Farming Cost Review (Final)
Montana-Alberta Tie Ltd.

Submitted to:
Environmental Management Bureau
Montana Department of Environmental Quality

Prepared Under:
State of Montana Environmental Services Term Contract (SPB06-81195O)
Task Order #01-CII

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July 12, 2007

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Mr. Tom Ring
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Montana Department of Environmental Quality
PO Box 200901
1520 East Sixth Avenue
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RE: Farming Cost Review Montana-Alberta Tie Ltd. (Final)
DEQ Contract #SPB06-81195O
Task Order #01-CII

Dear Mr. Ring:

HydroSolutions Inc and Fehringer Agricultural Consulting, Inc., is pleased to provide this Farming Cost Review Report for the Montana-Alberta Tie Ltd. presented under the State of Montana Environmental Services Term Contract (SPB06-81195O) for Task Order #01-CII to the Montana Department of Environmental Quality (MDEQ).

A report outlining objective and results of this review are attached. The report presents the findings of a detailed and critical review and a range of reasonable values for the annual cost to farming of transmission structures in their crop fields. The review was based on the use of most recent data available and realistic assumptions with respect to the extra work, inputs, yields and time needed by farmers, and was representative of farming in the Great Falls to Cut Bank, Montana area. Please refer to the attached report for specific details.

It has been a pleasure completing this review and look forward to working with you again in the future. If you have any questions, please contact us at (406) 655-9555.

Sincerely,
HydroSolutions Inc

Shane A. Bofto
Senior Chemical/Environmental Engineer

Attachment: Farming Cost Review – Montana-Alberta Tie Ltd.

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Executive Summary

This report presents a detailed and critical review of three existing studies that estimate costs of farming around transmission line structures to a 'representative farmer' in the Conrad, Montana area. As a result of the review, estimated ranges of reasonable values for the annual cost to farmers of transmission structures in their crop fields were made.

The studies reviewed included two from farmers in area of the proposed Montana Alberta Tie power line path, and one study conducted by researchers at North Dakota State University. The studies either over or under estimated the size of the footprint of land which would be taken out of production due to the obstruction. This was mainly due to either the lack of an implement transition area to navigate around the obstruction or the use of a large safety buffer.

The alternative analysis presented used likely transition areas and safety buffers around the pole(s) for the proposed structure types, orientation to the field and location in the field. A representative farmer was chosen to be either dryland or irrigated, where the dryland farmer grew spring wheat in fallow rotations as well as continuous crop spring wheat. Spring wheat was used because it had the highest value and expenses of crops grown in the in the proposed area. The irrigated farmer would also grow spring wheat for the same reasons listed above.

The results indicated that long-span 6.5-foot diameter mono-poles at the field edges would cost the least to farm around on an overall basis which considers multiple structures within the field. The long-span mono-pole layout would have a larger footprint than the short-span, but would have fewer structures to farm around per mile. On an individual structure basis, the 3.5-foot diameter mono-pole structure at the field edge would be the least cost to farm around.

A. Introduction

HydroSolutions Inc (HydroSolutions) is pleased to present this report in accordance with the Scope of Service for the Limited Solicitation for Farming Cost Review, Environmental Permit Preparation, Analysis and Assistance Services Term Contract, Contract # SPB06-81195O, Task Order # 01-CII, approved by the Montana Department of Environmental Quality (MDEQ) on June 4, 2007.

On April 27, 2007 the Montana Department of Environmental Quality issued a limited solicitation for a firm to complete the scope of Services described therein. The MDEQ has completed a Draft Environmental Impact Statement for the Montana-Alberta Tie Ltd. (MATL) 230-kV Transmission Line and is currently addressing comments on the Draft Environmental Impact Statement (DEIS). The scope included the review of three existing studies that estimated the cost of transmission line structures to a 'representative farmer' in Conrad, Montana area.

This scope of service was completed by HydroSolutions and Fehringer Agricultural Consulting, Inc. (Fehringer), an agronomic consulting firm.

B. Background

The MDEQ received comments on the DEIS indicating that locating H-Frame poles on diagonal crossing of cultivated fields has greater costs to farmers than locating the proposed line along field boundaries and section lines. Comments also indicated that the use of single pole structures along field boundaries would result in lower impacts to farming costs. The information in this review would be used with other information in the decision process whether to grant, deny or grant with conditions a certificate of compliance under Montana's Major Facility Siting Act.

C. Scope and Methods

The scope of service included the critical review of three studies that estimate the cost of transmission line structures to a 'representative farmer' in the Conrad, Montana area. Each study was reviewed for assumptions, cost inputs and total area taken out of production. A reasonable range of annual estimated costs to farmers were made due to the structures in their crop fields. The analysis and report was conservative in favor of farmers and used most recent date, realistic assumptions and was to be representative of farmers in the Great Falls to Cut Bank, Montana area.

HydroSolutions and Fehringer reviewed the three referenced studies for approach, applicability, scope, cost basis, timeliness of pricing, and practice. The most representative information was compiled and provided alternative sources of information to estimate cost impacts to farmers as a result of power line structures placed in agricultural fields located from Great Falls to Cut Bank, Montana. Farming expenses reflect 2007 costs and included the following: prices for fuel, maintenance and repair, fertilizer, pesticides, time and labor cost. The estimates were tailored in a conservative direction towards the farmers.

Two 'representative farmer' scenarios were created to accurately represent dry land and irrigated farming practices in the Great Falls to Cut Bank, Montana area. Items of focus included farming practices, size of machinery used, typical acreages farmed, typical crops and yields, and other regional characteristics.

The cost values developed were applied to the chosen "representative farmer' to develop a range of reasonable values for the annual cost to farmers per transmission structure for each of the structures that will be possibly used in their crop fields. The presence of these structures may result in both lost crop production from the structure footprint and overlapping of tillage and inputs as well as increased labor costs.

Several scenarios were addressed including two configurations, Mono-pole (both short-span and long-span) and H-frame, along with location of the power poles, to include edge or interior. As required in the solicitation, farming techniques using auto steer and GPS were of particular consideration.

D. Summary of Comments

D.1. MATL DEIS Analysis

A brief review of the MATL DEIS was made to determine its basis and assumptions. The DEIS Land Use analysis assumed a 5 foot buffer around each pole structure in any direction. The H-pole base area (1.5 feet by 23.5 feet) with 5 feet added to all sides was 0.0088 acre (385.25 square feet) removed from production per structure. The short-span mono-pole structure (1.75 foot pole radius plus 5 feet) would remove 0.0027 acre (143.14 square feet) per structure. Long-span mono-poles would remove more acreage from production because of their 6.5-foot-wide concrete foundations, but there would be fewer of them in comparison to the short-span design (DEQ, 2007).

The analysis also stated that farmers have to divert their equipment around structures, make additional passes, take additional time to maneuver equipment, skip areas, or retreat areas, production cost would increase. In addition, efficiency of some large, GPS-guided equipment would be adversely affected in fields with diagonal crossing. (DEQ, 2007).

The DEIS analysis reports (Table 2.3-1) that mono-poles were to be set on an average of 790 feet apart (about 6.6 structures per mile) for long-span, 490 feet apart (about 10.8 structures per mile) for short-span (regular). H-frame structures were to be set on an average of 790 feet apart (about 6.6 structures per mile).

Alternative 2 had no mono-pole structures but 6 acres removed from production. There were 742 H-pole structures spanning a total of 92.7 miles and removing 6.53 acres of production.

Alternative 3 had no mono-pole structures but 6.3 acres removed from production. There were 782 H-pole structures over 97.7 miles with 6.88 acres removed from production.

Alternative 4 had 588 long-span mono-poles or 947 short-span mono-poles over 87.9 miles. There was 3.7 acres removed for production for the long-span, and 1.4 acres for the short-span. There were no H-pole structures in Alternative 4.

As presented in the MATL DEIS analysis, total acreage removed from production for Alternatives 2 and 3 was 12.53 and 13.18 acres, respectively.

Total acreage removed from production for Alternative 4 was 3.7 acres for long-span mono-pole structures and 1.4 acres for short-span for mono-pole structures as there were no H-pole structures used in Alternative 4 (DEQ, 2007).

D.2. Public Comments and Studies

There were three cost analysis studies reviewed for this report. The first was prepared by Allen Denzer of Conrad, Montana, the second was prepared by Brent MacDonald of Brent MacDonald, Inc. of Floweree, Montana, and the third was a spreadsheet model prepared by Dr. Eric A. DeVuyst, Dean A. Bangsund, and Dr. F. Larry Leistritz. Copies of the comments and studies are included in Appendix A.

Each study was critically reviewed for assumptions, inputs such as costs and acreage taken out of production, and formulas. The results of each study review is detailed below.

D.2.a. Denzer Study:

The Denzer study had concerns regarding farming operation around H-frame and Single-pole structures. Also, there were some concerns regarding the use of Global Positioning System (GPS), yield mapping, and variable rate fertilizing around poles. The Denzer study also had concern with the North Dakota study not addressing GPS auto steering around poles and the model was incomplete and used custom farming rates which did not apply.

This study assumed that the lead implement would always be the first to encounter the structure, Also, that the equipment would to be working in unison so one or two pieces of equipment would have to wait for the lead implement to make a lap around an interior pole(s).

If pole(s) are in the middle of the field, it would take alternative planning so that implements are not standing by as another implement is detouring around the pole structure. This could be accomplished by increasing the separation of the implements or work from two sides of a field.

The entire field still required spreading a wildoat herbicide ("Fargo"), spraying, seeding, harvesting, etc., but it will take longer.

Input costs are high or inadequately defined. Crop loss would not be 50% as stated in the study, but likely no more that 20% as used in the alternative analysis.

In regard to yield mapping, GPS and auto-steer, manufacturers have procedures for obstruction avoidance in fields. These obstructions would not be the first ones that this technology has had to encounter.

Structures at field edges would create less of a footprint and cost to farm around. The direction of farming would not matter with edge structures because one to two passes are typically made parallel to all field edges when beginning or ending a field. This creates an area for turning around when approaching field edges at an angle or perpendicular.

For structures placed in the interior of a field, it would not matter what direction the structures are oriented, it is still the same sized obstruction. If they are parallel to the direction of a farming operation, they would all be encountered in the same pass. If they are perpendicular or diagonal to the direction of the operation, they would be encountered in multiple passes – one at a time. There certainly will be more per section on a diagonal direction. However, not all fields run east and west or north and south.

The number and type of operations; as well as, size of equipment used were helpful in creating the alternative analysis. All necessary operations for a cropping cycle were not listed. Please refer to the alternative analysis for specific cropping cycles. No consideration for loss of crop quantity and/or quality was listed.

D.2.b. MacDonald Study:

The major concerns of the MacDonald study appeared to be related primarily to the farming operation around the towers associated with GPS auto steer and diagonal lines. Also, concern was raised regarding the increase of specific farming costs since the original analysis was performed.

The safety buffer was figured at 20 feet instead of five feet. This added considerable area to the total outage from each pole(s) and was not necessary. Most farmers will farm closer than five feet. By using the 20 foot safety buffer, overlap area has been over estimated.

The MacDonald study figured a required minimum of 1.5 revolutions around a pole. Farming around an interior structures merely adds one revolution (merely 360 degrees), not 1.5. If 1.5 revolutions (540 degrees) were made, the farmer would be headed the opposite direction as to the approach of the structure. It will not take an additional revolution to "get the GPS back on track". Tracking would be instantaneous. Auto-steer can be turned off and on at obstructions and at the ends of a field. Again, overlap area has been over estimated by Mr. MacDonald.

