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Fertilizer Rates on Iowa Corn:  
Effects on Rates and Returns**

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*Working Paper 97-WP 182*  
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## **Abstract**

This paper estimates the potential value of switching from applying nitrogen fertilizer according to SRT to applying it according to VRT in 12 Iowa counties. Changes in yields, nitrogen use, and profits are estimated for individual fields and entire counties as farmers move from SRT to VRT. The county-level results indicate modest increases in returns over fertilizer costs, ranging from \$7.43 per acre to \$1.59 per acre. The county-level VRT production benefits are increases in yields ranging from 0.05 to 0.50 bushels per acre and reduction in production costs ranging from \$1.19 to \$6.83 per acre. The VRT environmental benefit for the entire study area is quite large, ranging from 77 to 172 tons of nitrogen. Increases in the price of corn and nitrogen cause the value of VRT to increase. Greater field variability from either the soil types within a field or from the best manner to treat the soil types also cause the value of VRT to increase.

## **MOVING FROM UNIFORM TO VARIABLE FERTILIZER RATES ON IOWA CORN: EFFECTS ON RATES AND RETURNS**

Many studies show that crop yields vary within fields and that the degree of variability can be substantial [Robert et al., 1990; Carr et al., 1991; Miller et al., 1992; Vetsch et al., 1993; Wibawa et al., 1993; Wolkowski and Wollenhaupt, 1993]. Yield variability can be caused by a nonuniform distribution of soil properties, such as nutrient availability, soil moisture, landscape position, pest pressure, soil compaction, drainage, and rooting depth [Donahue, et al., 1983; Sawyer, 1994], or by a variable response to uniformly applied inputs.

The pervasiveness of spatial variability in yields suggests an opportunity for improving production efficiency by varying input applications within fields. Traditional input management techniques are to apply a single rate to an entire field (or group of fields). We refer to these traditional practices as single rate technologies (SRT). Significant research efforts are underway to develop the knowledge and equipment needed to allow farmers to move to variable rate technologies (VRT) [National Research Council, 1997].

When the response of yield to applied inputs varies across a field, then using an SRT will, in general, leave part of the field under-supplied with the input, while another portion is over-supplied. The under-supplied portion experiences a reduction in yield from the lack of necessary inputs. The over-supplied portion results in wasteful input use, increasing production costs and the risk of environmental contamination. Babcock (1992) showed that the profit-maximizing SRT application rate is where the marginal yield gain on the under-supplied portions of a field is just equal to the real cost of the input. Babcock showed that when the real cost of an input is inexpensive relative to its average productivity, then optimal SRT rates may result in most of a field being over-

supplied. In this situation, moving to VRT, where each portion of a field receives an optimal amount of input, should lead to greater output with lower input levels.

Recent empirical findings indicate that moving from SRT to VRT to control nitrogen fertilizer rates should have significant effects on input usage and possibly yield levels. Spatial variations in soil moisture within a field result in variations in the marginal product of nitrogen fertilizer, which leads to optimal nitrogen application rates that vary across a field [Dai et al., 1993]. Also, other growing conditions between experimental sites alter optimal nitrogen fertilizer rates [Babcock and Blackmer, 1994], which suggests that optimal rates should vary within fields if site-specific growing conditions vary within fields. Increased growing condition variability tends to increase optimal SRT application rates as farmers over-apply nitrogen fertilizer to insure against the possibility of being caught short of fertilizer [Babcock, 1992; Babcock and Blackmer, 1992].

Excessive use of nitrogen by farmers is a major concern among agronomists, environmentalists, and the water industry [Nielsen and Lee, 1987; Office of Technology Assessment, 1984]. The environmental concern about the over-application of chemicals has grown over the years with the increasing evidence of groundwater contamination [Dao, 1992].

Small-scale experiments with VRT on specific fields indicate that potential exists for small yield increases with reduced input usage [Robert et al., 1990; Carr et al., 1991; Miller et al., 1992; Wibawa et al., 1993; Wolkowski and Wollenhaupt, 1993]. Individual fields are tested and monitored extensively over a number of years. The precision agriculture industry and the literature, however, lacks a method to use readily available data and decision rules to replicate the process of applying VRT. The output of such a model could assist local extension agents and the agricultural community in examining the private and environmental benefits from the widespread implementation of VRT.

This paper estimates the potential value of switching from applying nitrogen fertilizer according to SRT to applying it according to VRT in 12 Iowa counties. The economic and environmental impacts of moving from SRT to VRT depends heavily on the amount of inherent yield variability in fields [Hennessy et al., 1996]. An empirical

contribution of this paper is that an estimate of potential yield variability across Iowa fields is estimated. Changes in yields, nitrogen use, and profits are estimated for individual fields and entire counties as farmers move from SRT to VRT. These estimates are based on a fertilizer decision model that is parameterized from the results of previous studies.

### The Model

The overall relationship between corn yields and applied nitrogen is needed to calculate the value of VRT. A consensus on the appropriate functional form has not been reached. A substantial portion of the literature supports the existence of a plateau in the plant yield response to applied nitrogen [Ackello-Ogutu et al., 1985; Cerrato and Blackmer, 1990; Paris, 1992]. Others find the plateau conflicting with standard agronomic principles [Berck and Hefland, 1990; Frank et al., 1990; Sinclair and Park, 1993]. Studies that relate corn yields to nitrogen have used the quadratic [Babcock and Blackmer, 1994], the Mitscherlich [Babcock and Blackmer, 1994], cubic [Hennessy et al., 1996], and LRP production functions [Niven, 1994; Babcock and Blackmer, 1994; Babcock et al, 1996]. In this study the linear response plateau (LRP) relationship is used to represent the relationship between corn yield and applied nitrogen.

Each field is assumed to consist of  $n$  different types of soil. Each soil type is assumed to have an inherent maximum corn productivity level. Nitrogen is assumed to be the only input limiting corn productivity. All other necessary inputs are nonlimiting. For each soil type  $i$ , the maximum inherent yield ( $M_i$ ) is produced by the optimal nitrogen application ( $Q_i$ ). Nitrogen applications ( $N_i$ ) greater than  $Q_i$  have no effect on the soil's productivity, but applications less than  $Q_i$  reduce the soil's corn yield by a constant per unit level ( $b$ ). The dummy variable  $D_i$  is equal to one if  $N_i < Q_i$  and equal to zero otherwise. Under these assumptions, the  $i^{\text{th}}$  soil type corn yield response to applied nitrogen is summarized by the LRP production function:

$$Y_i = M_i - D_i b(Q_i - N_i). \quad (1)$$

With VRT, the farmer is assumed to know the exact location of the  $n$  soil types within a field. Let  $\alpha_i$  denote the proportion of the field containing of the  $i^{\text{th}}$  soil type.

Furthermore, let  $P_N$  denote the price of nitrogen fertilizer and  $P_C$  the price of corn. The optimal per acre average yield ( $Y^{VRT}$ ), nitrogen application ( $N^{VRT}$ ), and profit ( $\pi^{VRT}$ ) with VRT are:

$$Y^{VRT} = \sum_{i=1}^n \alpha_i M_i, \quad (2)$$

$$N^{VRT} = \sum_{i=1}^n \alpha_i Q_i, \quad (3)$$

$$\pi^{VRT} = P_C Y^{VRT} - P_N N^{VRT} = \sum_{i=1}^n \alpha_i (P_C M_i - P_N Q_i). \quad (4)$$

With SRT, the farmer does not know the exact location of the  $n$  soil types within a field, but knows the spatial distribution of each soil type (the  $\alpha_i$ 's). The expected per acre profit on a field from SRT is given by:

$$E(\pi^{SRT}) = \sum_{i=1}^n \alpha_i [P_C (M_i - D_i b (Q_i - N^{SRT})) - P_N N^{SRT}], \quad (5)$$

where  $N^{SRT}$  is the single rate of nitrogen fertilizer applied throughout the field.

The value,  $V$ , of moving to a variable rate technology on a field is the increase in profits when switching from SRT to VRT:

$$V = \pi^{VRT} - E(\pi^{SRT}) = \sum_{i=1}^n \alpha_i D_i (b P_C - P_N) (Q_i - N^{SRT}) + \sum_{i=1}^n \alpha_i (1 - D_i) P_N (N^{SRT} - Q_i). \quad (6)$$

With VRT, nitrogen fertilizer rates are varied according to soil type allowing optimal rates to be applied to each type of soil. The first term in equation (6) represents the change in profits from increased yields. The term  $D_i (b P_C - P_N)$  represents the marginal profit from an additional unit of applied nitrogen when eliminating the under-application of nitrogen fertilizer and  $(Q_i - N)$  is the amount of additional fertilizer applied to these soils. The second term in equation (6) represents the change in profits from eliminating the over-application of nitrogen fertilizer.

Equation (6) estimates the value of moving to VRT as the change in returns over fertilizer costs. It does not account for a number of costs associated with moving to VRT.

These include the cost of acquiring knowledge about the spatial distribution of soils within a field, any additional equipment costs including new fertilizer spreaders, computer hardware and software, global positioning systems, and any additional labor costs. There are two reasons why these costs are not accounted for here. First, some of the costs would be allocated to other precision farming endeavors, such as weed control, planting, and perhaps insect control. Thus, not all the costs would have to be covered by more efficient fertilizer decisions. Second, the actual increase in costs from moving to VRT are unknown. The precision farming industry is in its infancy. Equipment standards and practices have not been set. Hence, any current cost estimates are bound to overstate costs once the industry has matured.

The value of VRT depends on the type of SRT strategy used. If the SRT strategy is to farm to the best soil, so that  $N^{SRT} = \max_i(Q_i)$  so that  $D_i = 0$  for all  $i$ , then the total value of VRT becomes the cost saving from reduced fertilizer application, as corn yield and production are unaffected. In this case, VRT allows farmers to produce the same output with a smaller amount of fertilizer. Only the price of nitrogen fertilizer affects the value of VRT, not the price of corn. Increases (decreases) in the price of nitrogen fertilizer increases (decreases) the value of VRT.

If the SRT strategy is to find the nitrogen application rate that maximizes expected profit, then either farming to the best soil may be optimal or having  $D_i = 0$  for some soil types and  $D_i = 1$  for others. If some soil types are under-supplied and others over-supplied, then the value of VRT consists of yield increases as well as and input cost savings. The value of VRT increases as the prices of nitrogen fertilizer and corn increase, as demonstrated by equations (7) and (8). Equation (9) shows that as corn yields become more responsive to applied nitrogen, the value of VRT also increases.

$$\frac{\partial \mathcal{N}}{\partial P_C} = \sum_{i=1}^n \alpha_i D_i b(Q_i - N^{SRT}) \geq 0, \quad (7)$$

$$\frac{\partial \mathcal{N}}{\partial P_N} = \sum_{i=1}^n \alpha_i [D_i(Q_i - N^{SRT}) + (1 - D_i)(N^{SRT} - Q_i)] \geq 0, \quad (8)$$

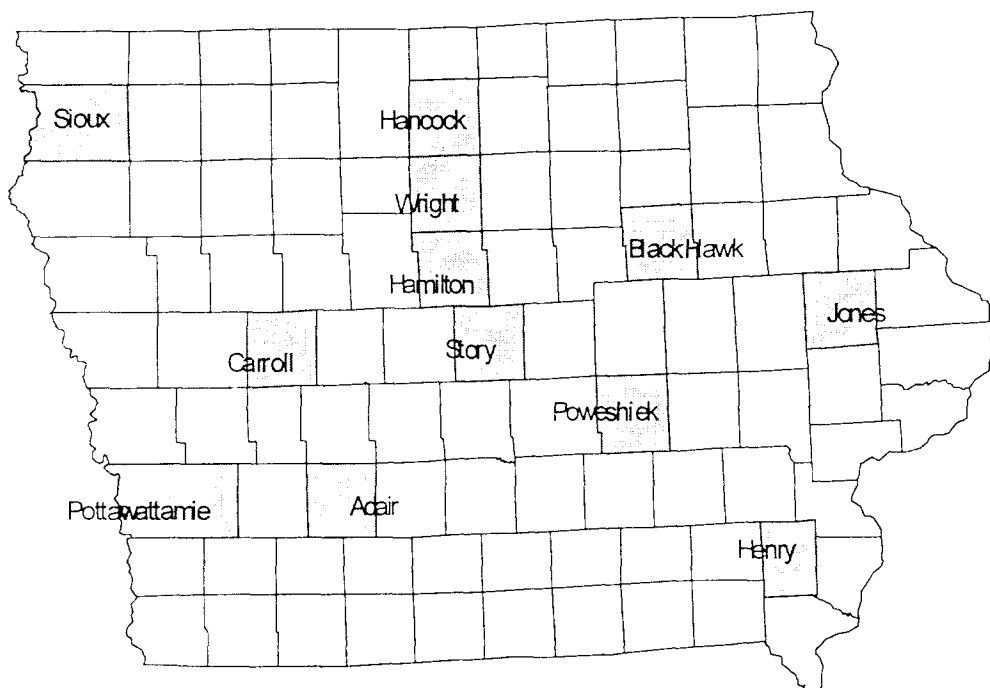


$$\frac{\partial \mathcal{N}}{\partial b} = \sum_{i=1}^n \alpha_i D_i P_C(Q_i - N^{SRT}) \geq 0. \quad (9)$$

### Empirical Results

Data on the distribution and productivity of soils on 20 randomly selected fields in 12 randomly selected Iowa counties were obtained from the Soil Survey section of the Iowa State University Department of Agronomy. Figure 1 shows the location of the counties. For each field, the spatial distribution of soil types ( $\alpha_i$ ) was estimated from digitized soil maps. Each soil type has an associated estimate of corn yield potential. The maximum yield in the LRP model ( $M_i$  from equation [1]) was set equal to this corn yield potential. The slope coefficient ( $b$ ) of the LRP model was set equal to 0.56 which was the average LRP slope across many site-years in a previous study [Babcock and Blackmer, 1994]. The price per bushel of corn was set at \$2.50 and the price per pound of nitrogen was set at \$0.20.

Figure 1. Iowa Counties Selected for Analysis



How optimal nitrogen applications (the rate where the kink occurs in the LRP model) change with a soil's yield potential is not a straightforward relationship. Fertilizer recommendations from Iowa State University used to be based on the rule that  $Q_i = 1.2M_i$ . Babcock and Blackmer (1994) found evidence that supports a positive relationship between  $Q_i$  and  $M_i$  across sites, but the parameters of the relationship were sensitive to the assumed functional form of the site-specific production function. To show how the effects of moving to VRT are affected by the parameters, two sets of parameters are used in this study:

$$Q_i = 105.56 + 0.68M_i, \quad (11)$$

$$Q_i = -21.93 + 1.52M_i. \quad (12)$$

The two relationships are used to examine the changes in the value of VRT from altering the responsiveness of optimal nitrogen rates to maximum inherent yields. Equation (11) represents the situation where optimal nitrogen rates are relatively unresponsive to maximum yields, whereas equation (12) represents the more responsive case.

To estimate the effects of moving to VRT, we first must determine  $N^{SRT}$  for each field. This was accomplished by finding the application rate that maximized equation (5). At this optimal single application rate, portions of fields either receive too much fertilizer ( $M_i < bN^{SRT}$ ), too little fertilizer ( $M_i > bN^{SRT}$ ), or the optimal (in an ex post sense) amount ( $M_i = bN^{SRT}$ ). Table 1 presents estimates of the acreage and proportion of acreage on the fields in each of the 12 counties that are over-supplied or under-supplied with fertilizer. The acreage that receives the optimal amount is the residual.

If farmers fertilize according to the optimal SRT rule, and if optimal fertilizer rates and soil type are linearly related, as specified in equations (11) and (12), then 66 percent of acreage would be over-supplied with fertilizer, 4 percent would be under-supplied, and 30 percent of the acreage on these fields would receive the correct amount of fertilizer. The optimal single rate of fertilizer will equal the optimal VRT application

for an entire field only if the field has only one soil type. In this study, all fields exhibited some soil type variability. The optimal single rate will equal the VRT rate on a portion of a field if that portion is the predominant soil type that is relatively high yielding. This predominance of soils on fields is why 30 percent of the acreage would receive the correct amount of fertilizer under SRT.

Table 2 presents the per acre change in returns over fertilizer costs in each of the 12 Iowa counties when switching from SRT to VRT applications of nitrogen fertilizer. The Table 2 results assume that optimal nitrogen rates are relatively responsive to maximum yields (equation [11]). The largest increase in returns, \$7.43 per acre, occurred in Adair County and the smallest increase in profit, \$3.40 per acre, occurred in Henry County. Over the whole study area, switching to VRT would increase returns over fertilizer costs by \$4.44 per acre.

