/26/06	57	9.1	231.7	0.12	0.15	0.02	0.46	0.00	0.00	9.10	0.00	9.1	231.3	254.0	127.0
2/27/06	58	9.1	231.3	0.15	0.15	0.02	0.57	0.00	0.00	9.08	0.00	9.1	230.7	254.0	127.0
2/28/06	59	9.1	230.7	0.14	0.15	0.02	0.53	0.00	0.00	9.06	0.00	9.1	230.1	254.0	127.0
3/1/06	60	9.1	230.1	0.32	0.15	0.05	1.22	0.00	0.00	9.01	0.00	9.0	228.9	254.0	127.0
3/2/06	61	9.0	228.9	0.16	0.15	0.02	0.61	0.00	0.00	8.99	0.00	9.0	228.3	254.0	127.0
3/3/06	62	9.0	228.3	0.10	0.15	0.02	0.38	0.00	0.00	8.97	0.00	9.0	227.9	254.0	127.0
3/4/06	63	9.0	227.9	0.11	0.15	0.02	0.42	0.30	0.00	9.26	0.00	9.3	235.1	254.0	127.0
3/5/06	64	9.3	235.1	0.16	0.15	0.02	0.61	0.00	0.00	9.23	0.00	9.2	234.5	254.0	127.0
3/6/06	65	9.2	234.5	0.13	0.15	0.02	0.50	0.00	0.00	9.21	0.00	9.2	234.0	254.0	127.0
3/7/06	66	9.2	234.0	0.20	0.15	0.03	0.76	0.11	0.00	9.29	0.00	9.3	236.1	254.0	127.0
3/8/06	67	9.3	236.1	0.18	0.15	0.03	0.69	0.00	0.00	9.27	0.00	9.3	235.4	254.0	127.0
3/9/06	68	9.3	235.4	0.12	0.15	0.02	0.46	0.00	0.00	9.25	0.00	9.2	234.9	254.0	127.0
3/10/06	69	9.2	234.9	0.07	0.15	0.01	0.27	0.00	0.00	9.24	0.00	9.2	234.7	254.0	127.0
3/11/06	70	9.2	234.7	0.15	0.15	0.02	0.57	0.00	0.00	9.22	0.00	9.2	234.1	254.0	127.0
3/12/06	71	9.2	234.1	0.16	0.15	0.02	0.61	0.06	0.00	9.25	0.00	9.3	235.0	254.0	127.0
3/13/06	72	9.3	235.0	0.18	0.15	0.03	0.69	0.00	0.00	9.22	0.00	9.2	234.3	254.0	127.0
3/14/06	73	9.2	234.3	0.15	0.15	0.02	0.57	0.00	0.00	9.20	0.00	9.2	233.7	254.0	127.0
3/15/06	74	9.2	233.7	0.42	0.15	0.06	1.60	0.00	0.00	9.14	0.00	9.1	232.1	254.0	127.0
3/16/06	75	9.1	232.1	0.30	0.15	0.05	1.14	0.00	0.00	9.09	0.00	9.1	231.0	254.0	127.0
3/17/06	76	9.1	231.0	0.11	0.15	0.02	0.42	0.00	0.00	9.08	0.00	9.1	230.6	254.0	127.0
3/18/06	77	9.1	230.6	0.12	0.15	0.02	0.46	0.05	0.00	9.11	0.00	9.1	231.4	254.0	127.0
3/19/06	78	9.1	231.4	0.05	0.15	0.01	0.19	0.45	0.00	9.55	0.00	9.6	242.6	254.0	127.0
3/20/06	79	9.6	242.6	0.04	0.15	0.01	0.15	0.37	0.00	9.92	0.00	9.9	251.9	254.0	127.0
3/21/06	80	9.9	251.9	0.04	0.15	0.01	0.15	0.01	0.00	9.92	0.00	9.9	252.0	254.0	127.0
3/22/06	81	9.9	252.0	0.08	0.15	0.01	0.30	0.00	0.00	9.91	0.00	9.9	251.7	254.0	127.0
3/23/06	82	9.9	251.7	0.10	0.15	0.02	0.38	0.00	0.00	9.89	0.00	9.9	251.3	254.0	127.0
3/24/06	83	9.9	251.3	0.12	0.15	0.02	0.46	0.00	0.00	9.88	0.00	9.9	250.8	254.0	127.0
3/25/06	84	9.9	250.8	0.10	0.15	0.02	0.38	0.00	0.00	9.86	0.00	9.9	250.5	254.0	127.0
3/26/06	85	9.9	250.5	0.18	0.15	0.03	0.69	0.22	0.00	10.05	0.05	10.0	254.0	254.0	127.0
3/27/06	86	10.0	254.0	0.14	0.15	0.02	0.53	0.00	0.00	9.98	0.00	10.0	253.5	254.0	127.0
3/28/06	87	10.0	253.5	0.13	0.15	0.02	0.50	0.00	0.00	9.96	0.00	10.0	253.0	254.0	127.0
3/29/06	88	10.0	253.0	0.33	0.15	0.05	1.26	0.05	0.00	9.96	0.00	10.0	253.0	254.0	127.0
3/30/06	89	10.0	253.0	0.17	0.15	0.03	0.65	0.82	0.00	10.75	0.75	10.0	254.0	254.0	127.0
3/31/06	90	10.0	254.0	0.26	0.15	0.04	0.99	0.00	0.00	9.96	0.00	10.0	253.0	254.0	127.0
4/1/06	91	10.0	253.0	0.21	0.15	0.03	0.80	0.88	0.00	10.81	0.81	10.0	254.0	254.0	127.0
4/2/06	92	10.0	254.0	0.28	0.15	0.04	1.07	0.00	0.00	9.96	0.00	10.0	252.9	254.0	127.0
4/3/06	93	10.0	252.9	0.21	0.15	0.03	0.80	0.00	0.00	9.93	0.00	9.9	252.1	254.0	127.0
4/4/06	94	9.9	252.1	0.16	0.15	0.02	0.61	0.00	0.00	9.90	0.00	9.9	251.5	254.0	127.0
4/5/06	95	9.9	251.5	0.25	0.18	0.04	1.13	0.00	0.00	9.86	0.00	9.9	250.4	254.0	127.0
4/6/06	96	9.9	250.4	0.29	0.20	0.06	1.51	0.05	0.00	9.85	0.00	9.8	250.2	254.0	127.0
4/7/06	97	9.8	250.2	0.16	0.23	0.04	0.94	0.21	0.00	10.02	0.02	10.0	254.0	254.0	127.0
4/8/06	98	10.0	254.0	0.19	0.26	0.05	1.25	0.00	0.00	9.95	0.00	10.0	252.7	254.0	127.0
4/9/06	99	10.0	252.7	0.26	0.29	0.07	1.90	0.00	0.00	9.88	0.00	9.9	250.9	254.0	127.0
4/10/06	100	9.9	250.9	0.36	0.31	0.11	2.88	0.00	0.00	9.76	0.00	9.8	248.0	254.0	127.0
4/11/06	101	9.8	248.0	0.40	0.34	0.14	3.47	0.00	0.00	9.63	0.00	9.6	244.5	254.0	127.0

4/12/06	102	9.6	244.5	0.25	0.37	0.09	2.35	0.00	0.00	9.53	0.00	9.5	242.2	254.0	127.0
4/13/06	103	9.5	242.2	0.37	0.40	0.15	3.73	0.00	0.00	9.39	0.00	9.4	238.4	254.0	127.0
4/14/06	104	9.4	238.4	0.43	0.42	0.18	4.63	0.00	0.00	9.20	0.00	9.2	233.8	254.0	127.0
4/15/06	105	9.2	233.8	0.31	0.45	0.14	3.56	0.00	0.00	9.06	0.00	9.1	230.2	254.0	127.0
4/16/06	106	9.1	230.2	0.37	0.48	0.18	4.50	0.00	0.00	8.89	0.00	8.9	225.7	254.0	127.0
4/17/06	107	8.9	225.7	0.23	0.51	0.12	2.96	0.00	0.00	8.77	0.00	8.8	222.8	254.0	127.0
4/18/06	108	8.8	222.8	0.37	0.53	0.20	5.02	0.00	0.00	8.57	0.00	8.6	217.8	254.0	127.0
4/19/06	109	8.6	217.8	0.23	0.56	0.13	3.28	0.00	0.00	8.44	0.00	8.4	214.5	254.0	127.0
4/20/06	110	8.4	214.5	0.24	0.59	0.14	3.59	0.00	0.00	8.30	0.00	8.3	210.9	254.0	127.0
4/21/06	111	8.3	210.9	0.17	0.62	0.10	2.66	0.00	0.00	8.20	0.00	8.2	208.2	254.0	127.0
4/22/06	112	8.2	208.2	0.27	0.64	0.17	4.41	0.00	0.00	8.02	0.00	8.0	203.8	254.0	127.0
4/23/06	113	8.0	203.8	0.29	0.67	0.19	4.94	0.00	0.00	7.83	0.00	7.8	198.9	254.0	127.0
4/24/06	114	7.8	198.9	0.10	0.70	0.07	1.77	0.19	0.00	7.95	0.00	7.9	201.9	254.0	127.0
4/25/06	115	7.9	201.9	0.07	0.73	0.05	1.29	0.02	0.00	7.92	0.00	7.9	201.1	254.0	127.0
4/26/06	116	7.9	201.1	0.14	0.75	0.11	2.68	0.00	0.00	7.81	0.00	7.8	198.5	254.0	127.0
4/27/06	117	7.8	198.5	0.23	0.78	0.18	4.56	0.00	0.00	7.63	0.00	7.6	193.9	254.0	127.0
4/28/06	118	7.6	193.9	0.08	0.81	0.06	1.64	1.28	0.00	8.85	0.00	8.8	224.8	254.0	127.0
4/29/06	119	8.8	224.8	0.04	0.84	0.03	0.85	0.13	0.00	8.95	0.00	8.9	227.2	254.0	127.0
4/30/06	120	8.9	227.2	0.22	0.86	0.19	4.82	0.00	0.00	8.76	0.00	8.8	222.4	254.0	127.0
5/1/06	121	8.8	222.4	0.14	0.89	0.12	3.17	0.00	0.00	8.63	0.00	8.6	219.2	254.0	127.0
5/2/06	122	8.6	219.2	0.24	0.92	0.22	5.59	0.58	0.00	8.99	0.00	9.0	228.4	254.0	127.0
5/3/06	123	9.0	228.4	0.13	0.95	0.12	3.12	0.20	0.00	9.07	0.00	9.1	230.3	254.0	127.0
5/4/06	124	9.1	230.3	0.13	0.97	0.13	3.21	0.18	0.00	9.12	0.00	9.1	231.7	254.0	127.0
5/5/06	125	9.1	231.7	0.08	1.00	0.08	2.03	0.00	0.00	9.04	0.00	9.0	229.7	254.0	127.0
5/6/06	126	9.0	229.7	0.06	0.15	0.01	0.23	0.00	0.00	9.03	0.00	9.0	229.4	254.0	127.0
5/7/06	127	9.0	229.4	0.07	0.17	0.01	0.31	0.00	0.00	9.02	0.00	9.0	229.1	254.0	127.0
5/8/06	128	9.0	229.1	0.20	0.19	0.04	0.98	0.67	0.00	9.65	0.00	9.7	245.2	254.0	127.0
5/9/06	129	9.7	245.2	0.21	0.22	0.05	1.15	0.01	0.00	9.62	0.00	9.6	244.3	254.0	127.0
5/10/06	130	9.6	244.3	0.26	0.24	0.06	1.57	0.00	0.00	9.56	0.00	9.6	242.7	254.0	127.0
5/11/06	131	9.6	242.7	0.23	0.26	0.06	1.51	0.00	0.00	9.50	0.00	9.5	241.2	254.0	127.0
5/12/06	132	9.5	241.2	0.20	0.28	0.06	1.43	0.00	0.00	9.44	0.00	9.4	239.8	254.0	127.0
5/13/06	133	9.4	239.8	0.27	0.30	0.08	2.07	0.00	0.00	9.36	0.00	9.4	237.7	254.0	127.0
5/14/06	134	9.4	237.7	0.18	0.32	0.06	1.48	0.00	0.00	9.30	0.00	9.3	236.2	254.0	127.0
5/15/06	135	9.3	236.2	0.23	0.35	0.08	2.02	0.00	0.00	9.22	0.00	9.2	234.2	254.0	127.0
5/16/06	136	9.2	234.2	0.27	0.37	0.10	2.52	0.00	0.00	9.12	0.00	9.1	231.7	254.0	127.0
5/17/06	137	9.1	231.7	0.38	0.39	0.15	3.76	0.00	0.00	8.97	0.00	9.0	227.9	254.0	127.0
5/18/06	138	9.0	227.9	0.30	0.41	0.12	3.14	0.00	0.00	8.85	0.00	8.8	224.8	254.0	127.0
5/19/06	139	8.8	224.8	0.46	0.43	0.20	5.06	0.00	0.00	8.65	0.00	8.6	219.7	254.0	127.0
5/20/06	140	8.6	219.7	0.29	0.46	0.13	3.35	0.00	0.00	8.52	0.00	8.5	216.3	254.0	127.0
5/21/06	141	8.5	216.3	0.28	0.48	0.13	3.39	0.00	0.00	8.38	0.00	8.4	213.0	254.0	127.0
5/22/06	142	8.4	213.0	0.30	0.50	0.15	3.80	0.00	0.00	8.23	0.00	8.2	209.2	254.0	127.0
5/23/06	143	8.2	209.2	0.30	0.52	0.16	3.97	0.00	0.00	8.08	0.00	8.1	205.2	254.0	127.0
5/24/06	144	8.1	205.2	0.40	0.54	0.22	5.51	0.00	0.00	7.86	0.00	7.9	199.7	254.0	127.0
5/25/06	145	7.9	199.7	0.40	0.56	0.23	5.73	0.00	0.00	7.64	0.00	7.6	194.0	254.0	127.0
5/26/06	146	7.6	194.0	0.27	0.59	0.16	4.02	0.31	0.00	7.79	0.00	7.8	197.8	254.0	127.0
5/27/06	147	7.8	197.8	0.41	0.61	0.25	6.33	0.00	0.00	7.54	0.00	7.5	191.5	254.0	127.0
5/28/06	148	7.5	191.5	0.48	0.63	0.30	7.67	0.00	0.00	7.24	0.00	7.2	183.8	254.0	127.0
5/29/06	149	7.2	183.8	0.23	0.65	0.15	3.80	0.20	0.00	7.29	0.00	7.3	185.1	254.0	127.0
5/30/06	150	7.3	185.1	0.19	0.67	0.13	3.25	0.70	0.00	7.86	0.00	7.9	199.6	254.0	127.0
5/31/06	151	7.9	199.6	0.21	0.69	0.15	3.71	0.03	0.00	7.74	0.00	7.7	196.7	254.0	127.0
6/1/06	152	7.7	196.7	0.17	0.72	0.12	3.09	0.11	0.00	7.73	0.00	7.7	196.4	254.0	127.0