Glyphosate ("Roundup") cost listed in this study was double that of current actual costs. Application expense was listed at $3.75 per acre, and typical farming cost may be consistent with that value, although custom application would be closer to $5.00 per acre.

Aerial applicators have to consider a number of obstacles – regular power lines, trees, towers. They do not charge more for spraying field with obstructions, but they may leave small untreated areas to avoid the obstructions.

The number and type of operations as well as size of equipment was helpful in creating the alternative analysis. Not all necessary operations for a cropping cycle were listed. No consideration for loss of crop quantity and/or quality was listed.

D.2.c. DeVuyst Study:

The DeVuyst study estimated cost based on footprint of the towers using various assumptions such as; operations are not discontinued when overlap begins, custom application rates were adequate to cover individual farmer's cost of application, easement settlement covers lost production from the tower footprint and existing crops without irrigation is continued in the foreseeable future.

The study was comprehensive, compared to the other studies reviewed, as it considered more pole scenarios. It considered all crops that could be grown in the area of this power line. Footprint diagrams do not depict actual farming patterns around poles. It assumes that the crop is 100% destroyed by the sprayer's tire tracks. That is not the case unless the crop is being sprayed at the wrong growth stage. More damage is done by doubling the rate of seed, fertilizer (on dryland), and herbicides. Costs for farming around poles were more accurate and more agronomically complete than the previous two studies.

E. Alternative Analysis

Based on the review of the above referenced comments and studies, and the MATL DEIS, an alternative analysis is presented below.

E.1. Pole Layouts

A range of most frequently encountered specific pole layouts were evaluated and are presented on Figure 1, Pole Configuration Footprint Layouts. These areas represent the portion of land adjacent to the pole(s) that would not be farmed due to impedance to the farming implements resulting in the portion of land that is taken out of production. Power poles were in two structure types, Mono-pole and H-pole. Mono-poles consisted of a 3.5-foot diameter pole (short-span) or

6.5-foot (long-span) wide concrete foundation, and an H-hole, which consisted of two 3-foot diameter poles spaced 20 feet apart at the centers or 23 feet apart at each outside diameter.

Mono-poles were either located at the edge of the field (Layouts A & B) or in the interior (Layouts C & D). H-poles were oriented either perpendicular with, and at the edge of the field Layout E), perpendicular with, and at the edge of the field and straddling the fence line (Layout F), parallel with, and at the edge of the field (Layout G), and interior (Layout H).

A safety buffer of 5 feet was used around the outside diameters of each pole to assess footprint areas around each structure, location and orientation using conventional farming techniques. The safety buffer is generally dependent upon the specific field, equipment and operator experience, but in this case a 5-foot safety buffer should be adequate to safely clear the pole(s) using typical equipment while still optimizing farmed area.

These footprint areas also consider transition lengths used to navigate farming equipment around the structure located along the edge to maintain the 5-foot safety buffer and return to the previously established row track. These transition lengths include an approximate 1.3:1 (transition length to diversion) transition length for the edge pole(s) diversion (A, B, E, F). These transition lengths are used for pole(s) locations on field edges. For H-poles located parallel and adjacent to the property line (G), a 1:1 transition length was used due to its longer parallel section and flatter transition along the parallel poles adjacent to the property line. This transition does not require the implement to swing out as far as the other edge layouts. Please refer to Table 1 for estimated footprint areas.

E.2. Representative Farmer

This analysis is based on the ‘representative farmer’ scenarios which represent dry land and irrigated farming practices in the Great Falls to Cut Bank, Montana area. Costs used in the analysis reflect up-to-date information by using current 2007 prices. Fertilizer prices were obtained from Farmer’s Union, (Personal Communications, Farmer’s Union, June 2007).

Herbicide costs were taken from Wilbur-Ellis' 2007 Price List and reflect highest retail cost (Wilbur-Ellis 2007).

A typical dry land field was chosen to grow spring wheat in fallow rotation as well as continuous crop spring wheat. Spring wheat is used because it has the highest value of crops grown in the proposed area. Currently, spring wheat is trading at near $6.00 per bushel. Winter wheat is worth about $5.50 per bushel, and it will generally yield more than spring wheat but the gross per acre will be more with spring wheat. Winter wheat is not a crop that survives winters consistently in the Cut Bank, Montana area. Malt barley is approximately $4.40 per bushel and will yield more than spring wheat but spring wheat will still gross more per acre. In addition, spring wheat requires more fertilizer per acre, particularly nitrogen, than winter wheat, durum, canola, and malt barley. In summary, spring wheat was used because it is the highest valued per acre crop, has the highest inputs per acre, and can be grown in all parts of the proposed area. If a farmer chooses to plant something other than spring wheat, the cost of farming around the poles will be less. Spring wheat provides the worst case scenario from the farmer's perspective.

For dry land crop production, both wheat-fallow rotation and continuous crop farming were evaluated because both practices are used in this area. Many farmers will flex crop, which is recropping a field when enough stored soil moisture is present at planting time to assure a profitable yield. If stored soil moisture is below average, the farmer then chooses to fallow.

A typical irrigated field was chosen to also grow spring wheat for the same reasons listed in the dry land section above. Irrigated malt barley generally has been a more profitable crop than spring, winter wheat, canola, etc., but at the time of this writing, spring wheat has surpassed malt barley. Again, using spring wheat for the irrigated crop provides the worst case scenario.

E.3. Row Layout

The row layout was applicable to farming equipment with GPS and auto-steer. Please refer to Figure 1 for specific pole layouts.

E.3.a. Layouts A, B, E, F and G:

These layouts represent pole(s) locations at the edge of a field. It was assumed that the farmer would not be able to use auto-steer on the initial pass on the field edge containing poles. In this analysis, ample transition space was created to easily farm around the pole. On the second pass, the farmer would establish the AB line for auto-steer or GPS light bar guidance. The transition varied with the type of structure, location and orientation, but always included a 5-foot safety buffer.

E.3.b. Layouts C, D, and H:

Interior Mono-pole or H-poles orientation assumed that the farmer would approach the pole(s), turn off the auto-steer, and divert either left or right while maintaining the 5-foot safety buffer. Upon reaching the other side of the pole(s), the tractor and implement would continue around the pole(s) to make an additional 360 degrees and then return to using auto-steer and following the previously established row track. Farming around the pole(s) involves only one lap around the pole not 1.5 to 2.5 extra revolutions as listed in the Denzer and MacDonald studies.

E.4. Overlap

Using the footprint areas, overlaps of farming rows were calculated using standard implement widths for harrowing, discing, toolbarring, chemical spraying, “Fargo” (wild oat control) application , fertilizer application, seeding, and combining. Implement widths are presented in Table 1. These implement widths were typical of those used in the Great Falls to Cut Bank, Montana farming area, as indicated by the Denzer and MacDonald studies referenced above. Using the footprint areas and implement widths, overlaps were calculated for each pole configuration and orientation using the selected implements for each specific process.

The overlap areas were calculated by adding the footprint areas for the pole(s) at the edge of the field to the implement width chosen. This would account for the implement moving out and around the pole(s) footprint on the first pass, moving into the adjacent row path and overlapping the width of the footprint. The overlap for the interior structures assumed a 360 degree path around the pole(s) footprint, which includes the 5-foot safety buffer, with the selected implement width added.

E.5. Estimated Costs

Cost for labor, materials, and equipment were estimated from various sources including custom farming and application rates (University of Wyoming "Custom Rates for Wyoming Farm and Ranch Operations, 2004-2006" and Personal Communications, Farmer's Union, June 2007, respectively) site specific vendor information, and personal communications with regional farmers. Provided below is a brief description of the various farming operations anticipated for the Great Falls to Cut Bank area. The information is reflected on Attachments DL-1 to 16 and IRR-1 to 8 found in Appendix B and C, respectively.

Many dry land farmers heavy harrow to incorporate seeds after harvest so that they germinate more uniformly, especially in drier years. Harrowing also distributes crop residue if it did not get uniformly spread behind the combine. Heavy residue rows can cause disease problem, especially when continuous cropping.

Irrigated farmers will most likely disc their fields one to two times after harvest and toolbar it one to two times before planting. For these analysis, two of each of these operations have been included.

Fallow and preplanting sprayings listed represents the highest number of applications needed per year. A farmer may have fewer applications than listed. Herbicide rates are typical for this type of spraying. In addition to the "Roundup" for first fallow application, dicamba ("Banvel") was added to the mix as this would be the ideal mixture but would cost more per acre than if "Roundup" only was applied. The addition of dicamba would provide extended broadleaf weed control and is a prudent practice to reduce the risk of creating "Roundup" resistance in the weeds. For preplant spraying, only "Roundup" was applied for both dry land and irrigated fields.

In regard to wild oat control, "Fargo" application at 15 pounds per acre was used because this is the most expensive method of controlling this weed. It requires a separate application and possibly a harrow incorporation. If a grower uses a post-emergent herbicide that can be tank mixed with the broadleaf weed herbicides, then there is only one application of herbicides to the

field, not two and no incorporation with a harrow. Lastly, 15 pounds per acre of "Fargo" was the rate used for barley and winter wheat. Ten to twelve and one-half pounds per acre is the labeled rate on spring wheat. Again, all inputs were designed to be a worst case scenario.

Prices used for fertilizer reflects the cost spike that has occurred in 2007, $450 per ton for 46-0-0, 11-52-0, and 18-46-0. For dry land crops, fertilizer banded with the seed would be 60 pounds per acre of 11-52-0 or 18-46-0. Topdress nitrogen was 55 actual units (pounds) of nitrogen per acre for a total of 61 pounds of nitrogen per acre since six pounds are applied via the 11-52-0 banded with the seed. These amounts of nutrients would be adequate for a spring wheat-fallow rotation yield goal of 50 bushels per acre. For continuous crop dry land spring wheat, 69 pounds of actual nitrogen was topdressed for a total of 75 pounds per acres (including fertilizer banded with the seed) for a yield goal of 35 bushels per acre. For irrigated spring wheat, 80 pounds of 11-52-0 was banded with the seed. Nitrogen applied for a 90 bushel per acre yield goal was a total of 210 pounds per acre. Crop yields listed are from Fehringer's personal knowledge from production in the area and Montana Agricultural Statistics website (USDA 2007).

Seeding rate was figured at 70 pounds per acre for dry land and 100 pounds per acre for irrigated land. The price used is for certified seed that has been cleaned and treated.

Herbicides listed for in-crop spraying to control broadleaf weeds are the more expensive ones available. Herbicides used have only a 60 day plant back restriction so any crop can be planted the next growing season.

Harvesting expense was calculated at custom rates. Overlap was figured for combining even though custom harvesters charge by the acre and what the crop is yielding. They do not have a surcharge for cutting around obstructions.

Crop loss due to overlap was figured at 20% of the yield goal. Yield loss would be from reduced yield and/or quality (test weight, protein, etc.). Yield loss for edge poles would be only the

footprint area shown for Layouts A, B, E, F, and G. Yield loss for poles in the field interior was much larger because of having to overlap for one revolution around the pole(s) (Figures C, D, H). The amount of area used was figured by taking the largest implements listed in Table 1, which are sprayer and "Fargo" applicator.