Table 2 also presents the source of the increase in returns when switching to VRT. In the study area, the vast majority of the increase (86 percent) came from reducing excess fertilizer applications. Profit-maximization using SRT leads to excess applications because the payoff from reducing yield shortfalls in high-yielding portions of fields is greater than the cost savings from reducing rates on low-yielding portions. That is, when farmers cannot vary fertilizer rates across their fields, or they do not have information about the location of their best yielding soils, then they have an incentive to fertilize for the best soils on their fields. With VRT farmers possess information about the location of their soils and the ability to vary fertilizer rates. This knowledge and ability leads to lower production costs from reduced fertilizer applications without a yield loss. In Pottawattamie County, eliminating the over-application of nitrogen fertilizer contributed to 95 percent of the increase in profit. In Carroll County, the contribution is lowest, but still quite substantial at 70 percent.

The other source of increasing profits with VRT is eliminating the under-application of nitrogen fertilizer. Applying more nitrogen fertilizer where it is needed increases corn yield and farmer profit. In the study area, only 14 percent of the increase in profits are attributable to increasing yields. This modest contribution reflects the large amount of land that is over-supplied with nitrogen fertilizer rather than under supplied

when using SRT. The increases in marginal returns from increasing fertilizer rates on under-supplied land is much higher than for reducing rates on over-supplied land. Adding a pound of nitrogen where it is needed generates \$1.20  $[(2.5*0.56)-0.2]$  additional returns per acre, whereas removing a pound of nitrogen where it is not needed generates only \$0.20 per acre. Of course, this asymmetry in returns is why farmers have an incentive to over-apply nitrogen fertilizer under SRT.

Table 3 presents the environmental and production improvements when switching to VRT. As shown in Table 1, about 66 percent of acreage received excess fertilizer over the study area. The first column of Table 3 reports the amount of excess fertilizer applied on this acreage. This is fertilizer that is not needed by the crop and potentially lost to the environment. The second column reports the amount as a percentage of the level applied under VRT. Over the study region, the 66 percent of acreage that received too much fertilizer received, on average, 16.9 percent too much. This over-application ranged from a high of 31.8 percent in Adair County to a low of 12.1 percent in Carroll and Story Counties. The reductions in excess nitrogen applications presumably yields some public environmental benefit without any loss in farmer yields.

The VRT production benefits are higher yields and lower production costs. Increases in yields are quite small, since gains are possible on only 4 percent of the acreage. Over the entire study area, VRT increases yield by an average of 0.30 bushels per acre, which has a value of \$0.75 per acre. This small yield increase occurs with a \$3.69 per acre reduction in the cost of nitrogen fertilizer. With VRT, farmers are able to modestly increase production using a smaller amount of inputs and inflicting less damage on the surrounding environment.

The individual field estimates are presented in Appendixes A, B, and C. Appendix A contains the acres in each field that are over-supplied, under-supplied, and properly supplied with nitrogen when using the optimal SRT. Appendixes B and C contain estimates for the environmental and production benefits for each field when switching to VRT. Appendix B is for the case of highly responsive optimal nitrogen rates, while Appendix C is for the less responsive case.

### **Factors Affecting the Value of VRT**

Factors that may affect the value of VRT are the responsiveness of optimal nitrogen rates to maximum yields, the variability of soil types within a field, and the overall productivity level of a field.

*Responsiveness of Optimal Nitrogen Rates.* The SRT acres that are either over-supplied or under-supplied with nitrogen fertilizer are unaffected by the responsiveness of optimal nitrogen rates to maximum inherent yields. The linearity of the relationships between yield and applied nitrogen and between maximum inherent yield and optimal nitrogen rate leaves the SRT acres improperly supplied unchanged.

Table 4 presents the increase in profit when switching to VRT when the response of optimal nitrogen application to maximum inherent yield is relatively unresponsive as given by equation [11]. As the responsiveness decreases, the increase in returns to moving to VRT becomes smaller for each county. The largest increase becomes \$3.32 per acre in Adair County, while the smallest increase is \$1.52 per acre in Henry County. For the study area, the increase is less than half the increase estimated under the more responsive relationship. The average increase falls from \$4.44 per acre to \$1.99 per acre. The source of the increase in returns from moving to VRT, however, remains at 86 percent due to the elimination of over-application and 14 percent due to the elimination of under-application of nitrogen.

As the responsiveness of optimal nitrogen rates to soil productivity declines, SRT applications continue to incorrectly apply nitrogen to the same acreage, but the magnitude of the over- and under-application becomes smaller. This reduction in the misapplication of nitrogen to a field is due to the reduced variability of optimal nitrogen rates. SRT applications of nitrogen fertilizer becomes closer to VRT applications. Of course, in the limit, as variability goes to zero, SRT rates converge to VRT rates.

Tables 3 and 5 provide additional evidence of this by showing that the VRT environmental and production improvements are smaller when the optimal nitrogen application rate is less responsive. In the study area, the amount of nitrogen fertilizer potentially leeching into underground water supplies declines from 16.9 percent of VRT application rates to 7.6 percent. VRT increase in corn yields also falls from 0.30 bushels

per acre in the high response case to 0.13 bushels per acre in the low response case. Finally, the VRT reduction in nitrogen costs decreases from \$3.69 per acre to \$1.65 per acre. A lower optimal nitrogen rate response to maximum inherent yields causes the value of VRT as well as its environmental and production improvements to decline.

*Field Variability and Productivity.* To estimate the impact of yield variability within a field, the value of VRT on field ( $V$ ) is regressed on the standard deviation of  $M_i$  for each field. Table 6 presents the results of the regression when the optimal nitrogen rate is relatively responsive and nonresponsive to soil productivity. Not surprisingly, the variability of soil productivity significantly affects  $V$ , a result that supports the theoretical models of the effects of variability on the value of VRT [Hennessy et al., 1996]. As the standard deviation of soil productivity (as measured by maximum inherent yield) increases by one bushel per acre, the value of VRT increases by \$0.13 per acre in the low response case and \$0.28 per acre in the high response case.

In the 12-county study area, fields with lower overall productivity on average possess greater yield variability. The correlation coefficient between yield variability and overall field productivity is equal to  $-0.54$ . These results indicate that the value of VRT on average will be greater for less productive fields than fields with higher productivity levels.

### **Conclusions**

There is a growing need for research that estimates the potential value to farmers of acquiring and using improved information about spatial variability within their fields. This need comes from the precision agriculture industry, as it struggles to develop decision models that can turn technical advances in positioning equipment and data generation into value for farmers, and from farmers who are trying to estimate the potential value of investing in precision agriculture equipment. This study begins to fill this need by estimating the potential value of using information about the distribution of soil productivity within fields to guide nitrogen fertilizer rates.

The spatial distribution of soils on 20 randomly selected fields in each of 12 Iowa counties is used to estimate the degree of spatial variability that exists and how fertilizer

rates and returns to fertilizer might be altered by moving to variable fertilizer rates. We demonstrate that following an optimal uniform rate on these 240 fields would result in 66 percent of acreage being over-supplied with nitrogen fertilizer. Only 4 percent of acreage would be under-supplied. Thus, matching fertilizer rates with a soil's productivity would reduce average nitrogen fertilizer rates and increase yields by a small amount, thereby increasing returns over fertilizer costs. Environmental benefits would accrue because less nitrogen would be available to contaminate water supplies.

The county-level results indicate modest increases in returns over fertilizer costs, ranging from \$7.43 per acre to \$1.59 per acre. The county-level VRT production benefits are increases in yields ranging from 0.05 to 0.50 bushels per acre and reduction in production costs ranging from \$1.19 to \$6.83 per acre. The modest increase in returns is due to farmers over-applying nitrogen when using SRT, thereby insuring themselves against yield losses. The profit margin for correcting over-supplied land is minimal, \$0.20 per acre, while correcting under-supplied land is much larger, \$1.20 per acre. The VRT environmental benefit for the entire study area is quite large, ranging from 77 to 172 tons of nitrogen.

Increases in the price of corn and nitrogen cause the value of VRT to increase. Greater field variability from either the soil types within a field (maximum inherent yields) or from the best manner to treat the soil types (optimal nitrogen applications) also cause the value of VRT to increase. Increasing the yield variability within a field one bushel per acre increases the value of VRT approximately \$0.13 to \$0.28 per acre. The lower productive fields in the study area were found to possess more yield variability than the higher productive fields. This indicates that the value of VRT will be greater on average for lower productive fields.

The increases in returns over fertilizer costs estimated here would likely not cover the total cost of moving to VRT. However, the analysis ignored other farming decisions that may be improved through the use of VRT for nitrogen applications. For example, knowing the soil types within a field may refine the decisions on the levels of phosphorous and potassium to add as well as improve seeding practices. In this manner, the multiproduct nature of VRT would be fully exploited, increasing its value.





Furthermore, the analysis assumed the farmer possessed either perfect information (VRT) or no information (SRT) about the location of soil types within a field. If the farmer obtains partial information, much of the VRT benefits might be realized at a significantly lower cost.

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Table 1. SRT acres over-supplied and under-supplied with nitrogen fertilizer in 12 Iowa counties

| County        | Total Acres | SRT Acres Over-Supplied | Percentage Over-Supplied | SRT Acres Under-Supplied | Percentage Under-Supplied |
|---------------|-------------|-------------------------|--------------------------|--------------------------|---------------------------|
| Adair         | 1,081       | 752                     | 70                       | 42                       | 4                         |
| Black Hawk    | 987         | 567                     | 58                       | 27                       | 3                         |
| Carroll       | 1,447       | 1,010                   | 70                       | 113                      | 8                         |
| Henry         | 1,044       | 640                     | 62                       | 21                       | 2                         |
| Hancock       | 1,800       | 1,144                   | 64                       | 83                       | 5                         |
| Hamilton      | 1,909       | 1,257                   | 66                       | 113                      | 6                         |
| Poweshiek     | 1,000       | 608                     | 61                       | 43                       | 4                         |
| Pottawattamie | 1,271       | 732                     | 58                       | 15                       | 1                         |
| Sioux         | 2,024       | 1,470                   | 73                       | 115                      | 6                         |
| Story         | 1,582       | 944                     | 60                       | 52                       | 3                         |
| Jones         | 962         | 688                     | 72                       | 48                       | 5                         |
| Wright        | 3,039       | 2,116                   | 70                       | 67                       | 2                         |
| Total         | 18,146      | 11,929                  | 66                       | 738                      | 4                         |

Table 2. Increase in farmer returns over fertilizer costs using VRT in 12 Iowa counties when optimal nitrogen rates are less responsive to maximum yields

| County        | Returns over Fertilizer Cost (\$/acre) | Percent Attributable to Eliminating SRT Over-Application of Nitrogen | Percent Attributable to Eliminating SRT Under-Application of Nitrogen |
|---------------|----------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------|
| Adair         | 7.43                                   | 93                                                                   | 7                                                                     |
| Black Hawk    | 3.42                                   | 93                                                                   | 7                                                                     |
| Carroll       | 4.24                                   | 70                                                                   | 30                                                                    |
| Henry         | 3.40                                   | 93                                                                   | 7                                                                     |
| Hancock       | 4.52                                   | 86                                                                   | 14                                                                    |
| Hamilton      | 3.89                                   | 73                                                                   | 27                                                                    |
| Poweshiek     | 5.65                                   | 82                                                                   | 18                                                                    |
| Pottawattamie | 4.27                                   | 95                                                                   | 5                                                                     |
| Sioux         | 3.78                                   | 86                                                                   | 14                                                                    |
| Story         | 3.55                                   | 80                                                                   | 20                                                                    |
| Jones         | 6.68                                   | 89                                                                   | 11                                                                    |
| Wright        | 4.34                                   | 90                                                                   | 10                                                                    |
| Total         | 4.44                                   | 86                                                                   | 14                                                                    |

Table 3. VRT environmental and production improvements in 12 Iowa counties when optimal nitrogen rates are highly responsive to maximum yields

| County        | VRT Reduction in Over Application of Nitrogen |      | VRT Increase in Corn Yield | VRT Decrease in Nitrogen Costs |
|---------------|-----------------------------------------------|------|----------------------------|--------------------------------|
|               | (lb.)                                         | (%)  | (bu./acre)                 | (\$/acre)                      |
| Adair         | 37,401                                        | 31.8 | 0.24                       | 6.83                           |
| Black Hawk    | 15,661                                        | 14.6 | 0.12                       | 3.13                           |
| Carroll       | 21,427                                        | 12.1 | 0.60                       | 2.75                           |
| Henry         | 16,583                                        | 15.4 | 0.11                       | 3.14                           |
| Hancock       | 34,851                                        | 18.3 | 0.30                       | 3.76                           |
| Hamilton      | 26,988                                        | 12.1 | 0.50                       | 2.65                           |
| Poweshiek     | 23,150                                        | 21.6 | 0.48                       | 4.46                           |
| Pottawattamie | 25,806                                        | 21.7 | 0.10                       | 4.02                           |
| Sioux         | 32,913                                        | 15.1 | 0.25                       | 3.16                           |
| Story         | 22,373                                        | 12.1 | 0.34                       | 2.71                           |
| Jones         | 28,583                                        | 25.5 | 0.34                       | 5.82                           |
| Wright        | 59,043                                        | 15.9 | 0.21                       | 3.81                           |
| Total         | 344,778                                       | 16.9 | 0.30                       | 3.69                           |

Table 4. Increase in farmer profit using VRT in 12 Iowa counties (\$/acre) when optimal nitrogen rates are less responsive to maximum yields

| County        | Returns over Fertilizer Cost | Percent Attributable to Eliminating SRT Over-Application of Nitrogen | Percent Attributable to Eliminating SRT Under-Application of Nitrogen |
|---------------|------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------|
|               | (\$/acre)                    |                                                                      |                                                                       |
| Adair         | 3.32                         | 93                                                                   | 7                                                                     |
| Black Hawk    | 1.53                         | 93                                                                   | 7                                                                     |
| Carroll       | 1.90                         | 70                                                                   | 30                                                                    |
| Henry         | 1.52                         | 93                                                                   | 7                                                                     |
| Hancock       | 2.02                         | 86                                                                   | 14                                                                    |
| Hamilton      | 1.74                         | 73                                                                   | 27                                                                    |
| Poweshiek     | 2.53                         | 82                                                                   | 18                                                                    |
| Pottawattamie | 1.91                         | 95                                                                   | 5                                                                     |
| Sioux         | 1.69                         | 86                                                                   | 14                                                                    |
| Story         | 1.59                         | 80                                                                   | 20                                                                    |
| Jones         | 2.99                         | 89                                                                   | 11                                                                    |
| Wright        | 1.94                         | 90                                                                   | 10                                                                    |
| Total         | 1.99                         | 86                                                                   | 14                                                                    |

Table 5. VRT environmental and production improvements in 12 Iowa counties when optimal nitrogen rates are less responsive to maximum yields

| County        | VRT Reduction in Over-Application of Nitrogen |      | VRT Increase in Corn Yield | VRT Decrease in Nitrogen Costs |
|---------------|-----------------------------------------------|------|----------------------------|--------------------------------|
|               | (lb.)                                         | (%)  | (bu./acre)                 | (\$/acre)                      |
| Adair         | 16,732                                        | 14.2 | 0.11                       | 3.06                           |
| Black Hawk    | 7,006                                         | 6.5  | 0.05                       | 1.40                           |
| Carroll       | 9,586                                         | 5.4  | 0.27                       | 1.23                           |
| Henry         | 7,419                                         | 6.9  | 0.05                       | 1.40                           |
| Hancock       | 15,591                                        | 8.2  | 0.14                       | 1.68                           |
| Hamilton      | 12,073                                        | 5.4  | 0.22                       | 1.19                           |
| Poweshiek     | 10,357                                        | 9.7  | 0.21                       | 2.00                           |
| Pottawattamie | 11,545                                        | 9.7  | 0.04                       | 1.80                           |
| Sioux         | 14,724                                        | 6.7  | 0.11                       | 1.42                           |
| Story         | 10,009                                        | 5.4  | 0.15                       | 1.21                           |
| Jones         | 12,787                                        | 11.4 | 0.15                       | 2.60                           |
| Wright        | 26,414                                        | 7.1  | 0.09                       | 1.70                           |
| Total         | 154,243                                       | 7.6  | 0.13                       | 1.65                           |

Table 6. Regression results for the effect of yield variability within a field on the value of VRT

| Variable          | Responsiveness of Optimal N Rates to Soil Productivity |              |
|-------------------|--------------------------------------------------------|--------------|
|                   | High Response                                          | Low Response |
| Intercept         | 0.69*                                                  | 0.31*        |
|                   | (3.49)                                                 | (3.49)       |
| Yield Variability | 0.28*                                                  | 0.13*        |
|                   | (23.76)                                                | (23.76)      |
| R <sup>2</sup>    | 0.69                                                   | 0.69         |

Numbers in parentheses are t-ratios.