6/2/06	153	7.7	196.4	0.26	0.74	0.19	4.88	0.00	0.00	7.54	0.00	7.5	191.5	254.0	127.0
6/3/06	154	7.5	191.5	0.27	0.76	0.21	5.21	0.00	0.00	7.33	0.00	7.3	186.3	254.0	127.0
6/4/06	155	7.3	186.3	0.31	0.78	0.24	6.16	0.00	0.00	7.09	0.00	7.1	180.1	254.0	127.0
6/5/06	156	7.1	180.1	0.24	0.80	0.19	4.90	0.01	0.00	6.91	0.00	6.9	175.5	254.0	127.0
6/6/06	157	6.9	175.5	0.30	0.83	0.25	6.29	0.00	0.00	6.66	0.00	6.7	169.2	254.0	127.0
6/7/06	158	6.7	169.2	0.32	0.85	0.27	6.89	0.00	0.00	6.39	0.00	6.4	162.3	254.0	127.0
6/8/06	159	6.4	162.3	0.31	0.87	0.27	6.84	0.00	0.00	6.12	0.00	6.1	155.4	254.0	127.0
6/9/06	160	6.1	155.4	0.47	0.89	0.42	10.64	0.00	0.00	5.70	0.00	5.7	144.8	254.0	127.0
6/10/06	161	5.7	144.8	0.32	0.91	0.29	7.42	0.07	0.00	5.48	0.00	5.5	139.2	254.0	127.0
6/11/06	162	5.5	139.2	0.22	0.93	0.21	5.22	0.01	0.00	5.28	0.00	5.3	134.2	254.0	127.0
6/12/06	163	5.3	134.2	0.19	0.96	0.18	4.62	0.00	0.00	5.10	0.00	5.1	129.6	254.0	127.0
6/13/06	164	5.1	129.6	0.21	0.98	0.21	5.22	0.00	0.00	4.90	0.00	4.9	124.4	254.0	127.0
6/14/06	165	4.9	124.4	0.40	1.00	0.40	10.16	0.00	0.00	4.50	0.00	4.5	114.2	254.0	127.0
6/15/06	166	4.5	114.2	0.56	0.15	0.08	2.13	0.00	0.00	4.41	0.00	4.4	112.1	254.0	127.0
6/16/06	167	4.4	112.1	0.44	0.17	0.08	1.95	0.28	0.00	4.62	0.00	4.6	117.2	254.0	127.0
6/17/06	168	4.6	117.2	0.19	0.20	0.04	0.96	0.48	0.00	5.06	0.00	5.1	128.5	254.0	127.0
6/18/06	169	5.1	128.5	0.25	0.22	0.06	1.42	0.00	0.00	5.00	0.00	5.0	127.1	254.0	127.0
6/19/06	170	5.0	127.1	0.29	0.25	0.07	1.82	0.00	0.00	4.93	0.00	4.9	125.2	254.0	127.0
6/20/06	171	4.9	125.2	0.32	0.27	0.09	2.21	0.03	0.00	4.87	0.00	4.9	123.8	254.0	127.0
6/21/06	172	4.9	123.8	0.27	0.30	0.08	2.03	0.30	0.00	5.09	0.00	5.1	129.4	254.0	127.0
6/22/06	173	5.1	129.4	0.22	0.32	0.07	1.79	0.01	0.00	5.03	0.00	5.0	127.8	254.0	127.0
6/23/06	174	5.0	127.8	0.28	0.34	0.10	2.45	0.00	0.00	4.94	0.00	4.9	125.4	254.0	127.0
6/24/06	175	4.9	125.4	0.25	0.37	0.09	2.34	0.00	0.00	4.84	0.00	4.8	123.1	254.0	127.0
6/25/06	176	4.8	123.1	0.26	0.39	0.10	2.59	0.07	0.00	4.81	0.00	4.8	122.2	254.0	127.0
6/26/06	177	4.8	122.2	0.29	0.42	0.12	3.07	0.00	0.00	4.69	0.00	4.7	119.2	254.0	127.0
6/27/06	178	4.7	119.2	0.24	0.44	0.11	2.69	0.00	0.00	4.59	0.00	4.6	116.5	254.0	127.0
6/28/06	179	4.6	116.5	0.26	0.47	0.12	3.08	0.04	0.00	4.50	0.00	4.5	114.4	254.0	127.0
6/29/06	180	4.5	114.4	0.37	0.49	0.18	4.61	0.04	0.00	4.36	0.00	4.4	110.8	254.0	127.0
6/30/06	181	4.4	110.8	0.39	0.51	0.20	5.09	0.00	0.00	4.16	0.00	4.2	105.7	254.0	127.0
7/1/06	182	4.2	105.7	0.44	0.54	0.24	6.02	0.00	0.00	3.93	0.00	3.9	99.7	254.0	127.0
7/2/06	183	3.9	99.7	0.43	0.56	0.24	6.15	0.00	0.00	3.68	0.00	3.7	93.6	254.0	127.0
7/3/06	184	3.7	93.6	0.31	0.59	0.18	4.62	1.30	0.00	4.80	0.00	4.8	122.0	254.0	127.0
7/4/06	185	4.8	122.0	0.25	0.61	0.15	3.88	0.01	0.00	4.66	0.00	4.7	118.3	254.0	127.0
7/5/06	186	4.7	118.3	0.27	0.64	0.17	4.36	0.00	0.00	4.49	0.00	4.5	114.0	254.0	127.0
7/6/06	187	4.5	114.0	0.27	0.66	0.18	4.53	0.00	0.00	4.31	0.00	4.3	109.5	254.0	127.0
7/7/06	188	4.3	109.5	0.50	0.68	0.34	8.69	0.00	0.00	3.97	0.00	4.0	100.8	254.0	127.0
7/8/06	189	4.0	100.8	0.27	0.71	0.19	4.86	0.00	0.00	3.78	0.00	3.8	95.9	254.0	127.0
7/9/06	190	3.8	95.9	0.12	0.73	0.09	2.23	1.27	0.00	4.96	0.00	5.0	125.9	254.0	127.0
7/10/06	191	5.0	125.9	0.14	0.76	0.11	2.69	0.34	0.00	5.19	0.00	5.2	131.9	254.0	127.0
7/11/06	192	5.2	131.9	0.24	0.78	0.19	4.76	0.02	0.00	5.02	0.00	5.0	127.6	254.0	127.0
7/12/06	193	5.0	127.6	0.26	0.81	0.21	5.32	0.00	0.00	4.81	0.00	4.8	122.3	254.0	127.0
7/13/06	194	4.8	122.3	0.33	0.83	0.27	6.96	0.00	0.00	4.54	0.00	4.5	115.3	254.0	127.0
7/14/06	195	4.5	115.3	0.25	0.85	0.21	5.42	0.00	0.00	4.33	0.00	4.3	109.9	254.0	127.0
7/15/06	196	4.3	109.9	0.27	0.88	0.24	6.03	0.00	0.00	4.09	0.00	4.1	103.9	254.0	127.0
7/16/06	197	4.1	103.9	0.27	0.90	0.24	6.19	0.00	0.00	3.85	0.00	3.8	97.7	254.0	127.0
7/17/06	198	3.8	97.7	0.34	0.93	0.32	8.01	0.00	0.00	3.53	0.00	3.5	89.7	254.0	127.0
7/18/06	199	3.5	89.7	0.30	0.95	0.29	7.25	0.00	0.00	3.25	0.00	3.2	82.4	254.0	127.0
7/19/06	200	3.2	82.4	0.41	0.98	0.40	10.16	0.00	0.00	2.85	0.00	2.8	72.3	254.0	127.0
7/20/06	201	2.8	72.3	0.38	1.00	0.38	9.65	0.00	5.50	7.97	0.00	8.0	202.3	254.0	127.0
7/21/06	202	8.0	202.3	0.18	0.15	0.03	0.69	0.72	0.00	8.66	0.00	8.7	219.9	254.0	127.0

7/22/06	203	8.7	219.9	0.24	0.17	0.04	1.05	0.00	0.00	8.62	0.00	8.6	218.9	254.0	127.0
7/23/06	204	8.6	218.9	0.22	0.19	0.04	1.09	0.00	0.00	8.57	0.00	8.6	217.8	254.0	127.0
7/24/06	205	8.6	217.8	0.28	0.22	0.06	1.54	0.00	0.00	8.51	0.00	8.5	216.2	254.0	127.0
7/25/06	206	8.5	216.2	0.37	0.24	0.09	2.25	0.00	0.00	8.42	0.00	8.4	214.0	254.0	127.0
7/26/06	207	8.4	214.0	0.25	0.26	0.07	1.66	0.00	0.00	8.36	0.00	8.4	212.3	254.0	127.0
7/27/06	208	8.4	212.3	0.15	0.28	0.04	1.08	0.05	0.00	8.37	0.00	8.4	212.5	254.0	127.0
7/28/06	209	8.4	212.5	0.25	0.31	0.08	1.95	0.00	0.00	8.29	0.00	8.3	210.6	254.0	127.0
7/29/06	210	8.3	210.6	0.30	0.33	0.10	2.51	0.00	0.00	8.19	0.00	8.2	208.1	254.0	127.0
7/30/06	211	8.2	208.1	0.52	0.35	0.18	4.64	0.00	0.00	8.01	0.00	8.0	203.4	254.0	127.0
7/31/06	212	8.0	203.4	0.42	0.37	0.16	3.99	0.00	0.00	7.85	0.00	7.9	199.4	254.0	127.0
8/1/06	213	7.9	199.4	0.38	0.40	0.15	3.82	0.00	0.00	7.70	0.00	7.7	195.6	254.0	127.0
8/2/06	214	7.7	195.6	0.20	0.42	0.08	2.13	0.67	0.00	8.29	0.00	8.3	210.5	254.0	127.0
8/3/06	215	8.3	210.5	0.26	0.44	0.11	2.91	0.00	0.00	8.17	0.00	8.2	207.6	254.0	127.0
8/4/06	216	8.2	207.6	0.25	0.46	0.12	2.94	0.00	0.00	8.06	0.00	8.1	204.7	254.0	127.0
8/5/06	217	8.1	204.7	0.36	0.49	0.17	4.44	0.00	0.00	7.88	0.00	7.9	200.2	254.0	127.0
8/6/06	218	7.9	200.2	0.35	0.51	0.18	4.52	0.00	0.00	7.70	0.00	7.7	195.7	254.0	127.0
8/7/06	219	7.7	195.7	0.29	0.53	0.15	3.91	0.00	0.00	7.55	0.00	7.6	191.8	254.0	127.0
8/8/06	220	7.6	191.8	0.27	0.55	0.15	3.79	0.00	0.00	7.40	0.00	7.4	188.0	254.0	127.0
8/9/06	221	7.4	188.0	0.42	0.58	0.24	6.13	0.00	0.00	7.16	0.00	7.2	181.9	254.0	127.0
8/10/06	222	7.2	181.9	0.19	0.60	0.11	2.88	0.49	0.00	7.54	0.00	7.5	191.4	254.0	127.0
8/11/06	223	7.5	191.4	0.28	0.62	0.17	4.41	0.01	0.00	7.37	0.00	7.4	187.3	254.0	127.0
8/12/06	224	7.4	187.3	0.36	0.64	0.23	5.87	0.00	0.00	7.14	0.00	7.1	181.4	254.0	127.0
8/13/06	225	7.1	181.4	0.29	0.66	0.19	4.89	1.11	0.00	8.06	0.00	8.1	204.7	254.0	127.0
8/14/06	226	8.1	204.7	0.20	0.69	0.14	3.49	1.02	0.00	8.94	0.00	8.9	227.1	254.0	127.0
8/15/06	227	8.9	227.1	0.25	0.71	0.18	4.50	0.01	0.00	8.77	0.00	8.8	222.9	254.0	127.0
8/16/06	228	8.8	222.9	0.23	0.73	0.17	4.27	0.01	0.00	8.62	0.00	8.6	218.9	254.0	127.0
8/17/06	229	8.6	218.9	0.30	0.75	0.23	5.75	0.60	0.00	8.99	0.00	9.0	228.4	254.0	127.0
8/18/06	230	9.0	228.4	0.22	0.78	0.17	4.34	3.42	0.00	12.24	2.24	10.0	254.0	254.0	127.0
8/19/06	231	10.0	254.0	0.18	0.80	0.14	3.65	0.20	0.00	10.06	0.06	10.0	254.0	254.0	127.0
8/20/06	232	10.0	254.0	0.19	0.82	0.16	3.96	0.00	0.00	9.84	0.00	9.8	250.0	254.0	127.0
8/21/06	233	9.8	250.0	0.16	0.84	0.13	3.43	0.00	0.00	9.71	0.00	9.7	246.6	254.0	127.0
8/22/06	234	9.7	246.6	0.18	0.87	0.16	3.96	0.00	0.00	9.55	0.00	9.6	242.7	254.0	127.0
8/23/06	235	9.6	242.7	0.23	0.89	0.20	5.19	0.00	0.00	9.35	0.00	9.3	237.5	254.0	127.0
8/24/06	236	9.3	237.5	0.26	0.91	0.24	6.01	0.00	0.00	9.11	0.00	9.1	231.4	254.0	127.0
8/25/06	237	9.1	231.4	0.22	0.93	0.21	5.21	1.43	0.00	10.34	0.34	10.0	254.0	254.0	127.0
8/26/06	238	10.0	254.0	0.14	0.96	0.13	3.40	1.83	0.00	11.70	1.70	10.0	254.0	254.0	127.0
8/27/06	239	10.0	254.0	0.15	0.98	0.15	3.72	0.30	0.00	10.15	0.15	10.0	254.0	254.0	127.0
8/28/06	240	10.0	254.0	0.29	1.00	0.29	7.37	0.04	0.00	9.75	0.00	9.8	247.7	254.0	127.0
8/29/06	241	9.8	247.7	0.21	0.15	0.03	0.80	0.00	0.00	9.72	0.00	9.7	246.8	254.0	127.0
8/30/06	242	9.7	246.8	0.23	0.17	0.04	1.01	0.00	0.00	9.68	0.00	9.7	245.8	254.0	127.0
8/31/06	243	9.7	245.8	0.24	0.20	0.05	1.20	0.00	0.00	9.63	0.00	9.6	244.6	254.0	127.0
9/1/06	244	9.6	244.6	0.17	0.22	0.04	0.95	0.00	0.00	9.59	0.00	9.6	243.7	254.0	127.0
9/2/06	245	9.6	243.7	0.10	0.24	0.02	0.62	0.14	0.00	9.71	0.00	9.7	246.6	254.0	127.0
9/3/06	246	9.7	246.6	0.18	0.27	0.05	1.23	0.00	0.00	9.66	0.00	9.7	245.4	254.0	127.0
9/4/06	247	9.7	245.4	0.22	0.29	0.06	1.63	0.00	0.00	9.60	0.00	9.6	243.8	254.0	127.0
9/5/06	248	9.6	243.8	0.18	0.32	0.06	1.44	0.00	0.00	9.54	0.00	9.5	242.3	254.0	127.0
9/6/06	249	9.5	242.3	0.17	0.34	0.06	1.46	0.00	0.00	9.48	0.00	9.5	240.9	254.0	127.0
9/7/06	250	9.5	240.9	0.18	0.36	0.07	1.66	0.00	0.00	9.42	0.00	9.4	239.2	254.0	127.0
9/8/06	251	9.4	239.2	0.15	0.39	0.06	1.47	0.01	0.00	9.37	0.00	9.4	238.0	254.0	127.0
9/9/06	252	9.4	238.0	0.14	0.41	0.06	1.46	0.82	0.00	10.13	0.13	10.0	254.0	254.0	127.0
9/10/06	253	10.0	254.0	0.19	0.43	0.08	2.09	0.04	0.00	9.96	0.00	10.0	252.9	254.0	127.0

9/11/06	254	10.0	252.9	0.05	0.46	0.02	0.58	0.00	0.00	9.93	0.00	9.9	252.3	254.0	127.0
9/12/06	255	9.9	252.3	0.07	0.48	0.03	0.85	0.00	0.00	9.90	0.00	9.9	251.5	254.0	127.0
9/13/06	256	9.9	251.5	0.16	0.50	0.08	2.05	0.00	0.00	9.82	0.00	9.8	249.4	254.0	127.0
9/14/06	257	9.8	249.4	0.30	0.53	0.16	4.02	0.00	0.00	9.66	0.00	9.7	245.4	254.0	127.0
9/15/06	258	9.7	245.4	0.39	0.55	0.22	5.46	0.02	0.00	9.47	0.00	9.5	240.5	254.0	127.0
9/16/06	259	9.5	240.5	0.44	0.58	0.25	6.43	0.00	0.00	9.21	0.00	9.2	234.0	254.0	127.0
9/17/06	260	9.2	234.0	0.17	0.60	0.10	2.58	0.55	0.00	9.66	0.00	9.7	245.4	254.0	127.0
9/18/06	261	9.7	245.4	0.25	0.62	0.16	3.95	0.00	0.00	9.51	0.00	9.5	241.5	254.0	127.0
9/19/06	262	9.5	241.5	0.15	0.65	0.10	2.46	0.00	0.00	9.41	0.00	9.4	239.0	254.0	127.0
9/20/06	263	9.4	239.0	0.21	0.67	0.14	3.57	0.00	0.00	9.27	0.00	9.3	235.4	254.0	127.0
9/21/06	264	9.3	235.4	0.21	0.69	0.15	3.70	0.37	0.00	9.49	0.00	9.5	241.1	254.0	127.0
9/22/06	265	9.5	241.1	0.16	0.72	0.11	2.91	0.03	0.00	9.41	0.00	9.4	239.0	254.0	127.0
9/23/06	266	9.4	239.0	0.16	0.74	0.12	3.01	0.01	0.00	9.30	0.00	9.3	236.2	254.0	127.0
9/24/06	267	9.3	236.2	0.14	0.76	0.11	2.72	0.00	0.00	9.19	0.00	9.2	233.5	254.0	127.0
9/25/06	268	9.2	233.5	0.16	0.79	0.13	3.20	0.00	0.00	9.07	0.00	9.1	230.3	254.0	127.0
9/26/06	269	9.1	230.3	0.20	0.81	0.16	4.12	0.00	0.00	8.91	0.00	8.9	226.2	254.0	127.0
9/27/06	270	8.9	226.2	0.19	0.83	0.16	4.03	0.00	0.00	8.75	0.00	8.7	222.2	254.0	127.0
9/28/06	271	8.7	222.2	0.14	0.86	0.12	3.05	0.00	0.00	8.63	0.00	8.6	219.1	254.0	127.0
9/29/06	272	8.6	219.1	0.17	0.88	0.15	3.81	0.00	0.00	8.48	0.00	8.5	215.3	254.0	127.0
9/30/06	273	8.5	215.3	0.15	0.91	0.14	3.45	0.00	0.00	8.34	0.00	8.3	211.9	254.0	127.0
10/1/06	274	8.3	211.9	0.37	0.93	0.34	8.73	0.00	0.00	8.00	0.00	8.0	203.1	254.0	127.0
10/2/06	275	8.0	203.1	0.33	0.95	0.31	7.99	0.00	0.00	7.68	0.00	7.7	195.1	254.0	127.0
10/3/06	276	7.7	195.1	0.45	0.98	0.44	11.16	0.00	0.00	7.24	0.00	7.2	184.0	254.0	127.0
10/4/06	277	7.2	184.0	0.12	1.00	0.12	3.05	0.00	0.00	7.12	0.00	7.1	180.9	254.0	127.0
10/5/06	278	7.1	180.9	0.10	0.15	0.02	0.38	0.00	0.00	7.11	0.00	7.1	180.6	254.0	127.0
10/6/06	279	7.1	180.6	0.14	0.15	0.02	0.53	0.00	0.00	7.09	0.00	7.1	180.0	254.0	127.0
10/7/06	280	7.1	180.0	0.18	0.15	0.03	0.69	0.00	0.00	7.06	0.00	7.1	179.3	254.0	127.0
10/8/06	281	7.1	179.3	0.12	0.15	0.02	0.46	0.00	0.00	7.04	0.00	7.0	178.9	254.0	127.0
10/9/06	282	7.0	178.9	0.13	0.15	0.02	0.50	0.04	0.00	7.06	0.00	7.1	179.4	254.0	127.0
10/10/06	283	7.1	179.4	0.04	0.15	0.01	0.15	0.40	0.00	7.46	0.00	7.5	189.4	254.0	127.0
10/11/06	284	7.5	189.4	0.06	0.15	0.01	0.23	0.00	0.00	7.45	0.00	7.4	189.2	254.0	127.0
10/12/06	285	7.4	189.2	0.07	0.15	0.01	0.27	0.00	0.00	7.44	0.00	7.4	188.9	254.0	127.0
10/13/06	286	7.4	188.9	0.07	0.15	0.01	0.27	0.00	0.00	7.43	0.00	7.4	188.6	254.0	127.0
10/14/06	287	7.4	188.6	0.08	0.15	0.01	0.30	0.00	0.00	7.41	0.00	7.4	188.3	254.0	127.0
10/15/06	288	7.4	188.3	0.06	0.15	0.01	0.23	0.12	0.00	7.53	0.00	7.5	191.2	254.0	127.0
10/16/06	289	7.5	191.2	0.04	0.15	0.01	0.15	0.06	0.00	7.58	0.00	7.6	192.5	254.0	127.0
10/17/06	290	7.6	192.5	0.05	0.15	0.01	0.19	0.02	0.00	7.59	0.00	7.6	192.8	254.0	127.0
10/18/06	291	7.6	192.8	0.05	0.15	0.01	0.19	0.00	0.00	7.58	0.00	7.6	192.7	254.0	127.0
10/19/06	292	7.6	192.7	0.05	0.15	0.01	0.19	0.00	0.00	7.58	0.00	7.6	192.5	254.0	127.0
10/20/06	293	7.6	192.5	0.07	0.15	0.01	0.27	0.00	0.00	7.57	0.00	7.6	192.2	254.0	127.0
10/21/06	294	7.6	192.2	0.03	0.15	0.00	0.11	0.11	0.00	7.67	0.00	7.7	194.9	254.0	127.0
10/22/06	295	7.7	194.9	0.05	0.15	0.01	0.19	0.00	0.00	7.66	0.00	7.7	194.7	254.0	127.0
10/23/06	296	7.7	194.7	0.05	0.15	0.01	0.19	0.00	0.00	7.66	0.00	7.7	194.5	254.0	127.0
10/24/06	297	7.7	194.5	0.07	0.15	0.01	0.27	0.00	0.00	7.65	0.00	7.6	194.2	254.0	127.0
10/25/06	298	7.6	194.2	0.05	0.15	0.01	0.19	1.51	0.00	9.15	0.00	9.1	232.4	254.0	127.0
10/26/06	299	9.1	232.4	0.02	0.15	0.00	0.08	0.13	0.00	9.28	0.00	9.3	235.6	254.0	127.0
10/27/06	300	9.3	235.6	0.05	0.15	0.01	0.19	0.12	0.00	9.39	0.00	9.4	238.5	254.0	127.0
10/28/06	301	9.4	238.5	0.07	0.15	0.01	0.27	0.00	0.00	9.38	0.00	9.4	238.2	254.0	127.0
10/29/06	302	9.4	238.2	0.13	0.15	0.02	0.50	0.00	0.00	9.36	0.00	9.4	237.7	254.0	127.0
10/30/06	303	9.4	237.7	0.16	0.15	0.02	0.61	0.00	0.00	9.33	0.00	9.3	237.1	254.0	127.0
10/31/06	304	9.3	237.1	0.07	0.15	0.01	0.27	0.00	0.00	9.32	0.00	9.3	236.8	254.0	127.0

