APPENDIX A:
DEQ LOCAL REALIGNMENT SEGMENTS PRELIMINARY ANALYSIS

Many alternative alignment segments were developed for the preliminary alternative analyses for the March 2007 Document and the Draft EIS (February 2008). Some alternative alignment segments were developed and would apply only to Alternative 2. Likewise, some segments were developed and would apply only to Alternative 4. Some alternative alignment segments could apply to either alternative where Alternative 2 and Alternative 4 are in the same right-of-way. The acreages and mileage values provided in the Appendix A alternative descriptions and tables were accurate and correct for the preliminary analysis but have not been updated for the Final EIS.

Development of Alternative 4 (Possible Agency-Proposed Local Realignments)

During the development of Alternative 4, DEQ considered eight possible local realignments to address specific scoping issues (**Figure A1**). The eight local realignments are presented below as segments A1, A2, B1, B2, C1, C2, D, and E. In assembling Alternative 4 as a whole, DEQ selected segments A1, B2, C1, the north half of D, and E. As discussed in Section 2.5, the DEQ Director may select some of the segments included in Alternative 4 as mitigations to address land use and visual resource issues identified during scoping and in the analysis of Alternative 2. Therefore, all of the segment descriptions are included here for information. DEQ's analysis of these segments, and the information that helped in the selection of segments for Alternative 4, are presented here.

West Great Falls Realignment Segment A1

Alternative segment A1 is an alignment that would diverge from the southern 23 miles of Alternative 2, to avoid diagonal crossing of farm land, where possible. Where Alternative 2 would go directly north out of the Great Falls Substation, segment A1 would take a west-northwesterly path out of Great Falls paralleling the railroad and WAPA 230-kV transmission line, making use of an existing transportation corridor. The segment A1 alignment would head west and then north along the railroad and rejoin Alternative 2 where it leaves 8th Road. Segment A1 is the only segment that would run south and west of Benton Lake National Wildlife Refuge.

Shooting Sports Complex Realignment Segment A2

Approximately 1½ miles north of Great Falls, Alternative 2 would turn directly west for a mile and then run directly north along the west side of the Great Falls Shooting Sports Complex. Segment A2 is a 4.2-mile-long alignment that would continue directly north from Great Falls along the edge of cropland and parallel to the access road on the east side of the Great Falls Shooting Sports Complex. The alignment would parallel the existing 161-kV NWE transmission line between Great Falls and Havre. Segment A2 would rejoin Alternative 2 where it crosses Highway 87. This alignment would minimize crossing of farmland.