**APPENDIX A**

**SRT Acres Over-supplied, Under-supplied and  
Properly Supplied with Nitrogen Fertilizer**

## Appendix A

| County & Field | Total<br>Acres | SRT                       | SRT                        | SRT                           | Percent                   | Percent                    | Percent                       |
|----------------|----------------|---------------------------|----------------------------|-------------------------------|---------------------------|----------------------------|-------------------------------|
|                |                | Acres<br>Over<br>Supplied | Acres<br>Under<br>Supplied | Acres<br>Properly<br>Supplied | Acres<br>Over<br>Supplied | Acres<br>Under<br>Supplied | Acres<br>Properly<br>Supplied |
| ADAIR753226    | 77.85          | 64.15                     | 6.98                       | 6.72                          | 82%                       | 9%                         | 9%                            |
| ADAIR773321    | 24.16          | 16.22                     | 0.00                       | 7.94                          | 67%                       | 0%                         | 33%                           |
| ADAIR743034    | 31.42          | 15.92                     | 0.00                       | 15.50                         | 51%                       | 0%                         | 49%                           |
| ADAIR773323    | 39.96          | 29.41                     | 1.88                       | 8.68                          | 74%                       | 5%                         | 22%                           |
| ADAIR743307    | 22.00          | 17.14                     | 0.00                       | 4.86                          | 78%                       | 0%                         | 22%                           |
| ADAIR773131    | 86.97          | 60.61                     | 0.00                       | 26.36                         | 70%                       | 0%                         | 30%                           |
| ADAIR743136A   | 50.97          | 29.41                     | 4.84                       | 16.73                         | 58%                       | 9%                         | 33%                           |
| ADAIR743136    | 77.61          | 55.21                     | 4.20                       | 18.21                         | 71%                       | 5%                         | 23%                           |
| ADAIR743118    | 66.66          | 44.37                     | 6.34                       | 15.95                         | 67%                       | 10%                        | 24%                           |
| ADAIR763128    | 28.89          | 21.38                     | 4.10                       | 3.41                          | 74%                       | 14%                        | 12%                           |
| ADAIR753328A   | 48.18          | 31.61                     | 3.36                       | 13.21                         | 66%                       | 7%                         | 27%                           |
| ADAIR753328    | 104.14         | 87.25                     | 0.00                       | 16.89                         | 84%                       | 0%                         | 16%                           |
| ADAIR773022    | 28.67          | 13.02                     | 0.00                       | 15.65                         | 45%                       | 0%                         | 55%                           |
| ADAIR773022A   | 75.36          | 57.65                     | 0.00                       | 17.71                         | 77%                       | 0%                         | 23%                           |
| ADAIR763034    | 33.72          | 27.76                     | 0.00                       | 5.96                          | 82%                       | 0%                         | 18%                           |
| ADAIR773013    | 72.83          | 33.46                     | 0.00                       | 39.38                         | 46%                       | 0%                         | 54%                           |
| ADAIR743017    | 44.84          | 24.15                     | 0.00                       | 20.69                         | 54%                       | 0%                         | 46%                           |
| ADAIR763132    | 34.30          | 23.05                     | 3.15                       | 8.10                          | 67%                       | 9%                         | 24%                           |
| ADAIR753020    | 78.50          | 55.77                     | 0.00                       | 22.73                         | 71%                       | 0%                         | 29%                           |
| ADAIR753213    | 54.32          | 44.61                     | 6.71                       | 3.00                          | 82%                       | 12%                        | 6%                            |
| BHAWK891123    | 106.99         | 61.28                     | 0.00                       | 45.70                         | 57%                       | 0%                         | 43%                           |
| BHAWK881234    | 22.69          | 11.27                     | 0.00                       | 11.42                         | 50%                       | 0%                         | 50%                           |
| BHAWK881330    | 55.61          | 48.48                     | 0.00                       | 7.13                          | 87%                       | 0%                         | 13%                           |
| BHAWK901110    | 27.63          | 21.20                     | 0.00                       | 6.43                          | 77%                       | 0%                         | 23%                           |
| BHAWK871114    | 30.51          | 23.51                     | 1.49                       | 5.51                          | 77%                       | 5%                         | 18%                           |
| BHAWK871329    | 148.41         | 114.88                    | 4.26                       | 29.26                         | 77%                       | 3%                         | 20%                           |
| BHAWK881125    | 30.04          | 7.14                      | 0.00                       | 22.90                         | 24%                       | 0%                         | 76%                           |
| BHAWK881430    | 31.44          | 7.53                      | 0.00                       | 23.91                         | 24%                       | 0%                         | 76%                           |
| BHAWK891102    | 33.41          | 11.10                     | 0.00                       | 22.30                         | 33%                       | 0%                         | 67%                           |
| BHAWK871434    | 33.38          | 7.56                      | 0.00                       | 25.82                         | 23%                       | 0%                         | 77%                           |
| BHAWK881217    | 32.01          | 2.60                      | 0.81                       | 28.60                         | 8%                        | 3%                         | 89%                           |
| BHAWK891134    | 67.42          | 47.64                     | 0.00                       | 19.78                         | 71%                       | 0%                         | 29%                           |
| BHAWK871334    | 59.42          | 31.74                     | 4.88                       | 22.80                         | 53%                       | 8%                         | 38%                           |
| BHAWK871325    | 19.68          | 15.80                     | 0.00                       | 3.89                          | 80%                       | 0%                         | 20%                           |
| BHAWK891409    | 75.66          | 45.36                     | 5.54                       | 24.76                         | 60%                       | 7%                         | 33%                           |
| BHAWK891404    | 73.24          | 53.15                     | 0.00                       | 20.09                         | 73%                       | 0%                         | 27%                           |
| BHAWK871223    | 17.93          | 7.25                      | 2.32                       | 8.36                          | 40%                       | 13%                        | 47%                           |
| BHAWK901208    | 23.78          | 17.49                     | 3.17                       | 3.11                          | 74%                       | 13%                        | 13%                           |
| BHAWK891109    | 64.57          | 21.03                     | 4.25                       | 39.29                         | 33%                       | 7%                         | 61%                           |
| BHAWK901106    | 33.03          | 11.44                     | 0.00                       | 21.59                         | 35%                       | 0%                         | 65%                           |
| CARROLL853508  | 19.81          | 11.04                     | 2.79                       | 5.98                          | 56%                       | 14%                        | 30%                           |
| CARROLL 853520 | 118.40         | 89.82                     | 0.00                       | 28.58                         | 76%                       | 0%                         | 24%                           |
| CARROLL823511  | 33.21          | 26.47                     | 0.00                       | 6.73                          | 80%                       | 0%                         | 20%                           |
| CARROLL823315  | 115.45         | 91.77                     | 6.91                       | 16.77                         | 79%                       | 6%                         | 15%                           |
| CARROLL843325  | 60.62          | 35.71                     | 0.00                       | 24.91                         | 59%                       | 0%                         | 41%                           |
| CARROLL833331  | 165.17         | 140.60                    | 13.21                      | 11.35                         | 85%                       | 8%                         | 7%                            |
| CARROLL833430  | 99.88          | 62.56                     | 13.78                      | 23.54                         | 63%                       | 14%                        | 24%                           |

## Appendix A

| County & Field | Total<br>Acres | SRT                       | SRT                        | SRT                           | Percent                   | Percent                    | Percent                       |
|----------------|----------------|---------------------------|----------------------------|-------------------------------|---------------------------|----------------------------|-------------------------------|
|                |                | Acres<br>Over<br>Supplied | Acres<br>Under<br>Supplied | Acres<br>Properly<br>Supplied | Acres<br>Over<br>Supplied | Acres<br>Under<br>Supplied | Acres<br>Properly<br>Supplied |
| CARROLL853428  | 72.17          | 49.05                     | 6.02                       | 17.10                         | 68%                       | 8%                         | 24%                           |
| CARROLL853510  | 36.20          | 20.75                     | 0.58                       | 14.87                         | 57%                       | 2%                         | 41%                           |
| CARROLL853510A | 64.94          | 54.25                     | 0.00                       | 10.69                         | 84%                       | 0%                         | 16%                           |
| CARROLL843414  | 40.05          | 31.70                     | 0.00                       | 8.35                          | 79%                       | 0%                         | 21%                           |
| CARROLL823430  | 123.93         | 91.27                     | 4.37                       | 28.29                         | 74%                       | 4%                         | 23%                           |
| CARROLL843512  | 45.63          | 30.73                     | 5.12                       | 9.78                          | 67%                       | 11%                        | 21%                           |
| CARROLL823534  | 54.46          | 38.76                     | 0.00                       | 15.69                         | 71%                       | 0%                         | 29%                           |
| CARROLL823623  | 73.88          | 47.40                     | 0.64                       | 25.84                         | 64%                       | 1%                         | 35%                           |
| CARROLL823324  | 58.57          | 0.00                      | 3.28                       | 55.29                         | 0%                        | 6%                         | 94%                           |
| CARROLL823612  | 51.45          | 36.85                     | 1.65                       | 12.95                         | 72%                       | 3%                         | 25%                           |
| CARROLL833303  | 129.83         | 110.00                    | 17.93                      | 1.90                          | 85%                       | 14%                        | 1%                            |
| CARROLL833617  | 44.78          | 38.06                     | 3.92                       | 2.80                          | 85%                       | 9%                         | 6%                            |
| CARROLL853321  | 38.51          | 3.42                      | 32.85                      | 2.24                          | 9%                        | 85%                        | 6%                            |
| HENRY700712    | 35.41          | 27.60                     | 1.05                       | 6.76                          | 78%                       | 3%                         | 19%                           |
| HENRY700701    | 71.97          | 61.42                     | 0.00                       | 10.55                         | 85%                       | 0%                         | 15%                           |
| HENRY720508    | 82.10          | 55.03                     | 0.00                       | 27.07                         | 67%                       | 0%                         | 33%                           |
| HENRY720615    | 40.59          | 26.91                     | 0.00                       | 13.67                         | 66%                       | 0%                         | 34%                           |
| HENRY720614    | 61.94          | 46.46                     | 0.00                       | 15.48                         | 75%                       | 0%                         | 25%                           |
| HENRY730731    | 81.95          | 65.37                     | 0.00                       | 16.58                         | 80%                       | 0%                         | 20%                           |
| HENRY720605    | 37.61          | 23.73                     | 5.05                       | 8.82                          | 63%                       | 13%                        | 23%                           |
| HENRY700513    | 36.38          | 13.16                     | 0.00                       | 23.21                         | 36%                       | 0%                         | 64%                           |
| HENRY710736    | 19.77          | 10.15                     | 0.00                       | 9.62                          | 51%                       | 0%                         | 49%                           |
| HENRY730501    | 41.01          | 19.93                     | 3.69                       | 17.40                         | 49%                       | 9%                         | 42%                           |
| HENRY730720    | 46.34          | 32.03                     | 0.00                       | 14.31                         | 69%                       | 0%                         | 31%                           |
| HENRY730717    | 51.02          | 18.05                     | 3.35                       | 29.61                         | 35%                       | 7%                         | 58%                           |
| HENRY710718    | 31.10          | 22.40                     | 0.10                       | 8.60                          | 72%                       | 0%                         | 28%                           |
| HENRY720703    | 62.52          | 23.75                     | 0.00                       | 38.77                         | 38%                       | 0%                         | 62%                           |
| HENRY730702    | 47.24          | 39.19                     | 0.00                       | 8.04                          | 83%                       | 0%                         | 17%                           |
| HENRY730708    | 59.38          | 14.60                     | 0.00                       | 44.78                         | 25%                       | 0%                         | 75%                           |
| HENRY700514    | 47.88          | 24.97                     | 0.00                       | 22.91                         | 52%                       | 0%                         | 48%                           |
| HENRY710623    | 77.93          | 47.42                     | 0.00                       | 30.51                         | 61%                       | 0%                         | 39%                           |
| HENRY700527    | 30.17          | 16.39                     | 0.00                       | 13.78                         | 54%                       | 0%                         | 46%                           |
| HENRY700624    | 81.71          | 51.52                     | 7.96                       | 22.23                         | 63%                       | 10%                        | 27%                           |
| HANCOCK962521  | 182.44         | 126.31                    | 7.93                       | 48.21                         | 69%                       | 4%                         | 26%                           |
| HANCOCK962323  | 176.35         | 101.16                    | 13.79                      | 61.41                         | 57%                       | 8%                         | 35%                           |
| HANCOCK952403  | 52.66          | 52.44                     | 0.00                       | 0.22                          | 100%                      | 0%                         | 0%                            |
| HANCOCK962633  | 28.81          | 21.42                     | 0.00                       | 7.39                          | 74%                       | 0%                         | 26%                           |
| HANCOCK962423  | 115.26         | 76.48                     | 15.94                      | 22.83                         | 66%                       | 14%                        | 20%                           |
| HANCOCK962524  | 104.82         | 88.76                     | 14.63                      | 1.43                          | 85%                       | 14%                        | 1%                            |
| HANCOCK962524  | 35.10          | 26.75                     | 0.41                       | 7.94                          | 76%                       | 1%                         | 23%                           |
| HANCOCK952612  | 155.55         | 129.21                    | 0.00                       | 26.34                         | 83%                       | 0%                         | 17%                           |
| HANCOCK942520  | 82.04          | 62.67                     | 0.00                       | 19.37                         | 76%                       | 0%                         | 24%                           |
| HANCOCK972433  | 52.34          | 41.84                     | 0.00                       | 10.50                         | 80%                       | 0%                         | 20%                           |
| HANCOCK972426  | 74.52          | 51.40                     | 1.57                       | 21.55                         | 69%                       | 2%                         | 29%                           |
| HANCOCK942402  | 53.99          | 34.15                     | 6.58                       | 13.27                         | 63%                       | 12%                        | 25%                           |
| HANCOCK972530  | 54.44          | 44.72                     | 0.00                       | 9.72                          | 82%                       | 0%                         | 18%                           |
| HANCOCK952630  | 124.14         | 14.99                     | 0.31                       | 108.85                        | 12%                       | 0%                         | 88%                           |