11/1/06	305	9.3	236.8	0.05	0.15	0.01	0.19	0.00	0.00	9.32	0.00	9.3	236.7	254.0	127.0
11/2/06	306	9.3	236.7	0.06	0.15	0.01	0.23	0.00	0.00	9.31	0.00	9.3	236.4	254.0	127.0
11/3/06	307	9.3	236.4	0.10	0.15	0.02	0.38	0.00	0.00	9.29	0.00	9.3	236.0	254.0	127.0
11/4/06	308	9.3	236.0	0.10	0.15	0.02	0.38	0.00	0.00	9.28	0.00	9.3	235.7	254.0	127.0
11/5/06	309	9.3	235.7	0.05	0.15	0.01	0.19	0.00	0.00	9.27	0.00	9.3	235.5	254.0	127.0
11/6/06	310	9.3	235.5	0.04	0.15	0.01	0.15	0.00	0.00	9.26	0.00	9.3	235.3	254.0	127.0
11/7/06	311	9.3	235.3	0.06	0.15	0.01	0.23	0.00	0.00	9.26	0.00	9.3	235.1	254.0	127.0
11/8/06	312	9.3	235.1	0.09	0.15	0.01	0.34	0.00	0.00	9.24	0.00	9.2	234.7	254.0	127.0
11/9/06	313	9.2	234.7	0.11	0.15	0.02	0.42	0.00	0.00	9.23	0.00	9.2	234.3	254.0	127.0
11/10/06	314	9.2	234.3	0.07	0.15	0.01	0.27	0.00	0.00	9.21	0.00	9.2	234.1	254.0	127.0
11/11/06	315	9.2	234.1	0.05	0.15	0.01	0.19	0.00	0.00	9.21	0.00	9.2	233.9	254.0	127.0
11/12/06	316	9.2	233.9	0.10	0.15	0.02	0.38	0.00	0.00	9.19	0.00	9.2	233.5	254.0	127.0
11/13/06	317	9.2	233.5	0.08	0.15	0.01	0.30	0.00	0.00	9.18	0.00	9.2	233.2	254.0	127.0
11/14/06	318	9.2	233.2	0.04	0.15	0.01	0.15	0.00	0.00	9.17	0.00	9.2	233.0	254.0	127.0
11/15/06	319	9.2	233.0	0.04	0.15	0.01	0.15	0.00	0.00	9.17	0.00	9.2	232.9	254.0	127.0
11/16/06	320	9.2	232.9	0.05	0.15	0.01	0.19	0.00	0.00	9.16	0.00	9.2	232.7	254.0	127.0
11/17/06	321	9.2	232.7	0.07	0.15	0.01	0.27	0.00	0.00	9.15	0.00	9.2	232.4	254.0	127.0
11/18/06	322	9.2	232.4	0.03	0.15	0.00	0.11	0.00	0.00	9.15	0.00	9.1	232.3	254.0	127.0
11/19/06	323	9.1	232.3	0.04	0.15	0.01	0.15	0.00	0.00	9.14	0.00	9.1	232.2	254.0	127.0
11/20/06	324	9.1	232.2	0.06	0.15	0.01	0.23	0.00	0.00	9.13	0.00	9.1	231.9	254.0	127.0
11/21/06	325	9.1	231.9	0.11	0.15	0.02	0.42	0.00	0.00	9.11	0.00	9.1	231.5	254.0	127.0
11/22/06	326	9.1	231.5	0.06	0.15	0.01	0.23	0.00	0.00	9.11	0.00	9.1	231.3	254.0	127.0
11/23/06	327	9.1	231.3	0.06	0.15	0.01	0.23	0.00	0.00	9.10	0.00	9.1	231.0	254.0	127.0
11/24/06	328	9.1	231.0	0.05	0.15	0.01	0.19	0.00	0.00	9.09	0.00	9.1	230.9	254.0	127.0
11/25/06	329	9.1	230.9	0.04	0.15	0.01	0.15	0.00	0.00	9.08	0.00	9.1	230.7	254.0	127.0
11/26/06	330	9.1	230.7	0.05	0.15	0.01	0.19	0.00	0.00	9.08	0.00	9.1	230.5	254.0	127.0
11/27/06	331	9.1	230.5	0.03	0.15	0.00	0.11	0.07	0.00	9.14	0.00	9.1	232.2	254.0	127.0
11/28/06	332	9.1	232.2	0.08	0.15	0.01	0.30	0.00	0.00	9.13	0.00	9.1	231.9	254.0	127.0
11/29/06	333	9.1	231.9	0.04	0.15	0.01	0.15	0.00	0.00	9.12	0.00	9.1	231.7	254.0	127.0
11/30/06	334	9.1	231.7	0.04	0.15	0.01	0.15	0.00	0.00	9.12	0.00	9.1	231.6	254.0	127.0
12/1/06	335	9.1	231.6	0.03	0.15	0.00	0.11	0.00	0.00	9.11	0.00	9.1	231.5	254.0	127.0
12/2/06	336	9.1	231.5	0.04	0.15	0.01	0.15	0.00	0.00	9.11	0.00	9.1	231.3	254.0	127.0
12/3/06	337	9.1	231.3	0.02	0.15	0.00	0.08	0.00	0.00	9.10	0.00	9.1	231.2	254.0	127.0
12/4/06	338	9.1	231.2	0.04	0.15	0.01	0.15	0.00	0.00	9.10	0.00	9.1	231.1	254.0	127.0
12/5/06	339	9.1	231.1	0.06	0.15	0.01	0.23	0.00	0.00	9.09	0.00	9.1	230.8	254.0	127.0
12/6/06	340	9.1	230.8	0.06	0.15	0.01	0.23	0.00	0.00	9.08	0.00	9.1	230.6	254.0	127.0
12/7/06	341	9.1	230.6	0.03	0.15	0.00	0.11	0.00	0.00	9.07	0.00	9.1	230.5	254.0	127.0
12/8/06	342	9.1	230.5	0.06	0.15	0.01	0.23	0.00	0.00	9.07	0.00	9.1	230.3	254.0	127.0
12/9/06	343	9.1	230.3	0.08	0.15	0.01	0.30	0.00	0.00	9.05	0.00	9.1	230.0	254.0	127.0
12/10/06	344	9.1	230.0	0.08	0.15	0.01	0.30	0.00	0.00	9.04	0.00	9.0	229.7	254.0	127.0
12/11/06	345	9.0	229.7	0.06	0.15	0.01	0.23	0.00	0.00	9.03	0.00	9.0	229.4	254.0	127.0
12/12/06	346	9.0	229.4	0.03	0.15	0.00	0.11	0.00	0.00	9.03	0.00	9.0	229.3	254.0	127.0
12/13/06	347	9.0	229.3	0.05	0.15	0.01	0.19	0.00	0.00	9.02	0.00	9.0	229.1	254.0	127.0
12/14/06	348	9.0	229.1	0.06	0.15	0.01	0.23	0.00	0.00	9.01	0.00	9.0	228.9	254.0	127.0
12/15/06	349	9.0	228.9	0.04	0.15	0.01	0.15	0.00	0.00	9.01	0.00	9.0	228.8	254.0	127.0
12/16/06	350	9.0	228.8	0.04	0.15	0.01	0.15	0.00	0.00	9.00	0.00	9.0	228.6	254.0	127.0
12/17/06	351	9.0	228.6	0.09	0.15	0.01	0.34	0.00	0.00	8.99	0.00	9.0	228.3	254.0	127.0
12/18/06	352	9.0	228.3	0.06	0.15	0.01	0.23	0.00	0.00	8.98	0.00	9.0	228.0	254.0	127.0
12/19/06	353	9.0	228.0	0.05	0.15	0.01	0.19	0.00	0.00	8.97	0.00	9.0	227.8	254.0	127.0
12/20/06	354	9.0	227.8	0.05	0.15	0.01	0.19	0.00	0.00	8.96	0.00	9.0	227.6	254.0	127.0
12/21/06	355	9.0	227.6	0.02	0.15	0.00	0.08	0.42	0.00	9.38	0.00	9.4	238.2	254.0	127.0

12/22/06	356	9.4	238.2	0.03	0.15	0.00	0.11	0.01	0.00	9.38	0.00	9.4	238.4	254.0	127.0
12/23/06	357	9.4	238.4	0.02	0.15	0.00	0.08	0.00	0.00	9.38	0.00	9.4	238.3	254.0	127.0
12/24/06	358	9.4	238.3	0.03	0.15	0.00	0.11	0.00	0.00	9.38	0.00	9.4	238.2	254.0	127.0
12/25/06	359	9.4	238.2	0.02	0.15	0.00	0.08	0.00	0.00	9.37	0.00	9.4	238.1	254.0	127.0
12/26/06	360	9.4	238.1	0.04	0.15	0.01	0.15	0.00	0.00	9.37	0.00	9.4	238.0	254.0	127.0
12/27/06	361	9.4	238.0	0.04	0.15	0.01	0.15	0.00	0.00	9.36	0.00	9.4	237.8	254.0	127.0
12/28/06	362	9.4	237.8	0.05	0.15	0.01	0.19	0.00	0.00	9.35	0.00	9.4	237.6	254.0	127.0
12/29/06	363	9.4	237.6	0.04	0.15	0.01	0.15	0.00	0.00	9.35	0.00	9.3	237.5	254.0	127.0
12/30/06	364	9.3	237.5	0.03	0.15	0.00	0.11	0.00	0.00	9.34	0.00	9.3	237.3	254.0	127.0
12/31/06	365	9.3	237.3	0.02	0.15	0.00	0.08	0.00	0.00	9.34	0.00	9.3	237.3	254.0	127.0
1/1/07	366	9.3	237.3	0.01	0.15	0.00	0.04	0.00	0.00	9.34	0.00	9.3	237.2	254.0	127.0

Yield and Nutrient Calculations

Table A.7: Alfalfa cutting 4/28/2004

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	7.71	116.70	24.53	18.51	0.05	0.38	1653.21	3.47	0.43	57.37	7.04
102	7.48	118.91	24.86	18.84	0.05	0.37	1608.64	4.22	0.46	67.88	7.45
103	9.07	110.39	21.90	15.88	0.06	0.51	2176.55	3.93	0.43	85.54	9.34
104	6.35	128.73	26.99	20.97	0.05	0.31	1326.53	3.59	0.42	47.62	5.57
201	9.98	179.44	45.74	39.72	0.03	0.34	1446.24	4.12	0.44	59.59	6.41
202	8.16	201.61	46.83	40.81	0.04	0.31	1333.27	3.89	0.45	51.86	6.01
203	9.07	125.95	33.55	27.53	0.03	0.30	1310.97	4.07	0.44	53.36	5.76
204	7.71	115.81	28.53	22.51	0.04	0.30	1287.31	3.65	0.43	46.99	5.54
301	7.03	145.23	31.74	25.72	0.04	0.31	1335.72	3.76	0.42	50.22	5.64
302	7.71	99.93	20.24	14.22	0.06	0.43	1860.58	3.42	0.44	63.63	8.09
303	8.16	160.91	25.50	19.48	0.07	0.57	2443.60	3.66	0.41	89.44	9.92
304	9.07	93.00	22.47	16.45	0.04	0.39	1674.69	3.10	0.42	51.92	7.08
401	6.12	61.24	12.85	6.83	0.07	0.43	1867.95	4.54	0.47	84.80	8.85
402	5.44	132.60	29.00	22.98	0.05	0.25	1056.54	3.65	0.40	38.56	4.24
403	5.44	228.96	46.48	40.46	0.05	0.25	1056.98	3.84	0.42	40.59	4.45
404	8.85	121.11	26.00	19.98	0.05	0.42	1812.85	3.79	0.43	68.71	7.70

Table A.8: Alfalfa cutting 6/8/2004

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	7.19	135.87	19.60	13.58	0.09	0.62	2650.29	3.38	0.37	89.58	9.81
102	7.12	99.75	17.36	11.34	0.07	0.52	2227.70	3.32	0.36	73.96	8.06
103	7.85	93.93	16.79	10.77	0.07	0.56	2419.95	3.27	0.35	79.13	8.45
104	6.17	69.85	14.88	8.86	0.06	0.38	1647.88	2.79	0.33	45.98	5.47
201	9.03	134.95	20.88	14.86	0.08	0.69	2983.71	3.59	0.36	107.12	10.80
202	8.98	102.72	17.50	11.48	0.07	0.67	2870.52	3.79	0.38	108.79	10.91
203	8.16	99.93	17.19	11.17	0.07	0.60	2603.94	3.16	0.33	82.28	8.65
204	8.91	164.22	24.88	18.86	0.07	0.66	2835.26	3.37	0.34	95.55	9.55
301	7.69	141.49	20.43	14.41	0.08	0.65	2781.73	3.08	0.38	85.68	10.43
302	7.71	63.18	13.17	7.15	0.07	0.54	2322.18	3.39	0.36	78.72	8.29
303	8.07	129.50	18.89	12.87	0.09	0.69	2988.96	3.35	0.37	100.13	11.03
304	8.10	131.26	18.29	12.27	0.09	0.75	3209.61	3.16	0.38	101.42	12.04
401	7.03	175.60	25.23	19.21	0.08	0.55	2369.53	3.00	0.39	71.09	9.15
402	7.03	123.47	18.56	12.54	0.08	0.59	2532.49	3.20	0.36	81.04	9.22
403	6.46	147.62	23.73	17.71	0.07	0.45	1946.41	2.62	0.33	51.00	6.50
404	6.92	123.89	18.38	12.36	0.09	0.59	2542.38	2.90	0.34	73.73	8.72

Table A.9: Alfalfa cutting 7/7/2004

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	6.67	84.48	14.30	8.28	0.08	0.57	2433.30	3.76	0.38	91.49	9.25
102	6.76	110.47	19.69	13.67	0.07	0.45	1932.43	3.22	0.40	62.22	7.65
103	6.62	107.84	18.65	12.63	0.07	0.47	2013.55	3.17	0.37	63.83	7.49
104	5.99	82.37	14.57	8.55	0.08	0.47	2044.25	3.61	0.38	73.80	7.77
201	8.07	173.19	31.74	25.72	0.05	0.44	1911.82	3.32	0.40	63.47	7.61
202	9.80	128.16	21.63	15.61	0.07	0.67	2878.85	3.50	0.41	100.76	11.75
203	7.26	115.11	20.93	14.91	0.06	0.46	1973.77	3.11	0.37	61.38	7.24
204	10.12	101.35	17.83	11.81	0.07	0.72	3079.93	3.73	0.36	114.88	11.21
301	8.35	113.41	20.97	14.95	0.06	0.52	2221.94	3.33	0.41	73.99	9.02
302	7.71	105.50	18.38	12.36	0.07	0.54	2340.15	3.36	0.41	78.63	9.64
303	7.98	137.18	22.83	16.81	0.07	0.54	2338.17	3.85	0.39	90.02	9.21
304	7.12	81.01	14.79	8.77	0.08	0.54	2315.18	3.73	0.39	86.36	9.01
401	7.94	81.80	19.08	13.06	0.05	0.38	1641.33	3.22	0.40	52.85	6.58
402	8.62	118.16	24.01	17.99	0.05	0.45	1941.95	2.88	0.39	55.93	7.65
403	7.48	115.16	24.07	18.05	0.05	0.38	1626.20	3.80	0.37	61.80	6.05
404	4.99	158.51	31.57	25.55	0.05	0.25	1067.32	2.85	0.36	30.42	3.89