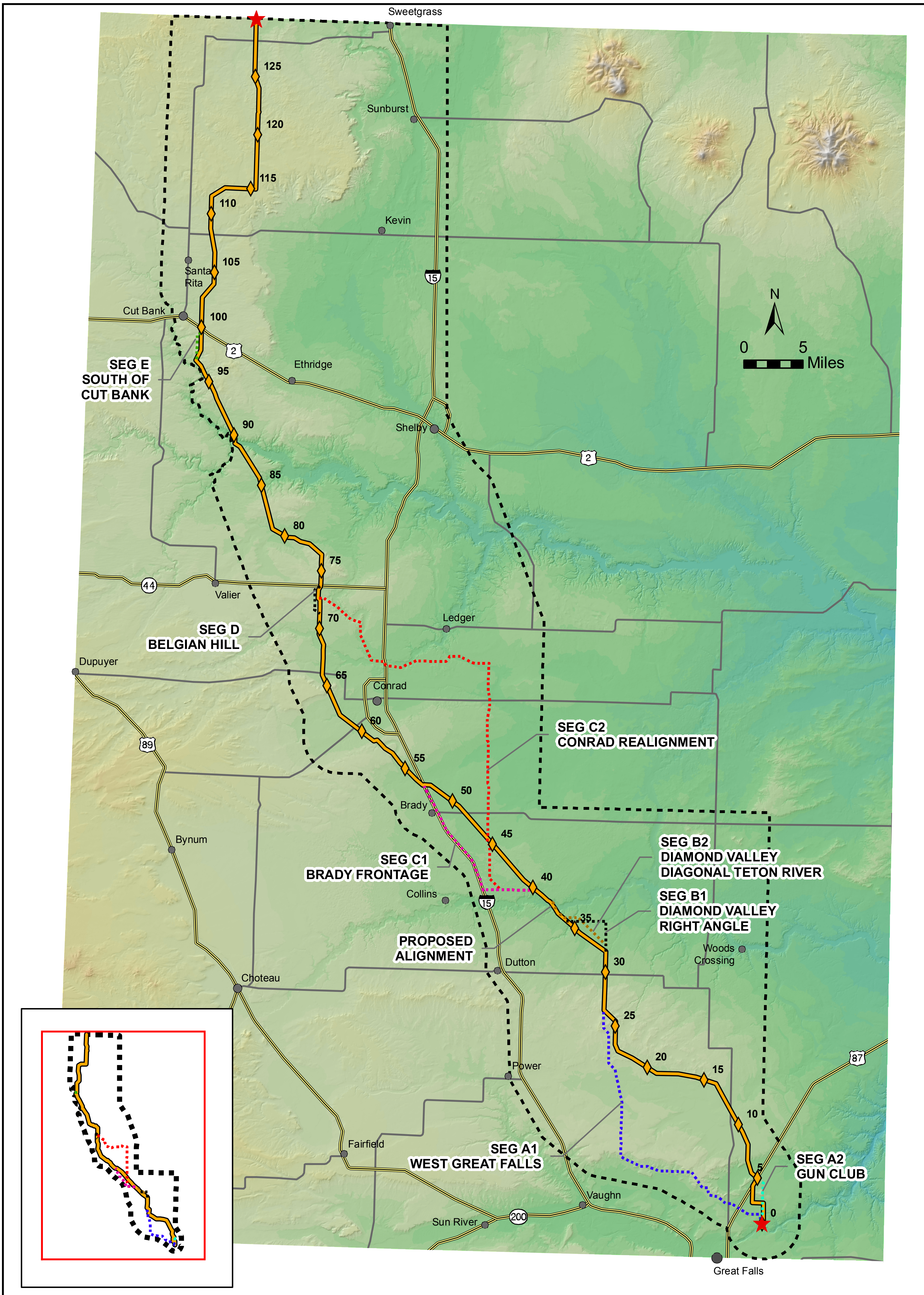


FIGURE A1
AGENCY PROPOSED LOCAL REALIGNMENT SEGMENTS

LEGEND

- ALT2 - ALIGNMENT
- ALT2 - MILEPOSTS
- SEGMENT A1 WEST GREAT FALLS
- SEGMENT A2 SHOOTING SPORTS COMPLEX
- SEGMENT B1 DIAMOND VALLEY RIGHT ANGLE
- SEGMENT B2 DIAMOND VALLEY AND TETON RIVER
- SEGMENT C1 BRADY FRONTAGE ROAD
- SEGMENT C2 CONRAD REALIGNMENT
- SEGMENT D BELGIAN HILL
- SEGMENT E SOUTH OF CUT BANK
- CITIES AND TOWNS
- ALIGNMENT END AND EXIT POINTS
- STUDY AREA BOUNDARY
- MAJOR HIGHWAYS
- SECONDARY ROADS

GIS map by Ed Madej -TTEMI-HE FigA1_MATL_ALT4_Agency_Realignments_021607.mxd

Diamond Valley Right Angle Realignment Segment B1

Segment B1 is a 5.9-mile-long alignment addressing the area in Teton county 2 to 5 miles south of the Teton River. In the headwaters of Kinnerely Coulee, segment B1 would run directly north where Alternative 2 turns northwest. After running directly north for approximately 2½ miles, segment B1 would turn directly west running approximately 3 miles until it would rejoin Alternative 2 in the vicinity of Hunt Coulee. This alignment would avoid diagonal crossing of farm land.