Harrowing, toolbarring, discing, fertilizer application, seeding, and harvesting are all smaller equipment, but again, the worst case situation was used. Crop spraying and "Fargo" application would result in the largest yield loss due to double applying herbicides. Double application would cause the most crop stress. In addition to the reduced yields from overlap, farmers would not have the area of the structure footprint in crop any longer. The foot print areas for each pole situation are shown in Table 1.

Weed control in the pole footprint was also addressed. The best option would be to establish grass in the footprint area. However, this might present a fire danger that MATL does not want to have. In lieu of having grass established, total vegetation control would be the next best option. This could be accomplished each fall by an application rate of up to five quarts of diuron, three pints "Arsenal", and "Roundup" per acre to each footprint area. Winter moisture would incorporate the herbicides into the soil so that vegetation is controlled all season long. Cost for these herbicides was approximately $150 per acre. Two hundred dollars per acre had been allotted in the cost analyses to cover any other herbicides selected.

Farming Cost Sheets for each dry land and irrigated scenario are included in Appendix B and C, respectively.

E.6. Results

The alternatives analysis included dry land with a spring wheat-fallow two year crop rotation and continuous cropping spring wheat. Irrigated land included raising continuous spring wheat. Each layout was considered in the evaluation. Results of the Alternative Analysis for dry land and irrigated farming are summarized in Tables 2 and 3, respectively. For MATL and the growers, structures at field edges would cost less to farm around than interior poles.

The results indicated that long-span 6.5-foot diameter mono-poles at the field edges would cost the least to farm around on an overall basis which considers multiple structures within the field. The long-span mono-pole layout would have a larger footprint than the short-span, but would have fewer structures to farm around per mile. On an individual structure basis, the 3.5-foot diameter mono-pole structure at the field edge would be the least to farm around.

All care should be taken to not place structures in a sprinkler irrigated field; due to the additional costs of having to break apart a wheel line to move it past a pole(s) and the cost of disrupting a pivot from making a complete revolution. Those costs have not been addressed in the alternate analysis because each field will have a unique situation to calculate. Pole(s) in flood irrigated fields will have additional costs beyond overlap costs. Again, cost depends upon its location in the field, top, middle, or bottom of field. Structures at the top of the field will result in less crop watered down slope than crop located in the in the middle or bottom of the field. Cost of interior pole(s) will be also influenced by the length the water has to travel.

F. Standard of Care

Services performed by HSI personnel for this project have been conducted with that level of care and skill ordinarily exercised by members of the profession, currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is made.

G. References

Farmers Union, Worden, Montana, June 2007. Personal communication.

Montana Department of Environmental Quality, Draft Environmental Impact Statement for the Montana Alberta Tie Ltd. (MATL) 230-kV Transmission Line, March 2007.

United States Department of Agriculture, National Agricultural Statistics Services, Montana Agricultural Statistics, Available online at **http://www.nass.usda.gov/Statistics_by_State/Montana/index.asp**, Accessed June 2007.

University of Wyoming "Custom Rates for Wyoming Farm and Ranch Operations", 2004-2006, Hewlett, John P. and Sedman, James, May 2006.

Wilbur-Ellis Company 2007 Price List, Term and Conditions, 4/9/2007.

Figure

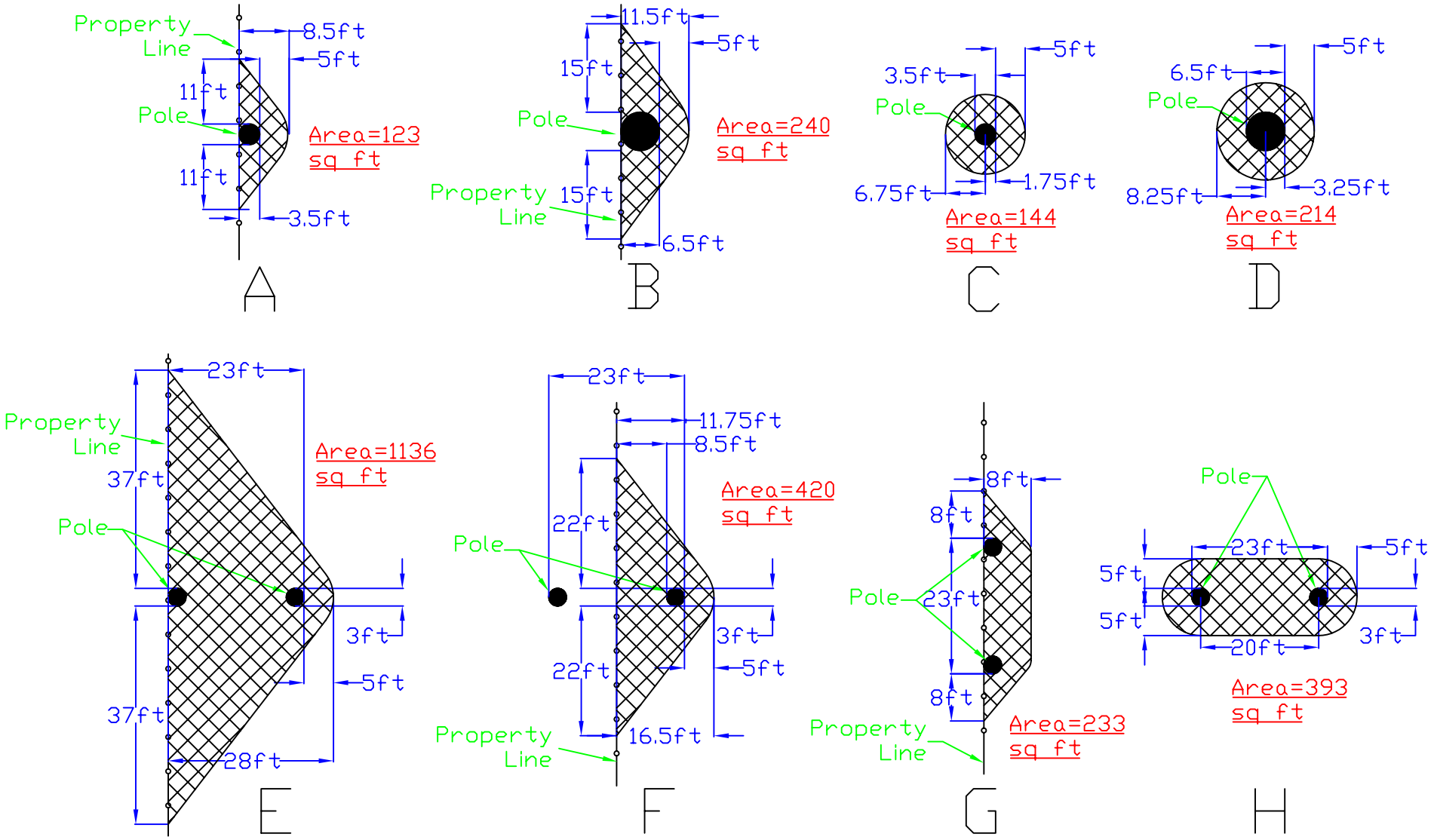

FIGURE # 1	INT	DATE
	DRAWN BY: sab	07/12/07
	APP'D BY: sab	07/12/07
	JOB No. DEQ Farming	
	DWG. No. Figure 1	SHEET OF
	SCALE NA	

Pole Configuration Footprint Layouts
MATL Farming Cost Review

Montana Department Of Environmental Quality

Tables

Table 1. Footprint and Overlap

Layout[1]	Structure	Pole Diam. (ft)	Location	Orientation	Minimum Buffer Distance From Center of Pole (ft)	Footprint (square feet)	Implement Width (feet)			
							70	120	36	60
							Overlap (square feet)			
							Harrow	"Fargo" & Spraying	Disc & Combine	Fertilizing, Toolbar & Seeding
A	Mono-pole	3.5	Edge		1.75	123	123	123	117	123
B	Mono-pole	6.5	Edge		3.25	240	240	240	207	240
C	Mono-pole	3.5	Interior		1.75	144	18,362	50,328	5,597	13,854
D	Mono-pole	6.5	Interior		3.25	214	19,022	51,459	5,937	14,420
E	H-pole	3.0	Edge	Perpendicular	1.5	1136	1,136	1,136	1,136	1,136
F	H-pole	3.0	Edge	Straddling	1.5	420	420	420	420	420
G	H-pole	3.0	Edge	Parallel	1.5	233	233	233	233	233
H	H-pole	3.0	Interior		1.5	393	21,052	54,490	6,982	16,160

Notes: [1]From Figure 1.
Mono-pole: Regular and long span are 3.5 and 6.5-ft diam, respectively.
H-Pole: 3-ft diam. each, 20-ft separation center to center, 23-ft from outside pole to outside pole.
Safety buffer: 5-ft.

Table compiled by Shane Bofto, Engineer & Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/12/07.

Table 2. Dryland Costs of Farming Around Pole(s).

Layout[1]	Structure	Pole Diam. (ft)	Location	Orientation	Farming Practice			
					Spring Wheat-Fallow		Continuous Crop	
					Information Source	Annual Cost (per structure)[2]	Information Source	Annual Cost (per structure)[2]
A	Mono-pole	3.5	Edge		Attachment DL-1	$13.81	Attachment DL-9	$14.22
B	Mono-pole	6.5	Edge		Attachment DL-2	15.06	Attachment DL-10	15.86
C	Mono-pole	3.5	Interior		Attachment DL-3	105.09	Attachment DL-11	156.01
D	Mono-pole	6.5	Interior		Attachment DL-4	107.98	Attachment DL-12	160.44
E	H-pole	3.0	Edge	Perpendicular	Attachment DL-5	37.13	Attachment DL-13	40.91
F	H-pole	3.0	Edge	Straddling	Attachment DL-6	20.98	Attachment DL-14	22.38
G	H-pole	3.0	Edge	Parallel	Attachment DL-7	14.99	Attachment DL-15	15.76
H	H-pole	3.0	Interior		Attachment DL-8	120.57	Attachment DL-16	177.74

Notes: [1]From Figure 1.
[2]Cost reflect 2007 prices.
Mono-pole: Regular and long span are 3.5 and 6.5-ft diam, respectively.
H-Pole: 3-ft diam. each, 20-ft separation center to center, 23-ft from outside pole to outside pole.
Safety buffer: 5-ft.

Table compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/21/07.

Table 3. Irrigated Costs of Farming Around Pole(s).

Layout[1]	Structure	Pole Diam. (ft)	Location	Orientation	Irrigated Cropping	
					Information Source	Annual Cost (per structure)[2]
A	Mono-pole	3.5	Edge		Attachment IRR-1	$15.60
B	Mono-pole	6.5	Edge		Attachment IRR-2	18.69
C	Mono-pole	3.5	Interior		Attachment IRR-3	258.67
D	Mono-pole	6.5	Interior		Attachment IRR-4	266.61
E	H-pole	3.0	Edge	Perpendicular	Attachment IRR-5	41.81
F	H-pole	3.0	Edge	Straddling	Attachment IRR-6	23.34
G	H-pole	3.0	Edge	Parallel	Attachment IRR-7	18.51
H	H-pole	3.0	Interior		Attachment IRR-8	290.41

Notes:
[1]From Figure 1.
[2]Cost reflect 2007 prices.
Mono-pole: Regular and long span are 3.5 and 6.5-ft diam, respectively.
H-Pole: 3-ft diam. each, 20-ft separation center to center, 23-ft from outside pole to outside pole.
Safety buffer: 5-ft.

Table compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/21/07.