Table A.10: Alfalfa cutting 8/13/2004

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	5.60	85.52	16.94	10.92	0.06	0.35	1515.54	2.94	0.29	44.56	4.36
102	5.65	94.85	17.36	11.34	0.07	0.39	1661.38	3.20	0.30	53.16	5.03
103	5.35	112.23	20.80	14.78	0.06	0.33	1426.06	3.17	0.27	45.21	3.85
104	5.26	94.75	17.89	11.87	0.06	0.34	1467.53	2.77	0.29	40.65	4.18
201	6.53	150.60	19.55	13.53	0.10	0.63	2725.05	2.95	0.30	80.39	8.07
202	7.28	129.34	19.93	13.91	0.08	0.57	2465.48	2.89	0.31	71.25	7.52
203	6.12	115.51	19.20	13.18	0.07	0.45	1927.30	2.70	0.30	52.04	5.70
204	7.33	99.77	18.89	12.87	0.06	0.46	1982.89	3.26	0.29	64.64	5.65
301	6.89	105.57	17.76	11.74	0.07	0.52	2220.32	2.99	0.33	66.39	7.35
302	6.58	101.98	17.85	11.83	0.07	0.47	2014.71	3.00	0.31	60.44	6.29
303	6.49	107.18	18.89	12.87	0.07	0.45	1916.61	3.25	0.29	62.29	5.56
304	5.83	91.98	18.29	12.27	0.06	0.35	1507.07	3.24	0.29	48.83	4.42
401	6.46	82.57	16.23	10.21	0.06	0.42	1808.12	2.84	0.34	51.35	6.06
402	7.03	112.67	16.90	10.88	0.09	0.62	2665.94	2.83	0.32	75.45	8.56
403	6.01	118.22	19.20	13.18	0.08	0.45	1944.00	2.93	0.27	56.96	5.29
404	4.31	120.52	18.05	12.03	0.09	0.37	1580.26	2.94	0.30	46.46	4.66

Table A.11: Alfalfa cutting 9/10/2004

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (%)	TP (%)	TN (kg/ha)	TP (kg/ha)
101	4.54	86.56	15.57	9.55	0.07	0.34	1451.74	3.56	0.38	51.71	5.47
102	4.54	79.22	15.03	9.01	0.07	0.32	1391.36	3.91	0.37	54.43	5.12
103	4.08	116.61	22.94	16.92	0.06	0.23	973.06	3.77	0.37	36.70	3.61
104	4.54	107.12	21.20	15.18	0.06	0.26	1105.40	3.74	0.37	41.29	4.11
201	4.99	128.01	23.35	17.33	0.06	0.30	1297.39	4.23	0.40	54.94	5.14
202	4.76	130.52	26.23	20.21	0.05	0.25	1058.18	4.09	0.42	43.23	4.46
203	4.99	115.90	23.46	17.44	0.05	0.26	1138.68	3.30	0.38	37.56	4.27
204	4.54	98.18	19.94	13.92	0.06	0.25	1097.70	3.82	0.40	41.99	4.35
301	5.44	97.73	22.55	16.53	0.05	0.25	1065.88	3.49	0.39	37.18	4.11
302	5.44	98.45	21.31	15.29	0.05	0.27	1182.36	3.54	0.36	41.91	4.20
303	4.99	77.17	14.94	8.92	0.07	0.35	1498.73	3.75	0.38	56.24	5.72
304	4.54	102.94	21.79	15.77	0.05	0.23	1004.97	4.12	0.38	41.42	3.79
401	4.99	83.33	19.38	13.36	0.05	0.24	1028.31	2.56	0.26	26.27	2.67
402	5.44	107.18	23.78	17.76	0.05	0.26	1100.53	3.55	0.37	39.04	4.12
403	4.54	121.27	27.93	21.91	0.04	0.19	832.00	3.92	0.37	32.59	3.08
404	3.63	82.52	20.53	14.51	0.04	0.16	667.48	3.86	0.36	25.78	2.38

Table A.12: Alfalfa cutting 5/9/2005

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	3.63	246.18	94.42	88.40	0.02	0.06	268.22	2.93	0.43	7.86	1.14
102	4.99	285.32	82.75	76.73	0.03	0.13	567.15	2.98	0.46	16.90	2.63
103	5.67	232.48	81.27	75.25	0.02	0.11	490.55	3.06	0.43	15.01	2.10
104	4.31	289.81	104.15	98.13	0.02	0.08	351.02	2.52	0.42	8.85	1.47
201	7.71	190.22	51.39	45.37	0.03	0.24	1015.92	2.86	0.44	29.06	4.50
202	5.22	226.85	86.32	80.30	0.02	0.09	393.05	2.49	0.45	9.79	1.77
203	5.67	281.37	90.30	84.28	0.02	0.13	553.44	2.48	0.44	13.73	2.43
204	5.44	207.57	85.61	79.59	0.02	0.08	359.12	2.43	0.43	8.73	1.54
301	6.12	203.78	71.15	65.13	0.02	0.12	536.90	3.11	0.42	16.70	2.27
302	5.90	243.20	85.19	79.17	0.02	0.12	506.71	2.65	0.44	13.43	2.20
303	5.44	211.85	78.73	72.71	0.02	0.10	429.07	2.82	0.41	12.10	1.74
304	4.08	158.75	58.53	52.51	0.02	0.08	335.47	2.14	0.42	7.18	1.42
401	6.58	148.04	47.86	41.84	0.02	0.16	678.04	2.78	0.47	18.85	3.21
402	5.67	123.61	39.60	33.58	0.03	0.14	610.74	2.51	0.40	15.33	2.45
403	4.08	132.68	45.66	39.64	0.02	0.09	385.85	2.50	0.42	9.65	1.62
404	4.99	166.88	57.75	51.73	0.02	0.11	453.20	2.12	0.43	9.61	1.93

Table A.13: Alfalfa cutting 6/14/2005

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	5.22	146.37	50.68	44.66	0.02	0.11	481.22	2.74	0.35	13.19	1.69
102	5.44	117.31	48.48	42.46	0.02	0.09	379.90	3.30	0.37	12.54	1.40
103	4.54	147.45	60.37	54.35	0.02	0.07	312.91	2.44	0.34	7.63	1.06
104	4.54	120.68	44.36	38.34	0.02	0.09	388.76	3.31	0.37	12.87	1.43
201	4.08	140.17	49.00	42.98	0.02	0.09	372.84	2.76	0.36	10.29	1.35
202	5.90	179.09	57.75	51.73	0.02	0.14	595.53	2.90	0.34	17.27	2.04
203	5.90	136.36	45.70	39.68	0.02	0.13	580.07	2.75	0.36	15.95	2.08
204	5.44	115.62	41.90	35.88	0.02	0.11	481.52	3.73	0.34	17.96	1.63
301	4.99	116.16	40.81	34.79	0.02	0.11	465.28	3.19	0.94	14.84	4.37
302	5.44	77.09	29.85	23.83	0.02	0.11	464.58	3.06	0.39	14.22	1.79
303	6.12	100.54	36.70	30.68	0.02	0.13	548.61	2.80	0.36	15.36	1.95
304	6.35	141.77	46.32	40.30	0.02	0.15	647.58	2.56	0.35	16.58	2.27
401	6.12	120.50	39.79	33.77	0.02	0.15	630.12	2.89	0.38	18.21	2.38
402	5.44	109.39	36.20	30.18	0.02	0.13	568.34	3.00	0.36	17.05	2.05
403	6.35	169.70	56.98	50.96	0.02	0.14	604.78	2.61	0.35	15.78	2.10
404	4.99	152.74	61.07	55.05	0.02	0.08	357.73	2.78	0.36	9.94	1.28

Table A.14: Alfalfa cutting 7/14/2005

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	5.90	165.72	49.95	43.93	0.03	0.16	669.07	2.26	0.29	15.12	1.93
102	5.44	209.10	61.38	55.36	0.03	0.15	625.35	2.30	0.30	14.38	1.85
103	5.90	176.51	53.68	47.66	0.03	0.15	654.32	2.35	0.27	15.38	1.79
104	4.54	170.46	52.47	46.45	0.03	0.12	496.08	2.55	0.30	12.65	1.50
201	7.26	152.30	41.35	35.33	0.03	0.23	981.29	2.24	0.30	21.98	2.97
202	6.35	194.90	52.11	46.09	0.03	0.20	847.06	2.64	0.33	22.36	2.82
203	8.16	210.75	60.45	54.43	0.03	0.23	970.71	2.86	0.30	27.76	2.94
204	6.35	221.45	55.97	49.95	0.03	0.21	905.80	2.53	0.33	22.92	3.02
301	6.35	163.09	42.85	36.83	0.03	0.21	892.63	2.86	0.34	25.53	3.06
302	8.16	178.27	46.87	40.85	0.03	0.26	1130.76	2.56	0.30	28.95	3.39
303	8.16	215.12	52.38	46.36	0.04	0.29	1234.01	3.22	0.32	39.74	3.99
304	8.16	224.49	62.76	56.74	0.03	0.23	1002.00	2.79	0.31	27.96	3.10
401	8.16	200.14	54.90	48.88	0.03	0.24	1044.54	3.05	0.34	31.86	3.52
402	9.07	247.07	72.57	66.55	0.03	0.24	1024.17	2.77	0.29	28.37	2.98
403	9.07	235.55	50.44	44.42	0.04	0.38	1627.71	2.74	0.35	44.60	5.73
404	7.26	271.28	66.95	60.93	0.03	0.24	1047.89	2.50	0.32	26.20	3.36

Table A.15: Alfalfa cutting 8/31/2005

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	6.80	171.55	49.27	43.25	0.03	0.19	828.24	2.44	0.32	20.21	2.68
102	4.99	161.67	52.39	46.37	0.02	0.12	506.28	2.67	0.33	13.52	1.68
103	5.90	187.78	61.69	55.67	0.02	0.13	575.04	2.54	0.30	14.61	1.72
104	6.35	182.44	57.28	51.26	0.02	0.16	667.59	2.29	0.30	15.29	2.02
201	7.26	158.83	51.00	44.98	0.02	0.17	749.09	2.48	0.30	18.58	2.22
202	6.35	177.84	59.60	53.58	0.02	0.14	603.37	2.55	0.31	15.39	1.86
203	4.54	175.96	55.84	49.82	0.02	0.11	470.88	2.58	0.32	12.15	1.53
204	4.99	161.88	51.74	45.72	0.02	0.12	517.52	2.30	0.30	11.90	1.54
301	4.99	203.18	60.94	54.92	0.03	0.13	556.39	2.56	0.31	14.24	1.71
302	5.90	232.81	74.94	68.92	0.02	0.14	581.56	2.37	0.34	13.78	1.99
303	5.90	239.13	81.85	75.83	0.02	0.12	526.59	2.40	0.32	12.64	1.69
304	4.54	181.37	74.76	68.74	0.02	0.07	302.89	2.06	0.32	6.24	0.97
401	4.54	154.77	53.80	47.78	0.02	0.10	412.71	2.81	0.35	11.60	1.46
402	6.35	163.37	61.61	55.59	0.02	0.12	500.50	2.45	0.32	12.26	1.61
403	5.44	162.55	53.67	47.65	0.02	0.12	535.50	2.65	0.35	14.19	1.85
404	6.80	186.03	55.40	49.38	0.03	0.18	774.96	2.26	0.31	17.51	2.39

Table A.16: Alfalfa cutting 10/7/2005

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	6.58	171.55	49.27	43.25	0.03	0.19	800.63	3.34	0.41	26.74	3.27
102	7.26	161.67	52.39	46.37	0.02	0.17	736.41	3.22	0.38	23.71	2.80
103	7.03	187.78	61.69	55.67	0.02	0.16	685.63	2.77	0.38	18.99	2.57
104	7.48	182.44	57.28	51.26	0.02	0.18	786.80	3.49	0.43	27.46	3.35
201	7.48	158.83	51.00	44.98	0.02	0.18	772.50	3.60	0.43	27.81	3.31
202	7.48	177.84	59.60	53.58	0.02	0.17	711.12	3.29	0.43	23.40	3.04
203	6.80	175.96	55.84	49.82	0.02	0.16	706.32	3.22	0.45	22.74	3.18
204	7.94	161.88	51.74	45.72	0.02	0.19	823.33	3.23	0.43	26.59	3.51
301	7.94	203.18	60.94	54.92	0.03	0.21	885.17	3.74	0.46	33.11	4.11
302	7.71	232.81	74.94	68.92	0.02	0.18	760.50	4.02	0.43	30.57	3.29
303	7.94	239.13	81.85	75.83	0.02	0.16	708.87	3.58	0.42	25.38	3.00
304	6.35	181.37	74.76	68.74	0.02	0.10	424.05	3.56	0.47	15.10	1.98
401	7.26	154.77	53.80	47.78	0.02	0.15	660.33	3.81	0.45	25.16	3.00
402	7.26	163.37	61.61	55.59	0.02	0.13	572.00	3.53	0.45	20.19	2.57
403	6.58	162.55	53.67	47.65	0.02	0.15	647.07	3.47	0.43	22.45	2.78
404	6.12	186.03	55.40	49.38	0.03	0.16	697.46	3.39	0.16	23.64	1.14

Table A.17: Alfalfa cutting 5/16/2006

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	7.26	154.64	41.38	0.03	0.44	763.05	855.27	3.19	0.37	27.28	3.12
102	8.62	138.95	30.73	0.04	0.67	1165.86	1306.75	3.39	0.38	44.30	5.02
103	7.71	161.23	41.30	0.03	0.49	860.15	964.10	2.73	0.35	26.32	3.40
104	6.80	142.90	37.54	0.03	0.42	733.53	822.18	3.30	0.35	27.13	2.89
201	7.26	141.01	33.50	0.03	0.51	894.69	1002.81	3.10	0.37	31.09	3.66
202	9.07	133.60	38.61	0.02	0.49	857.35	960.96	2.84	0.36	27.29	3.41
203	8.16	142.18	39.38	0.03	0.47	818.72	917.67	3.28	0.37	30.10	3.40
204	7.26	158.38	44.15	0.03	0.41	721.30	808.47	3.01	0.39	24.33	3.11
301	7.26	114.98	33.49	0.02	0.39	678.35	760.33	3.53	0.39	26.84	2.99
302	6.35	162.12	40.55	0.03	0.42	731.33	819.71	3.04	0.40	24.92	3.28
303	8.16	195.58	60.83	0.02	0.40	694.75	778.72	2.79	0.38	21.73	2.97
304	8.62	130.80	47.63	0.02	0.33	578.08	647.94	2.27	0.33	14.71	2.13
401	6.80	136.19	43.91	0.02	0.32	549.27	615.65	3.40	0.37	20.93	2.30
402	5.44	120.83	38.28	0.02	0.26	450.89	505.38	2.79	0.35	14.10	1.79
403	7.26	110.11	39.13	0.02	0.29	505.70	566.81	3.27	0.37	18.53	2.09
404	8.16	116.69	33.43	0.02	0.45	781.12	875.52	3.09	0.37	27.05	3.21

Table A.18: Alfalfa cutting 6/14/2006

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	4.54	138.37	50.87	0.02	0.17	299.71	335.92	2.70	0.32	9.07	1.08
102	4.54	136.52	51.81	0.02	0.16	284.88	319.31	2.83	0.34	9.04	1.09
103	4.54	119.58	48.33	0.01	0.15	256.87	287.91	2.48	0.29	7.14	0.85
104	3.18	127.66	53.44	0.01	0.10	169.39	189.87	2.27	0.32	4.31	0.60
201	4.08	95.10	35.88	0.02	0.15	258.83	290.10	2.47	0.33	7.17	0.94
202	4.08	148.09	53.32	0.02	0.16	278.72	312.41	2.62	0.33	8.19	1.04
203	4.54	172.39	58.14	0.02	0.20	342.40	383.77	2.82	0.32	10.82	1.23
204	3.63	96.20	44.92	0.01	0.09	159.13	178.36	2.53	0.31	4.51	0.56
301	3.63	84.19	40.86	0.01	0.08	147.82	165.68	2.84	0.30	4.71	0.50
302	4.99	102.43	35.37	0.02	0.21	363.39	407.30	2.82	0.32	11.49	1.29
303	4.54	122.80	45.83	0.02	0.17	292.63	327.99	2.66	0.32	8.72	1.04
304	3.63	117.95	51.66	0.01	0.10	178.87	200.48	2.52	0.31	5.05	0.62
401	3.63	170.71	74.10	0.01	0.10	181.74	203.70	2.87	0.33	5.85	0.66
402	4.54	157.84	56.47	0.02	0.18	312.78	350.58	2.93	0.33	10.27	1.14
403	4.08	150.13	56.62	0.02	0.15	258.99	290.29	2.77	0.33	8.04	0.97
404	4.54	114.64	49.98	0.01	0.13	225.42	252.66	2.70	0.33	6.82	0.83

Table A.19: Alfalfa cutting 7/20/2006

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	6.35	125.33	23.28	0.04	0.61	1069.31	1198.53	2.72	0.40	32.60	4.81
102	5.44	125.26	27.95	0.03	0.42	727.92	815.88	2.63	0.37	21.46	3.04
103	5.90	104.81	20.43	0.04	0.54	935.43	1048.47	2.91	0.37	30.51	3.83
104	4.99	100.12	24.93	0.03	0.33	577.98	647.82	2.90	0.36	18.79	2.35
201	6.35	89.71	28.59	0.02	0.30	521.62	584.65	2.71	0.36	15.84	2.13
202	6.35	87.93	28.21	0.02	0.30	516.32	578.71	2.85	0.39	16.49	2.26
203	5.44	81.57	25.33	0.02	0.27	464.11	520.19	2.60	0.33	13.53	1.73
204	5.44	92.08	25.83	0.03	0.31	536.32	601.14	2.50	0.36	15.03	2.18
301	4.99	96.35	23.43	0.03	0.34	596.38	668.45	2.66	0.35	17.78	2.31
302	4.54	74.06	25.81	0.02	0.19	325.79	365.16	2.66	0.38	9.71	1.37
303	5.90	87.81	22.97	0.03	0.37	639.29	716.55	2.37	0.34	16.98	2.45
304	5.44	64.58	29.21	0.01	0.15	253.18	283.77	2.64	0.36	7.49	1.02
401	4.54	91.22	25.88	0.03	0.25	439.82	492.98	2.42	0.32	11.93	1.60
402	4.99	98.80	24.90	0.03	0.33	568.84	637.59	2.57	0.34	16.39	2.15
403	5.44	80.49	22.27	0.03	0.31	546.48	612.52	2.30	0.31	14.09	1.91
404	4.54	66.71	25.16	0.02	0.17	287.70	322.47	2.89	0.40	9.32	1.30