## Appendix A

| County & Field  | Total<br>Acres | SRT<br>Acres<br>Over<br>Supplied | SRT<br>Acres<br>Under<br>Supplied | SRT<br>Acres<br>Properly<br>Supplied | Percent<br>Acres<br>Over<br>Supplied | Percent<br>Acres<br>Under<br>Supplied | Percent<br>Acres<br>Properly<br>Supplied |
|-----------------|----------------|----------------------------------|-----------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|------------------------------------------|
| HANCOCK952518   | 155.93         | 100.27                           | 0.00                              | 55.67                                | 64%                                  | 0%                                    | 36%                                      |
| HANCOCK942606   | 49.10          | 5.10                             | 0.62                              | 43.37                                | 10%                                  | 1%                                    | 88%                                      |
| HANCOCK952328   | 55.64          | 46.85                            | 0.00                              | 8.79                                 | 84%                                  | 0%                                    | 16%                                      |
| HANCOCK972605   | 166.19         | 77.81                            | 20.81                             | 67.56                                | 47%                                  | 13%                                   | 41%                                      |
| HANCOCK942627   | 38.93          | 16.73                            | 0.30                              | 21.90                                | 43%                                  | 1%                                    | 56%                                      |
| HANCOCK942322   | 41.97          | 25.37                            | 0.00                              | 16.60                                | 60%                                  | 0%                                    | 40%                                      |
| HAMILTON882308  | 111.60         | 82.98                            | 0.00                              | 28.63                                | 74%                                  | 0%                                    | 26%                                      |
| HAMILTON892412  | 164.40         | 138.99                           | 6.57                              | 18.85                                | 85%                                  | 4%                                    | 11%                                      |
| HAMILTON892519  | 72.80          | 50.50                            | 0.00                              | 22.30                                | 69%                                  | 0%                                    | 31%                                      |
| HAMILTON862514  | 83.17          | 35.39                            | 7.12                              | 40.66                                | 43%                                  | 9%                                    | 49%                                      |
| HAMILTON872312  | 56.01          | 46.45                            | 5.45                              | 4.10                                 | 83%                                  | 10%                                   | 7%                                       |
| HAMILTON882502  | 54.86          | 32.38                            | 6.33                              | 16.16                                | 59%                                  | 12%                                   | 29%                                      |
| HAMILTON862421  | 88.56          | 57.11                            | 10.90                             | 20.56                                | 64%                                  | 12%                                   | 23%                                      |
| HAMILTON872413  | 53.14          | 25.78                            | 2.52                              | 24.83                                | 49%                                  | 5%                                    | 47%                                      |
| HAMILTON872522  | 158.10         | 124.46                           | 21.59                             | 12.05                                | 79%                                  | 14%                                   | 8%                                       |
| HAMILTON882303  | 319.79         | 264.90                           | 18.58                             | 36.31                                | 83%                                  | 6%                                    | 11%                                      |
| HAMILTON872536  | 44.86          | 27.73                            | 0.00                              | 17.13                                | 62%                                  | 0%                                    | 38%                                      |
| HAMILTON892305  | 40.93          | 8.92                             | 4.76                              | 27.25                                | 22%                                  | 12%                                   | 67%                                      |
| HAMILTON862505  | 97.99          | 66.30                            | 11.51                             | 20.19                                | 68%                                  | 12%                                   | 21%                                      |
| HAMILTON862412  | 101.09         | 58.42                            | 7.40                              | 35.27                                | 58%                                  | 7%                                    | 35%                                      |
| HAMILTON882530  | 85.79          | 70.91                            | 0.85                              | 14.02                                | 83%                                  | 1%                                    | 16%                                      |
| HAMILTON862632  | 82.28          | 21.78                            | 5.73                              | 54.78                                | 26%                                  | 7%                                    | 67%                                      |
| HAMILTON862632A | 80.93          | 47.65                            | 2.61                              | 30.66                                | 59%                                  | 3%                                    | 38%                                      |
| HAMILTON862629  | 87.80          | 54.43                            | 0.00                              | 33.37                                | 62%                                  | 0%                                    | 38%                                      |
| HAMILTON882627  | 85.49          | 13.50                            | 0.81                              | 71.17                                | 16%                                  | 1%                                    | 83%                                      |
| HAMILTON892616  | 39.33          | 28.20                            | 0.00                              | 11.13                                | 72%                                  | 0%                                    | 28%                                      |
| POWESHIE791529  | 33.81          | 17.47                            | 0.00                              | 16.34                                | 52%                                  | 0%                                    | 48%                                      |
| POWESHIE791532  | 35.32          | 25.35                            | 3.81                              | 6.16                                 | 72%                                  | 11%                                   | 17%                                      |
| POWESHIE781629  | 89.93          | 65.39                            | 2.33                              | 22.21                                | 73%                                  | 3%                                    | 25%                                      |
| POWESHIE801409  | 25.63          | 11.43                            | 2.81                              | 11.39                                | 45%                                  | 11%                                   | 44%                                      |
| POWESHIE801404  | 38.70          | 26.25                            | 1.16                              | 11.29                                | 68%                                  | 3%                                    | 29%                                      |
| POWESHIE791318  | 149.56         | 57.40                            | 12.31                             | 79.85                                | 38%                                  | 8%                                    | 53%                                      |
| POWESHIE791318  | 87.48          | 53.91                            | 11.11                             | 22.46                                | 62%                                  | 13%                                   | 26%                                      |
| POWESHIE791509  | 40.19          | 16.92                            | 0.39                              | 22.88                                | 42%                                  | 1%                                    | 57%                                      |
| POWESHIE801532  | 93.16          | 71.82                            | 0.00                              | 21.35                                | 77%                                  | 0%                                    | 23%                                      |
| POWESHIE801430  | 62.76          | 35.87                            | 7.71                              | 19.18                                | 57%                                  | 12%                                   | 31%                                      |
| POWESHIE791525  | 51.00          | 38.25                            | 0.00                              | 12.75                                | 75%                                  | 0%                                    | 25%                                      |
| POWESHIE811310  | 36.03          | 23.94                            | 1.46                              | 10.63                                | 66%                                  | 4%                                    | 30%                                      |
| POWESHIE791608  | 38.43          | 14.32                            | 0.00                              | 24.11                                | 37%                                  | 0%                                    | 63%                                      |
| POWESHIE811620  | 43.01          | 32.27                            | 0.00                              | 10.74                                | 75%                                  | 0%                                    | 25%                                      |
| POWESHIE781618  | 42.25          | 30.48                            | 0.00                              | 11.77                                | 72%                                  | 0%                                    | 28%                                      |
| POWESHIE791308  | 9.86           | 4.66                             | 0.00                              | 5.20                                 | 47%                                  | 0%                                    | 53%                                      |
| POWESHIE781509  | 48.10          | 30.70                            | 0.00                              | 17.40                                | 64%                                  | 0%                                    | 36%                                      |
| POWESHIE781419  | 21.95          | 14.55                            | 0.00                              | 7.41                                 | 66%                                  | 0%                                    | 34%                                      |
| POWESHIE811509  | 36.26          | 27.02                            | 0.00                              | 9.24                                 | 75%                                  | 0%                                    | 25%                                      |
| POWESHIE781436  | 16.49          | 10.20                            | 0.00                              | 6.29                                 | 62%                                  | 0%                                    | 38%                                      |
| POTTAWAT764428  | 68.94          | 7.47                             | 0.00                              | 61.47                                | 11%                                  | 0%                                    | 89%                                      |

## Appendix A

| County & Field | Total<br>Acres | SRT                       | SRT                        | SRT                           | Percent                   | Percent                    | Percent                       |
|----------------|----------------|---------------------------|----------------------------|-------------------------------|---------------------------|----------------------------|-------------------------------|
|                |                | Acres<br>Over<br>Supplied | Acres<br>Under<br>Supplied | Acres<br>Properly<br>Supplied | Acres<br>Over<br>Supplied | Acres<br>Under<br>Supplied | Acres<br>Properly<br>Supplied |
| POTTAWAT754132 | 110.99         | 92.32                     | 8.67                       | 10.00                         | 83%                       | 8%                         | 9%                            |
| POTTAWAT754107 | 37.90          | 24.88                     | 0.00                       | 13.02                         | 66%                       | 0%                         | 34%                           |
| POTTAWAT744317 | 85.38          | 0.00                      | 2.12                       | 83.25                         | 0%                        | 2%                         | 98%                           |
| POTTAWAT764326 | 62.74          | 42.42                     | 0.00                       | 20.32                         | 68%                       | 0%                         | 32%                           |
| POTTAWAT744006 | 48.59          | 18.47                     | 3.98                       | 26.14                         | 38%                       | 8%                         | 54%                           |
| POTTAWAT764324 | 66.79          | 47.19                     | 0.00                       | 19.60                         | 71%                       | 0%                         | 29%                           |
| POTTAWAT764323 | 42.73          | 33.31                     | 0.00                       | 9.42                          | 78%                       | 0%                         | 22%                           |
| POTTAWAT763912 | 39.73          | 32.04                     | 0.00                       | 7.69                          | 81%                       | 0%                         | 19%                           |
| POTTAWAT773805 | 102.83         | 78.77                     | 0.00                       | 24.06                         | 77%                       | 0%                         | 23%                           |
| POTTAWAT774010 | 65.30          | 40.35                     | 0.00                       | 24.95                         | 62%                       | 0%                         | 38%                           |
| POTTAWAT763822 | 22.64          | 12.45                     | 0.00                       | 10.19                         | 55%                       | 0%                         | 45%                           |
| POTTAWAT764335 | 40.29          | 15.49                     | 0.00                       | 24.80                         | 38%                       | 0%                         | 62%                           |
| POTTAWAT764127 | 75.63          | 62.21                     | 0.00                       | 13.42                         | 82%                       | 0%                         | 18%                           |
| POTTAWAT754322 | 14.28          | 10.78                     | 0.00                       | 3.51                          | 75%                       | 0%                         | 25%                           |
| POTTAWAT743912 | 70.19          | 37.50                     | 0.00                       | 32.69                         | 53%                       | 0%                         | 47%                           |
| POTTAWAT774110 | 38.68          | 19.76                     | 0.00                       | 18.92                         | 51%                       | 0%                         | 49%                           |
| POTTAWAT774501 | 160.48         | 66.38                     | 0.00                       | 94.10                         | 41%                       | 0%                         | 59%                           |
| POTTAWAT744130 | 81.72          | 60.65                     | 0.00                       | 21.07                         | 74%                       | 0%                         | 26%                           |
| POTTAWAT774216 | 35.52          | 29.84                     | 0.00                       | 5.68                          | 84%                       | 0%                         | 16%                           |
| SIoux974510    | 124.73         | 104.53                    | 6.44                       | 13.77                         | 84%                       | 5%                         | 11%                           |
| SIoux944704    | 139.28         | 110.84                    | 1.09                       | 27.36                         | 80%                       | 1%                         | 20%                           |
| SIoux954416    | 43.26          | 22.99                     | 0.00                       | 20.27                         | 53%                       | 0%                         | 47%                           |
| SIoux964707    | 177.55         | 149.28                    | 0.00                       | 28.27                         | 84%                       | 0%                         | 16%                           |
| SIoux964425    | 42.34          | 34.39                     | 1.37                       | 6.58                          | 81%                       | 3%                         | 16%                           |
| SIoux974622    | 80.92          | 66.63                     | 10.73                      | 3.56                          | 82%                       | 13%                        | 4%                            |
| SIoux964629    | 40.58          | 32.87                     | 4.56                       | 3.15                          | 81%                       | 11%                        | 8%                            |
| SIoux944422    | 125.70         | 94.25                     | 14.67                      | 16.78                         | 75%                       | 12%                        | 13%                           |
| SIoux954627    | 21.24          | 17.02                     | 1.57                       | 2.65                          | 80%                       | 7%                         | 12%                           |
| SIoux944608    | 106.30         | 80.52                     | 13.66                      | 12.12                         | 76%                       | 13%                        | 11%                           |
| SIoux944409    | 63.89          | 49.37                     | 8.31                       | 6.21                          | 77%                       | 13%                        | 10%                           |
| SIoux944536    | 122.68         | 98.01                     | 7.52                       | 17.15                         | 80%                       | 6%                         | 14%                           |
| SIoux974721    | 34.77          | 29.06                     | 0.00                       | 5.71                          | 84%                       | 0%                         | 16%                           |
| SIoux954318    | 114.34         | 97.94                     | 10.89                      | 5.51                          | 86%                       | 10%                        | 5%                            |
| SIoux964723    | 40.48          | 8.74                      | 3.23                       | 28.51                         | 22%                       | 8%                         | 70%                           |
| SIoux964503    | 241.51         | 119.21                    | 0.00                       | 122.31                        | 49%                       | 0%                         | 51%                           |
| SIoux954714    | 105.47         | 68.63                     | 0.21                       | 36.63                         | 65%                       | 0%                         | 35%                           |
| SIoux974401    | 106.01         | 88.99                     | 15.09                      | 1.93                          | 84%                       | 14%                        | 2%                            |
| SIoux974517    | 147.52         | 119.49                    | 12.71                      | 15.33                         | 81%                       | 9%                         | 10%                           |
| SIoux944803    | 145.69         | 77.31                     | 2.47                       | 65.91                         | 53%                       | 2%                         | 45%                           |
| STORY822404    | 66.68          | 24.73                     | 7.90                       | 34.04                         | 37%                       | 12%                        | 51%                           |
| STORY240403    | 77.52          | 20.27                     | 7.99                       | 49.26                         | 26%                       | 10%                        | 64%                           |
| STORY822407    | 81.35          | 40.80                     | 8.50                       | 32.04                         | 50%                       | 10%                        | 39%                           |
| STORY822413    | 55.16          | 37.99                     | 0.00                       | 17.17                         | 69%                       | 0%                         | 31%                           |
| STORY822211    | 42.61          | 0.48                      | 3.84                       | 38.29                         | 1%                        | 9%                         | 90%                           |
| STORY822301    | 81.80          | 64.93                     | 0.00                       | 16.87                         | 79%                       | 0%                         | 21%                           |
| STORY852335    | 150.80         | 109.16                    | 8.45                       | 33.19                         | 72%                       | 6%                         | 22%                           |
| STORY852222    | 64.77          | 49.51                     | 0.00                       | 15.26                         | 76%                       | 0%                         | 24%                           |

## Appendix A

| County & Field | Total<br>Acres | SRT<br>Acres<br>Over<br>Supplied | SRT<br>Acres<br>Under<br>Supplied | SRT<br>Acres<br>Properly<br>Supplied | Percent<br>Acres<br>Over<br>Supplied | Percent<br>Acres<br>Under<br>Supplied | Percent<br>Acres<br>Properly<br>Supplied |
|----------------|----------------|----------------------------------|-----------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|------------------------------------------|
| STORY842218    | 84.55          | 70.09                            | 0.00                              | 14.46                                | 83%                                  | 0%                                    | 17%                                      |
| STORY852403    | 130.67         | 32.17                            | 9.11                              | 89.38                                | 25%                                  | 7%                                    | 68%                                      |
| STORY832301    | 108.22         | 78.12                            | 0.00                              | 30.10                                | 72%                                  | 0%                                    | 28%                                      |
| STORY822224    | 58.02          | 15.41                            | 4.94                              | 37.66                                | 27%                                  | 9%                                    | 65%                                      |
| STORY852122    | 45.92          | 24.14                            | 0.00                              | 21.78                                | 53%                                  | 0%                                    | 47%                                      |
| STORY832314    | 79.64          | 31.44                            | 1.74                              | 46.46                                | 39%                                  | 2%                                    | 58%                                      |
| STORY842110    | 94.43          | 79.79                            | 0.00                              | 14.63                                | 85%                                  | 0%                                    | 15%                                      |
| STORY832421    | 28.39          | 22.41                            | 0.00                              | 5.98                                 | 79%                                  | 0%                                    | 21%                                      |
| STORY822425    | 46.60          | 19.79                            | 0.00                              | 26.82                                | 42%                                  | 0%                                    | 58%                                      |
| STORY842331    | 64.73          | 49.40                            | 0.00                              | 15.32                                | 76%                                  | 0%                                    | 24%                                      |
| STORY852105    | 68.39          | 46.04                            | 0.00                              | 22.35                                | 67%                                  | 0%                                    | 33%                                      |
| STORY832122    | 151.92         | 127.41                           | 0.00                              | 24.51                                | 84%                                  | 0%                                    | 16%                                      |
| JONES850207    | 35.67          | 13.80                            | 3.75                              | 18.12                                | 39%                                  | 11%                                   | 51%                                      |
| JONES840308    | 40.07          | 24.99                            | 0.00                              | 15.09                                | 62%                                  | 0%                                    | 38%                                      |
| JONES840305    | 47.63          | 38.62                            | 8.32                              | 0.70                                 | 81%                                  | 17%                                   | 1%                                       |
| JONES840134    | 73.49          | 61.67                            | 9.27                              | 2.55                                 | 84%                                  | 13%                                   | 3%                                       |
| JONES830235    | 37.37          | 29.56                            | 0.00                              | 7.81                                 | 79%                                  | 0%                                    | 21%                                      |
| JONES830428    | 80.93          | 58.85                            | 0.00                              | 22.08                                | 73%                                  | 0%                                    | 27%                                      |
| JONES860229    | 41.27          | 33.81                            | 4.66                              | 2.80                                 | 82%                                  | 11%                                   | 7%                                       |
| JONES860425    | 50.90          | 35.47                            | 6.93                              | 8.50                                 | 70%                                  | 14%                                   | 17%                                      |
| JONES840226    | 31.16          | 22.64                            | 0.25                              | 8.27                                 | 73%                                  | 1%                                    | 27%                                      |
| JONES830424    | 42.41          | 34.29                            | 0.00                              | 8.11                                 | 81%                                  | 0%                                    | 19%                                      |
| JONES830424A   | 41.01          | 33.41                            | 0.82                              | 6.78                                 | 81%                                  | 2%                                    | 17%                                      |
| JONES830310    | 40.43          | 32.70                            | 4.25                              | 3.48                                 | 81%                                  | 11%                                   | 9%                                       |
| JONES850110    | 43.34          | 24.79                            | 0.00                              | 18.56                                | 57%                                  | 0%                                    | 43%                                      |
| JONES860135    | 67.40          | 55.35                            | 0.32                              | 11.73                                | 82%                                  | 0%                                    | 17%                                      |
| JONES830106    | 33.30          | 20.14                            | 0.00                              | 13.16                                | 60%                                  | 0%                                    | 40%                                      |
| JONES830135    | 71.65          | 59.41                            | 4.31                              | 7.93                                 | 83%                                  | 6%                                    | 11%                                      |
| JONES830133    | 58.37          | 44.33                            | 0.00                              | 14.04                                | 76%                                  | 0%                                    | 24%                                      |
| JONES860313    | 39.67          | 5.57                             | 0.00                              | 34.10                                | 14%                                  | 0%                                    | 86%                                      |
| JONES860310    | 66.65          | 46.62                            | 4.50                              | 15.53                                | 70%                                  | 7%                                    | 23%                                      |
| JONES830401    | 18.82          | 11.85                            | 0.45                              | 6.52                                 | 63%                                  | 2%                                    | 35%                                      |
| WRIGHT932301   | 219.90         | 166.30                           | 0.00                              | 53.60                                | 76%                                  | 0%                                    | 24%                                      |
| WRIGHT932620   | 36.10          | 28.50                            | 0.00                              | 7.60                                 | 79%                                  | 0%                                    | 21%                                      |
| WRIGHT 932614  | 115.00         | 81.10                            | 16.00                             | 17.90                                | 71%                                  | 14%                                   | 16%                                      |
| WRIGHT932522   | 88.00          | 55.90                            | 0.00                              | 32.10                                | 64%                                  | 0%                                    | 36%                                      |
| WRIGHT932523   | 80.00          | 54.00                            | 0.00                              | 26.00                                | 68%                                  | 0%                                    | 33%                                      |
| WRIGHT932513   | 60.10          | 33.30                            | 0.00                              | 26.80                                | 55%                                  | 0%                                    | 45%                                      |
| WRIGHT932420   | 120.10         | 96.50                            | 0.00                              | 23.60                                | 80%                                  | 0%                                    | 20%                                      |
| WRIGHT932317   | 65.00          | 31.90                            | 8.70                              | 24.40                                | 49%                                  | 13%                                   | 38%                                      |
| WRIGHT932324   | 95.10          | 68.20                            | 8.30                              | 18.60                                | 72%                                  | 9%                                    | 20%                                      |
| WRIGHT932435   | 80.10          | 63.70                            | 6.90                              | 9.50                                 | 80%                                  | 9%                                    | 12%                                      |
| WRIGHT922506   | 80.00          | 31.70                            | 11.20                             | 37.10                                | 40%                                  | 14%                                   | 46%                                      |
| WRIGHT922512   | 159.90         | 113.20                           | 0.00                              | 46.70                                | 71%                                  | 0%                                    | 29%                                      |
| WRIGHT922302   | 160.00         | 130.50                           | 0.00                              | 29.50                                | 82%                                  | 0%                                    | 18%                                      |
| WRIGHT922517   | 160.00         | 101.00                           | 0.00                              | 59.00                                | 63%                                  | 0%                                    | 37%                                      |
| WRIGHT922520   | 130.00         | 110.20                           | 0.00                              | 19.80                                | 85%                                  | 0%                                    | 15%                                      |