Appendix A
Comments

I Allen Denzer, Terri Denzer, and Darlene Denzer appreciate the effort the DEQ put into the Draft Impact Study and statement.

Upon reading it I noted you took into account the following:

1. All the concerns raised by myself and the other farmers
2. Single poles.
3. Non diagonal.
4. Diagonally only on grass land.
5. Difficulty farming around 2 power lines in close proximity to each other.
6. Weed control around double poles.
7. Added liability with poles in the middle of fields.

Concerns we have that need to be addressed.

1. The difficulties our son will have operating around an H frame or a Single pole structure. Rick lost his arm 3 years ago. We have made many improvements to help him with this, by moving all unnecessary structure that are in his way. He is the 5th generation on our family farm and wants to continue to farming. With his son we are looking at a 6th generation of farming. Rick's capability has changed making him unable to use some of the old machinery, but is able to use modern guidance equipment. All consideration should be taken to help him continue farming. These diagonal poles will be one more obstacle he has to negotiate around for the rest of his working life adding a great burden on his other arm. Using Alternative 4, or moving the line south by ¼ mile would take it off our crop land giving Rick the opportunity to farm with less interference. This power line should be done right the first time, for the impact we will have to live with forever.
2. Modern GPS, auto steering, yield mapping, and variable rate fertilizing doesn't work in fields with poles in them. As you cut around and around these poles to clean up your skips the yield monitor records a very low yield, as it thinks the 36 ft. header is full not just cutting skips. The next year the variable rate fertilizer come to the pole and is told because of the low yield last year to dump on the fertilizer to make up for the pervious low year. You have just created a big problem as far as quality and yield of your crop, wasted fertilizer and possibility environmental concerns by going way beyond the recommended rate. The problem continues with chemical applications being doubled or tripled.

Modern farming has progressed very rapidly within a few years these guidance systems will not even need a human in the operating cab. John Deere has an unmanned tractor testing now that doesn't have an operator seat. We will see these in the near future except in fields with power poles, oil wells, and other obstacles.

Farmers make sacrifices for the good of the public, but we shouldn't have to sacrifice our progress of the future for the cheap way out now. Again you need to know the farmers expenses and try to figure out want they well be in 10 to 50 years. Once the power line is built, MATL will have little maintenance for years. (Northwest

line has had no poles replaced on our farm since being built in the 60's). So MATL has basically a one time expense while the farmer will have continued expense.

3. On December 10, 2006, I met with MATL's people, and the North Dakota professors MATL haired to calculate the cost to farm around the poles. In the professors opening statement he stated GPS auto steering makes farming around the poles way easier, enabling you to get closer to the poles. I informed him that GPS and auto steering doesn't drive themselves around the poles and are incapable of sensing an object ahead of them. He agreed that he hadn't used it but his students told him they could. There model was very incomplete as it showed the impacted area of the pole on the boarder of a field being a perfect ½ circle which its not. Their model showed the impacted area around the poles in middle of the field as being a perfect circle the width of the implement which is again wrong. As it takes at least 2 circles around the poles to get all the corners and skips. Their model uses custom per acre rates which don't apply here. The custom rate is figured at doing a whole field or farm at a normal ground speed, not going slowly around and around poles. There is a lot of time and productivity lost with these poles in the middle of a crop field. There is no time lost with poles on the edges of fields.

We are again sending you our cost to farm around the poles:
Example:
What our yearly cost is on the existing H structure:

(1)-**Fargo application**

2-60 ft Fargo (wild oat spreaders), working together at 15 mph. 112 acres per machine.

One works around poles while to other one sits and waits.
$5.00 dollars an acre for each machine
$17.00 an acre of chemical
3 minutes lost per pole X 2 = $55.99 lost production.
17.00 dollars x 2 acres chemical overlap= $34.00 dollars.
$55.99
$ 34.00

$ 89.99

(2)- **Broad Cast Fertilizer**

60 ft. at 15 mph. = 112 acres per hour. Rate $5.00 acre around poles loss 3 Minutes=$27.99
Fertilizer doubled around poles = $52.49
$350 per ton at 150pounds an acre x 2 $ = 52.50
$52.49

$52.50

$80.49

(3) **Pre Plant Spray**

3 Sprayers:

90ft. at 12 mph at $5.00 per acre 116 acre per hour
90 ft at 12 mph at $5.00 per acre 116 acre per hour
60 ft at 12 mph at $5.00 per acre 87 acre per hour

One sprayer goes around poles while the other 2 wait at in line for the first to get back in the row. Time lost 9 minutes =$230.00

Chemical = $ 9.18

$248.43

(4) **Heavy Harrow**

60 ft. at 14 mph = 105 acres per hour
$5.00 per acre, 3 minutes lost =
$26.25

(5) **Seeding:**

57 ft. air drill at 6 mph, $42.75 acre per hour at $7.00 per acre
525 hp tractor
3 minutes lost $14.97
Seed and fertilizer $24.00 x 2 =$48.00
$14.96
$ 48.00

$62.96

(6) **Weed spraying same as #3 for time and machinery**

Time $239.25
Chemical
$15.00 x 2 $30.00

$269.25

(7) **Harvest:**

3 combines; tractor and grain cart working together totals $1,000.00
Investment one cuts around poles while the others wait. Operating cost of

$160.00 an hour, for each combines. Loss 9 minutes
Loss $72.00

Summer fallow second year:

4 sprayers operation the same as # 3

248.43
X4

$ 993.72

Cost 2 seasons = $1843.09

Or $921.54 per year

Crop Loss:

75 bushels x $4.00 =$300.00 an acre x 2 acres x 50 % reduced production
$300.00 per crop
Or $150.00 per year

A senior loan officer from Northwest Farm Credit looked over our figures and said some were a little high and some were a little low but that our price came out the same as his.

Total cost per year is: $1071.54

These were 2005 production costs

Plus additional weed problems and liability.

The farmer should know exactly what the costs to farm around the poles are. They do it year after year. A computerized program is not capable of figuring out wasted time, double seeding, double spraying, compaction of the ground, loss in bushels per acre, loss of spray, etc, etc, etc. Why should we settle for less? What MATL is offering is nothing compared to our real costs. MATL is out to make a profit for the businessmen of Canada. MATL will recover the cost of alternative 4 in a mater of months while it takes farmers 20 to 30 years to pay for their land, shouldn't the farmers of the United States still be able to keep making the profit they were making before MATL decided to make another power line. This power will be sent out of state, used in Canada, not one bit in Montana.

We have Northwestern double diagonal poles in our fields that create a lot of problems and cost. We also have 5 miles of the WAPA line running down section lines and field boarders that create no problems or additional costs.

4. Alternative 4 seems to be a will thought out that covers all my concerns. Alternative 2 basically fallows MATL's route in being the cheapest for a

foreign company building in the United States. The state of Montana should only be worried about doing what's right for its citizens, and shouldn't concern itself about Bob Williams comment that they can't afford alternative 4. The draft should not take into consideration that MATL already has easements on some land. Farmers that signed did so under derris, they were told to sign or be condemned, MATL's right a way agents and lawyer, misled local farmers telling them they had to sign and they were the only ones that hadn't. We were even told we had 3 day to sign. That the line was decided. MALT went ahead and got some easement before the DEQ had made they decision where the line should go. I feel this put added pressure on you to decide on their route.

5. The DEQ worked very hard to figure the impact on the Canadian MATL Company, the water, antelope, birds, mule deer, and teepee rings, but seemed to leave out the financial impact on the Montana's farmers. We have paid our taxes and donated our land for roads, highways, power lines, missile lines and sights, fiber optic lines, petroleum lines, and oil wells. The state should recognize this and make sure when this power line is built that it is the best for everyone. I hear politicians stating this is so good and if they went through there land they'd give it to them. Words are cheap. I guess I would say that to, if they were not even near my land. This seems to me that the politicians always have ideas how to use farmers land. Like the wolf and bear introductions. Again the farmer and rancher have to take it and can't protect what's theirs. Why is this? I hope the DEQ decides on the right way to do this power line and not buckle to political pressure.

Allen Denzer

Terri Denzer

Darlene Denzer

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Actual costs of farming around a double pole utility set:

16.5 feet x 2640 ft.(1/2 mile) = 1 acre or 43560 square ft.

Spraying with a 120 ft sprayer: 160 ft. diameter circle (leaving 20 ft around poles) 160 x 3.1416 = 502 ft. x 1.5 = 753.9 linear ft.

120 ft./ 16.5 = 7.272727 acres/ 2640 ft. = .002755 acres per ft. x 753.9 ft = 2.0768 acres per pole set.

application costs: $3.75/ acre
chemical costs: $6.00/ acre (Roundup)
$9.75 x 2.0768 x 4 = $81.00 (4 applications of Roundup)

Maverick costs: $11.00/ acre + $3.75 app. = 14.75 x 2.0768 acres = $30.63
Total cost of going around a pole 1.5 times = $101.63

If we have to go around a pole an additional time to keep the GPS on track, it will be a 280 ft dia. or an additional 2.42 acres.
$9.75 x 4 x 2.42 = $94.38 (Roundup cost)
$14.75 x 2.42 = $35.70 Total of second loop: $130.08
Total cost of 2.5 loops $231.71

Heavy harrowing with a 70 ft. tool: 90 ft. dia. (leaving 10 ft. around poles) 90 x 3.1416 = 282.75 ft. x 1.5 = 425 ft.
70/16.5 = 4.25 acres/ 2640 ft. = .001606978(acres per ft.) x 425 ft. = .683 acres at $ 10.00 = $ 6.83 per pole set.
An additional time around poles at 160 ft. dia = 502.66 ft. or .8 acres x $10.00 = $8.00
Total cost of 2.5 loops: $14.83

Seeding with a 60 ft air drill: 80 ft dia x 3.1416 = 251.328 x 1.5 = 377 linear ft.
60/16.5/2640 = .00137741 acre per ft. x 377 ft. = .52 acres
Fertilizer: $36.00/ acre
Seed $7.50 / acre
Application $12.00/ acre
total $ 55.50/ acre x .52 = $28.86 per pole set
An additional time around a pole set at 140 ft. dia. = .6058 acres x $55.50 = $33.62
Total cost of 2.5 loops: $62.48

Combining with a 36 ft. header: 82 ft. dia. x 3.1416 = 257.61 ft. x 1.5 = 386.42 ft.
36/16.5/2640 = .000826446 acres per ft. x 386.42 ft. = .32 acres
$20.00 per acre x .32 = $6.40
Additional costs will be incurred while other combines wait for 1 combine to clean up around a pole set. Also, combines need to be
run at capacity and will lose grain out the back of the machine when it is not fully loaded or comes to a stop according to the grain loss
monitor.

Approximately 2 acres around each pole set will have a reduction in yield due to over applied spray, fertilizer and compaction from the
additional traffic from the equipment. If the reduction is 30% on a 58 bushel per acre proven yield, the results are 17.4 bushels per acre.
17.4 x 2 acres x $4.00 per acre = $139.20 per pole set.

Total out of pocket costs of going around a pole 1.5 times plus the yield reduction:**$282.92**

Total out of pocket costs of going around a pole set 2.5 times plus the yield reduction: **$454.62**

These costs will be spread over a two (2) year period so the above figures will be divided by 2 to get an annual cost
of farming around a double pole set.

Annual cost of going around a pole 1.5 times: **$141.46**
Annual cost of going around a pole 2.5 times: **$227.31**

I suspect that it will take 2.5 loops around each pole set so as to NOT leave skips and to give the equipment enough room to get
back on the preceding line and lock on the GPS and auto steer. I don't have a difinitive answer at this time as we have just installed the
auto steer recently. I'll have a better idea in about a month after we spray around some existing double pole sets.