Table A.20: Alfalfa cutting 8/22/2006

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	6.80	98.06	24.62	0.03	0.45	779.62	873.84	2.96	0.34	25.87	2.96
102	8.16	87.94	20.17	0.03	0.60	1053.78	1181.13	2.58	0.33	30.47	3.93
103	7.26	141.85	29.45	0.04	0.61	1064.02	1192.60	2.68	0.30	31.96	3.53
104	7.26	123.81	25.37	0.04	0.62	1081.73	1212.46	2.83	0.34	34.31	4.09
201	8.16	95.45	21.50	0.03	0.62	1078.75	1209.11	2.62	0.32	31.68	3.92
202	8.16	120.61	30.10	0.03	0.54	943.08	1057.06	2.83	0.36	29.91	3.75
203	7.71	129.94	34.46	0.03	0.47	820.72	919.90	2.73	0.35	25.11	3.23
204	7.26	113.55	24.91	0.04	0.57	992.03	1111.91	2.69	0.35	29.91	3.85
301	7.26	131.75	30.35	0.03	0.53	931.42	1043.99	2.68	0.37	27.98	3.84
302	8.16	76.54	21.51	0.03	0.46	802.38	899.35	2.50	0.34	22.48	3.05
303	9.07	160.24	34.97	0.04	0.72	1248.33	1399.19	2.69	0.36	37.64	4.98
304	9.07	118.98	26.63	0.03	0.69	1208.49	1354.54	2.46	0.34	33.32	4.58
401	7.26	144.50	32.17	0.03	0.56	973.45	1091.09	3.17	0.37	34.59	4.04
402	7.26	174.01	44.73	0.03	0.46	805.75	903.12	3.22	0.38	29.08	3.42
403	6.35	130.77	27.55	0.04	0.52	913.94	1024.39	3.04	0.39	31.14	3.97
404	7.71	133.82	28.66	0.04	0.62	1086.85	1218.20	2.63	0.34	32.04	4.18

Table A.21: Alfalfa cutting 10//4/2006

Plot ID	Plot (kg)	Wet (g)	Dry+Bag (g)	Dry (g)	MC	Dry Plot (kg)	Field (kg/ha)	TN (ppm)	TP (ppm)	TN (kg/ha)	TP (kg/ha)
101	7.26	130.05	26.13	0.04	0.64	1108.73	1242.72	3.13	0.43	38.90	5.29
102	5.44	195.59	38.68	0.04	0.49	848.19	950.69	3.66	0.37	34.80	3.52
103	5.44	144.50	29.51	0.04	0.47	814.74	913.20	3.20	0.37	29.22	3.37
104	3.63	144.89	29.23	0.04	0.32	551.56	618.21	3.29	0.36	20.34	2.19
201	5.90	139.57	28.22	0.04	0.51	893.77	1001.78	2.41	0.39	24.14	3.95
202	4.99	145.48	30.65	0.04	0.41	718.07	804.85	3.24	0.42	26.08	3.36
203	5.90	173.76	35.10	0.04	0.51	894.82	1002.96	3.25	0.35	32.60	3.49
204	4.54	131.98	27.07	0.04	0.39	675.27	756.87	3.25	0.37	24.60	2.83
301	5.44	119.08	23.93	0.04	0.48	831.37	931.84	3.30	0.41	30.75	3.84
302	4.54	122.12	24.93	0.04	0.39	679.28	761.37	3.05	0.35	23.22	2.66
303	4.99	134.06	28.78	0.04	0.40	701.13	785.86	2.81	0.36	22.08	2.83
304	5.44	145.56	28.89	0.04	0.48	844.39	946.43	3.27	0.36	30.95	3.38
401	5.44	123.96	25.57	0.04	0.46	804.54	901.77	3.78	0.39	34.09	3.54
402	5.44	103.50	21.09	0.04	0.47	817.02	915.76	3.22	0.37	29.49	3.35
403	5.44	180.72	38.02	0.04	0.45	784.77	879.61	3.58	0.37	31.49	3.24
404	5.44	87.70	18.70	0.04	0.44	771.50	864.74	3.01	0.35	26.03	3.04

Soil Nutrient Values

Table A.22: Soil nutrients by depth

Plot ID	Depth	Total N ppm	Total P ppm
101	0"-6"	2514.36	3055.34
101	6"-1'	2012.28	2952.64
101	1'-2'	1050.45	540.57
101	2'-3'	651.08	218.94
102	0"-6"	3063.42	3215.58
102	6"-1'	2826.40	3264.48
102	1'-2'	1322.54	1066.02
102	2'-3'	778.90	278.53
103	0"-6"	2406.91	2286.91
103	6"-1'	1375.83	1809.92
103	1'-2'	1305.84	412.66
103	2'-3'	576.64	135.42
104	0"-6"	2064.56	2287.18
104	6"-1'	827.33	662.29
104	1'-2'	1390.50	602.85
104	2'-3'	1276.46	308.68
201	0"-6"	2994.93	3751.45
201	6"-1'	2989.56	3964.32
201	1'-2'	1414.18	270.45
201	2'-3'	1742.14	2500.23
202	0"-6"	1259.70	1112.11
202	6"-1'	2916.83	3326.76
202	1'-2'	2066.36	2839.63
202	2'-3'	1041.95	290.07
203	0"-6"	2702.18	2550.90
203	6"-1'	1525.36	1723.11
203	1'-2'	1370.98	480.66
203	2'-3'	1726.17	662.79
204	0"-6"	2580.84	1661.59
204	6"-1'	1948.15	1827.20
204	1'-2'	1213.28	797.86
204	2'-3'	1329.37	527.61
301	0"-6"	3409.94	4411.85

301	6"-1'	2106.87	2600.22
301	1'-2'	1283.98	722.58
301	2'-3'	791.42	304.06
302	0"-6"	3297.73	3620.36
302	6"-1'	1989.24	2942.79
302	1'-2'	1149.23	600.20
302	2'-3'	869.45	283.59
303	0"-6"	2424.36	1967.66
303	6"-1'	1540.55	782.11
303	1'-2'	2400.80	1439.51
303	2'-3'	1595.26	826.78
304	0"-6"	2882.70	1775.60
304	6"-1'	2087.09	1893.37
304	1'-2'	1333.92	1271.07
304	2'-3'	1222.54	629.13
401	0"-6"	2891.55	4061.06
401	6"-1'	1630.12	2233.01
401	1'-2'	1132.49	852.65
401	2'-3'	1138.73	368.41
402	0"-6"	3282.06	3548.73
402	6"-1'	2303.57	3109.93
402	1'-2'	1339.21	1508.27
402	2'-3'	1226.79	415.60
403	0"-6"	2777.89	2115.14
403	6"-1'	1801.27	1440.05
403	1'-2'	1009.67	734.04
403	2'-3'	708.63	218.74
404	0"-6"	2472.55	1685.13
404	6"-1'	1600.66	1484.68
404	1'-2'	1295.93	648.67
404	2'-3'	1268.27	418.59
BULK	0"-6"	1593.70	1820.84
BULK	6"-1'	1775.68	1970.76
BULK	1'-2'	1250.70	1260.54
BULK	2'-3'	681.22	258.82

SAS for Alfalfa Study

SAS Code for 2004

```
Data Year04;
Input trt rep yield TN TP @@;
Datalines;
3	1	9704	334.7017202	35.93211549
4	1	8821	311.6663035	33.31836654
1	1	9010	310.4103572	32.73854921
2	1	7592	249.3373192	27.09872669
3	2	10364	365.5008413	38.02205207
4	2	10606	375.9026662	40.65042039
2	2	8955	286.6263646	31.62055608
1	2	10283	364.0441529	36.30015644
4	3	9626	313.4612006	36.5534606
2	3	9720	323.3371464	36.50954542
1	3	11187	398.1140581	41.44525393
3	3	9712	329.943147	36.33213266
4	4	8715	286.3661934	33.30822439
1	4	9298	290.0155124	33.77952482
3	4	7405	242.9262025	25.36444145
2	4	7669	245.0934285	27.3484471
;
Proc glm data=Year04;
  Title1 ‘Alfalfa Nutrient Uptake Study ’;
  Title2 ‘Bailey Sullivan ’;
  Title3 ‘2004 Alfalfa ’;
  Title4 ‘Annual Yield (kg/ha)’;
  Class trt rep;
  Model yield =trt rep;
  Means trt/lsd;
  Run;
Proc glm data=Year04;
  Title1 ‘Alfalfa Nutrient Uptake Study ’;
  Title2 ‘Bailey Sullivan ’;
  Title3 ‘2004 Alfalfa ’;
  Title4 ‘Annual Nitrogen Uptake (kg/ha)’;
  Class trt rep;
  Model TN =trt rep;
  Means trt/lsd;
  Run;
Proc glm data=Year04;
  Title1 ‘Alfalfa Nutrient Uptake Study ’;
  Title2 ‘Bailey Sullivan ’;
  Title3 ‘2004 Alfalfa ’;
  Title4 ‘Annual Phosphorus Uptake (kg/ha)’;
  Class trt rep;
```

Model TP =trt rep;
Means trt/lsd;
Run;

SAS Output for 2004

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2004 Alfalfa

Obs	trt	rep	yield	TN	TP
1	3	1	9704	334.702	35.9321
2	4	1	8821	311.666	33.3184
3	1	1	9010	310.410	32.7385
4	2	1	7592	249.337	27.0987
5	3	2	10364	365.501	38.0221
6	4	2	10606	375.903	40.6504
7	2	2	8955	286.626	31.6206
8	1	2	10283	364.044	36.3002
9	4	3	9626	313.461	36.5535
10	2	3	9720	323.337	36.5095
11	1	3	11187	398.114	41.4453
12	3	3	9712	329.943	36.3321
13	4	4	8715	286.366	33.3082
14	1	4	9298	290.016	33.7795
15	3	4	7405	242.926	25.3644
16	2	4	7669	245.093	27.3484

Annual Yield (kg/ha)
11:35 Friday, June 1, 2007 5
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Annual Yield (kg/ha)
11:35 Friday, June 1, 2007 6
The GLM Procedure
Dependent Variable: yield

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	14286992.88	2381165.48	5.89	0.0095
Error	9	3635572.56	403952.51		
Corrected Total	15	17922565.44			

R-Square	Coeff Var	Root MSE	yield Mean
0.797151	6.840228	635.5726	9291.688

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	4404551.688	1468183.896	3.63	0.0576
rep	3	9882441.188	3294147.063	8.15	0.0062

Annual Yield (kg/ha)
11:35 Friday, June 1, 2007 7
The GLM Procedure
t Tests (LSD) for yield

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	403952.5
Critical Value of t	2.26216
Least Significant Difference	1016.7

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	9944.5	4	1
A			
B A	9442.0	4	4
B A			
B A	9296.3	4	3
B			
B	8484.0	4	2

Annual Nitrogen Uptake (kg/ha)
11:35 Friday, June 1, 2007 8
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Annual Nitrogen Uptake (kg/ha)
11:35 Friday, June 1, 2007 9
The GLM Procedure
Dependent Variable: TN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	26294.96797	4382.49466	5.95	0.0092
Error	9	6625.76917	736.19657		
Corrected Total	15	32920.73714			

R-Square	Coeff Var	Root MSE	TN Mean
0.798736	8.635141	27.13294	314.2154

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	8904.66976	2968.22325	4.03	0.0451
rep	3	17390.29821	5796.76607	7.87	0.0069

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	8904.66976	2968.22325	4.03	0.0451
rep	3	17390.29821	5796.76607	7.87	0.0069

Annual Nitrogen Uptake (kg/ha)
11:35 Friday, June 1, 2007 10
The GLM Procedure
t Tests (LSD) for TN

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	736.1966
Critical Value of t	2.26216
Least Significant Difference	43.401

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	340.65	4	1
A			
A	321.85	4	4
A			
B A	318.27	4	3
B			
B	276.10	4	2

Annual Phosphorus Uptake (kg/ha)
11:35 Friday, June 1, 2007
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Annual Phosphorus Uptake (kg/ha)
11:35 Friday, June 1, 2007
The GLM Procedure
Dependent Variable: TP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	237.4621133	39.5770189	4.45	0.0229
Error	9	80.0067256	8.8896362		
Corrected Total	15	317.4688389			

R-Square	Coeff Var	Root MSE	TP Mean
0.747986	8.731992	2.981549	34.14512

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	77.1362737	25.7120912	2.89	0.0945
rep	3	160.3258396	53.4419465	6.01	0.0156

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	77.1362737	25.7120912	2.89	0.0945
rep	3	160.3258396	53.4419465	6.01	0.0156

Annual Phosphorus Uptake (kg/ha)
11:35 Friday, June 1, 2007
The GLM Procedure
t Tests (LSD) for TP

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	8.889636
Critical Value of t	2.26216
Least Significant Difference	4.7692

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	36.066	4	1
A			
A	35.958	4	4
A			
B A	33.913	4	3
B			
B	30.644	4	2

SAS Code for 2005

```
Data Year05;
Input trt rep yield TN TP @@;
Datalines;
3 1 3075 83.11545872 10.70842576
4 1 2734 81.05101116 10.35292864
1 1 2820 71.61999226 9.238825737
2 1 2802 77.11122092 9.782660099
3 2 4086 107.7143269 14.35488422
4 2 3448 88.20138187 11.53799326
2 2 3418 92.33170001 12.15739341
1 2 3259 88.10033409 11.23727584
4 3 3342 104.4180354 15.51728581
2 3 3780 100.9467229 12.66989048
1 3 3669 105.2117553 12.364323
```

```
3       3       3234    73.04856638   9.727056436
4       4       3674    105.674047    13.57473655
1       4       3580    93.20327011   11.66101467
3       4       3988    106.6743759   14.08848759
2       4       3282    86.90821816   10.09843155
;
Proc glm data=Year05;
  Title1 ‘ Alfalfa Nutrient Uptake Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘ 2005 Alfalfa ’;
  Title4 ‘Annual Yield (kg/ha)’;
  Class trt rep;
  Model yield =trt rep;
  Means trt/lsd;
  Run;
Proc glm data=Year05;
  Title ‘Annual Nitrogen Uptake (kg/ha)’;
  Class trt rep;
  Model TN =trt rep;
  Means trt/lsd;
  Run;
Proc glm data=Year05;
  Title ‘Annual Phosphorus Uptake (kg/ha)’;
  Class trt rep;
  Model Tp =trt rep;
  Means trt/lsd;
  Run;
```

SAS Output for 2005

```
                    Alfalfa Nutrient Uptake Study
                          Bailey Sullivan\
                     11:35 Friday, June 1, 2007
                           2005 Alfalfa
                       Annual Yield (kg/ha)
                         The GLM Procedure
                      Class Level Information

      Class         Levels    Values
      trt                4    1 2 3 4
      rep                4    1 2 3 4

   Number of Observations Read          16
   Number of Observations Used          16


                    Alfalfa Nutrient Uptake Study
                          Bailey Sullivan
                     11:35 Friday, June 1, 2007
                           2005 Alfalfa
                       Annual Yield (kg/ha)
```

The GLM Procedure
Dependent Variable: yield

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	1760060.875	293343.479	3.84	0.0352
Error	9	688324.063	76480.451		
Corrected Total	15	2448384.938			

R-Square	Coeff Var	Root MSE	yield Mean
0.718866	8.165223	276.5510	3386.938

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	234720.188	78240.063	1.02	0.4272
rep	3	1525340.688	508446.896	6.65	0.0116

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	234720.188	78240.063	1.02	0.4272
rep	3	1525340.687	508446.896	6.65	0.0116

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2005 Alfalfa
Annual Yield (kg/ha)
The GLM Procedure
t Tests (LSD) for yield

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	76480.45
Critical Value of t	2.26216
Least Significant Difference	442.37

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	3595.8	4	3
A			
A	3332.0	4	1
A			
A	3320.5	4	2
A			
A	3299.5	4	4

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2005 Alfalfa
Annual Nitrogen Uptake (kg/ha)
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2005 Alfalfa
Annual Nitrogen Uptake (kg/ha)
The GLM Procedure
Dependent Variable: TN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	1068.299860	178.049977	1.29	0.3496
Error	9	1239.092548	137.676950		
Corrected Total	15	2307.392407			

R-Square	Coeff Var	Root MSE	TN Mean
0.462990	12.81194	11.73358	91.58315

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	83.9849378	27.9949793	0.20	0.8915
rep	3	984.3149220	328.1049740	2.38	0.1370

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	83.9849378	27.9949793	0.20	0.8915
rep	3	984.3149220	328.1049740	2.38	0.1370

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2005 Alfalfa
Annual Nitrogen Uptake (kg/ha)
The GLM Procedure
t Tests (LSD) for TN

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	137.6769
Critical Value of t	2.26216
Least Significant Difference	18.769

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	94.836	4	4
A			
A	92.638	4	3
A			
A	89.534	4	1
A			
A	89.324	4	2

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2005 Alfalfa
Annual Phosphorus Uptake (kg/ha)
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2005 Alfalfa
Annual Phosphorus Uptake (kg/ha)
The GLM Procedure
Dependent Variable: TP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	25.00308429	4.16718071	1.42	0.3057
Error	9	26.43959411	2.93773268		
Corrected Total	15	51.44267840			

R-Square	Coeff Var	Root MSE	TP Mean
0.486038	14.50440	1.713982	11.81698

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	7.65029931	2.55009977	0.87	0.4925
rep	3	17.35278498	5.78426166	1.97	0.1893

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	7.65029931	2.55009977	0.87	0.4925
rep	3	17.35278498	5.78426166	1.97	0.1893

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2005 Alfalfa
Annual Phosphorus Uptake (kg/ha)
The GLM Procedure
t Tests (LSD) for TP
NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	2.937733
Critical Value of t	2.26216
Least Significant Difference	2.7417

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	12.746	4	4
A			
A	12.220	4	3
A			
A	11.177	4	2
A			
A	11.125	4	1