## Appendix A

| County & Field | Total<br>Acres   | SRT<br>Acres<br>Over<br>Supplied | SRT<br>Acres<br>Under<br>Supplied | SRT<br>Acres<br>Properly<br>Supplied | Percent<br>Acres<br>Over<br>Supplied | Percent<br>Acres<br>Under<br>Supplied | Percent<br>Acres<br>Properly<br>Supplied |
|----------------|------------------|----------------------------------|-----------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|------------------------------------------|
| WRIGHT912618   | 40.00            | 29.40                            | 0.00                              | 10.60                                | 74%                                  | 0%                                    | 27%                                      |
| WRIGHT922415   | 80.00            | 62.10                            | 0.70                              | 17.20                                | 78%                                  | 1%                                    | 22%                                      |
| WRIGHT922423   | 112.10           | 85.00                            | 0.00                              | 27.10                                | 76%                                  | 0%                                    | 24%                                      |
| WRIGHT922313   | 157.10           | 121.40                           | 0.00                              | 35.70                                | 77%                                  | 0%                                    | 23%                                      |
| WRIGHT922331   | 77.90            | 58.10                            | 0.00                              | 19.80                                | 75%                                  | 0%                                    | 25%                                      |
| WRIGHT922326   | 80.10            | 57.40                            | 0.00                              | 22.70                                | 72%                                  | 0%                                    | 28%                                      |
| WRIGHT912611   | 80.00            | 58.20                            | 0.00                              | 21.80                                | 73%                                  | 0%                                    | 27%                                      |
| WRIGHT912506   | 95.00            | 51.40                            | 0.00                              | 43.60                                | 54%                                  | 0%                                    | 46%                                      |
| WRIGHT912411   | 53.10            | 43.00                            | 0.00                              | 10.10                                | 81%                                  | 0%                                    | 19%                                      |
| WRIGHT912632   | 80.00            | 0.20                             | 11.00                             | 68.80                                | 0%                                   | 14%                                   | 86%                                      |
| WRIGHT912532   | 57.00            | 25.20                            | 0.00                              | 31.80                                | 44%                                  | 0%                                    | 56%                                      |
| WRIGHT902314   | 216.90           | 174.50                           | 2.20                              | 40.20                                | 80%                                  | 1%                                    | 19%                                      |
| WRIGHT902527   | 80.00            | 66.40                            | 0.00                              | 13.60                                | 83%                                  | 0%                                    | 17%                                      |
| WRIGHT902426   | 80.00            | 50.10                            | 0.00                              | 29.90                                | 63%                                  | 0%                                    | 37%                                      |
| WRIGHT902335   | 100.10           | 67.20                            | 2.20                              | 30.70                                | 67%                                  | 2%                                    | 31%                                      |
| <b>TOTAL</b>   | <b>18,146.12</b> | <b>11,929.21</b>                 | <b>738.00</b>                     | <b>5,478.91</b>                      | <b>66%</b>                           | <b>4%</b>                             | <b>30%</b>                               |





**APPENDIX B**

**Field Production and Environmental Benefits  
The High Response Case**

## Appendix B

## HIGH RESPONSE

| County & Field | SRT                                         | VRT                                  | VRT                                  | VRT                               | VRT                              | VRT                              |
|----------------|---------------------------------------------|--------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
|                | Over<br>Application<br>of Nitrogen<br>(lbs) | Increase<br>In<br>Yield<br>(bu/acre) | Increase<br>in<br>Production<br>(\$) | Increase<br>in<br>Revenue<br>(\$) | Reduction<br>in<br>Costs<br>(\$) | Increase<br>in<br>Profit<br>(\$) |
| ADAIR753226    | 3,120                                       | 0.40                                 | 31                                   | 78                                | 613                              | 691                              |
| ADAIR773321    | 904                                         | 0.00                                 | 0                                    | 0                                 | 181                              | 181                              |
| ADAIR743034    | 642                                         | 0.00                                 | 0                                    | 0                                 | 128                              | 128                              |
| ADAIR773323    | 310                                         | 0.29                                 | 12                                   | 29                                | 58                               | 87                               |
| ADAIR743307    | 793                                         | 0.00                                 | 0                                    | 0                                 | 159                              | 159                              |
| ADAIR773131    | 6,193                                       | 0.00                                 | 0                                    | 0                                 | 1,239                            | 1,239                            |
| ADAIR743136A   | 1,804                                       | 0.88                                 | 45                                   | 113                               | 345                              | 457                              |
| ADAIR743136    | 2,169                                       | 0.23                                 | 18                                   | 45                                | 427                              | 472                              |
| ADAIR743118    | 1,547                                       | 0.89                                 | 59                                   | 148                               | 288                              | 437                              |
| ADAIR763128    | 1,043                                       | 0.87                                 | 25                                   | 63                                | 200                              | 262                              |
| ADAIR753328A   | 1,676                                       | 0.52                                 | 25                                   | 63                                | 326                              | 389                              |
| ADAIR753328    | 4,628                                       | 0.00                                 | 0                                    | 0                                 | 926                              | 926                              |
| ADAIR773022    | 215                                         | 0.00                                 | 0                                    | 0                                 | 43                               | 43                               |
| ADAIR773022A   | 2,024                                       | 0.00                                 | 0                                    | 0                                 | 405                              | 405                              |
| ADAIR763034    | 731                                         | 0.00                                 | 0                                    | 0                                 | 146                              | 146                              |
| ADAIR773013    | 852                                         | 0.00                                 | 0                                    | 0                                 | 170                              | 170                              |
| ADAIR743017    | 2,387                                       | 0.00                                 | 0                                    | 0                                 | 477                              | 477                              |
| ADAIR763132    | 1,516                                       | 0.39                                 | 13                                   | 33                                | 298                              | 332                              |
| ADAIR753020    | 3,042                                       | 0.00                                 | 0                                    | 0                                 | 608                              | 608                              |
| ADAIR753213    | 1,806                                       | 0.53                                 | 29                                   | 71                                | 351                              | 422                              |
| BHAWK891123    | 1,618                                       | 0.00                                 | 0                                    | 0                                 | 324                              | 324                              |
| BHAWK881234    | 879                                         | 0.00                                 | 0                                    | 0                                 | 176                              | 176                              |
| BHAWK881330    | 676                                         | 0.00                                 | 0                                    | 0                                 | 135                              | 135                              |
| BHAWK901110    | 1,124                                       | 0.00                                 | 0                                    | 0                                 | 225                              | 225                              |
| BHAWK871114    | 2,057                                       | 0.25                                 | 8                                    | 19                                | 409                              | 428                              |
| BHAWK871329    | 3,095                                       | 0.07                                 | 11                                   | 27                                | 615                              | 642                              |
| BHAWK881125    | 168                                         | 0.00                                 | 0                                    | 0                                 | 34                               | 34                               |
| BHAWK881430    | 153                                         | 0.00                                 | 0                                    | 0                                 | 31                               | 31                               |
| BHAWK891102    | 1,394                                       | 0.00                                 | 0                                    | 0                                 | 279                              | 279                              |
| BHAWK871434    | 257                                         | 0.00                                 | 0                                    | 0                                 | 51                               | 51                               |
| BHAWK881217    | 12                                          | 0.48                                 | 15                                   | 38                                | -3                               | 35                               |
| BHAWK891134    | 923                                         | 0.00                                 | 0                                    | 0                                 | 185                              | 185                              |
| BHAWK871334    | 654                                         | 0.49                                 | 29                                   | 73                                | 120                              | 193                              |
| BHAWK871325    | 314                                         | 0.00                                 | 0                                    | 0                                 | 63                               | 63                               |
| BHAWK891409    | 735                                         | 0.06                                 | 5                                    | 12                                | 145                              | 157                              |
| BHAWK891404    | 506                                         | 0.00                                 | 0                                    | 0                                 | 101                              | 101                              |
| BHAWK871223    | 210                                         | 1.32                                 | 24                                   | 59                                | 34                               | 93                               |
| BHAWK901208    | 364                                         | 0.48                                 | 11                                   | 29                                | 69                               | 97                               |
| BHAWK891109    | 416                                         | 0.17                                 | 11                                   | 27                                | 79                               | 106                              |
| BHAWK901106    | 108                                         | 0.00                                 | 0                                    | 0                                 | 22                               | 22                               |
| CARROLL853508  | 92                                          | 1.32                                 | 26                                   | 65                                | 9                                | 74                               |
| CARROLL 853520 | 2,481                                       | 0.00                                 | 0                                    | 0                                 | 496                              | 496                              |
| CARROLL823511  | 271                                         | 0.00                                 | 0                                    | 0                                 | 54                               | 54                               |
| CARROLL823315  | 2,375                                       | 0.83                                 | 95                                   | 238                               | 441                              | 679                              |
| CARROLL843325  | 1,016                                       | 0.00                                 | 0                                    | 0                                 | 203                              | 203                              |

## Appendix B

| County & Field | HIGH RESPONSE                                      |                                             |                                             |                                          |                                         |                                         |
|----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| CARROLL833331  | 2,269                                              | 0.68                                        | 112                                         | 281                                      | 414                                     | 695                                     |
| CARROLL833430  | 967                                                | 0.23                                        | 23                                          | 59                                       | 185                                     | 244                                     |
| CARROLL853428  | 1,011                                              | 0.78                                        | 56                                          | 141                                      | 182                                     | 323                                     |
| CARROLL853510  | 180                                                | 0.15                                        | 5                                           | 14                                       | 34                                      | 48                                      |
| CARROLL853510A | 1,118                                              | 0.00                                        | 0                                           | 0                                        | 224                                     | 224                                     |
| CARROLL843414  | 1,955                                              | 0.00                                        | 0                                           | 0                                        | 391                                     | 391                                     |
| CARROLL823430  | 2,450                                              | 0.12                                        | 15                                          | 37                                       | 485                                     | 522                                     |
| CARROLL843512  | 377                                                | 1.05                                        | 48                                          | 120                                      | 58                                      | 178                                     |
| CARROLL823534  | 336                                                | 0.00                                        | 0                                           | 0                                        | 67                                      | 67                                      |
| CARROLL823623  | 597                                                | 0.01                                        | 1                                           | 1                                        | 119                                     | 121                                     |
| CARROLL823324  | 0                                                  | 0.23                                        | 14                                          | 34                                       | -5                                      | 29                                      |
| CARROLL823612  | 310                                                | 0.11                                        | 6                                           | 14                                       | 60                                      | 74                                      |
| CARROLL833303  | 2,691                                              | 0.82                                        | 107                                         | 267                                      | 500                                     | 767                                     |
| CARROLL833617  | 654                                                | 0.22                                        | 10                                          | 25                                       | 127                                     | 152                                     |
| CARROLL853321  | 276                                                | 8.97                                        | 345                                         | 864                                      | -68                                     | 795                                     |
| HENRY700712    | 1,419                                              | 0.33                                        | 12                                          | 29                                       | 280                                     | 309                                     |
| HENRY700701    | 2,699                                              | 0.00                                        | 0                                           | 0                                        | 540                                     | 540                                     |
| HENRY720508    | 251                                                | 0.00                                        | 0                                           | 0                                        | 50                                      | 50                                      |
| HENRY720615    | 438                                                | 0.00                                        | 0                                           | 0                                        | 88                                      | 88                                      |
| HENRY720614    | 656                                                | 0.00                                        | 0                                           | 0                                        | 131                                     | 131                                     |
| HENRY730731    | 2,128                                              | 0.00                                        | 0                                           | 0                                        | 426                                     | 426                                     |
| HENRY720605    | 578                                                | 0.87                                        | 33                                          | 81                                       | 104                                     | 185                                     |
| HENRY700513    | 284                                                | 0.00                                        | 0                                           | 0                                        | 57                                      | 57                                      |
| HENRY710736    | 245                                                | 0.00                                        | 0                                           | 0                                        | 49                                      | 49                                      |
| HENRY730501    | 652                                                | 0.61                                        | 25                                          | 63                                       | 121                                     | 184                                     |
| HENRY730720    | 112                                                | 0.00                                        | 0                                           | 0                                        | 22                                      | 22                                      |
| HENRY730717    | 83                                                 | 0.45                                        | 23                                          | 57                                       | 8                                       | 66                                      |
| HENRY710718    | 781                                                | 0.07                                        | 2                                           | 5                                        | 155                                     | 161                                     |
| HENRY720703    | 185                                                | 0.00                                        | 0                                           | 0                                        | 37                                      | 37                                      |
| HENRY730702    | 2,946                                              | 0.00                                        | 0                                           | 0                                        | 589                                     | 589                                     |
| HENRY730708    | 324                                                | 0.00                                        | 0                                           | 0                                        | 65                                      | 65                                      |
| HENRY700514    | 367                                                | 0.00                                        | 0                                           | 0                                        | 73                                      | 73                                      |
| HENRY710623    | 526                                                | 0.00                                        | 0                                           | 0                                        | 105                                     | 105                                     |
| HENRY700527    | 425                                                | 0.00                                        | 0                                           | 0                                        | 85                                      | 85                                      |
| HENRY700624    | 1,483                                              | 0.20                                        | 17                                          | 42                                       | 291                                     | 332                                     |
| HANCOCK962521  | 4,576                                              | 0.18                                        | 32                                          | 81                                       | 904                                     | 985                                     |
| HANCOCK962323  | 1,076                                              | 0.67                                        | 117                                         | 293                                      | 173                                     | 467                                     |
| HANCOCK952403  | 1,782                                              | 0.00                                        | 0                                           | 0                                        | 356                                     | 356                                     |
| HANCOCK962633  | 1,630                                              | 0.00                                        | 0                                           | 0                                        | 326                                     | 326                                     |
| HANCOCK962423  | 1,985                                              | 0.24                                        | 27                                          | 68                                       | 387                                     | 455                                     |
| HANCOCK962524  | 4,988                                              | 0.91                                        | 96                                          | 240                                      | 963                                     | 1,203                                   |
| HANCOCK962524  | 549                                                | 0.10                                        | 3                                           | 9                                        | 109                                     | 117                                     |
| HANCOCK952612  | 2,945                                              | 0.00                                        | 0                                           | 0                                        | 589                                     | 589                                     |
| HANCOCK942520  | 1,617                                              | 0.00                                        | 0                                           | 0                                        | 323                                     | 323                                     |
| HANCOCK972433  | 1,522                                              | 0.00                                        | 0                                           | 0                                        | 304                                     | 304                                     |