There are other factors that enter into farming around an above gound power line such as unlocking and locking the GPS autosteer
(functions on the equipment when you come to a pole set). There is also difficulty getting back on the pass without the use of a foam marker.
Another will involve the option of arial (sp) spraying when there are two double poled power lines running in parrallel about 200 ft. apart.

I suspect Arial Applicators may not want to spray fields with (2) diagonal power lines running through it for obvious reasons.

I am certainly not against power lines **if they run North/South, East/West following section lines**. Diagonal lines just create too much expense in todays farming environment. I would be willing to sign an easement for a line **if it followed section lines** for a reasonable fee, but, the diagonal lines are simply unacceptable.

Sincerely,

Brent MacDonald
President
Brent MacDonald, Inc.
1250 Anderson Road
Floweree, MT 59440-9012

Fertilizer costs have increased by 30% since this analysis was done in the summer of 2006 - so the costs will increase accordingly.

Model Overview

The methodology of the spreadsheet is based on professional assessment by Dr. Eric A. DeVuyst, Dean. A. Bangsund, and Dr. F. Larry Leistritz on how to find a reasonable estimate of the additional expense of having to farm around electrical towers in a crop field. The formulas and approach used in the model were not found in existing academic literature, although we cannot assume that a similar approach has not been used in other studies. Our approach may not be unique or novel.

The intent of the model is to use site-specific values and inputs, if available, to estimate the highest reasonable expectation for the cost to farm around electrical towers and guy wires. Costs are expected to vary based on the location or placement of the structure in the field. Towers located in the interior of the field require farming around the entire structure and so will cost more than those located on the field edge. The estimates in the model are considered conservative since the maximum amount of overlap, based on machinery size, is used in all field operations (both machinery cost and overlapped inputs). Further, the model assumes that complete crop failure occurs under the tire tracks of the sprayer when the sprayer drives over standing crop. Again, scientific evidence suggesting the actual (likely) amount or the relationship to yield loss associated with those actions could not be found. To be consistent, a worst case scenario (complete yield loss) was used.

The methodology has a number of assumptions. These assumptions include

1) operations are not discontinued when overlap begins–for example, the farmer does not shut off part of the sprayer as he sprays over areas that are considered overlap;

2) custom application rates are adequate to cover individual farmer's cost of application, which include machinery depreciation, power requirements (tractor fuel, depreciation on tractor), and operator labor;

3) estimations of the loss of productivity stemming from the 'footprint' of the towers is adequately covered by the easement settlement;

4) the existing crops grown and the lack of irrigation are continued into the foreseeable future. In other words, a new, high value, crop is not raised on the affected fields in the next several years.

The spreadsheet model is a work in progress and will not cover all situations encountered in the field. However, it is intended to be useful in a wide number of situations. If significantly different situations are encountered, modifications will be necessary.

MATL Spreadsheet Instructions

The purpose of this spreadsheet is to compute 1) yield loss associated with additional tire tracks and 2) additional costs associated with the overlapping of crop inputs from farming operations that have to maneuver around electrical tower bases. Throughout the spreadsheet, a conservative approach is used by assuming the maximum amount of overlap possible according to the farmer's machinery size.

The spreadsheet is comprised of five sheets. The tabs in the lower left corner, labeled INPUTS, AREA CALCULATIONS, COST CALCULATIONS, REVENUE LOSSES and TOTAL LOSS, direct the user to each section. Cells shaded turquoise are input cells and cells shaded yellow are calculated or fixed.

INPUTS

Start with the INPUTS sheet. All information enter here is carried through to the other sheets. First, enter the landowner's name and the field identification (such as legal description).

TABLE A. Structure Measurements and Number by Location

In Table A, three different pole configurations (1 pole, 2 pole and 3 pole) and 2 different guy wire configurations (1 wire and 3 wire) are allowed. Only 1-pole and 2-poles structures are allowed on the EDGE of the field or in the INTERIOR of the field. (An EDGE structure is too close to the field boundary to allow farming on all sides of the structure. An INTERIOR structure is distant enough from the field boundaries to allow farming on all sides of the structure.) All pole configurations are allowed in field CORNERs. Both 1-wire and 2-wire configurations are assumed to be in field CORNERs. (A CORNER structure is too close to two field boundaries to allow farming on two sides of the structure.)

For EDGE configurations, enter the distance from the field boundary to the farthest (from the boundary) edge of the poles. See FIGUREs 1-POLE EDGE FOOTPRINT and 2-POLE EDGE FOOTPRINT. Enter a safety margin if the farmer states a need for one. Also, enter the number of each type of EDGE structure.

For INTERIOR configurations, the distance from the outside edges of the tower(s). For example, a 1-pole structure may measure three feet across and a 2-pole structure may measure 23 feet from outside edge to outside edge of the poles. See FIGUREs 1-POLE INTERIOR FOOTPRINTand 2-INTERIOR FOOTPRINT.

CORNER configurations require more input. To allow for reasonable estimation of overlapped areas and nonplantable areas, it is necessary to assume a rectangular footprint for each corner configuration. Enter the farther point into the field from each boundary. These are entered as "width" and "length". Also, enter a safety margin if requested. Then, enter the number of each type of corner configuration. Last, enter the easement area for each type of CORNER structure in the field. (The easement area may be different than the footprint.) See FIGUREs 1-POLE CORNER FOOTPRINT, 2-POLE CORNER FOOTPRINT, 3-POLE CORNER FOOTPRINT, 1-

WIRE CORNER FOOTPRINT AND 3-WIRE CORNER FOOTPRINT.

TABLE B. Machinery Size and Custom Rates

In Table B, enter the farm's tillage, seeding, harvest, pesticide application and other relevant equipment used in actual field operations for the crops grown. Also, enter the width of each implement. Default widths can be over-written. Enter a custom rate for each implement/field operation. Again, a default set of values is included but can be over-written. The default values are from western ND and were taken from a North Dakota State University publication. The western ND rates were inflated by 20% above the published rate to account for recent increases in fuel prices.

Also, in Table B, enter the wheel base of the farm's crop sprayer and the width of the sprayer's tires. The model assumes that spraying operations are done with a self-propelled sprayer–if the farmer uses a tractor and pull-type sprayer, the model will need to be modified.

TABLE C. Crops, Yields and Rotation

In Table C, enter the crops grown on this *field*. DO NOT INCLUDE ANY CROPS GROWN ON THE FARM BUT NOT IN THIS FIELD. Enter the average (last few years) yield for each crop in this field. It is recommended that the APH yield from the farm's crop insurance forms be used. An estimate of the crop rotation as percent is needed for this *field*. The cropping history from the insurance forms can be of help. The rotation is entered as a percent. For example, if durum is raised about one out of four years, enter "25". Note FALLOW is treated as a crop for this spreadsheet. Other crops can be added.

TABLE D. Pesticides

Enter all pesticides used on the field for any crop. These include herbicides, insecticides (if any), and fungicides (if any). Enter the rate, the price per unit (such as per quart) and the unit (such as quart). Multiple rates for the same pesticide can be entered on separate lines. It is assumed that sprayers are not shut off on overlap areas.

TABLE E. Fertilizers

For each crop, enter the fertilizer rate and price.

TABLE F. Seeding

For each crop, enter seeding rate and price.

AREA CALCULATIONS

This sheet computes the area of overlap for each field operation listed in Table B and for each structure listed in TABLE A..

Diagrams 1-Pole or Wire Structures, Diagrams 2-Pole Structures, and Diagrams 3-Pole Structures

These sheets contain the diagrams referenced in TABLE A and throughout this manual.

TABLE G. Estimates of Overlap by Field Operation

Using the data entered on the INPUTS sheet, the area overlapped by each field operation is computed. For all INTERIOR structures, circular formulas are used. The area of a circle is computed as pi times radius squared (πR^2). A circle around each structure (the inner orange circles in Figures 1-POLE INTERIOR FOOTPRINT and 2-POLE INTERIOR FOOTPRINT) is assumed to be lost to production and not overlapped.

The outer circular area (shaded in blue in INTERIOR figures) is the computed area of overlap. The area of overlap will vary across field operations due to the different widths of implements. The overlap areas for edge of field structures are given as one-half the area in INTERIOR figures and are given in Figures 1-POLE INTERIOR OVERLAP and 2-POLE INTERIOR OVERLAP.

For EDGE structures, one-half of a circle with a diameter equal to the sum of the width of the structure and the safety margin is assumed to be non-overlap. (See Figures 1-POLE EDGE FOOTPRINT and 2-POLE EDGE FOOTPRINT.) Overlap area estimates for EDGE structures are shown in Figure 1-POLE EDGE OVERLAP and 2-POLE EDGE OVERLAP.

For CORNER structures, the non-overlap areas are shown in Figures 1-POLE CORNER OVERLAP, 2-POLE CORNER OVERLAP, 3-POLE CORNER OVERLAP, 1-WIRE CORNER OVERLAP, and 2-WIRE CORNER OVERLAP. Rectangular formulas are used to estimate overlapped areas. Areas assumed to not be planted are given in figures 1-POLE CORNER NONPLANT, 2-POLE CORNER NONPLANT, 3-POLE CORNER NONPLANT, 1-WIRE CORNER NONPLANT, and 2-WIRE CORNER NONPLANT.

TABLE H. Change in Quality

Table H is not used to compute economic loss and is presented for demonstration purposes. In Table H the change in grain quality due to overlapping of inputs is computed. Input cells are total acres in the field, yields, test weights, and protein levels. The affected acres are computed from the width of the air seeder. The model assumes that fertilizer is applied through the air seeder. If the producer broadcasts fertilizer, contact Jose as changes will need to be made to the formulas.

Providing reasonable values are entered in Table H, the potential economic effects of a change in the quality of malting barley from the placement of electrical towers will be negligible.

COST CALCULATIONS

Using the previously entered data and the number of trips/applications for each field operation, this sheet computes the costs associated with overlapping inputs–including both material costs and custom work rates for field operations.

Each crop –including FALLOW– that was entered on the INPUTS sheet has a separate table. NOTE: If a 0% area was enter for a crop's rotation percent in TABLE C, NO TABLE FOR COST CALCULATIONS WILL BE VIEWABLE OF THIS SHEET. Only Table I is discussed below, since the input requirements for the other crops are the same.

TABLE I. First Crop, Estimates of the Cost of Overlap

SPRING WHEAT

For each field operation, enter the number of times the operation is completed. The formula then uses the overlap calculations from the AREA CALCULATIONS sheet, the input prices and rates and the custom work rates from the INPUTS sheet. The resulting overlap costs are given PER FIELD.

REVENUE LOSS

This sheet computes losses associated with additional tire tracks, which are considered to drive over standing crop and result in complete yield loss under the tires. All tracks are considered to be due to spraying operations, since that is the only operation assumed to drive over standing crop, and it is assumed that no tracks would have been made around/through the field where the structure is located..

TABLE P. Yield loss due to tire tracks around towers

It assumed that each tire on the sprayer makes a unique track in the standing crop and that no yield is realized in each tire track. The circumference of each tire track (depending on its location relative to the tower) is computed as $2\pi R$ for INTERIOR structures. The radius R is computed based on the distance to the center of the circle using the width of the sprayer and the sprayer's wheel base. The area covered by each tire is equal to the distance it travels (circumference) times the tire width. For EDGE structures, a half circle is assumed. For CORNER structures, straight lines parallel to the field edges are assumed.