SAS Code for 2006

```
Data Year06;
Input trt rep yield TN TP @@;
Datalines;
3       1       4506    133.7158437   17.26246096
4       1       4574    140.0619122   16.58943144
1       1       4406    125.1549627   14.97648335
2       1       3491    104.8806665   12.12362094
3       2       4088    109.9184386   14.59576936
4       2       3714    107.9611755   13.82861248
2       2       3744    112.1563913   13.07881325
1       2       3457    98.3847841    12.53093666
4       3       3570    108.0554998   13.48567512
2       3       3253    91.82357699   11.65246649
1       3       4008    107.1537589   14.27850668
3       3       3433    91.52190876   11.71573187
4       4       3305    107.382583    12.14276608
1       4       3312    99.32612812   11.85512517
3       4       3374    103.2950851   12.1780803
2       4       3534    101.2619802   12.56373156
;
Proc glm data=Year06;
  Title1 ‘ Alfalfa Nutrient Uptake Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘ 2006 Alfalfa ’;
  Title4 ‘Annual Yield (kg/ha)’;
  Class trt rep;
  Model yield =trt rep;
  Means trt/lsd;
  Run;
Proc glm data=Year06;
  Title1 ‘ Alfalfa Nutrient Uptake Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘ 2006 Alfalfa ’;
```

```
Title4 'Annual Nitrogen Uptake (kg/ha)';
Class trt rep;
Model TN =trt rep;
Means trt/lsd;
Run;
Proc glm data=Year06;
Title1 ' Alfalfa Nutrient Uptake Study ';
Title2 ' Bailey Sullivan ';
Title3 ' 2006 Alfalfa ';
Title4 'Annual Phosphorus Uptake (kg/ha)';
Class trt rep;
Model Tp =trt rep;
Means trt/lsd;
Run;
```

SAS Output for 2006

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2006 Alfalfa
Annual Yield (kg/ha)
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2006 Alfalfa
Annual Yield (kg/ha)
The GLM Procedure
Dependent Variable: yield

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	1944130.375	324021.729	2.84	0.0774
Error	9	1026251.563	114027.951		
Corrected Total	15	2970381.938			

R-Square	Coeff Var	Root MSE	yield Mean
0.654505	9.039609	337.6803	3735.563

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	291000.688	97000.229	0.85	0.5005
rep	3	1653129.688	551043.229	4.83	0.0285

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	291000.688	97000.229	0.85	0.5005
rep	3	1653129.688	551043.229	4.83	0.0285

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2006 Alfalfa
Annual Yield (kg/ha)
The GLM Procedure
t Tests (LSD) for yield

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	114028
Critical Value of t	2.26216
Least Significant Difference	540.15

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	3850.3	4	3
A			
A	3795.8	4	1
A			
A	3790.8	4	4
A			
A	3505.5	4	2

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2006 Alfalfa
Annual Nitrogen Uptake (kg/ha)
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2006 Alfalfa
Annual Nitrogen Uptake (kg/ha)
The GLM Procedure

Dependent Variable: TN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	2033.416245	338.902707	4.13	0.0284
Error	9	738.019297	82.002144		
Corrected Total	15	2771.435542			

R-Square	Coeff Var	Root MSE	TN Mean
0.733705	8.317078	9.055504	108.8784

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	366.145606	122.048535	1.49	0.2825
rep	3	1667.270639	555.756880	6.78	0.0110

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	366.145606	122.048535	1.49	0.2825
rep	3	1667.270639	555.756880	6.78	0.0110

Alfalfa Nutrient Uptake Study

Bailey Sullivan

11:35 Friday, June 1, 2007

2006 Alfalfa

Annual Nitrogen Uptake (kg/ha)

The GLM Procedure

t Tests (LSD) for TN

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	82.00214
Critical Value of t	2.26216
Least Significant Difference	14.485

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	115.865	4	4
A			
A	109.613	4	3
A			
A	107.505	4	1
A			
A	102.531	4	2

Alfalfa Nutrient Uptake Study

Bailey Sullivan

11:35 Friday, June 1, 2007

2006 Alfalfa

Annual Phosphorus Uptake (kg/ha)

The GLM Procedure

Class Level Information

Class	Levels	Values
trt	4	1 2 3 4

rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2006 Alfalfa
Annual Phosphorus Uptake (kg/ha)
The GLM Procedure
Dependent Variable: TP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	27.98726954	4.66454492	2.54	0.1007
Error	9	16.50658870	1.83406541		
Corrected Total	15	44.49385824			

R-Square	Coeff Var	Root MSE	TP Mean
0.629014	10.08499	1.354277	13.42864

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	7.01240211	2.33746737	1.27	0.3407
rep	3	20.97486744	6.99162248	3.81	0.0516

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	7.01240211	2.33746737	1.27	0.3407
rep	3	20.97486744	6.99162248	3.81	0.0516

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
2006 Alfalfa
Annual Phosphorus Uptake (kg/ha)
The GLM Procedure
t Tests (LSD) for TP

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	1.834065
Critical Value of t	2.26216
Least Significant Difference	2.1663

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	14.0116	4	4
A			
A	13.9380	4	3
A			
A	13.4103	4	1
A			
A	12.3547	4	2

SAS Code for Three Year Total

```
Data Total;
Input trt rep yield TN TP @@;
Datalines;
3       1       17285  551.5330226   63.90300221
4       1       16129  532.7792268   60.26072662
1       1       16236  507.1853122   56.9538583
2       1       13885  431.3292066   49.00500773
3       2       18538  583.1336067   66.97270565
4       2       17768  572.0652236   66.01702613
2       2       16117  491.1144559   56.85676274
1       2       16999  550.5292711   60.06836894
4       3       16538  525.9347357   65.55642153
2       3       16753  516.1074463   60.83190239
1       3       18864  610.4795723   68.08808361
3       3       16379  494.5136221   57.77492096
4       4       15694  499.4228233   59.02572701
1       4       16190  482.5449106   57.29566465
3       4       14767  452.8956634   51.63100934
2       4       14485  433.2636268   50.01061021;
Proc glm data=Total;
  Title1 ‘ Alfalfa Nutrient Uptake Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘ Total Alfalfa ’;
  Title4 ‘Total Yield (kg/ha)’;
  Class trt rep;
  Model yield =trt rep;
  Means trt/lsd;
  Run;
Proc glm data=Total;
  Title1 ‘ Alfalfa Nutrient Uptake Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘ Total Alfalfa ’;
  Title4 ‘Total Nitrogen Uptake (kg/ha)’;
  Class trt rep;
  Model TN =trt rep;
  Means trt/lsd;
  Run;
Proc glm data=Total;
  Title1 ‘ Alfalfa Nutrient Uptake Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘ Total Alfalfa ’;
```

```
Title4 'Total Phosphorus Uptake (kg/ha)';
Class trt rep;
Model Tp =trt rep;
Means trt/lsd;
Run;
```

SAS Output for Three Year Total

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Total Alfalfa
Total Yield (kg/ha)
The GLM Procedure

Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Total Alfalfa
Total Yield (kg/ha)
The GLM Procedure
Dependent Variable: yield

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	18944029.88	3157338.31	3.45	0.0471
Error	9	8234734.56	914970.51		
Corrected Total	15	27178764.44			

R-Square	Coeff Var	Root MSE	yield Mean
0.697016	5.827525	956.5409	16414.19

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	7095360.19	2365120.06	2.58	0.1179
rep	3	11848669.69	3949556.56	4.32	0.0381

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	7095360.19	2365120.06	2.58	0.1179
rep	3	11848669.69	3949556.56	4.32	0.0381

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Total Alfalfa
Total Yield (kg/ha)
The GLM Procedure

t Tests (LSD) for yield

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	914970.5
Critical Value of t	2.26216
Least Significant Difference	1530.1

Means with the same letter are not significantly different.

t Grouping		Mean	N	trt
	A	17072.3	4	1
	A			
B	A	16742.3	4	3
B	A			
B	A	16532.3	4	4
B				
B		15310.0	4	2

Alfalfa Nutrient Uptake Study

Bailey Sullivan

11:35 Friday, June 1, 2007

Total Alfalfa

Total Nitrogen Uptake (kg/ha)

The GLM Procedure

Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study

Bailey Sullivan

11:35 Friday, June 1, 2007

Total Alfalfa

Total Nitrogen Uptake (kg/ha)

The GLM Procedure

Dependent Variable: TN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	28386.92869	4731.15478	3.69	0.0393
Error	9	11546.11184	1282.90132		
Corrected Total	15	39933.04053			

R-Square	Coeff Var	Root MSE	TN Mean
0.710863	6.959241	35.81761	514.6770

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	12264.06556	4088.02185	3.19	0.0772
rep	3	16122.86313	5374.28771	4.19	0.0411

Source	DF	Type III SS	Mean Square	F Value	Pr > F

trt	3	12264.06556	4088.02185	3.19	0.0772
rep	3	16122.86313	5374.28771	4.19	0.0411

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Total Alfalfa
Total Nitrogen Uptake (kg/ha)
The GLM Procedure
t Tests (LSD) for TN

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	1282.901
Critical Value of t	2.26216
Least Significant Difference	57.293

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	537.68	4	1
A			
A	532.55	4	4
A			
B A	520.52	4	3
B			
B	467.95	4	2

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Total Alfalfa
Total Phosphorus Uptake (kg/ha)
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Total Alfalfa
Total Phosphorus Uptake (kg/ha)
The GLM Procedure
Dependent Variable: TP

Sum of

Source	DF	Squares	Mean Square	F Value	Pr > F
Model	6	362.6434437	60.4405740	3.59	0.0424
Error	9	151.6199280	16.8466587		
Corrected Total	15	514.2633717			

R-Square	Coeff Var	Root MSE	TP Mean
0.705171	6.910957	4.104468	59.39074

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	160.6847653	53.5615884	3.18	0.0776
rep	3	201.9586785	67.3195595	4.00	0.0461

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	160.6847653	53.5615884	3.18	0.0776
rep	3	201.9586785	67.3195595	4.00	0.0461

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Total Alfalfa
Total Phosphorus Uptake (kg/ha)
The GLM Procedure
t Tests (LSD) for TP

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	16.84666
Critical Value of t	2.26216
Least Significant Difference	6.5655

Means with the same letter are not significantly different.

t Grouping		Mean	N	trt
	A	62.715	4	4
	A			
B	A	60.601	4	1
B	A			
B	A	60.070	4	3
B				
B		54.176	4	2

SAS Code for Soil Data

```
Data Soil;
Input trt rep SoilN SoilP @@;
Datalines;
3       1       6711.198058   7292.335799
4       1       8611.026473   8431.445023
1       1       6104.583694   5005.146815
2       1       5989.968834   4160.434217
3       2       9849.726266   11299.7231
```

```
4       2       7849.810218   8155.552547
2       2       7892.749444   5837.611428
1       2       7620.0735     5187.62281
4       3       8181.019918   8662.159975
2       3       7872.257905   8024.48838
1       3       8578.382546   5405.080157
3       3       8109.950283   6001.09479
4       4       7319.71261    8097.982107
1       4       8783.823935   9248.143792
3       4       6785.858306   4857.5819
2       4       7152.182338   4565.674787
;

Proc glm data=Soil;
  Title1 ‘ Alfalfa Nutrient Uptake Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘ Soil Nutrients ’;
  Title4 ‘ Soil Nitrogen (kg)’;
  Class trt rep;
  Model SoilN =trt rep;
  Means trt/lsd;
  Run;
Proc glm data=Soil;
  Title1 ‘ Alfalfa Nutrient Uptake Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘ Soil Nutrients ’;
  Title4 ‘ Soil Phosphorous (kg)’;
  Class trt rep;
  Model SoilP =trt rep;
  Means trt/lsd;
  Run;
```

SAS Output for Soil Data

```
                    Alfalfa Nutrient Uptake Study
                          Bailey Sullivan
                     11:35 Friday, June 1, 2007
                          Soil Nutrients
                       Soil Nitrogen (kg)
                        The GLM Procedure
                      Class Level Information

      Class         Levels    Values
      trt                4    1 2 3 4
      rep                4    1 2 3 4

   Number of Observations Read          16
   Number of Observations Used          16
```

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Soil Nutrients
Soil Nitrogen (kg)
The GLM Procedure
Dependent Variable: SoilN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	6758468.14	1126411.36	1.14	0.4106
Error	9	8858999.39	984333.27		
Corrected Total	15	15617467.53			

R-Square	Coeff Var	Root MSE	SoilN Mean
0.432751	12.86271	992.1357	7713.270

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	1358602.599	452867.533	0.46	0.7169
rep	3	5399865.539	1799955.180	1.83	0.2121

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	1358602.599	452867.533	0.46	0.7169
rep	3	5399865.539	1799955.180	1.83	0.2121

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Soil Nutrients
Soil Nitrogen (kg)
The GLM Procedure
t Tests (LSD) for SoilN
NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	984333.3
Critical Value of t	2.26216
Least Significant Difference	1587

Means with the same letter are not significantly different.

t Grouping	Mean	N	trt
A	7990.4	4	4
A			
A	7864.2	4	3
A			
A	7771.7	4	1
A			
A	7226.8	4	2

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Soil Nutrients

Soil Phosphorous (kg)
The GLM Procedure
Class Level Information

Class	Levels	Values
trt	4	1 2 3 4
rep	4	1 2 3 4

Number of Observations Read	16
Number of Observations Used	16

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Soil Nutrients
Soil Phosphorous (kg)
The GLM Procedure

Dependent Variable: SoilP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	21430259.05	3571709.84	0.78	0.6051
Error	9	41139783.86	4571087.10		
Corrected Total	15	62570042.91			

R-Square	Coeff Var	Root MSE	SoilP Mean
0.342500	31.03286	2138.010	6889.505

Source	DF	Type I SS	Mean Square	F Value	Pr > F
trt	3	17287597.31	5762532.44	1.26	0.3449
rep	3	4142661.74	1380887.25	0.30	0.8233

Source	DF	Type III SS	Mean Square	F Value	Pr > F
trt	3	17287597.31	5762532.44	1.26	0.3449
rep	3	4142661.74	1380887.25	0.30	0.8233

Alfalfa Nutrient Uptake Study
Bailey Sullivan
11:35 Friday, June 1, 2007
Soil Nutrients
Soil Phosphorous (kg)
The GLM Procedure
t Tests (LSD) for SoilP

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9

```
Error Mean Square            4571087
Critical Value of t          2.26216
Least Significant Difference  3419.9

Means with the same letter are not significantly different.

t Grouping          Mean      N    trt
         A          8337      4    4
         A
         A          7363      4    3
         A
         A          6211      4    1
         A
         A          5647      4    2
```

Appendix B - Chapter 3 Data

Model Values

Table B.1: Model input values

Crop	Yield (bu)	Yield (kg/ha)	Yield (tons)	%MC	N (lb/ac)	P (lb/ac)	USE	N (kg/ha)	P (kg/ha)	Manure Rate (kg/ha)	Years to Remove N	Years to remove P
Alfalfa 2004		9291.68	4.15	6.40	216.66	20.30	(hay)	242.89	22.76	672.50	2.77	29.55
Alfalfa 2005		3386.80	1.51	2.50	82.12	7.69	(hay)	92.06	8.63	672.50	7.31	77.97
Alfalfa 2006		3735.63	1.67	2.80	90.00	8.43	(hay)	100.89	9.45	672.50	6.67	71.14
BlueStem		9291.68	4.15	10.83	66.33	NA	(hay)	74.37	NA	672.50	9.04	NA
BlueStem		3386.80	1.51	10.83	24.14	NA	(hay)	27.06	NA	672.50	24.85	NA
BlueStem		3735.63	1.67	10.83	26.69	NA	(hay)	29.93	NA	672.50	22.47	NA
Brome		9291.68	4.15	10.48	150.63	17.16	(hay)	168.87	19.24	672.50	3.98	34.95
Brome		3386.80	1.51	10.48	54.81	6.24	(hay)	61.45	7.00	672.50	10.94	96.06
Brome		3735.63	1.67	10.48	60.62	6.91	(hay)	67.96	7.74	672.50	9.90	86.85
Corn	57.86	36299.90	16.20	70.08	125.55	36.68	(Silage)	140.75	41.12	672.50	4.78	16.35
Corn	150.00	94110.85	42.00	70.08	325.51	95.10	(grain)	364.92	106.61	672.50	1.84	6.31
Sorghum	56.20	35260.20	15.74	11.18	52.20	9.30	(grain)	58.52	10.43	672.50	11.49	64.49
Sorghum	47.86	30025.84	13.40	71.90	77.03	15.98	(Silage)	86.35	17.92	672.50	7.79	37.53
Soybeans	43.00	2890.55	1.29	10.12	151.24	15.49	(grain)	169.55	17.37	672.50	3.97	38.73

Appendix C - Chapter 4 Data

Uniformity Calculations

Table C.1: Irrigation Uniformity raw data

ROW	COLLUM	Precip (kg)	n	M (mean applicatio n)	Xi-M	D (Average Absolute Deviation from the mean)	CU (Christiansen's Coefficient of

							Uniformity (%))
1	1	1.1	53	1.4	0.3	0.29	80.02
2	1	1.5			0.1		
3	1	1.1			0.3		
4	1	1.2			0.2		
5	1	1.3			0.1		
6	1	1.4			0.0		
7	1	1.3			0.1		
8	1	1.3			0.1		
9	1	1.5			0.1		
10	1	1.7			0.3		
11	1	1.5			0.1		
12	1	1.0			0.4		
13	1	1.0			0.4		
1	2	1.2			0.2		
2	2	1.0			0.4		
3	2	1.8			0.4		
4	2	1.6			0.2		
5	2	1.6			0.2		
6	2	2.2			0.8		
7	2	2.3			0.9		
8	2	1.8			0.4		
9	2	1.7			0.3		
10	2	1.5			0.1		
11	2	1.3			0.1		
12	2	1.1			0.3		
13	2	1.0			0.4		
12	3	1.4			0.0		
13	3	1.6			0.2		
1	4	1.2			0.2		
2	4	1.0			0.4		
3	4	1.8			0.4		
4	4	1.5			0.1		
5	4	1.8			0.4		
6	4	2.2			0.8		
7	4	2.2			0.8		
8	4	1.9			0.5		
9	4	1.3			0.1		
10	4	1.3			0.1		
11	4	1.2			0.2		
12	4	1.0			0.4		
13	4	1.0			0.4		
1	5	1.1			0.3		
2	5	1.5			0.1		
3	5	1.0			0.4		
4	5	1.5			0.1		
5	5	2.1			0.7		
6	5	2.0			0.6		