## Appendix B

| County & Field  | HIGH RESPONSE                                      |                                             |                                             |                                          |                                         |                                         |
|-----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                 | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| HANCOCK972426   | 1,220                                              | 0.20                                        | 15                                          | 37                                       | 239                                     | 276                                     |
| HANCOCK942402   | 1,698                                              | 1.28                                        | 69                                          | 173                                      | 315                                     | 488                                     |
| HANCOCK972530   | 1,407                                              | 0.00                                        | 0                                           | 0                                        | 281                                     | 281                                     |
| HANCOCK952630   | 366                                                | 0.03                                        | 4                                           | 11                                       | 72                                      | 82                                      |
| HANCOCK952518   | 2,295                                              | 0.00                                        | 0                                           | 0                                        | 459                                     | 459                                     |
| HANCOCK942606   | 178                                                | 0.06                                        | 3                                           | 8                                        | 35                                      | 42                                      |
| HANCOCK952328   | 982                                                | 0.00                                        | 0                                           | 0                                        | 196                                     | 196                                     |
| HANCOCK972605   | 2,975                                              | 1.06                                        | 176                                         | 439                                      | 532                                     | 972                                     |
| HANCOCK942627   | 411                                                | 0.07                                        | 3                                           | 7                                        | 81                                      | 88                                      |
| HANCOCK942322   | 648                                                | 0.00                                        | 0                                           | 0                                        | 130                                     | 130                                     |
| HAMILTON882308  | 2,352                                              | 0.00                                        | 0                                           | 0                                        | 470                                     | 470                                     |
| HAMILTON892412  | 1,850                                              | 0.36                                        | 59                                          | 147                                      | 349                                     | 496                                     |
| HAMILTON892519  | 1,391                                              | 0.00                                        | 0                                           | 0                                        | 278                                     | 278                                     |
| HAMILTON862514  | 1,055                                              | 0.80                                        | 67                                          | 167                                      | 187                                     | 354                                     |
| HAMILTON872312  | 1,172                                              | 0.91                                        | 51                                          | 128                                      | 216                                     | 344                                     |
| HAMILTON882502  | 549                                                | 0.79                                        | 43                                          | 108                                      | 94                                      | 202                                     |
| HAMILTON862421  | 837                                                | 0.84                                        | 74                                          | 186                                      | 141                                     | 326                                     |
| HAMILTON872413  | 296                                                | 0.44                                        | 24                                          | 59                                       | 51                                      | 110                                     |
| HAMILTON872522  | 2,938                                              | 0.93                                        | 147                                         | 368                                      | 535                                     | 903                                     |
| HAMILTON882303  | 6,416                                              | 0.54                                        | 174                                         | 435                                      | 1,221                                   | 1,656                                   |
| HAMILTON872536  | 687                                                | 0.00                                        | 0                                           | 0                                        | 137                                     | 137                                     |
| HAMILTON892305  | 249                                                | 1.59                                        | 65                                          | 163                                      | 26                                      | 189                                     |
| HAMILTON862505  | 1,380                                              | 0.80                                        | 78                                          | 196                                      | 248                                     | 444                                     |
| HAMILTON862412  | 1,133                                              | 0.68                                        | 69                                          | 173                                      | 202                                     | 375                                     |
| HAMILTON882530  | 1,702                                              | 0.07                                        | 6                                           | 15                                       | 338                                     | 353                                     |
| HAMILTON862632  | 205                                                | 0.65                                        | 54                                          | 134                                      | 22                                      | 156                                     |
| HAMILTON862632A | 547                                                | 0.30                                        | 24                                          | 61                                       | 101                                     | 162                                     |
| HAMILTON862629  | 1,135                                              | 0.00                                        | 0                                           | 0                                        | 227                                     | 227                                     |
| HAMILTON882627  | 364                                                | 0.14                                        | 12                                          | 29                                       | 69                                      | 98                                      |
| HAMILTON892616  | 729                                                | 0.00                                        | 0                                           | 0                                        | 146                                     | 146                                     |
| POWESHIE791529  | 264                                                | 0.00                                        | 0                                           | 0                                        | 53                                      | 53                                      |
| POWESHIE791532  | 2,411                                              | 0.83                                        | 29                                          | 73                                       | 472                                     | 545                                     |
| POWESHIE781629  | 1,851                                              | 0.18                                        | 16                                          | 40                                       | 365                                     | 404                                     |
| POWESHIE801409  | 25                                                 | 1.63                                        | 42                                          | 104                                      | -10                                     | 94                                      |
| POWESHIE801404  | 961                                                | 0.23                                        | 9                                           | 22                                       | 189                                     | 211                                     |
| POWESHIE791318  | 872                                                | 1.31                                        | 195                                         | 488                                      | 105                                     | 593                                     |
| POWESHIE791318  | 4,633                                              | 1.26                                        | 110                                         | 276                                      | 887                                     | 1,163                                   |
| POWESHIE791509  | 489                                                | 0.02                                        | 1                                           | 2                                        | 97                                      | 100                                     |
| POWESHIE801532  | 1,597                                              | 0.00                                        | 0                                           | 0                                        | 319                                     | 319                                     |
| POWESHIE801430  | 3,790                                              | 0.94                                        | 59                                          | 148                                      | 737                                     | 885                                     |
| POWESHIE791525  | 643                                                | 0.00                                        | 0                                           | 0                                        | 129                                     | 129                                     |
| POWESHIE811310  | 296                                                | 0.45                                        | 16                                          | 40                                       | 53                                      | 94                                      |
| POWESHIE791608  | 731                                                | 0.00                                        | 0                                           | 0                                        | 146                                     | 146                                     |
| POWESHIE811620  | 1,681                                              | 0.00                                        | 0                                           | 0                                        | 336                                     | 336                                     |
| POWESHIE781618  | 577                                                | 0.00                                        | 0                                           | 0                                        | 115                                     | 115                                     |

## Appendix B

| County & Field | HIGH RESPONSE                                      |                                             |                                             |                                          |                                         |                                         |
|----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| POWESHIE791308 | 127                                                | 0.00                                        | 0                                           | 0                                        | 25                                      | 25                                      |
| POWESHIE781509 | 1,128                                              | 0.00                                        | 0                                           | 0                                        | 226                                     | 226                                     |
| POWESHIE781419 | 304                                                | 0.00                                        | 0                                           | 0                                        | 61                                      | 61                                      |
| POWESHIE811509 | 467                                                | 0.00                                        | 0                                           | 0                                        | 93                                      | 93                                      |
| POWESHIE781436 | 305                                                | 0.00                                        | 0                                           | 0                                        | 61                                      | 61                                      |
| POTTAWAT764428 | 177                                                | 0.00                                        | 0                                           | 0                                        | 35                                      | 35                                      |
| POTTAWAT754132 | 2,856                                              | 0.33                                        | 37                                          | 92                                       | 558                                     | 650                                     |
| POTTAWAT754107 | 1,157                                              | 0.00                                        | 0                                           | 0                                        | 231                                     | 231                                     |
| POTTAWAT744317 | 0                                                  | 0.97                                        | 83                                          | 208                                      | -30                                     | 178                                     |
| POTTAWAT764326 | 2,902                                              | 0.00                                        | 0                                           | 0                                        | 580                                     | 580                                     |
| POTTAWAT744006 | 464                                                | 0.07                                        | 3                                           | 8                                        | 92                                      | 100                                     |
| POTTAWAT764324 | 2,036                                              | 0.00                                        | 0                                           | 0                                        | 407                                     | 407                                     |
| POTTAWAT764323 | 1,546                                              | 0.00                                        | 0                                           | 0                                        | 309                                     | 309                                     |
| POTTAWAT763912 | 634                                                | 0.00                                        | 0                                           | 0                                        | 127                                     | 127                                     |
| POTTAWAT773805 | 1,795                                              | 0.00                                        | 0                                           | 0                                        | 359                                     | 359                                     |
| POTTAWAT774010 | 678                                                | 0.00                                        | 0                                           | 0                                        | 136                                     | 136                                     |
| POTTAWAT763822 | 208                                                | 0.00                                        | 0                                           | 0                                        | 42                                      | 42                                      |
| POTTAWAT764335 | 769                                                | 0.00                                        | 0                                           | 0                                        | 154                                     | 154                                     |
| POTTAWAT764127 | 1,850                                              | 0.00                                        | 0                                           | 0                                        | 370                                     | 370                                     |
| POTTAWAT754322 | 686                                                | 0.00                                        | 0                                           | 0                                        | 137                                     | 137                                     |
| POTTAWAT743912 | 1,067                                              | 0.00                                        | 0                                           | 0                                        | 213                                     | 213                                     |
| POTTAWAT774110 | 897                                                | 0.00                                        | 0                                           | 0                                        | 179                                     | 179                                     |
| POTTAWAT774501 | 2,881                                              | 0.00                                        | 0                                           | 0                                        | 576                                     | 576                                     |
| POTTAWAT744130 | 1,672                                              | 0.00                                        | 0                                           | 0                                        | 334                                     | 334                                     |
| POTTAWAT774216 | 1,532                                              | 0.00                                        | 0                                           | 0                                        | 306                                     | 306                                     |
| SIoux974510    | 1,797                                              | 0.13                                        | 16                                          | 41                                       | 354                                     | 395                                     |
| SIoux944704    | 1,459                                              | 0.01                                        | 1                                           | 2                                        | 291                                     | 294                                     |
| SIoux954416    | 505                                                | 0.00                                        | 0                                           | 0                                        | 101                                     | 101                                     |
| SIoux964707    | 8,858                                              | 0.00                                        | 0                                           | 0                                        | 1,772                                   | 1,772                                   |
| SIoux964425    | 356                                                | 0.14                                        | 6                                           | 15                                       | 69                                      | 84                                      |
| SIoux974622    | 4,176                                              | 0.34                                        | 27                                          | 69                                       | 825                                     | 894                                     |
| SIoux964629    | 300                                                | 0.50                                        | 20                                          | 51                                       | 53                                      | 103                                     |
| SIoux944422    | 1,494                                              | 0.62                                        | 78                                          | 195                                      | 271                                     | 466                                     |
| SIoux954627    | 130                                                | 0.50                                        | 11                                          | 27                                       | 22                                      | 49                                      |
| SIoux944608    | 877                                                | 0.67                                        | 71                                          | 178                                      | 150                                     | 328                                     |
| SIoux944409    | 369                                                | 0.89                                        | 57                                          | 141                                      | 54                                      | 195                                     |
| SIoux944536    | 1,636                                              | 0.16                                        | 19                                          | 48                                       | 320                                     | 368                                     |
| SIoux974721    | 477                                                | 0.00                                        | 0                                           | 0                                        | 95                                      | 95                                      |
| SIoux954318    | 1,020                                              | 0.56                                        | 65                                          | 161                                      | 181                                     | 342                                     |
| SIoux964723    | 501                                                | 0.80                                        | 33                                          | 81                                       | 89                                      | 170                                     |
| SIoux964503    | 1,599                                              | 0.00                                        | 0                                           | 0                                        | 320                                     | 320                                     |
| SIoux954714    | 522                                                | 0.02                                        | 2                                           | 5                                        | 104                                     | 109                                     |
| SIoux974401    | 1,263                                              | 0.58                                        | 61                                          | 153                                      | 231                                     | 384                                     |
| SIoux974517    | 1,889                                              | 0.22                                        | 32                                          | 81                                       | 366                                     | 447                                     |
| SIoux944803    | 3,684                                              | 0.01                                        | 2                                           | 5                                        | 736                                     | 741                                     |

## Appendix B

| County & Field | HIGH RESPONSE                                      |                                             |                                             |                                          |                                         |                                         |
|----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| STORY822404    | 339                                                | 1.11                                        | 74                                          | 185                                      | 41                                      | 226                                     |
| STORY240403    | 264                                                | 0.96                                        | 75                                          | 187                                      | 26                                      | 213                                     |
| STORY822407    | 757                                                | 0.98                                        | 80                                          | 199                                      | 123                                     | 322                                     |
| STORY822413    | 804                                                | 0.00                                        | 0                                           | 0                                        | 161                                     | 161                                     |
| STORY822211    | 4                                                  | 0.84                                        | 36                                          | 90                                       | -12                                     | 78                                      |
| STORY822301    | 1,214                                              | 0.00                                        | 0                                           | 0                                        | 243                                     | 243                                     |
| STORY852335    | 3,853                                              | 0.52                                        | 79                                          | 198                                      | 742                                     | 940                                     |
| STORY852222    | 1,224                                              | 0.00                                        | 0                                           | 0                                        | 245                                     | 245                                     |
| STORY842218    | 1,178                                              | 0.00                                        | 0                                           | 0                                        | 236                                     | 236                                     |
| STORY852403    | 962                                                | 0.95                                        | 124                                         | 310                                      | 148                                     | 458                                     |
| STORY832301    | 1,936                                              | 0.00                                        | 0                                           | 0                                        | 387                                     | 387                                     |
| STORY822224    | 448                                                | 0.80                                        | 46                                          | 116                                      | 73                                      | 189                                     |
| STORY852122    | 853                                                | 0.00                                        | 0                                           | 0                                        | 171                                     | 171                                     |
| STORY832314    | 610                                                | 0.20                                        | 16                                          | 41                                       | 116                                     | 157                                     |
| STORY842110    | 1,502                                              | 0.00                                        | 0                                           | 0                                        | 300                                     | 300                                     |
| STORY832421    | 393                                                | 0.00                                        | 0                                           | 0                                        | 79                                      | 79                                      |
| STORY822425    | 573                                                | 0.00                                        | 0                                           | 0                                        | 115                                     | 115                                     |
| STORY842331    | 958                                                | 0.00                                        | 0                                           | 0                                        | 192                                     | 192                                     |
| STORY852105    | 867                                                | 0.00                                        | 0                                           | 0                                        | 173                                     | 173                                     |
| STORY832122    | 3,635                                              | 0.00                                        | 0                                           | 0                                        | 727                                     | 727                                     |
| JONES850207    | 593                                                | 1.29                                        | 46                                          | 115                                      | 102                                     | 217                                     |
| JONES840308    | 387                                                | 0.00                                        | 0                                           | 0                                        | 77                                      | 77                                      |
| JONES840305    | 871                                                | 1.05                                        | 50                                          | 125                                      | 156                                     | 281                                     |
| JONES840134    | 4,656                                              | 0.97                                        | 71                                          | 178                                      | 906                                     | 1,083                                   |
| JONES830235    | 698                                                | 0.00                                        | 0                                           | 0                                        | 140                                     | 140                                     |
| JONES830428    | 924                                                | 0.00                                        | 0                                           | 0                                        | 185                                     | 185                                     |
| JONES860229    | 3,507                                              | 1.31                                        | 54                                          | 135                                      | 682                                     | 817                                     |
| JONES860425    | 174                                                | 1.16                                        | 59                                          | 147                                      | 14                                      | 161                                     |
| JONES840226    | 687                                                | 0.06                                        | 2                                           | 5                                        | 137                                     | 141                                     |
| JONES830424    | 804                                                | 0.00                                        | 0                                           | 0                                        | 161                                     | 161                                     |
| JONES830424A   | 1,168                                              | 0.12                                        | 5                                           | 12                                       | 232                                     | 244                                     |
| JONES830310    | 537                                                | 0.36                                        | 14                                          | 36                                       | 102                                     | 138                                     |
| JONES850110    | 2,918                                              | 0.00                                        | 0                                           | 0                                        | 584                                     | 584                                     |
| JONES860135    | 1,647                                              | 0.02                                        | 1                                           | 3                                        | 329                                     | 332                                     |
| JONES830106    | 610                                                | 0.00                                        | 0                                           | 0                                        | 122                                     | 122                                     |
| JONES830135    | 2,513                                              | 0.15                                        | 11                                          | 28                                       | 499                                     | 526                                     |
| JONES830133    | 2,082                                              | 0.00                                        | 0                                           | 0                                        | 416                                     | 416                                     |
| JONES860313    | 379                                                | 0.00                                        | 0                                           | 0                                        | 76                                      | 76                                      |
| JONES860310    | 3,251                                              | 0.23                                        | 15                                          | 38                                       | 645                                     | 683                                     |
| JONES830401    | 180                                                | 0.10                                        | 2                                           | 5                                        | 35                                      | 40                                      |
| WRIGHT932301   | 5,166                                              | 0.00                                        | 0                                           | 0                                        | 1,033                                   | 1,033                                   |
| WRIGHT932620   | 553                                                | 0.00                                        | 0                                           | 0                                        | 111                                     | 111                                     |
| WRIGHT 932614  | 740                                                | 1.30                                        | 150                                         | 375                                      | 94                                      | 469                                     |
| WRIGHT932522   | 1,205                                              | 0.00                                        | 0                                           | 0                                        | 241                                     | 241                                     |
| WRIGHT932523   | 1,291                                              | 0.00                                        | 0                                           | 0                                        | 258                                     | 258                                     |