Diamond Valley and Teton River Realignment Segment B2

Segment B2 is a 6.5-mile-long alignment that would diverge from Alternative 2 at the same location as segment B1. Where the segment B2 alignment intersects the Alternative 3 alignment and existing NWE 115-kV transmission line, it would parallel the line for approximately 3 miles until it would turn west to join Alternative 2 just south of the Teton River. Segment B2 would cross Hunt Coulee approximately ¾ mile north of the Alternative 2 crossing and ¼ mile north of the segment B1 crossing. Segment B2 would then cross the Teton River just east of the location described in Alternative 2. Segment B2 would address a landowner concern over opening a new corridor rather than paralleling an existing line which already has disrupted farming practices in some fields.

Brady Frontage Road Realignment Segment C1

Segment C1 is a 15-mile-long realignment that would diverge from Alternative 2 approximately 8 miles southeast of Brady. Segment C1 would run directly west from the Alternative 2 along the northern edge of the Teton River bank to the Interstate 15 frontage road, and follow the frontage road for about 11 miles past the town of Brady to rejoin Alternative 2 about two miles north of Brady. Segment C1 would closely parallel the existing transportation corridor of Interstate 15 and the frontage road. Segment C1 would decrease crossing of farmland and avoid paralleling one pipeline.

Conrad Realignment Segment C2

Segment C2 is a 41-mile-long realignment that would diverge from Alternative 2 at the same location as segment C1. After approximately 3 miles running directly west, segment C2 would turn northwest for approximately 1½ miles, then turn directly north for approximately 18 miles, then turn directly west, heading for the Dry Fork of the Marias River. After the alignment crosses the existing WAPA 230-kV transmission line, approximately 2 miles south of Ledger, it intersects the river. The alignment generally parallels the Dry Fork of the Marias until it would cross Interstate 15, then head northwest along Big Flat Coulee for approximately 8 miles. The alignment would turn due west for approximately 1 mile before rejoining Alternative 2, approximately 4 miles north of the Dry Fork of the Marias River crossing. This segment would minimize diagonal crossing of farm land, avoid crossing farm land by traversing uncultivated land, and avoid residences and paralleling of pipelines.

FIGURE A2
SEGMENT D
BELGIAN HILL

LEGEND

ALT2 - ALIGNMENT
SEGMENT D BELGIAN HILL
MILEPOSTS
RESIDENCES OR FARMSTEADS WITHIN 1 MILE OF ALIGNMENTS

EASEMENTS
CONSERVATION RESERVE PROGRAM

CITIES AND TOWNS
ALIGNMENT END AND EXIT POINTS
STUDY AREA
EXISTING TRANSMISSION LINES
MAJOR HIGHWAYS
SECONDARY ROADS
RIVERS AND STREAMS

GIS map by Ed Madej TTEMI-HE FigA2_MATL_Alt4_SegD_021507.mxd

Belgian Hill Realignment Segment D

Segment D is a 2.8-mile-long realignment that would move the alignment slightly west from the Alternative 2 alignment for 2 miles, just north of Belgian Hill, farther away from four residences (**Figure A2**). The alignment would generally parallel Alternative 2. Segment D would result in greater potential for general local acceptance. This segment would reduce visual impacts. Some diagonal crossing of farmland would be required.

South of Cut Bank Realignment Segment E

Segment E is a 2.5-mile-long realignment that would move the alignment approximately ¼ mile west for a 2-mile stretch, just south of the Alternative 2 intersection with Highway 2. Segment E would move the alignment to follow property boundaries better and is located farther away from residential areas and result in greater potential for general local acceptance. Segment E would generally parallel Alternative 2.