The economic value of yield loss is equal to the area covered by the tires ×yield×price. Areas are computed in the top of Table P and the yields used were reported on the INPUTS sheet. Prices are computed as a 10-year average of real (2006$) prices. Historical marketing-year average prices for MT (taken from Montana Agricultural Statistics Service and National Agricultural Statistics Service online data bases) are inflated to 2006$ using Producer Price Indices for wheats (spring, winter and durum) and barley (taken from US Bureau of Labor Statistics). For other crops, contact Jose as alternative data will need to be used.

The remaining tables on this sheet are the supporting price data and indices.

TABLE Q. Yield loss due to unfarmable areas around towers and guy wires

Some areas may be difficult to farm because of tight turns. These areas are shown in the figures as NON PLANT.

TOTAL LOSS

TABLE R. Total Losses

This sheet aggregates the losses from overlap and tire tracks. Losses for each crop are weighted by the crop rotation percentages and summed. No inputs are allowed on this page. The results are AVERAGE ANNUAL (or per year) losses and reported per field and per total number poles plus wires.

Appendix B
Farming Cost Sheets
Attachments DL-1 to 16

Attachment DL-1

Dryland Wheat-Fallow Rotation

Regular Span Mono-Pole at Field Edge (Layout A)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	123	0.003	$0.02
Chemical Fallow:										
Roundup (RT3)	$21.50	gallon	16	ounce	4	$10.75				
Dicamba	$71.00	gallon	4	ounce	1	2.22				
Ammonium sulfate	$6.00	gallon	16	ounce	4	3.00				
Application	$5.00	acre			4	20.00	35.97	123	0.003	0.10
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	123	0.003	0.08
Fertilizer:										
Banded w/ Seed	$450	ton	60	pound	1	$13.50				
Topdress N	$450	ton	120	pound	1	27.00				
Topdress App	$5.00	acre			1	5.00	45.50	123	0.003	0.13
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	123	0.003	0.07
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	123	0.003	0.03
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	123	0.003	0.06
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	50	bushel	20%	$60.00	60.00	123	0.003	0.17
Pole Footprint	$6.00	bushel	50	bushel		$300.00	300.00	123	0.003	0.85
Weed Control Around Pole:										
Herbicide	$200	acre			2	$400.00	400.00	123	0.003	1.13
Labor & Equipment	$50	hour	0.25	hour	2	$25.00	25.00			25.00
TOTAL COST OF 2 YEAR ROTATION										**$27.63**
ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE										**$13.81**

Estimated Spring Wheat Yield: 50 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 61 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-2

Dryland Wheat-Fallow Rotation

Long Span Mono-Pole at Field Edge (Layout B)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	240	0.006	$0.04
Chemical Fallow:										
Roundup (RT3)	$21.50	gallon	16	ounce	4	$10.75				
Dicamba	$71.00	gallon	4	ounce	1	2.22				
Ammonium sulfate	$6.00	gallon	16	ounce	4	3.00				
Application	$5.00	acre			4	20.00	35.97	240	0.006	0.20
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	240	0.006	0.15
Fertilizer:										
Banded w/ Seed	$450	ton	60	pound	1	$13.50				
Topdress N	$450	ton	120	pound	1	27.00				
Topdress App	$5.00	acre			1	5.00	45.50	240	0.006	0.25
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	240	0.006	0.13
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	240	0.006	0.06
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	240	0.006	0.11
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	50	bushel	20%	$60.00	60.00	240	0.006	0.33
Pole Footprint	$6.00	bushel	50	bushel		$300.00	300.00	240	0.006	1.65
Weed Control Around Pole:										
Herbicide	$200	acre			2	$400.00	400.00	240	0.006	2.20
Labor & Equipment	$50	hour	0.25	hour	2	$25.00	25.00			25.00
TOTAL COST OF 2 YEAR ROTATION										**$30.13**
ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE AT FIELD EDGE										**$15.06**

Estimated Spring Wheat Yield: 50 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 61 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-3

Dryland Wheat-Fallow Rotation

Regular Span Mono-Pole in Field Interior (Layout C)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost/Ac	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	18,362	0.422	$2.95
Chemical Fallow:										
Roundup (RT3)	$21.50	gallon	16	ounce	4	$10.75				
Dicamba	$71.00	gallon	4	ounce	1	2.22				
Ammonium sulfate	$6.00	gallon	16	ounce	4	3.00				
Application	$5.00	acre			4	20.00	35.97	50,328	1.155	41.56
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	50,328	1.155	31.20
Fertilizer:										
Banded w/ Seed	$450	ton	60	pound	1	$13.50				
Topdress N	$450	ton	120	pound	1	27.00				
Topdress App	$5.00	acre			1	5.00	45.50	13,854	0.318	14.47
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	13,854	0.318	7.38
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	50,328	1.155	13.42
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	5,597	0.128	2.57
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	50	bushel	20%	$60.00	60.00	50,328	1.155	69.32
Pole Footprint	$6.00	bushel	50	bushel		$300.00	300.00	144	0.003	0.99
Weed Control Around Pole:										
Herbicide	$200	acre			2	$400.00	400.00	144	0.003	1.32
Labor & Equipment	$50	hour	0.25	hour	2	$25.00				25.00
TOTAL COST PER POLE DURING 2 YEAR ROTATION										**$210.18**
ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE IN FIELD INTERIOR										**$105.09**

Estimated Spring Wheat Yield: 50 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 61 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-4

Dryland Wheat-Fallow Rotation

Long Span Mono-Pole in Field Interior (Layout D)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost/Ac	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	19,022	0.437	$3.06
Chemical Fallow:										
Roundup (RT3)	$21.50	gallon	16	ounce	4	$10.75				
Dicamba	$71.00	gallon	4	ounce	1	2.22				
Ammonium sulfate	$6.00	gallon	16	ounce	4	3.00				
Application	$5.00	acre			4	20.00	35.97	51,459	1.181	42.49
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	51,459	1.181	31.90
Fertilizer:										
Banded w/ Seed	$450	ton	60	pound	1	$13.50				
Topdress N	$450	ton	120	pound	1	27.00				
Topdress App	$5.00	acre			1	5.00	45.50	14,420	0.331	15.06
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	14,420	0.331	7.68
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	51,459	1.181	13.72
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	5,937	0.136	2.73
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	50	bushel	20%	$60.00	60.00	51,459	1.181	70.88
Pole Footprint	$6.00	bushel	50	bushel		$300.00	300.00	214	0.005	1.47
Weed Control Around Pole:										
Herbicide	$200	acre			2	$400.00	400.00	214	0.005	1.97
Labor & Equipment	$50	hour	0.25	hour	2	$25.00	25.00	25.00		25.00
TOTAL COST PER POLE DURING 2 YEAR ROTATION										**$215.95**
ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE IN FIELD INTERIOR										**$107.98**

Estimated Spring Wheat Yield: 50 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 61 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-5

Dryland Wheat-Fallow Rotation

H-Poles Perpendicular to Field Edge (Layout E)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	1,136	0.026	$0.18
Chemical Fallow:										
Roundup (RT3)	$21.50	gallon	16	ounce	4	$10.75				
Dicamba	$71.00	gallon	4	ounce	1	2.22				
Ammonium sulfate	$6.00	gallon	16	ounce	4	3.00				
Application	$5.00	acre			4	20.00	35.97	1,136	0.026	0.94
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	1,136	0.026	0.70
Fertilizer:										
Banded w/ Seed	$450	ton	60	pound	1	$13.50				
Topdress N	$450	ton	120	pound	1	27.00				
Topdress App	$5.00	acre			1	5.00	45.50	1,136	0.026	1.19
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	1,136	0.026	0.61
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	1,136	0.026	0.30
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	1,136	0.026	0.52
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	50	bushel	20%	$60.00	60.00	1,136	0.026	1.56
Pole Footprint	$6.00	bushel	50	bushel		$300.00	300.00	1,136	0.026	7.82
Weed Control Around Pole:										
Herbicide	$200	acre			2	$400.00	400.00	1136	0.026	10.43
Labor & Equipment	$50	hour	0.5	hour	2	$50.00	50.00			50.00
TOTAL COST OF 2 YEAR ROTATION										**$74.26**
ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE										**$37.13**

Estimated Spring Wheat Yield: 50 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 61 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-6

Dryland Wheat-Fallow Rotation

H-Poles Perpendicular to Field Edge & Splitting Property Line (Layout F)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	420	0.010	$0.07
Chemical Fallow:										
Roundup (RT3)	$21.50	gallon	16	ounce	4	$10.75				
Dicamba	$71.00	gallon	4	ounce	1	2.22				
Ammonium sulfate	$6.00	gallon	16	ounce	4	3.00				
Application	$5.00	acre			4	20.00	35.97	420	0.010	0.35
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	420	0.010	0.26
Fertilizer:										
Banded w/ Seed	$450	ton	60	pound	1	$13.50				
Topdress N	$450	ton	120	pound	1	27.00				
Topdress App	$5.00	acre			1	5.00	45.50	420	0.010	0.44
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	420	0.010	0.22
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	420	0.010	0.11
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	420	0.010	0.19
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	50	bushel	20%	$60.00	60.00	420	0.010	0.58
Pole Footprint	$6.00	bushel	50	bushel		$300.00	300.00	420	0.010	2.89
Weed Control Around Pole:										
Herbicide	$200	acre			2	$400.00	400.00	420	0.010	3.86
Labor & Equipment	$50	hour	0.33	hour	2	$33.00	33.00			33.00
TOTAL COST OF 2 YEAR ROTATION										**$41.97**

ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE & SPLITTING PROPERTY LINE **$20.98**

Estimated Spring Wheat Yield: 50 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 61 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-7

Dryland Wheat-Fallow Rotation

H-Poles Parallel to Field Edge (Layout G)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	233	0.005	$0.04
Chemical Fallow:										
Roundup (RT3)	$21.50	gallon	16	ounce	4	$10.75				
Dicamba	$71.00	gallon	4	ounce	1	2.22				
Ammonium sulfate	$6.00	gallon	16	ounce	4	3.00				
Application	$5.00	acre			4	20.00	35.97	233	0.005	0.19
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	233	0.005	0.14
Fertilizer:										
Banded w/ Seed	$450	ton	60	pound	1	$13.50				
Topdress N	$450	ton	120	pound	1	27.00				
Topdress App	$5.00	acre			1	5.00	45.50	233	0.005	0.24
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	233	0.005	0.12
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	233	0.005	0.06
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	233	0.005	0.11
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	50	bushel	20%	$60.00	60.00	233	0.005	0.32
Pole Footprint	$6.00	bushel	50	bushel		$300.00	300.00	233	0.005	1.60
Weed Control Around Pole:										
Herbicide	$200	acre			2	$400.00	400.00	233	0.005	2.14
Labor & Equipment	$50	hour	0.25	hour	2	$25.00	25.00			25.00
TOTAL COST OF 2 YEAR ROTATION										**$29.98**
ANNUAL COST OF FARMING AROUND H-POLES PARALLEL TO FIELD EDGE										**$14.99**

Estimated Spring Wheat Yield: 50 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 61 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-8