## Appendix B

| County & Field | HIGH RESPONSE                                      |                                             |                                             |                                          |                                         |                                         |
|----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| WRIGHT932513   | 804                                                | 0.00                                        | 0                                           | 0                                        | 161                                     | 161                                     |
| WRIGHT932420   | 2,607                                              | 0.00                                        | 0                                           | 0                                        | 521                                     | 521                                     |
| WRIGHT932317   | 312                                                | 1.25                                        | 81                                          | 204                                      | 33                                      | 237                                     |
| WRIGHT932324   | 1,968                                              | 0.82                                        | 78                                          | 194                                      | 366                                     | 560                                     |
| WRIGHT932435   | 1,003                                              | 0.37                                        | 29                                          | 73                                       | 190                                     | 264                                     |
| WRIGHT922506   | 760                                                | 1.99                                        | 159                                         | 398                                      | 95                                      | 493                                     |
| WRIGHT922512   | 3,121                                              | 0.00                                        | 0                                           | 0                                        | 624                                     | 624                                     |
| WRIGHT922302   | 3,512                                              | 0.00                                        | 0                                           | 0                                        | 702                                     | 702                                     |
| WRIGHT922517   | 2,131                                              | 0.00                                        | 0                                           | 0                                        | 426                                     | 426                                     |
| WRIGHT922520   | 3,892                                              | 0.00                                        | 0                                           | 0                                        | 778                                     | 778                                     |
| WRIGHT912618   | 643                                                | 0.00                                        | 0                                           | 0                                        | 129                                     | 129                                     |
| WRIGHT922415   | 2,333                                              | 0.08                                        | 7                                           | 16                                       | 464                                     | 481                                     |
| WRIGHT922423   | 1,928                                              | 0.00                                        | 0                                           | 0                                        | 386                                     | 386                                     |
| WRIGHT922313   | 2,769                                              | 0.00                                        | 0                                           | 0                                        | 554                                     | 554                                     |
| WRIGHT922331   | 1,473                                              | 0.00                                        | 0                                           | 0                                        | 295                                     | 295                                     |
| WRIGHT922326   | 1,482                                              | 0.00                                        | 0                                           | 0                                        | 296                                     | 296                                     |
| WRIGHT912611   | 1,550                                              | 0.00                                        | 0                                           | 0                                        | 310                                     | 310                                     |
| WRIGHT912506   | 1,228                                              | 0.00                                        | 0                                           | 0                                        | 246                                     | 246                                     |
| WRIGHT912411   | 1,129                                              | 0.00                                        | 0                                           | 0                                        | 226                                     | 226                                     |
| WRIGHT912632   | 9                                                  | 1.29                                        | 103                                         | 257                                      | -35                                     | 223                                     |
| WRIGHT912532   | 1,053                                              | 0.00                                        | 0                                           | 0                                        | 211                                     | 211                                     |
| WRIGHT902314   | 9,777                                              | 0.07                                        | 15                                          | 37                                       | 1,950                                   | 1,988                                   |
| WRIGHT902527   | 2,347                                              | 0.00                                        | 0                                           | 0                                        | 469                                     | 469                                     |
| WRIGHT902426   | 1,344                                              | 0.00                                        | 0                                           | 0                                        | 269                                     | 269                                     |
| WRIGHT902335   | 915                                                | 0.21                                        | 21                                          | 51                                       | 176                                     | 227                                     |
| <b>TOTAL</b>   | <b>344,778</b>                                     | <b>0.30</b>                                 | <b>5,445</b>                                | <b>13,612</b>                            | <b>67,011</b>                           | <b>80,623</b>                           |





**APPENDIX C**

**Field Production and Environmental Benefits  
The Low Response Case**

## Appendix C

## LOW RESPONSE

| County & Field | SRT                                         | VRT                                  | VRT                                  | VRT                               | VRT                              | VRT                              |
|----------------|---------------------------------------------|--------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|----------------------------------|
|                | Over<br>Application<br>of Nitrogen<br>(lbs) | Increase<br>In<br>Yield<br>(bu/acre) | Increase<br>in<br>Production<br>(\$) | Increase<br>in<br>Revenue<br>(\$) | Reduction<br>in<br>Costs<br>(\$) | Increase<br>in<br>Profit<br>(\$) |
| ADAIR753226    | 1,396                                       | 0.18                                 | 14                                   | 35                                | 274                              | 309                              |
| ADAIR773321    | 404                                         | 0.00                                 | 0                                    | 0                                 | 81                               | 81                               |
| ADAIR743034    | 287                                         | 0.00                                 | 0                                    | 0                                 | 57                               | 57                               |
| ADAIR773323    | 139                                         | 0.13                                 | 5                                    | 13                                | 26                               | 39                               |
| ADAIR743307    | 355                                         | 0.00                                 | 0                                    | 0                                 | 71                               | 71                               |
| ADAIR773131    | 2,770                                       | 0.00                                 | 0                                    | 0                                 | 554                              | 554                              |
| ADAIR743136A   | 807                                         | 0.40                                 | 20                                   | 50                                | 154                              | 205                              |
| ADAIR743136    | 970                                         | 0.10                                 | 8                                    | 20                                | 191                              | 211                              |
| ADAIR743118    | 692                                         | 0.40                                 | 27                                   | 66                                | 129                              | 195                              |
| ADAIR763128    | 467                                         | 0.39                                 | 11                                   | 28                                | 89                               | 117                              |
| ADAIR753328A   | 750                                         | 0.23                                 | 11                                   | 28                                | 146                              | 174                              |
| ADAIR753328    | 2,071                                       | 0.00                                 | 0                                    | 0                                 | 414                              | 414                              |
| ADAIR773022    | 96                                          | 0.00                                 | 0                                    | 0                                 | 19                               | 19                               |
| ADAIR773022A   | 906                                         | 0.00                                 | 0                                    | 0                                 | 181                              | 181                              |
| ADAIR763034    | 327                                         | 0.00                                 | 0                                    | 0                                 | 65                               | 65                               |
| ADAIR773013    | 381                                         | 0.00                                 | 0                                    | 0                                 | 76                               | 76                               |
| ADAIR743017    | 1,068                                       | 0.00                                 | 0                                    | 0                                 | 214                              | 214                              |
| ADAIR763132    | 678                                         | 0.17                                 | 6                                    | 15                                | 133                              | 148                              |
| ADAIR753020    | 1,361                                       | 0.00                                 | 0                                    | 0                                 | 272                              | 272                              |
| ADAIR753213    | 808                                         | 0.24                                 | 13                                   | 32                                | 157                              | 189                              |
| BHAWK891123    | 724                                         | 0.00                                 | 0                                    | 0                                 | 145                              | 145                              |
| BHAWK881234    | 393                                         | 0.00                                 | 0                                    | 0                                 | 79                               | 79                               |
| BHAWK881330    | 302                                         | 0.00                                 | 0                                    | 0                                 | 60                               | 60                               |
| BHAWK901110    | 503                                         | 0.00                                 | 0                                    | 0                                 | 101                              | 101                              |
| BHAWK871114    | 920                                         | 0.11                                 | 3                                    | 8                                 | 183                              | 191                              |
| BHAWK871329    | 1,385                                       | 0.03                                 | 5                                    | 12                                | 275                              | 287                              |
| BHAWK881125    | 75                                          | 0.00                                 | 0                                    | 0                                 | 15                               | 15                               |
| BHAWK881430    | 68                                          | 0.00                                 | 0                                    | 0                                 | 14                               | 14                               |
| BHAWK891102    | 624                                         | 0.00                                 | 0                                    | 0                                 | 125                              | 125                              |
| BHAWK871434    | 115                                         | 0.00                                 | 0                                    | 0                                 | 23                               | 23                               |
| BHAWK881217    | 5                                           | 0.21                                 | 7                                    | 17                                | -1                               | 16                               |
| BHAWK891134    | 413                                         | 0.00                                 | 0                                    | 0                                 | 83                               | 83                               |
| BHAWK871334    | 293                                         | 0.22                                 | 13                                   | 33                                | 54                               | 86                               |
| BHAWK871325    | 140                                         | 0.00                                 | 0                                    | 0                                 | 28                               | 28                               |
| BHAWK891409    | 329                                         | 0.03                                 | 2                                    | 5                                 | 65                               | 70                               |
| BHAWK891404    | 226                                         | 0.00                                 | 0                                    | 0                                 | 45                               | 45                               |
| BHAWK871223    | 94                                          | 0.59                                 | 11                                   | 27                                | 15                               | 42                               |
| BHAWK901208    | 163                                         | 0.22                                 | 5                                    | 13                                | 31                               | 44                               |
| BHAWK891109    | 186                                         | 0.08                                 | 5                                    | 12                                | 35                               | 48                               |
| BHAWK901106    | 48                                          | 0.00                                 | 0                                    | 0                                 | 10                               | 10                               |
| CARROLL853508  | 41                                          | 0.59                                 | 12                                   | 29                                | 4                                | 33                               |
| CARROLL 853520 | 1,110                                       | 0.00                                 | 0                                    | 0                                 | 222                              | 222                              |
| CARROLL823511  | 121                                         | 0.00                                 | 0                                    | 0                                 | 24                               | 24                               |
| CARROLL823315  | 1,062                                       | 0.37                                 | 43                                   | 107                               | 197                              | 304                              |
| CARROLL843325  | 455                                         | 0.00                                 | 0                                    | 0                                 | 91                               | 91                               |

## Appendix C

| County & Field | LOW RESPONSE                                       |                                             |                                             |                                          |                                         |                                         |
|----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| CARROLL833331  | 1,015                                              | 0.30                                        | 50                                          | 126                                      | 185                                     | 311                                     |
| CARROLL833430  | 433                                                | 0.11                                        | 10                                          | 26                                       | 83                                      | 109                                     |
| CARROLL853428  | 452                                                | 0.35                                        | 25                                          | 63                                       | 81                                      | 144                                     |
| CARROLL853510  | 80                                                 | 0.07                                        | 2                                           | 6                                        | 15                                      | 21                                      |
| CARROLL853510A | 500                                                | 0.00                                        | 0                                           | 0                                        | 100                                     | 100                                     |
| CARROLL843414  | 875                                                | 0.00                                        | 0                                           | 0                                        | 175                                     | 175                                     |
| CARROLL823430  | 1,096                                              | 0.05                                        | 7                                           | 17                                       | 217                                     | 233                                     |
| CARROLL843512  | 169                                                | 0.47                                        | 21                                          | 54                                       | 26                                      | 80                                      |
| CARROLL823534  | 150                                                | 0.00                                        | 0                                           | 0                                        | 30                                      | 30                                      |
| CARROLL823623  | 267                                                | 0.00                                        | 0                                           | 1                                        | 53                                      | 54                                      |
| CARROLL823324  | 0                                                  | 0.10                                        | 6                                           | 15                                       | -2                                      | 13                                      |
| CARROLL823612  | 139                                                | 0.05                                        | 3                                           | 6                                        | 27                                      | 33                                      |
| CARROLL833303  | 1,204                                              | 0.37                                        | 48                                          | 119                                      | 224                                     | 343                                     |
| CARROLL833617  | 293                                                | 0.10                                        | 4                                           | 11                                       | 57                                      | 68                                      |
| CARROLL853321  | 123                                                | 4.01                                        | 155                                         | 386                                      | -31                                     | 356                                     |
| HENRY700712    | 635                                                | 0.15                                        | 5                                           | 13                                       | 125                                     | 138                                     |
| HENRY700701    | 1,207                                              | 0.00                                        | 0                                           | 0                                        | 241                                     | 241                                     |
| HENRY720508    | 112                                                | 0.00                                        | 0                                           | 0                                        | 22                                      | 22                                      |
| HENRY720615    | 196                                                | 0.00                                        | 0                                           | 0                                        | 39                                      | 39                                      |
| HENRY720614    | 293                                                | 0.00                                        | 0                                           | 0                                        | 59                                      | 59                                      |
| HENRY730731    | 952                                                | 0.00                                        | 0                                           | 0                                        | 190                                     | 190                                     |
| HENRY720605    | 258                                                | 0.39                                        | 15                                          | 36                                       | 46                                      | 83                                      |
| HENRY700513    | 127                                                | 0.00                                        | 0                                           | 0                                        | 25                                      | 25                                      |
| HENRY710736    | 110                                                | 0.00                                        | 0                                           | 0                                        | 22                                      | 22                                      |
| HENRY730501    | 292                                                | 0.27                                        | 11                                          | 28                                       | 54                                      | 82                                      |
| HENRY730720    | 50                                                 | 0.00                                        | 0                                           | 0                                        | 10                                      | 10                                      |
| HENRY730717    | 37                                                 | 0.20                                        | 10                                          | 26                                       | 4                                       | 29                                      |
| HENRY710718    | 349                                                | 0.03                                        | 1                                           | 2                                        | 70                                      | 72                                      |
| HENRY720703    | 83                                                 | 0.00                                        | 0                                           | 0                                        | 17                                      | 17                                      |
| HENRY730702    | 1,318                                              | 0.00                                        | 0                                           | 0                                        | 264                                     | 264                                     |
| HENRY730708    | 145                                                | 0.00                                        | 0                                           | 0                                        | 29                                      | 29                                      |
| HENRY700514    | 164                                                | 0.00                                        | 0                                           | 0                                        | 33                                      | 33                                      |
| HENRY710623    | 235                                                | 0.00                                        | 0                                           | 0                                        | 47                                      | 47                                      |
| HENRY700527    | 190                                                | 0.00                                        | 0                                           | 0                                        | 38                                      | 38                                      |
| HENRY700624    | 664                                                | 0.09                                        | 7                                           | 19                                       | 130                                     | 149                                     |
| HANCOCK962521  | 2,047                                              | 0.08                                        | 14                                          | 36                                       | 404                                     | 440                                     |
| HANCOCK962323  | 481                                                | 0.30                                        | 53                                          | 131                                      | 78                                      | 209                                     |
| HANCOCK952403  | 797                                                | 0.00                                        | 0                                           | 0                                        | 159                                     | 159                                     |
| HANCOCK962633  | 729                                                | 0.00                                        | 0                                           | 0                                        | 146                                     | 146                                     |
| HANCOCK962423  | 888                                                | 0.11                                        | 12                                          | 30                                       | 173                                     | 204                                     |
| HANCOCK962524  | 2,231                                              | 0.41                                        | 43                                          | 107                                      | 431                                     | 538                                     |
| HANCOCK962524  | 246                                                | 0.04                                        | 2                                           | 4                                        | 49                                      | 52                                      |
| HANCOCK952612  | 1,318                                              | 0.00                                        | 0                                           | 0                                        | 264                                     | 264                                     |
| HANCOCK942520  | 724                                                | 0.00                                        | 0                                           | 0                                        | 145                                     | 145                                     |
| HANCOCK972433  | 681                                                | 0.00                                        | 0                                           | 0                                        | 136                                     | 136                                     |

## Appendix C

| County & Field  | LOW RESPONSE                                       |                                             |                                             |                                          |                                         |                                         |
|-----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                 | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| HANCOCK972426   | 546                                                | 0.09                                        | 7                                           | 16                                       | 107                                     | 123                                     |
| HANCOCK942402   | 760                                                | 0.57                                        | 31                                          | 77                                       | 141                                     | 218                                     |
| HANCOCK972530   | 629                                                | 0.00                                        | 0                                           | 0                                        | 126                                     | 126                                     |
| HANCOCK952630   | 164                                                | 0.02                                        | 2                                           | 5                                        | 32                                      | 37                                      |
| HANCOCK952518   | 1,027                                              | 0.00                                        | 0                                           | 0                                        | 205                                     | 205                                     |
| HANCOCK942606   | 80                                                 | 0.03                                        | 1                                           | 4                                        | 15                                      | 19                                      |
| HANCOCK952328   | 440                                                | 0.00                                        | 0                                           | 0                                        | 88                                      | 88                                      |
| HANCOCK972605   | 1,331                                              | 0.47                                        | 79                                          | 197                                      | 238                                     | 435                                     |
| HANCOCK942627   | 184                                                | 0.03                                        | 1                                           | 3                                        | 36                                      | 40                                      |
| HANCOCK942322   | 290                                                | 0.00                                        | 0                                           | 0                                        | 58                                      | 58                                      |
| HAMILTON882308  | 1,052                                              | 0.00                                        | 0                                           | 0                                        | 210                                     | 210                                     |
| HAMILTON892412  | 828                                                | 0.16                                        | 26                                          | 66                                       | 156                                     | 222                                     |
| HAMILTON892519  | 622                                                | 0.00                                        | 0                                           | 0                                        | 124                                     | 124                                     |
| HAMILTON862514  | 472                                                | 0.36                                        | 30                                          | 75                                       | 84                                      | 158                                     |
| HAMILTON872312  | 524                                                | 0.41                                        | 23                                          | 57                                       | 97                                      | 154                                     |
| HAMILTON882502  | 245                                                | 0.35                                        | 19                                          | 48                                       | 42                                      | 90                                      |
| HAMILTON862421  | 375                                                | 0.37                                        | 33                                          | 83                                       | 63                                      | 146                                     |
| HAMILTON872413  | 132                                                | 0.20                                        | 11                                          | 26                                       | 23                                      | 49                                      |
| HAMILTON872522  | 1,314                                              | 0.42                                        | 66                                          | 164                                      | 239                                     | 404                                     |
| HAMILTON882303  | 2,870                                              | 0.24                                        | 78                                          | 195                                      | 546                                     | 741                                     |
| HAMILTON872536  | 307                                                | 0.00                                        | 0                                           | 0                                        | 61                                      | 61                                      |
| HAMILTON892305  | 111                                                | 0.71                                        | 29                                          | 73                                       | 12                                      | 85                                      |
| HAMILTON862505  | 617                                                | 0.36                                        | 35                                          | 88                                       | 111                                     | 199                                     |
| HAMILTON862412  | 507                                                | 0.31                                        | 31                                          | 77                                       | 90                                      | 168                                     |
| HAMILTON882530  | 761                                                | 0.03                                        | 3                                           | 7                                        | 151                                     | 158                                     |
| HAMILTON862632  | 92                                                 | 0.29                                        | 24                                          | 60                                       | 10                                      | 70                                      |
| HAMILTON862632A | 245                                                | 0.13                                        | 11                                          | 27                                       | 45                                      | 72                                      |
| HAMILTON862629  | 508                                                | 0.00                                        | 0                                           | 0                                        | 102                                     | 102                                     |
| HAMILTON882627  | 163                                                | 0.06                                        | 5                                           | 13                                       | 31                                      | 44                                      |
| HAMILTON892616  | 326                                                | 0.00                                        | 0                                           | 0                                        | 65                                      | 65                                      |
| POWESHIE791529  | 118                                                | 0.00                                        | 0                                           | 0                                        | 24                                      | 24                                      |
| POWESHIE791532  | 1,078                                              | 0.37                                        | 13                                          | 33                                       | 211                                     | 244                                     |
| POWESHIE781629  | 828                                                | 0.08                                        | 7                                           | 18                                       | 163                                     | 181                                     |
| POWESHIE801409  | 11                                                 | 0.73                                        | 19                                          | 47                                       | -4                                      | 42                                      |
| POWESHIE801404  | 430                                                | 0.10                                        | 4                                           | 10                                       | 85                                      | 94                                      |
| POWESHIE791318  | 390                                                | 0.58                                        | 87                                          | 218                                      | 47                                      | 265                                     |
| POWESHIE791318  | 2,073                                              | 0.56                                        | 49                                          | 124                                      | 397                                     | 520                                     |
| POWESHIE791509  | 219                                                | 0.01                                        | 0                                           | 1                                        | 44                                      | 45                                      |
| POWESHIE801532  | 714                                                | 0.00                                        | 0                                           | 0                                        | 143                                     | 143                                     |
| POWESHIE801430  | 1,696                                              | 0.42                                        | 26                                          | 66                                       | 330                                     | 396                                     |
| POWESHIE791525  | 288                                                | 0.00                                        | 0                                           | 0                                        | 58                                      | 58                                      |
| POWESHIE811310  | 132                                                | 0.20                                        | 7                                           | 18                                       | 24                                      | 42                                      |
| POWESHIE791608  | 327                                                | 0.00                                        | 0                                           | 0                                        | 65                                      | 65                                      |
| POWESHIE811620  | 752                                                | 0.00                                        | 0                                           | 0                                        | 150                                     | 150                                     |
| POWESHIE781618  | 258                                                | 0.00                                        | 0                                           | 0                                        | 52                                      | 52                                      |