7	5	1.4	0.0
8	5	1.4	0.0
9	5	1.6	0.2
10	5	1.5	0.1
11	5	1.1	0.3
12	5	1.2	0.2

Bacteria Data

Table C.2: Bacteria data

				ECOLI		FECAL	
DATE	REP	TRT	Dilution	24 hrs	48 hrs	24 hrs	48 hrs
6/27/2007	1	1	10^1	TMTC	TMTC	0	0
6/27/2007	1	1	10^2	TMTC	TMTC	2	0
6/27/2007	1	1	10^3	47	47	4	6
6/27/2007	1	2	10^1	TMTC	0	TMTC	0
6/27/2007	1	2	10^2	76	TMTC	2	0
6/27/2007	1	2	10^3	4	5	2	1
6/27/2007	1	3	10^1	TMTC	TMTC	1	0
6/27/2007	1	3	10^2	5	TMTC	TMTC	TMTC
6/27/2007	1	3	10^3	16	21	3	9
6/27/2007	1	4	10^1	8	6	1	0
6/27/2007	1	4	10^2	8	11	3	1
6/27/2007	1	4	10^3	7	23	1	1
6/27/2007	2	1	10^1	TMTC	TMTC	1	0
6/27/2007	2	1	10^2	TMTC	24	TMTC	0
6/27/2007	2	1	10^3	29	33	0	8
6/27/2007	2	2	10^1	TMTC	TMTC	2	0
6/27/2007	2	2	10^2	TMTC	TMTC	5	0
6/27/2007	2	2	10^3	15	27	TMTC	0
6/27/2007	2	3	10^1	TMTC	17	0	10
6/27/2007	2	3	10^2	47	20	0	0
6/27/2007	2	3	10^3	10	18	0	1
6/27/2007	2	4	10^1	TMTC	TMTC	TMTC	0
6/27/2007	2	4	10^2	69	TMTC	1	0
6/27/2007	2	4	10^3	11	12	5	2

6/28/2007	3	1	10^1	TMTC	TMTC	TMTC	0
6/28/2007	3	1	10^2	TMTC	TMTC	9	0
6/28/2007	3	1	10^3	TMTC	TMTC	9	0
6/28/2007	3	2	10^1	TMTC	TMTC	0	0
6/28/2007	3	2	10^2	TMTC	12	0	0
6/28/2007	3	2	10^3	54	30	7	6
6/28/2007	3	3	10^1	10	23	0	0
6/28/2007	3	3	10^2	9	22	0	1
6/28/2007	3	3	10^3	4	0	18	6
6/28/2007	3	4	10^1	TMTC	0	TMTC	1
6/28/2007	3	4	10^2	12	0	TMTC	1
6/28/2007	3	4	10^3	4	0	20	5
6/28/2007	4	1	10^1	TMTC	2	TMTC	0
6/28/2007	4	1	10^2	TMTC	4	TMTC	0
6/28/2007	4	1	10^3	70	2	60	0
6/28/2007	4	2	10^1	TMTC	TMTC	TMTC	TMTC
6/28/2007	4	2	10^2	37	6	35	5
6/28/2007	4	2	10^3	25	5	31	7
6/28/2007	4	3	10^1	TMTC	2	TMTC	0
6/28/2007	4	3	10^2	42	0	39	1
6/28/2007	4	3	10^3	19	0	21	0
6/28/2007	4	4	10^1	8	0	11	0
6/28/2007	4	4	10^2	5	2	9	4
6/28/2007	4	4	10^3	5	0	10	2
6/27/2007	Manure	1-2	10^1	TMTC	40	TMTC	0
6/27/2007	Manure	1-2	10^2	TMTC	27	TMTC	9
6/27/2007	Manure	1-2	10^3	35	10	35	10
6/28/2007	Manure	3-4	10^1	TMTC	TMTC	TMTC	TMTC
6/28/2007	Manure	3-4	10^2	TMTC	37	TMTC	8
6/28/2007	Manure	3-4	10^3	60	14	62	2
6/27/2007	Water	1-4	10^1	1	1	0	3
6/27/2007	Water	1-4	10^2	0	0	0	0
6/27/2007	Water	1-4	10^3	0	0	0	0

TSS Calculations

Table C.3: TSS Calculation

Date	Location	Total	Can	Filter	Solids	TSS
6/27/2007	11	2.6505	2.5306	0.1093	10.6	424
6/27/2007	12	2.5982	2.4857	0.1105	2	80
6/27/2007	13	2.6312	2.5182	0.1064	6.6	264
6/27/2007	14	2.6283	2.5095	0.1101	8.7	348
6/27/2007	21	2.6152	2.4985	0.1106	6.1	244
6/27/2007	22	2.6270	2.5020	0.1073	17.7	708
6/27/2007	23	2.6619	2.5494	0.1095	3	120
6/27/2007	24	2.6317	2.5228	0.1054	3.5	140
6/27/2007	31	2.6513	2.5336	0.1066	11.1	444
6/28/2007	32	2.6244	2.5099	0.1118	2.7	108
6/28/2007	33	2.6464	2.5379	0.1069	1.6	64
6/28/2007	34	2.6275	2.5140	0.1099	3.6	144
6/28/2007	41	2.6459	2.5244	0.1100	11.5	460
6/28/2007	42	2.6453	2.5309	0.1108	3.6	144
6/28/2007	43	2.6406	2.5259	0.1111	3.6	144
6/28/2007	44	2.6249	2.5159	0.1074	1.6	64
6/27/2007	Water	2.6514	2.5402	0.1105	0.7	28
6/27/2007	Manure	2.6469	2.5206	0.1091	17.3	693

Pollutant Concentrations and Trapping Efficiency Calculations

Application Volumes

Table C.4: Water application volume calculation

Rep	TRT	Filter Length (m)	Manure Length (m)	Total Length (m)	Width (m)	Area (m2)	Simulation Time (s)	Flow Rate (L/s)	Percipitation (L)	Application Rate (L/m2)	Application Volume (L)
1	1	3.05	3.05	6.10	0.76	4.65	9720	0.95	9720.95	47.33	219.86
1	2	6.10	3.05	9.14	0.76	6.97	9720	0.95	9720.95	47.33	329.79
1	3	9.14	3.05	12.19	0.76	9.29	9720	0.95	9720.95	47.33	439.71
1	4	12.19	3.05	15.24	0.76	11.61	9720	0.95	9720.95	47.33	549.64
2	1	3.05	3.05	6.10	0.76	4.65	9720	0.95	9720.95	47.33	219.86
2	2	6.10	3.05	9.14	0.76	6.97	9720	0.95	9720.95	47.33	329.79
2	3	9.14	3.05	12.19	0.76	9.29	9720	0.95	9720.95	47.33	439.71
2	4	12.19	3.05	15.24	0.76	11.61	9720	0.95	9720.95	47.33	549.64
3	1	3.05	3.05	6.10	0.76	4.65	7695	0.95	7695.95	39.44	183.21
3	2	6.10	3.05	9.14	0.76	6.97	7695	0.95	7695.95	39.44	274.82
3	3	9.14	3.05	12.19	0.76	9.29	7695	0.95	7695.95	39.44	366.43
3	4	12.19	3.05	15.24	0.76	11.61	7695	0.95	7695.95	39.44	458.04
4	1	3.05	3.05	6.10	0.76	4.65	9180	0.95	9180.95	44.70	207.64
4	2	6.10	3.05	9.14	0.76	6.97	9180	0.95	9180.95	44.70	311.46
4	3	9.14	3.05	12.19	0.76	9.29	9180	0.95	9180.95	44.70	415.29
4	4	12.19	3.05	15.24	0.76	11.61	9180	0.95	9180.95	44.70	519.11

Soil Moisture

Table C.5: Initial soil moisture

Date	Rep	TRT	Can ID	WW + Can (g)	Can (g)	DW + Can (g)	Water Weigh (g)	DW (g)	MC (%)	Runoff Volume (L)
6/27/2007	1	1	2321	113.83	79.12	108.80	5.03	29.68	17	120
6/27/2007	1	2	2421	108.30	75.59	103.16	5.14	27.57	19	165
6/27/2007	1	3	3215	132.00	76.92	123.65	8.35	46.73	18	285
6/27/2007	1	4	C12	135.38	76.64	124.17	11.21	47.53	24	60
6/27/2007	2	1	3127	122.51	76.74	115.24	7.27	38.50	19	210
6/27/2007	2	2	C107	143.60	76.21	129.22	14.38	53.01	27	225
6/27/2007	2	3	C33	145.80	78.71	133.04	12.76	54.33	23	30
6/27/2007	2	4	C119	110.05	76.29	105.43	4.62	29.14	16	255
6/28/2007	3	1	C130	124.08	77.97	113.53	10.55	35.56	30	30
6/28/2007	3	2	C77	120.38	76.06	111.20	9.18	35.14	26	60
6/28/2007	3	3	C124	120.70	76.17	111.12	9.58	34.95	27	105
6/28/2007	3	4	4003	122.52	79.35	111.98	10.54	32.63	32	60
6/28/2007	4	1	C45	121.42	76.76	113.11	8.31	36.35	23	30
6/28/2007	4	2	C108	142.10	76.95	128.63	13.47	51.68	26	330
6/28/2007	4	3	15	135.14	79.18	125.22	9.92	46.04	22	300
6/28/2007	4	4	327	142.47	76.99	131.71	10.76	54.72	20	30

Table C.6: Final soil moisture

Date	Rep	TRT	Can ID	WW + Can (g)	Can (g)	DW + Can (g)	Water Weight (g)	DW (g)	MC (%)
6/27/2007	1	1	C32	117.92	76.45	109.09	8.83	32.64	27
6/27/2007	1	2	C60	151.46	75.99	134.78	16.68	58.79	28
6/27/2007	1	3	2627	126.02	76.24	115.81	10.21	39.57	26
6/27/2007	1	4	C78	121.75	76.46	111.73	10.02	35.27	28
6/27/2007	2	1	C118	162.96	77.18	144	18.96	66.82	28
6/27/2007	2	2	2221	127.19	78.12	116.16	11.03	38.04	29
6/27/2007	2	3	2009	132.62	77.33	120.98	11.64	43.65	27
6/27/2007	2	4	C127	106.6	76.54	100.12	6.48	23.58	27
6/28/2007	3	1	C136	157.84	76.68	138.61	19.23	61.93	31
6/28/2007	3	2	C72	131.53	75.43	119.17	12.36	43.74	28
6/28/2007	3	3	C10	132.54	76.24	118.9	13.64	42.66	32
6/28/2007	3	4	C67	173.54	79.09	150.25	23.29	71.16	33
6/28/2007	4	1	2603	158.03	79.47	139.36	18.67	59.89	31
6/28/2007	4	2	C137	153.46	77.36	134.19	19.27	56.83	34
6/28/2007	4	3	3015	163.68	77.29	140.76	22.92	63.47	36
6/28/2007	4	4	C3	186.54	76.38	161.77	24.77	85.39	29

Table C.7: Change in soil moisture

Rep	TRT	ISM (%)	FMC (%)	Difference
1	1	16.9	27.1	10.1
1	2	18.6	28.4	9.7
1	3	17.9	25.8	7.9
1	4	23.6	28.4	4.8
2	1	18.9	28.4	9.5
2	2	27.1	29.0	1.9
2	3	23.5	26.7	3.2
2	4	15.9	27.5	11.6
3	1	29.7	31.1	1.4
3	2	26.1	28.3	2.1
3	3	27.4	32.0	4.6
3	4	32.3	32.7	0.4
4	1	22.9	31.2	8.3
4	2	26.1	33.9	7.8
4	3	21.5	36.1	14.6
4	4	19.7	29.0	9.3

SAS for Filter Strip Study

SAS Code for Filter Strip with interactions

```
Data Filter;
```

```
Input REP TRT Slope Volume TSS Ecoli     Fecal TN TP@@;
Datalines;
1 1     0.5     120     424     47000  5000     97.4    8.63
1 2     0.5     165     80      4000    1000     77.13   2.56
1 3     0.5     285     264     19000  3000     92.86   6.71
1 4     0.5     60      348     7000    1000     80.79   3.04
2 1     0.5     210     244     29000  8000     98.86   8.82
2 2     0.5     225     708     15000  500      90.74   4.04
2 3     0.5     30      120     10000  100      78.51   1.54
2 4     0.5     255     140     11000  5000     73.11   1.08
3 1     1       30      444     500000          900     105.47 12.72
3 2     1       60      108     54000  7000     78.38   3.48
3 3     1       105     64      4000    6000     76.37   1.01
3 4     1       60      144     4000    5000     77.67   1.45
4 1     1       30      460     70000  80000    94.84   7.46
4 2     1       330     144     25000  31000    89.17   5.19
4 3     1       300     144     19000  21000    83.21   3.31
4 4     1       30      64      5000    10000    79.44   1.31;
Proc glm data=Filter;
  Title1 ‘ Filter Stripe Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘Volume (L) ‘;
  Class trt rep slope;
  Model Volume=trt|rep|slope;
  Means trt/lsd;
  Means slope/lsd;
  Run;
Proc glm data=Filter;
  Title1 ‘ Filter Stripe Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘TSS (mg/L) ‘;
  Class trt rep TSS;
  Model TSS=trt|rep|slope;
  Means trt/lsd;
  Means slope/lsd;
  Run;
Proc glm data=Filter;
  Title1 ‘ Filter Stripe Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘Ecoli (CFU/100mL) ‘;
  Class trt rep slope;
  Model ecoli=trt|rep|slope;
  Means trt/lsd;
  Means slope/lsd;
  Run;
```

```
Proc glm data=Filter;
  Title1 ‘ Filter Stripe Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘Fecal (CFU/100mL) ‘;
  Class trt rep slope;
  Model Fecal=trt|rep|slope;
  Means trt/lsd;
  Means slope/lsd;
  Run;
Proc glm data=Filter;
  Title1 ‘ Filter Stripe Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘TN (mg/L) ‘;
  Class trt rep slope;
  Model TN=trt|rep|slope;
  Means trt/lsd;
  Means slope/lsd;
  Run;
Proc glm data=Filter;
  Title1 ‘ Filter Stripe Study ’;
  Title2 ‘ Bailey Sullivan ’;
  Title3 ‘TP (mg/L) ‘;
  Class trt rep slope;
  Model TP=trt|rep|slope;
  Means trt/lsd;
  Means slope/lsd;
  Run;
```

SAS Output for Filter Strip with Interactions

```
Filter Stripe Study     17:04 Wednesday, July 11, 2007   7
                      Bailey Sullivan
                        Volume (L)
                     The GLM Procedure
                  Class Level Information

    Class         Levels    Values
    TRT                4    1 2 3 4
    REP                4    1 2 3 4
    Slope              2    0.5 1

 Number of Observations Read          16
 Number of Observations Used          16


Filter Stripe Study     17:04 Wednesday, July 11, 2007   8
                      Bailey Sullivan
                        Volume (L)
                     The GLM Procedure
```

Dependent Variable: Volume

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	89114.0625	9901.5625	0.67	0.7172
Error	6	88621.8750	14770.3125		
Corrected Total	15	177735.9375			

R-Square	Coeff Var	Root MSE	Volume Mean
0.501385	84.72901	121.5332	143.4375

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	31542.18750	10514.06250	0.71	0.5796
Slope	1	10251.56250	10251.56250	0.69	0.4367
TRT*Slope	3	22654.68750	7551.56250	0.51	0.6892
REP	2	24665.62500	12332.81250	0.83	0.4787

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	31542.18750	10514.06250	0.71	0.5796
Slope	0	0.00000	.	.	.
TRT*Slope	3	22654.68750	7551.56250	0.51	0.6892
REP	2	24665.62500	12332.81250	0.83	0.4787

Bailey Sullivan

Volume (L)

The GLM Procedure

t Tests (LSD) for Volume

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	14770.31
Critical Value of t	2.44691
Least Significant Difference	210.28

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	195.00	4	2
A			
A	180.00	4	3
A			
A	101.25	4	4
A			
A	97.50	4	1

Bailey Sullivan

Volume (L)

The GLM Procedure

t Tests (LSD) for Volume

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	14770.31

Critical Value of t 2.44691
Least Significant Difference 148.69

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	168.75	8	0.5
A			
A	118.13	8	1

Bailey Sullivan
TSS (mg/L)
The GLM Procedure

Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read 16
Number of Observations Used 16

Bailey Sullivan
TSS (mg/L)
The GLM Procedure
Dependent Variable: TSS

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	260873.0000	28985.8889	0.69	0.7024
Error	6	251078.0000	41846.3333		
Corrected Total	15	511951.0000			

R-Square	Coeff Var	Root MSE	TSS Mean
0.509566	83.92360	204.5638	243.7500

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	146291.0000	48763.6667	1.17	0.3977
Slope	1	35721.0000	35721.0000	0.85	0.3912
TRT*Slope	3	77371.0000	25790.3333	0.62	0.6293
REP	2	1490.0000	745.0000	0.02	0.9824

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	146291.0000	48763.6667	1.17	0.3977
Slope	0	0.0000	.	.	.
TRT*Slope	3	77371.0000	25790.3333	0.62	0.6293
REP	2	1490.0000	745.0000	0.02	0.9824

Bailey Sullivan
TSS (mg/L)
The GLM Procedure
t Tests (LSD) for TSS
NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	41846.33
Critical Value of t	2.44691
Least Significant Difference	353.94

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	393.0	4	1
A			
A	260.0	4	2
A			
A	174.0	4	4
A			
A	148.0	4	3

Bailey Sullivan

TSS (mg/L)

The GLM Procedure

t Tests (LSD) for TSS

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	41846.33
Critical Value of t	2.44691
Least Significant Difference	250.27

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	291.0	8	0.5
A			
A	196.5	8	1

Bailey Sullivan

Ecoli (CFU/100mL)

The GLM Procedure

Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read	16
Number of Observations Used	16

Bailey Sullivan

Ecoli (CFU/100mL)

The GLM Procedure

Dependent Variable: Ecoli

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	151742562500	16860284722	1.47	0.3286
Error	6	68705375000	11450895833		
Corrected Total	15	220447937500			