Dryland Wheat-Fallow Rotation

H-Pole in Field Interior (Layout H)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost/Ac	Overlap Ft^2	Overlap Acres	Cost/Pole
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	21,052	0.483	$3.38
Chemical Fallow:										
Roundup (RT3)	$21.50	gallon	16	ounce	4	$10.75				
Dicamba	$71.00	gallon	4	ounce	1	2.22				
Ammonium sulfate	$6.00	gallon	16	ounce	4	3.00				
Application	$5.00	acre			4	20.00	35.97	54,940	1.261	45.37
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	54,940	1.261	34.05
Fertilizer:										
Banded w/ Seed	$450	ton	60	pound	1	$13.50				
Topdress N	$450	ton	120	pound	1	27.00				
Topdress App	$5.00	acre			1	5.00	45.50	16,160	0.371	16.88
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	16,160	0.371	8.61
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	54,940	1.261	14.65
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	6,982	0.160	3.21
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	50	bushel	20%	$60.00	60.00	54,940	1.261	75.67
Pole Footprint	$6.00	bushel	50	bushel		$300.00	300.00	393	0.009	2.71
Weed Control Around Pole:										
Herbicide	$200	acre			2	$400.00	400.00	393	0.009	3.61
Labor & Equipment	$50	hour	0.33	hour	2	$33.00	33.00			33.00
TOTAL COST PER POLE DURING 2 YEAR ROTATION										**$241.14**
ANNUAL COST OF FARMING AROUND H-POLE IN FIELD INTERIOR										**$120.57**

Estimated Spring Wheat Yield: 50 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 61 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-9

Dryland Continuous Crop Rotation

Regular Span Mono-Pole at Field Edge (Layout A)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	123	0.003	$0.02
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	2	$5.38				
Ammonium sulfate	$6.00	gallon	16	ounce	2	1.50				
Application	$5.00	acre			2	10.00	16.88	123	0.003	0.05
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	123	0.003	0.08
Fertilizer:										
Banded w/ Seed[1]	$450	ton	60	pound	1	$13.50				
Topdress N[2]	$450	ton	150	pound	1	33.75				
Topdress App	$5	acre			1	5.00	52.25	123	0.003	0.15
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	123	0.003	0.07
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	123	0.003	0.03
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	123	0.003	0.06
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	35	bushel	20%	$42.00	42.00	123	0.003	0.12
Pole Footprint	$6.00	bushel	35	bushel		$210.00	210.00	123	0.003	0.59
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	123	0.003	0.56
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE										**$14.22**

Estimated Spring Wheat Yield: 35 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 75 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-10

Dryland Continuous Crop Rotation

Long Span Mono-Pole at Field Edge (Layout B)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	240	0.006	$0.04
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	2	$5.38				
Ammonium sulfate	$6.00	gallon	16	ounce	2	1.50				
Application	$5.00	acre			2	10.00	16.88	240	0.006	0.09
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	240	0.006	0.15
Fertilizer:										
Banded w/ Seed[1]	$450	ton	60	pound	1	$13.50				
Topdress N[2]	$450	ton	150	pound	1	33.75				
Topdress App	$5	acre			1	5.00	52.25	240	0.006	0.29
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	240	0.006	0.13
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	240	0.006	0.06
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	240	0.006	0.11
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	35	bushel	20%	$42.00	42.00	240	0.006	0.23
Pole Footprint	$6.00	bushel	35	bushel		$210.00	210.00	240	0.006	1.16
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	240	0.006	1.10
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE AT FIELD EDGE										**$15.86**

Estimated Spring Wheat Yield: 35 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 75 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-11

Dryland Continuous Crop Rotation

Regular Span Mono-Pole in Field Interior (Layout C)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	18,362	0.422	$2.95
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	2	$5.38				
Ammonium sulfate	$6.00	gallon	16	ounce	2	1.50				
Application	$5.00	acre			2	10.00	16.88	50,328	1.155	19.50
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	50,328	1.155	31.20
Fertilizer:										
Banded w/ Seed[1]	$450	ton	60	pound	1	$13.50				
Topdress N[2]	$450	ton	150	pound	1	33.75				
Topdress App	$5	acre			1	5.00	52.25	13,854	0.318	16.62
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	13,854	0.318	7.38
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	50,328	1.155	13.42
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	5,597	0.128	2.57
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	35	bushel	20%	$42.00	42.00	50,328	1.155	48.53
Pole Footprint	$6.00	bushel	35	bushel		$210.00	210.00	144	0.003	0.69
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	144	0.003	0.66
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE IN FIELD INTERIOR										**$156.01**

Estimated Spring Wheat Yield: 35 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 75 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-12

Dryland Continuous Crop Rotation

Long Span Mono-Pole in Field Interior (Layout D)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	19,022	0.437	$3.06
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	2	$5.38				
Ammonium sulfate	$6.00	gallon	16	ounce	2	1.50				
Application	$5.00	acre			2	10.00	16.88	51,459	1.181	19.94
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	51,459	1.181	31.90
Fertilizer:										
Banded w/ Seed[1]	$450	ton	60	pound	1	$13.50				
Topdress N[2]	$450	ton	150	pound	1	33.75				
Topdress App	$5	acre			1	5.00	52.25	14,420	0.331	17.30
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	14,420	0.331	7.68
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	51,459	1.181	13.72
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	5,937	0.136	2.73
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	35	bushel	20%	$42.00	42.00	51,459	1.181	49.62
Pole Footprint	$6.00	bushel	35	bushel		$210.00	210.00	214	0.005	1.03
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	214	0.005	0.98
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE IN FIELD INTERIOR										**$160.44**

Estimated Spring Wheat Yield: 35 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 75 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-13

Dryland Continuous Crop Rotation

H-Poles Perpendicular to Field Edge (Layout E)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	1,136	0.026	$0.18
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	2	$5.38				
Ammonium sulfate	$6.00	gallon	16	ounce	2	1.50				
Application	$5.00	acre			2	10.00	16.88	1,136	0.026	0.44
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	1,136	0.026	0.70
Fertilizer:										
Banded w/ Seed[1]	$450	ton	60	pound	1	$13.50				
Topdress N[2]	$450	ton	150	pound	1	33.75				
Topdress App	$5	acre			1	5.00	52.25	1,136	0.026	1.36
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	1,136	0.026	0.61
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	1,136	0.026	0.30
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	1,136	0.026	0.52
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	35	bushel	20%	$42.00	42.00	1,136	0.026	1.10
Pole Footprint	$6.00	bushel	35	bushel		$210.00	210.00	1,136	0.026	5.48
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	1136	0.026	5.22
Labor & Equipment	$50	hour	0.5	hour	1	$25.00	25.00			25.00
ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE										**$40.91**

Estimated Spring Wheat Yield: 35 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 75 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-14

Dryland Continuous Crop Rotation

H-Poles Perpendicular to Field Edge & Splitting Property Line (Layout F)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	420	0.010	$0.07
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	2	$5.38				
Ammonium sulfate	$6.00	gallon	16	ounce	2	1.50				
Application	$5.00	acre			2	10.00	16.88	420	0.010	0.16
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	420	0.010	0.26
Fertilizer:										
Banded w/ Seed[1]	$450	ton	60	pound	1	$13.50				
Topdress N[2]	$450	ton	150	pound	1	33.75				
Topdress App	$5	acre			1	5.00	52.25	420	0.010	0.50
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	420	0.010	0.22
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	420	0.010	0.11
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	420	0.010	0.19
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	35	bushel	20%	$42.00	42.00	420	0.010	0.40
Pole Footprint	$6.00	bushel	35	bushel		$210.00	210.00	420	0.010	2.02
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	420	0.010	1.93
Labor & Equipment	$50	hour	0.33	hour	1	$16.50	16.50			16.50

ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE & SPLITTING PROPERTY LINE **$22.38**

Estimated Spring Wheat Yield: 35 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 75 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-15

Dryland Continuous Crop Rotation

H-Poles Parallel to Field Edge (Layout G)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	233	0.005	$0.04
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	2	$5.38				
Ammonium sulfate	$6.00	gallon	16	ounce	2	1.50				
Application	$5.00	acre			2	10.00	16.88	233	0.005	0.09
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	233	0.005	0.14
Fertilizer:										
Banded w/ Seed[1]	$450	ton	60	pound	1	$13.50				
Topdress N[2]	$450	ton	150	pound	1	33.75				
Topdress App	$5	acre			1	5.00	52.25	233	0.005	0.28
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	233	0.005	0.12
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	233	0.005	0.06
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	233	0.005	0.11
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	35	bushel	20%	$42.00	42.00	233	0.005	0.22
Pole Footprint	$6.00	bushel	35	bushel		$210.00	210.00	233	0.005	1.12
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	233	0.005	1.07
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND H-POLES PARALLEL TO FIELD EDGE										**$15.76**

Estimated Spring Wheat Yield: 35 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 75 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Attachment DL-16

Dryland Continuous Crop Rotation

H-Poles in Field Interior (Layout H)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$7.00	acre			1	$7.00	$7.00	21,052	0.483	$3.38
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	2	$5.38				
Ammonium sulfate	$6.00	gallon	16	ounce	2	1.50				
Application	$5.00	acre			2	10.00	16.88	54,940	1.261	21.28
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	54,940	1.261	34.05
Fertilizer:										
Banded w/ Seed[1]	$450	ton	60	pound	1	$13.50				
Topdress N[2]	$450	ton	150	pound	1	33.75				
Topdress App	$5	acre			1	5.00	52.25	16,160	0.371	19.38
Planting:										
Seed	$16.00	cwt	70	pound	1	$11.20				
Seeding	$12.00	acre			1	12.00	23.20	16,160	0.371	8.61
In Crop Spraying:										
Affinity Broad Spectrum	$9.25	ounce	0.6	ounce	1	$5.55				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	11.62	54,940	1.261	14.65
Harvesting:										
Combine	$20.00	acre			1	$20.00	20.00	6,982	0.160	3.21
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	35	bushel	20%	$42.00	42.00	54,940	1.261	52.97
Pole Footprint	$6.00	bushel	35	bushel		$210.00	210.00	393	0.009	1.89
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	393	0.009	1.80
Labor & Equipment	$50	hour	0.33	hour	1	$16.50	16.50			16.50
ANNUAL COST OF FARMING AROUND H-POLES IN FIELD INTERIOR										**$177.74**

Estimated Spring Wheat Yield: 35 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 75 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07.

Appendix C
Farming Cost Sheet
Attachments IRR-1 to 8

Attachment IRR-1

Irrigated Farming

Regular Span Mono-Pole at Field Edge (Layout A)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Disc, Offset	$13.00	acre			2	$26.00	$26.00	123	0.003	$0.07
Toobar	$10.00	acre			2	20.00	20.00	123	0.003	0.06
Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	1	$2.69				
Ammonium sulfate	$6.00	gallon	16	ounce	1	0.75				
Application	$5.00	acre			1	5.00	8.44	123	0.003	0.02
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	123	0.003	0.08
Fertilizer:										
Banded w/ Seed[1]	$450	ton	80	pound	1	$18.00				
Topdress N[2]	$450	ton	437	pound	1	98.33				
Topdress App	$6	acre			1	6.00	122.33	123	0.003	0.35
Planting:										
Seed	$16.00	cwt	100	pound	1	$16.00				
Seeding	$14.00	acre			1	14.00	30.00	123	0.003	0.08
In Crop Spraying:										
Harmony Extra	$16.00	ounce	0.5	ounce	1	$8.00				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	14.07	123	0.003	0.04
Harvesting:										
Combine	$28.00	acre			1	$28.00	28.00	123	0.003	0.08
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	90	bushel	20%	$108.00	108.00	123	0.003	0.30
Pole Footprint	$6.00	bushel	90	bushel		$540.00	540.00	123	0.003	1.52
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	123	0.003	0.56
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE										**$15.60**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 210 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07.