## Appendix C

| County & Field | LOW RESPONSE                                       |                                             |                                             |                                          |                                         |                                         |
|----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| POWESHIE791308 | 57                                                 | 0.00                                        | 0                                           | 0                                        | 11                                      | 11                                      |
| POWESHIE781509 | 505                                                | 0.00                                        | 0                                           | 0                                        | 101                                     | 101                                     |
| POWESHIE781419 | 136                                                | 0.00                                        | 0                                           | 0                                        | 27                                      | 27                                      |
| POWESHIE811509 | 209                                                | 0.00                                        | 0                                           | 0                                        | 42                                      | 42                                      |
| POWESHIE781436 | 136                                                | 0.00                                        | 0                                           | 0                                        | 27                                      | 27                                      |
| POTTAWAT764428 | 79                                                 | 0.00                                        | 0                                           | 0                                        | 16                                      | 16                                      |
| POTTAWAT754132 | 1,278                                              | 0.15                                        | 17                                          | 41                                       | 250                                     | 291                                     |
| POTTAWAT754107 | 518                                                | 0.00                                        | 0                                           | 0                                        | 104                                     | 104                                     |
| POTTAWAT744317 | 0                                                  | 0.44                                        | 37                                          | 93                                       | -13                                     | 80                                      |
| POTTAWAT764326 | 1,298                                              | 0.00                                        | 0                                           | 0                                        | 260                                     | 260                                     |
| POTTAWAT744006 | 208                                                | 0.03                                        | 2                                           | 4                                        | 41                                      | 45                                      |
| POTTAWAT764324 | 911                                                | 0.00                                        | 0                                           | 0                                        | 182                                     | 182                                     |
| POTTAWAT764323 | 692                                                | 0.00                                        | 0                                           | 0                                        | 138                                     | 138                                     |
| POTTAWAT763912 | 284                                                | 0.00                                        | 0                                           | 0                                        | 57                                      | 57                                      |
| POTTAWAT773805 | 803                                                | 0.00                                        | 0                                           | 0                                        | 161                                     | 161                                     |
| POTTAWAT774010 | 303                                                | 0.00                                        | 0                                           | 0                                        | 61                                      | 61                                      |
| POTTAWAT763822 | 93                                                 | 0.00                                        | 0                                           | 0                                        | 19                                      | 19                                      |
| POTTAWAT764335 | 344                                                | 0.00                                        | 0                                           | 0                                        | 69                                      | 69                                      |
| POTTAWAT764127 | 828                                                | 0.00                                        | 0                                           | 0                                        | 166                                     | 166                                     |
| POTTAWAT754322 | 307                                                | 0.00                                        | 0                                           | 0                                        | 61                                      | 61                                      |
| POTTAWAT743912 | 477                                                | 0.00                                        | 0                                           | 0                                        | 95                                      | 95                                      |
| POTTAWAT774110 | 401                                                | 0.00                                        | 0                                           | 0                                        | 80                                      | 80                                      |
| POTTAWAT774501 | 1,289                                              | 0.00                                        | 0                                           | 0                                        | 258                                     | 258                                     |
| POTTAWAT744130 | 748                                                | 0.00                                        | 0                                           | 0                                        | 150                                     | 150                                     |
| POTTAWAT774216 | 685                                                | 0.00                                        | 0                                           | 0                                        | 137                                     | 137                                     |
| SIoux974510    | 804                                                | 0.06                                        | 7                                           | 18                                       | 158                                     | 177                                     |
| SIoux944704    | 653                                                | 0.00                                        | 0                                           | 1                                        | 130                                     | 131                                     |
| SIoux954416    | 226                                                | 0.00                                        | 0                                           | 0                                        | 45                                      | 45                                      |
| SIoux964707    | 3,963                                              | 0.00                                        | 0                                           | 0                                        | 793                                     | 793                                     |
| SIoux964425    | 159                                                | 0.06                                        | 3                                           | 7                                        | 31                                      | 37                                      |
| SIoux974622    | 1,868                                              | 0.15                                        | 12                                          | 31                                       | 369                                     | 400                                     |
| SIoux964629    | 134                                                | 0.22                                        | 9                                           | 23                                       | 24                                      | 46                                      |
| SIoux944422    | 669                                                | 0.28                                        | 35                                          | 87                                       | 121                                     | 209                                     |
| SIoux954627    | 58                                                 | 0.23                                        | 5                                           | 12                                       | 10                                      | 22                                      |
| SIoux944608    | 392                                                | 0.30                                        | 32                                          | 80                                       | 67                                      | 147                                     |
| SIoux944409    | 165                                                | 0.40                                        | 25                                          | 63                                       | 24                                      | 87                                      |
| SIoux944536    | 732                                                | 0.07                                        | 9                                           | 21                                       | 143                                     | 165                                     |
| SIoux974721    | 213                                                | 0.00                                        | 0                                           | 0                                        | 43                                      | 43                                      |
| SIoux954318    | 456                                                | 0.25                                        | 29                                          | 72                                       | 81                                      | 153                                     |
| SIoux964723    | 224                                                | 0.36                                        | 15                                          | 36                                       | 40                                      | 76                                      |
| SIoux964503    | 715                                                | 0.00                                        | 0                                           | 0                                        | 143                                     | 143                                     |
| SIoux954714    | 233                                                | 0.01                                        | 1                                           | 2                                        | 46                                      | 49                                      |
| SIoux974401    | 565                                                | 0.26                                        | 27                                          | 69                                       | 103                                     | 172                                     |
| SIoux974517    | 845                                                | 0.10                                        | 15                                          | 36                                       | 164                                     | 200                                     |
| SIoux944803    | 1,648                                              | 0.01                                        | 1                                           | 2                                        | 329                                     | 332                                     |

## Appendix C

| County & Field | LOW RESPONSE                                       |                                             |                                             |                                          |                                         |                                         |
|----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| STORY822404    | 152                                                | 0.50                                        | 33                                          | 83                                       | 18                                      | 101                                     |
| STORY240403    | 118                                                | 0.43                                        | 33                                          | 84                                       | 12                                      | 95                                      |
| STORY822407    | 339                                                | 0.44                                        | 36                                          | 89                                       | 55                                      | 144                                     |
| STORY822413    | 360                                                | 0.00                                        | 0                                           | 0                                        | 72                                      | 72                                      |
| STORY822211    | 2                                                  | 0.38                                        | 16                                          | 40                                       | -5                                      | 35                                      |
| STORY822301    | 543                                                | 0.00                                        | 0                                           | 0                                        | 109                                     | 109                                     |
| STORY852335    | 1,724                                              | 0.23                                        | 35                                          | 88                                       | 332                                     | 421                                     |
| STORY852222    | 547                                                | 0.00                                        | 0                                           | 0                                        | 109                                     | 109                                     |
| STORY842218    | 527                                                | 0.00                                        | 0                                           | 0                                        | 105                                     | 105                                     |
| STORY852403    | 430                                                | 0.42                                        | 56                                          | 139                                      | 66                                      | 205                                     |
| STORY832301    | 866                                                | 0.00                                        | 0                                           | 0                                        | 173                                     | 173                                     |
| STORY822224    | 201                                                | 0.36                                        | 21                                          | 52                                       | 33                                      | 84                                      |
| STORY852122    | 382                                                | 0.00                                        | 0                                           | 0                                        | 76                                      | 76                                      |
| STORY832314    | 273                                                | 0.09                                        | 7                                           | 18                                       | 52                                      | 70                                      |
| STORY842110    | 672                                                | 0.00                                        | 0                                           | 0                                        | 134                                     | 134                                     |
| STORY832421    | 176                                                | 0.00                                        | 0                                           | 0                                        | 35                                      | 35                                      |
| STORY822425    | 256                                                | 0.00                                        | 0                                           | 0                                        | 51                                      | 51                                      |
| STORY842331    | 429                                                | 0.00                                        | 0                                           | 0                                        | 86                                      | 86                                      |
| STORY852105    | 388                                                | 0.00                                        | 0                                           | 0                                        | 78                                      | 78                                      |
| STORY832122    | 1,626                                              | 0.00                                        | 0                                           | 0                                        | 325                                     | 325                                     |
| JONES850207    | 265                                                | 0.58                                        | 21                                          | 51                                       | 46                                      | 97                                      |
| JONES840308    | 173                                                | 0.00                                        | 0                                           | 0                                        | 35                                      | 35                                      |
| JONES840305    | 390                                                | 0.47                                        | 22                                          | 56                                       | 70                                      | 126                                     |
| JONES840134    | 2,083                                              | 0.43                                        | 32                                          | 79                                       | 405                                     | 485                                     |
| JONES830235    | 312                                                | 0.00                                        | 0                                           | 0                                        | 62                                      | 62                                      |
| JONES830428    | 414                                                | 0.00                                        | 0                                           | 0                                        | 83                                      | 83                                      |
| JONES860229    | 1,569                                              | 0.59                                        | 24                                          | 61                                       | 305                                     | 366                                     |
| JONES860425    | 78                                                 | 0.52                                        | 26                                          | 66                                       | 6                                       | 72                                      |
| JONES840226    | 307                                                | 0.03                                        | 1                                           | 2                                        | 61                                      | 63                                      |
| JONES830424    | 360                                                | 0.00                                        | 0                                           | 0                                        | 72                                      | 72                                      |
| JONES830424A   | 522                                                | 0.05                                        | 2                                           | 5                                        | 104                                     | 109                                     |
| JONES830310    | 240                                                | 0.16                                        | 6                                           | 16                                       | 46                                      | 62                                      |
| JONES850110    | 1,305                                              | 0.00                                        | 0                                           | 0                                        | 261                                     | 261                                     |
| JONES860135    | 737                                                | 0.01                                        | 0                                           | 1                                        | 147                                     | 148                                     |
| JONES830106    | 273                                                | 0.00                                        | 0                                           | 0                                        | 55                                      | 55                                      |
| JONES830135    | 1,124                                              | 0.07                                        | 5                                           | 12                                       | 223                                     | 235                                     |
| JONES830133    | 931                                                | 0.00                                        | 0                                           | 0                                        | 186                                     | 186                                     |
| JONES860313    | 169                                                | 0.00                                        | 0                                           | 0                                        | 34                                      | 34                                      |
| JONES860310    | 1,455                                              | 0.10                                        | 7                                           | 17                                       | 288                                     | 306                                     |
| JONES830401    | 81                                                 | 0.05                                        | 1                                           | 2                                        | 16                                      | 18                                      |
| WRIGHT932301   | 2,311                                              | 0.00                                        | 0                                           | 0                                        | 462                                     | 462                                     |
| WRIGHT932620   | 247                                                | 0.00                                        | 0                                           | 0                                        | 49                                      | 49                                      |
| WRIGHT 932614  | 331                                                | 0.58                                        | 67                                          | 168                                      | 42                                      | 210                                     |
| WRIGHT932522   | 539                                                | 0.00                                        | 0                                           | 0                                        | 108                                     | 108                                     |
| WRIGHT932523   | 578                                                | 0.00                                        | 0                                           | 0                                        | 116                                     | 116                                     |

## Appendix C

| County & Field | LOW RESPONSE                                       |                                             |                                             |                                          |                                         |                                         |
|----------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|
|                | SRT<br>Over<br>Application<br>of Nitrogen<br>(lbs) | VRT<br>Increase<br>In<br>Yield<br>(bu/acre) | VRT<br>Increase<br>in<br>Production<br>(\$) | VRT<br>Increase<br>in<br>Revenue<br>(\$) | VRT<br>Reduction<br>in<br>Costs<br>(\$) | VRT<br>Increase<br>in<br>Profit<br>(\$) |
| WRIGHT932513   | 360                                                | 0.00                                        | 0                                           | 0                                        | 72                                      | 72                                      |
| WRIGHT932420   | 1,166                                              | 0.00                                        | 0                                           | 0                                        | 233                                     | 233                                     |
| WRIGHT932317   | 140                                                | 0.56                                        | 36                                          | 91                                       | 15                                      | 106                                     |
| WRIGHT932324   | 880                                                | 0.37                                        | 35                                          | 87                                       | 164                                     | 251                                     |
| WRIGHT932435   | 449                                                | 0.16                                        | 13                                          | 33                                       | 85                                      | 118                                     |
| WRIGHT922506   | 340                                                | 0.89                                        | 71                                          | 178                                      | 43                                      | 221                                     |
| WRIGHT922512   | 1,396                                              | 0.00                                        | 0                                           | 0                                        | 279                                     | 279                                     |
| WRIGHT922302   | 1,571                                              | 0.00                                        | 0                                           | 0                                        | 314                                     | 314                                     |
| WRIGHT922517   | 953                                                | 0.00                                        | 0                                           | 0                                        | 191                                     | 191                                     |
| WRIGHT922520   | 1,741                                              | 0.00                                        | 0                                           | 0                                        | 348                                     | 348                                     |
| WRIGHT912618   | 287                                                | 0.00                                        | 0                                           | 0                                        | 57                                      | 57                                      |
| WRIGHT922415   | 1,044                                              | 0.04                                        | 3                                           | 7                                        | 208                                     | 215                                     |
| WRIGHT922423   | 863                                                | 0.00                                        | 0                                           | 0                                        | 173                                     | 173                                     |
| WRIGHT922313   | 1,239                                              | 0.00                                        | 0                                           | 0                                        | 248                                     | 248                                     |
| WRIGHT922331   | 659                                                | 0.00                                        | 0                                           | 0                                        | 132                                     | 132                                     |
| WRIGHT922326   | 663                                                | 0.00                                        | 0                                           | 0                                        | 133                                     | 133                                     |
| WRIGHT912611   | 693                                                | 0.00                                        | 0                                           | 0                                        | 139                                     | 139                                     |
| WRIGHT912506   | 549                                                | 0.00                                        | 0                                           | 0                                        | 110                                     | 110                                     |
| WRIGHT912411   | 505                                                | 0.00                                        | 0                                           | 0                                        | 101                                     | 101                                     |
| WRIGHT912632   | 4                                                  | 0.58                                        | 46                                          | 115                                      | -16                                     | 100                                     |
| WRIGHT912532   | 471                                                | 0.00                                        | 0                                           | 0                                        | 94                                      | 94                                      |
| WRIGHT902314   | 4,374                                              | 0.03                                        | 7                                           | 17                                       | 872                                     | 889                                     |
| WRIGHT902527   | 1,050                                              | 0.00                                        | 0                                           | 0                                        | 210                                     | 210                                     |
| WRIGHT902426   | 601                                                | 0.00                                        | 0                                           | 0                                        | 120                                     | 120                                     |
| WRIGHT902335   | 409                                                | 0.09                                        | 9                                           | 23                                       | 79                                      | 102                                     |
| TOTAL          | 154,243                                            | 0.13                                        | 2,436                                       | 6,089                                    | 29,979                                  | 36,068                                  |