R-Square	Coeff Var	Root MSE	Ecoli Mean
0.688337	208.0367	107008.9	51437.50

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	65255187500	21751729167	1.90	0.2308
Slope	1	18157562500	18157562500	1.59	0.2547
TRT*Slope	3	43780687500	14593562500	1.27	0.3649
REP	2	24549125000	12274562500	1.07	0.3999

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	65255187500	21751729167	1.90	0.2308
Slope	0	0	.	.	.
TRT*Slope	3	43780687500	14593562500	1.27	0.3649
REP	2	24549125000	12274562500	1.07	0.3999

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Bailey Sullivan

Ecoli (CFU/100mL)

The GLM Procedure

t Tests (LSD) for Ecoli

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	1.145E10
Critical Value of t	2.44691
Least Significant Difference	185150

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	161500	4	1
A			
A	24500	4	2
A			
A	13000	4	3
A			
A	6750	4	4

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Bailey Sullivan

Ecoli (CFU/100mL)

The GLM Procedure

t Tests (LSD) for Ecoli

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	1.145E10
Critical Value of t	2.44691
Least Significant Difference	130921

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	85125	8	1
A			
A	17750	8	0.5

Filter Stripe Study 17:04 Wednesday, July 11, 2007 24
Bailey Sullivan
Fecal (CFU/100mL)
The GLM Procedure\Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read 16
Number of Observations Used 16

Filter Stripe Study 17:04 Wednesday, July 11, 2007 25
Bailey Sullivan
Fecal (CFU/100mL)
The GLM Procedure
Dependent Variable: Fecal

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	4348140625	483126736	1.74	0.2566
Error	6	1662413750	277068958		
Corrected Total	15	6010554375			

R-Square	Coeff Var	Root MSE	Fecal Mean
0.723418	144.3503	16645.39	11531.25

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	803601875	267867292	0.97	0.4674
Slope	1	1178205625	1178205625	4.25	0.0848
TRT*Slope	3	470511875	156837292	0.57	0.6573
REP	2	1895821250	947910625	3.42	0.1020

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	803601875	267867292	0.97	0.4674
Slope	0	0	.	.	.
TRT*Slope	3	470511875	156837292	0.57	0.6573
REP	2	1895821250	947910625	3.42	0.1020

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Bailey Sullivan
Fecal (CFU/100mL)
The GLM Procedure
t Tests (LSD) for Fecal
NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha 0.05
Error Degrees of Freedom 6

Error Mean Square	2.7707E8
Critical Value of t	2.44691
Least Significant Difference	28800

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	23475	4	1
A			
A	9875	4	2
A			
A	7525	4	3
A			
A	5250	4	4

Bailey Sullivan

Fecal (CFU/100mL)

The GLM Procedure

t Tests (LSD) for Fecal

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	2.7707E8
Critical Value of t	2.44691
Least Significant Difference	20365

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	20113	8	1
A			
A	2950	8	0.5

Bailey Sullivan

TN (mg/L)

The GLM Procedure

Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read	16
Number of Observations Used	16

Bailey Sullivan

TN (mg/L)

The GLM Procedure

Dependent Variable: TN

Sum of

Source	DF	Squares	Mean Square	F Value	Pr > F
Model	9	1080.825906	120.091767	2.06	0.1961
Error	6	350.134738	58.355790		
Corrected Total	15	1430.960644			

R-Square	Coeff Var	Root MSE	TN Mean
0.755315	8.895923	7.639096	85.87188

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	1023.703319	341.234440	5.85	0.0326
Slope	1	1.470156	1.470156	0.03	0.8791
TRT*Slope	3	39.983119	13.327706	0.23	0.8735
REP	2	15.669313	7.834656	0.13	0.8769

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	1023.703319	341.234440	5.85	0.0326
Slope	0	0.000000	.	.	.
TRT*Slope	3	39.983119	13.327706	0.23	0.8735
REP	2	15.669313	7.834656	0.13	0.8769

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Bailey Sullivan

TN (mg/L)

The GLM Procedure

t Tests (LSD) for TN

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	58.35579
Critical Value of t	2.44691
Least Significant Difference	13.217

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	99.143	4	1
B	83.855	4	2
B			
B	82.738	4	3
B			
B	77.753	4	4

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Bailey Sullivan

TN (mg/L)

The GLM Procedure

t Tests (LSD) for TN

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	6
Error Mean Square	58.35579
Critical Value of t	2.44691
Least Significant Difference	9.3461

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	86.175	8	0.5
A			
A	85.569	8	1

Bailey Sullivan

TP (mg/L)

The GLM Procedure

Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read	16
Number of Observations Used	16

Bailey Sullivan

TP (mg/L)

The GLM Procedure

Dependent Variable: TP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	147.7006563	16.4111840	3.24	0.0830
Error	6	30.3811875	5.0635312		
Corrected Total	15	178.0818437			

R-Square	Coeff Var	Root MSE	TP Mean
0.829398	49.76319	2.250229	4.521875

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	136.4746188	45.4915396	8.98	0.0123
Slope	1	0.0150062	0.0150062	0.00	0.9584
TRT*Slope	3	7.2430688	2.4143563	0.48	0.7100
REP	2	3.9679625	1.9839813	0.39	0.6919

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	136.4746188	45.4915396	8.98	0.0123
Slope	0	0.0000000	.	.	.
TRT*Slope	3	7.2430688	2.4143563	0.48	0.7100
REP	2	3.9679625	1.9839813	0.39	0.6919

Bailey Sullivan

TP (mg/L)

The GLM Procedure

t Tests (LSD) for TP

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05

```
                Error Degrees of Freedom            6
                Error Mean Square             5.063531
                Critical Value of t            2.44691
                Least Significant Difference    3.8934

        Means with the same letter are not significantly different.

             t Grouping          Mean      N    TRT
                      A         9.408      4    1
                      B         3.818      4    2
                      B
                      B         3.143      4    3
                      B
                      B         1.720      4    4


                    Filter Stripe Study     17:04 Wednesday, July 11, 2007  37
                                          Bailey Sullivan
                                             TP (mg/L)

                                         The GLM Procedure

                                        t Tests (LSD) for TP

    NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

                Alpha                           0.05
                Error Degrees of Freedom           6
                Error Mean Square             5.063531
                Critical Value of t            2.44691
                Least Significant Difference    2.7531

        Means with the same letter are not significantly different.
             t Grouping          Mean      N    Slope

                      A         4.553      8    0.5
                      A
                                A         4.491      8    1
```

SAS Code for Filter Strip without Interactions

```
Data Filter;
Input REP TRT Slope Volume TSS Ecoli Fecal TN TP@@;
Datalines;
1 1   0.5   120   424   47000  5000   97.4   8.63
1 2   0.5   165   80    4000   1000   77.13  2.56
1 3   0.5   285   264   19000  3000   92.86  6.71
1 4   0.5   60    348   7000   1000   80.79  3.04
2 1   0.5   210   244   29000  8000   98.86  8.82
2 2   0.5   225   708   15000  500    90.74  4.04
2 3   0.5   30    120   10000  100    78.51  1.54
2 4   0.5   255   140   11000  5000   73.11  1.08
3 1   1     30    444   500000         900    105.47 12.72
3 2   1     60    108   54000  7000   78.38  3.48
```

```
3 3     1       105     64      4000    6000    76.37   1.01
3 4     1       60      144     4000    5000    77.67   1.45
4 1     1       30      460     70000   80000   94.84   7.46
4 2     1       330     144     25000   31000   89.17   5.19
4 3     1       300     144     19000   21000   83.21   3.31
4 4     1       30      64      5000    10000   79.44   1.31
;

Proc glm data=Filter;
  Title1 ' Filter Stripe Study ';
  Title2 ' Bailey Sullivan ';
  Title3 'Volume (L) ';
            Class trt rep slope;
  Model Volume=trt slope rep;
  Means trt/lsd;
  Means slope/lsd;
  Run;
          Proc glm data=Filter;
  Title1 ' Filter Stripe Study ';
  Title2 ' Bailey Sullivan ';
  Title3 'TSS (mg/L) ';
  Class trt rep slope;
  Model TSS=trt slope rep;
  Means trt/lsd;
  Means slope/lsd;
  Run;
Proc glm data=Filter;
  Title1 ' Filter Stripe Study ';
  Title2 ' Bailey Sullivan ';
  Title3 'Ecoli (CFU/100mL) ';
  Class trt rep slope;
  Model ecoli=trt slope rep;
  Means trt/lsd;
  Means slope/lsd;
  Run;
Proc glm data=Filter;
  Title1 ' Filter Stripe Study ';
  Title2 ' Bailey Sullivan ';
  Title3 'Fecal (CFU/100mL) ';
  Class trt rep slope;
  Model Fecal=trt slope rep;
  Means trt/lsd;
  Means slope/lsd;
  Run;
Proc glm data=Filter;
```

```
 Title1 ' Filter Stripe Study ';
 Title2 ' Bailey Sullivan ';
 Title3 'TN (mg/L) ';
 Class trt rep slope;
 Model TN=trt slope rep;
 Means trt/lsd;
 Means slope/lsd;
 Run;
Proc glm data=Filter;
 Title1 ' Filter Stripe Study ';
 Title2 ' Bailey Sullivan ';
 Title3 'TP (mg/L) ';
 Class trt rep slope;
 Model TP=trt slope rep;
 Means trt/lsd;
 Means slope/lsd;
 Run;
```

SAS Output for Filter Strip without Interactions

```
Filter Stripe Study     17:04 Wednesday, July 11, 2007  46
                        Bailey Sullivan
                           Volume (L)
                       The GLM Procedure
                    Class Level Information
              Class         Levels    Values
 TRT                4    1 2 3 4
 REP                4    1 2 3 4
 Slope              2    0.5 1

          Number of Observations Read          16
          Number of Observations Used          16



Filter Stripe Study     17:04 Wednesday, July 11, 2007  47
                        Bailey Sullivan
                           Volume (L)
                       The GLM Procedure

                    Dependent Variable: Volume

                                    Sum of
Source                      DF         Squares     Mean Square    F Value    Pr > F
Model                        6      66459.3750      11076.5625       0.90    0.5365
Error                        9     111276.5625      12364.0625
Corrected Total             15     177735.9375

                R-Square     Coeff Var      Root MSE    Volume Mean
                0.373922      77.52074      111.1938       143.4375

Source                      DF       Type I SS     Mean Square    F Value    Pr > F
```

TRT	3	31542.18750	10514.06250	0.85	0.5006
Slope	1	10251.56250	10251.56250	0.83	0.3863
REP	2	24665.62500	12332.81250	1.00	0.4062

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	31542.18750	10514.06250	0.85	0.5006
Slope	0	0.00000	.	.	.
REP	2	24665.62500	12332.81250	1.00	0.4062

Bailey Sullivan

Volume (L)

The GLM Procedure

t Tests (LSD) for Volume

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	12364.06
Critical Value of t	2.26216
Least Significant Difference	177.86

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	195.00	4	2
A			
A	180.00	4	3
A			
A	101.25	4	4
A			
A	97.50	4	1

Bailey Sullivan

Volume (L)

The GLM Procedure

t Tests (LSD) for Volume

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	12364.06
Critical Value of t	2.26216
Least Significant Difference	125.77

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	168.75	8	0.5
A			
A	118.13	8	1

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Bailey Sullivan

TSS (mg/L)

The GLM Procedure

Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read 16

Number of Observations Used 16

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Bailey Sullivan

TSS (mg/L)

The GLM Procedure

Dependent Variable: TSS

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	183502.0000	30583.6667	0.84	0.5703
Error	9	328449.0000	36494.3333		
Corrected Total	15	511951.0000			

R-Square	Coeff Var	Root MSE	TSS Mean
0.358437	78.37329	191.0349	243.7500

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	146291.0000	48763.6667	1.34	0.3226
Slope	1	35721.0000	35721.0000	0.98	0.3483
REP	2	1490.0000	745.0000	0.02	0.9798

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	146291.0000	48763.6667	1.34	0.3226
Slope	0	0.0000	.	.	.
REP	2	1490.0000	745.0000	0.02	0.9798

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Bailey Sullivan

TSS (mg/L)

The GLM Procedure

t Tests (LSD) for TSS

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	36494.33
Critical Value of t	2.26216
Least Significant Difference	305.58

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	393.0	4	1
A			

A	260.0	4	2
A			
A	174.0	4	4
A			
A	148.0	4	3

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Bailey Sullivan

TSS (mg/L)

The GLM Procedure

t Tests (LSD) for TSS

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	36494.33
Critical Value of t	2.26216
Least Significant Difference	216.08

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	291.00	8	0.5
A			
A	196.50	8	1

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Bailey Sullivan

Ecoli (CFU/100mL)

The GLM Procedure

Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read	16
Number of Observations Used	16

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Bailey Sullivan

Ecoli (CFU/100mL)

The GLM Procedure

Dependent Variable: Ecoli

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	107961875000	17993645833	1.44	0.2989
Error	9	112486062500	12498451389		
Corrected Total	15	220447937500			

R-Square	Coeff Var	Root MSE	Ecoli Mean
0.489739	217.3443	111796.5	51437.50

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	65255187500	21751729167	1.74	0.2282
Slope	1	18157562500	18157562500	1.45	0.2588
REP	2	24549125000	12274562500	0.98	0.4113

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	65255187500	21751729167	1.74	0.2282
Slope	0	0	.	.	.
REP	2	24549125000	12274562500	0.98	0.4113

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Bailey Sullivan

Ecoli (CFU/100mL)

The GLM Procedure

t Tests (LSD) for Ecoli

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	1.25E10
Critical Value of t	2.26216
Least Significant Difference	178828

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	161500	4	1
A			
A	24500	4	2
A			
A	13000	4	3
A			
A	6750	4	4

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Bailey Sullivan

Ecoli (CFU/100mL)

The GLM Procedure

t Tests (LSD) for Ecoli

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	1.25E10
Critical Value of t	2.26216
Least Significant Difference	126451

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	85125	8	1
A			
A	17750	8	0.5

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Bailey Sullivan
Fecal (CFU/100mL)
The GLM Procedure
Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read 16
Number of Observations Used 16

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Bailey Sullivan
Fecal (CFU/100mL)
The GLM Procedure
Dependent Variable: Fecal

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	3877628750	646271458	2.73	0.0855
Error	9	2132925625	236991736		
Corrected Total	15	6010554375			

R-Square	Coeff Var	Root MSE	Fecal Mean
0.645137	133.5028	15394.54	11531.25

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	803601875	267867292	1.13	0.3876
Slope	1	1178205625	1178205625	4.97	0.0527
REP	2	1895821250	947910625	4.00	0.0572

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	803601875	267867292	1.13	0.3876
Slope	0	0	.	.	.
REP	2	1895821250	947910625	4.00	0.0572

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Bailey Sullivan
Fecal (CFU/100mL)
The GLM Procedure
t Tests (LSD) for Fecal
NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	2.3699E8
Critical Value of t	2.26216
Least Significant Difference	24625

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	23475	4	1

A			
A	9875	4	2
A			
A	7525	4	3
A			
A	5250	4	4

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Bailey Sullivan

Fecal (CFU/100mL)

The GLM Procedure

t Tests (LSD) for Fecal

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	2.3699E8
Critical Value of t	2.26216
Least Significant Difference	17412

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	20113	8	1
A			
A	2950	8	0.5

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Bailey Sullivan

TN (mg/L)

The GLM Procedure

Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read	16
Number of Observations Used	16

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Bailey Sullivan

TN (mg/L)

The GLM Procedure

Dependent Variable: TN

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	1040.842788	173.473798	4.00	0.0312
Error	9	390.117856	43.346428		
Corrected Total	15	1430.960644			

R-Square	Coeff Var	Root MSE	TN Mean
0.727373	7.667004	6.583800	85.87188

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	1023.703319	341.234440	7.87	0.0069
Slope	1	1.470156	1.470156	0.03	0.8580
REP	2	15.669313	7.834656	0.18	0.8376

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	1023.703319	341.234440	7.87	0.0069
Slope	0	0.000000	.	.	.
REP	2	15.669313	7.834656	0.18	0.8376

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Bailey Sullivan

TN (mg/L)

The GLM Procedure

t Tests (LSD) for TN

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	43.34643
Critical Value of t	2.26216
Least Significant Difference	10.531

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	99.143	4	1
B	83.855	4	2
B			
B	82.738	4	3
B			
B	77.753	4	4

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Bailey Sullivan

TN (mg/L)

The GLM Procedure

t Tests (LSD) for TN

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	43.34643
Critical Value of t	2.26216
Least Significant Difference	7.4468

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	86.175	8	0.5
A			
A	85.569	8	1

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Bailey Sullivan

TP (mg/L)
The GLM Procedure
Class Level Information

Class	Levels	Values
TRT	4	1 2 3 4
REP	4	1 2 3 4
Slope	2	0.5 1

Number of Observations Read 16
Number of Observations Used 16

Bailey Sullivan
TP (mg/L)
The GLM Procedure
Dependent Variable: TP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	140.4575875	23.4095979	5.60	0.0112
Error	9	37.6242562	4.1804729		
Corrected Total	15	178.0818437			

R-Square	Coeff Var	Root MSE	TP Mean
0.788725	45.21621	2.044620	4.521875

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	3	136.4746188	45.4915396	10.88	0.0024
Slope	1	0.0150062	0.0150062	0.00	0.9535
REP	2	3.9679625	1.9839813	0.47	0.6369

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	3	136.4746188	45.4915396	10.88	0.0024
Slope	0	0.0000000	.	.	.
REP	2	3.9679625	1.9839813	0.47	0.6369

Bailey Sullivan
TP (mg/L)
The GLM Procedure
t Tests (LSD) for TP
NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	4.180473
Critical Value of t	2.26216
Least Significant Difference	3.2705

Means with the same letter are not significantly different.

t Grouping	Mean	N	TRT
A	9.408	4	1
B	3.818	4	2
B			
B	3.143	4	3

B			
B	1.720	4	4

Bailey Sullivan

TP (mg/L)

The GLM Procedure

t Tests (LSD) for TP

NOTE: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	9
Error Mean Square	4.180473
Critical Value of t	2.26216
Least Significant Difference	2.3126

Means with the same letter are not significantly different.

t Grouping	Mean	N	Slope
A	4.553	8	0.5
A			
A	4.491	8	1