Attachment IRR-2

Irrigated Farming

Long Span Mono-Pole at Field Edge (Layout B)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Disc, Offset	$13.00	acre			2	$26.00	$26.00	240	0.006	$0.14
Toobar	$10.00	acre			2	20.00	20.00	240	0.006	0.11
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	1	$2.69				
Ammonium sulfate	$6.00	gallon	16	ounce	1	0.75				
Application	$5.00	acre			1	5.00	8.44	240	0.006	0.05
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	240	0.006	0.15
Fertilizer:										
Banded w/ Seed[1]	$450	ton	80	pound	1	$18.00				
Topdress N[2]	$450	ton	437	pound	1	98.33				
Topdress App	$6	acre			1	6.00	122.33	240	0.006	0.67
Planting:										
Seed	$16.00	cwt	100	pound	1	$16.00				
Seeding	$14.00	acre			1	14.00	30.00	240	0.006	0.17
In Crop Spraying:										
Harmony Extra	$16.00	ounce	0.5	ounce	1	$8.00				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	14.07	240	0.006	0.08
Harvesting:										
Combine	$28.00	acre			1	$28.00	28.00	240	0.006	0.15
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	90	bushel	20%	$108.00	108.00	240	0.006	0.60
Pole Footprint	$6.00	bushel	90	bushel		$540.00	540.00	240	0.006	2.98
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	240	0.006	1.10
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE AT FIELD EDGE										**$18.69**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 210 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07.

Attachment IRR-3

Irrigated Farming

Regular Span Mono-Pole in Field Interior (Layout C)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Disc, Offset	$13.00	acre			2	$26.00	$26.00	5,597	0.128	$3.34
Toobar	$10.00	acre			2	20.00	20.00	13,854	0.318	6.36
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	1	$2.69				
Ammonium sulfate	$6.00	gallon	16	ounce	1	0.75				
Application	$5.00	acre			1	5.00	8.44	50,328	1.155	9.75
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	50,328	1.155	31.20
Fertilizer:										
Banded w/ Seed[1]	$450	ton	80	pound	1	$18.00				
Topdress N[2]	$450	ton	437	pound	1	98.33				
Topdress App	$6	acre			1	6.00	122.33	13,854	0.318	38.90
Planting:										
Seed	$16.00	cwt	100	pound	1	$16.00				
Seeding	$14.00	acre			1	14.00	30.00	13,854	0.318	9.54
In Crop Spraying:										
Harmony Extra	$16.00	ounce	0.5	ounce	1	$8.00				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	14.07	50,328	1.155	16.25
Harvesting:										
Combine	$28.00	acre			1	$28.00	28.00	5,597	0.128	3.60
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	90	bushel	20%	$108.00	108.00	50,328	1.155	124.78
Pole Footprint	$6.00	bushel	90	bushel		$540.00	540.00	144	0.003	1.79
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	144	0.003	0.66
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE IN FIELD INTERIOR										**$258.67**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 210 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07.

Attachment IRR-4

Irrigated Farming

Long Span Mono-Pole in Field Interior (Layout D)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Disc, Offset	$13.00	acre			2	$26.00	$26.00	5,937	0.136	$3.54
Toobar	$10.00	acre			2	20.00	20.00	14,420	0.331	6.62
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	1	$2.69				
Ammonium sulfate	$6.00	gallon	16	ounce	1	0.75				
Application	$5.00	acre			1	5.00	8.44	51,459	1.181	9.97
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	51,459	1.181	31.90
Fertilizer:										
Banded w/ Seed[1]	$450	ton	80	pound	1	$18.00				
Topdress N[2]	$450	ton	437	pound	1	98.33				
Topdress App	$6	acre			1	6.00	122.33	14,420	0.331	40.49
Planting:										
Seed	$16.00	cwt	100	pound	1	$16.00				
Seeding	$14.00	acre			1	14.00	30.00	14,420	0.331	9.93
In Crop Spraying:										
Harmony Extra	$16.00	ounce	0.5	ounce	1	$8.00				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	14.07	51,459	1.181	16.62
Harvesting:										
Combine	$28.00	acre			1	$28.00	28.00	5,937	0.136	3.82
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	90	bushel	20%	$108.00	108.00	51,459	1.181	127.58
Pole Footprint	$6.00	bushel	90	bushel		$540.00	540.00	214	0.005	2.65
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	214	0.005	0.98
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE IN FIELD INTERIOR										**$266.61**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 210 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07.

Attachment IRR-5

Irrigated Farming

H-Poles Perpendicular to Field Edge (Layout E)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Disc, Offset	$13.00	acre			2	$26.00	$26.00	1,136	0.026	$0.68
Toobar	$10.00	acre			2	20.00	20.00	1,136	0.026	0.52
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	1	$2.69				
Ammonium sulfate	$6.00	gallon	16	ounce	1	0.75				
Application	$5.00	acre			1	5.00	8.44	1,136	0.026	0.22
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	1,136	0.026	0.70
Fertilizer:										
Banded w/ Seed[1]	$450	ton	80	pound	1	$18.00				
Topdress N[2]	$450	ton	437	pound	1	98.33				
Topdress App	$6	acre			1	6.00	122.33	1,136	0.026	3.19
Planting:										
Seed	$16.00	cwt	100	pound	1	$16.00				
Seeding	$14.00	acre			1	14.00	30.00	1,136	0.026	0.78
In Crop Spraying:										
Harmony Extra	$16.00	ounce	0.5	ounce	1	$8.00				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	14.07	1,136	0.026	0.37
Harvesting:										
Combine	$28.00	acre			1	$28.00	28.00	1,136	0.026	0.73
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	90	bushel	20%	$108.00	108.00	1,136	0.026	2.82
Pole Footprint	$6.00	bushel	90	bushel		$540.00	540.00	1,136	0.026	14.08
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	1136	0.026	5.22
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE										**$41.81**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 210 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07.

Attachment IRR-6

Irrigated Farming

H-Poles Perpendicular to Field Edge & Splitting Property Line (Layout F)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Disc, Offset	$13.00	acre			2	$26.00	$26.00	420	0.010	$0.25
Toobar	$10.00	acre			2	20.00	20.00	420	0.010	0.19
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	1	$2.69				
Ammonium sulfate	$6.00	gallon	16	ounce	1	0.75				
Application	$5.00	acre			1	5.00	8.44	420	0.010	0.08
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	420	0.010	0.26
Fertilizer:										
Banded w/ Seed[1]	$450	ton	80	pound	1	$18.00				
Topdress N[2]	$450	ton	437	pound	1	98.33				
Topdress App	$6	acre			1	6.00	122.33	420	0.010	1.18
Planting:										
Seed	$16.00	cwt	100	pound	1	$16.00				
Seeding	$14.00	acre			1	14.00	30.00	420	0.010	0.29
In Crop Spraying:										
Harmony Extra	$16.00	ounce	0.5	ounce	1	$8.00				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	14.07	420	0.010	0.14
Harvesting:										
Combine	$28.00	acre			1	$28.00	28.00	420	0.010	0.27
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	90	bushel	20%	$108.00	108.00	420	0.010	1.04
Pole Footprint	$6.00	bushel	90	bushel		$540.00	540.00	420	0.010	5.21
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	420	0.010	1.93
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50

ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE & SPLITTING PROPERTY LINE **$23.34**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 210 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07.

Attachment IRR-7

Irrigated Farming

H-Poles Parallel to Field Edge (Layout G)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acre	Overlap Cost
Post Harvest:										
Disc, Offset	$13.00	acre			2	$26.00	$26.00	233	0.005	$0.14
Toobar	$10.00	acre			2	20.00	20.00	233	0.005	0.11
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	1	$2.69				
Ammonium sulfate	$6.00	gallon	16	ounce	1	0.75				
Application	$5.00	acre			1	5.00	8.44	233	0.005	0.05
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	233	0.005	0.14
Fertilizer:										
Banded w/ Seed[1]	$450	ton	80	pound	1	$18.00				
Topdress N[2]	$450	ton	437	pound	1	98.33				
Topdress App	$6	acre			1	6.00	122.33	233	0.005	0.65
Planting:										
Seed	$16.00	cwt	100	pound	1	$16.00				
Seeding	$14.00	acre			1	14.00	30.00	233	0.005	0.16
In Crop Spraying:										
Harmony Extra	$16.00	ounce	0.5	ounce	1	$8.00				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	14.07	233	0.005	0.08
Harvesting:										
Combine	$28.00	acre			1	$28.00	28.00	233	0.005	0.15
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	90	bushel	20%	$108.00	108.00	233	0.005	0.58
Pole Footprint	$6.00	bushel	90	bushel		$540.00	540.00	233	0.005	2.89
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	233	0.005	1.07
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND H-POLES PARALLEL TO FIELD EDGE										**$18.51**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 210 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07.

Attachment IRR-8

Irrigated Farming

H-Poles in Field Interior (Layout H)

Operation	Cost	Unit	Rate/ac	Unit	No. of App	Cost/Ac	Oper. Total Cost	Overlap Ft^2	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Disc, Offset	$13.00	acre			2	$26.00	$26.00	6,982	0.160	$4.17
Toobar	$10.00	acre			2	20.00	20.00	16,160	0.371	7.42
Post Harvest/Preplant Spraying										
Roundup (RT3)	$21.50	gallon	16	ounce	1	$2.69				
Ammonium sulfate	$6.00	gallon	16	ounce	1	0.75				
Application	$5.00	acre			1	5.00	8.44	54,940	1.261	10.64
Wildoat Control:										
Fargo	$1.00	pound	15	pound	1	$15.00				
Application	$5.00	acre			1	5.00				
Incorp w/ Heavy Harrow	$7.00	acre			1	7.00	27.00	54,940	1.261	34.05
Fertilizer:										
Banded w/ Seed[1]	$450	ton	80	pound	1	$18.00				
Topdress N[2]	$450	ton	437	pound	1	98.33				
Topdress App	$6	acre			1	6.00	122.33	16,160	0.371	45.38
Planting:										
Seed	$16.00	cwt	100	pound	1	$16.00				
Seeding	$14.00	acre			1	14.00	30.00	16,160	0.371	11.13
In Crop Spraying:										
Harmony Extra	$16.00	ounce	0.5	ounce	1	$8.00				
LV-6 (2,4-D)	$20.00	gallon	6	ounce	1	0.94				
Surfactant	$16.50	gallon	1	ounce	1	0.13				
Application	$5.00	acre			1	5.00	14.07	54,940	1.261	17.74
Harvesting:										
Combine	$28.00	acre			1	$28.00	28.00	6,982	0.160	4.49
Crop Loss:										
Quality/Quanity in Overlap	$6.00	bushel	90	bushel	20%	$108.00	108.00	54,940	1.261	136.21
Pole Footprint	$6.00	bushel	90	bushel		$540.00	540.00	393	0.009	4.87
Weed Control Around Pole:										
Herbicide	$200	acre			1	$200.00	200.00	393	0.009	1.80
Labor & Equipment	$50	hour	0.25	hour	1	$12.50	12.50			12.50
ANNUAL COST OF FARMING AROUND H-POLES IN FIELD INTERIOR										**$290.41**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.

[2]Applying a total of 210 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07.