Land Use Segment Analysis

Table A1 shows how many miles of cropland and CRP would be crossed by each agency-proposed local realignment segment in comparison to the same segment of Alternative 2.

TABLE A1
AGENCY SEGMENT CROPLAND COMPARISON
TO ALTERNATIVE 2 SEGMENTS

	Linear Miles	Acres in 500-Foot Wide Buffer	Miles Crossing CRP or Cropland
Segment A1 **(West Great Falls)**	**27.3**	1,652	11.7
Alternative 2 Corresponding segment	**26.8**	1,621	17.2
Segment A2 **(Shooting Sports Complex)**	**4.2**	255	2.4
Alternative 2 Corresponding segment	**5.0**	301	2.4
Segment B1 **(Diamond Valley Right Angle)**	**5.9**	357	5.4
Alternative 2 Corresponding segment	**4.2**	256	3.7
Segment B2 **(Diamond Valley & Teton River)**	**6.5**	393	5
Alternative 2 Corresponding segment	**5.9**	358	5.2
Segment C1 **(Brady Frontage)**	**15.0**	904	9.3
Alternative 2 Corresponding segment	**13.3**	804	12.6
Segment C2 **(Conrad Realignment)**	**41.0**	2,481	28.3
Alternative 2 Corresponding segment	**33.0**	1,999	27.5
Segment D **(Belgian Hill)**	**2.8**	170	2.8
Alternative 2 Corresponding segment	**2.4**	73	2.2
Segment E **(South of Cut Bank)**	**2.5**	149	0
Alternative 2 Corresponding segment	**2.3**	140	.7

Notes: Alternative 4 would require the use of monopole on cropland or CRP. The overall Alternative 2 alignment crosses 92.7 miles of cropland and CRP.

Table A2 shows the types of land use crossed by Alternatives 2 and 3, and how many miles of farm land are crossed parallel to farming rows, perpendicular to farming rows, or at a diagonal to farming rows.

TABLE A2
TYPES OF LAND USE CROSSED BY ALTERNATIVES 2 AND 3 (MILES)

	Alternative 2				Alternative 3			
	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total
Irrigated cropland	1.4	0	0.1	1.5	0	0	6.8	6.8
Non-irrigated cropland	34.5	3.9	52.8	91.2	27.3	0	63.6	90.9
Rangeland	6.3	1.8	25.5	33.6	5.2	0.2	16.2	21.6
Road/Right of Way	0.2	0.9	0.2	1.3	0.1	0	0.2	0.3
Residential	0	0	0	0	0	0	0.1	0.1
Forest	0	0	0	0	0	0	0.1	0.1
Riparian	0.6	0	1.3	1.9	0.1	0	1.2	1.3
Water	0	0	0	0	0	0	0.1	0.1
Total Miles	43.0	6.6	79.9	129.5	32.7	0.2	88.3	121.2

Notes:
[a] parallel to north and south
[b] perpendicular to north and south
[c] diagonal to north and south
Sources: Orthophotographs 2005 (Montana NRIS 2006a); NRIS 2000; MATL 2006b; field verification; photographic interpretation

The agency-proposed local realignment segments were developed, in part, to reduce the impacts on farming from the proposed transmission line. The numbers of miles of crossings parallel to, perpendicular to, and diagonal to irrigated cropland, non-irrigated cropland, and rangeland are summarized for corresponding segments of Alternative 2 and agency-proposed local realignments (**Table A3**).

TABLE A3 MILES OF PARALLEL, PERPENDICULAR, AND DIAGONAL ACROSS CROPLAND AND RANGELAND ALTERNATIVE 2 AND CORRESPONDING AGENCY LOCAL REALIGNMENT SEGMENT								
	Alternative 2				**Agency-proposed Local Realignment Segment**			
	Parallel[a]	**Perpendicular[b]**	**Diagonal[c]**	**Total**	**Parallel[a]**	**Perpendicular[b]**	**Diagonal[c]**	**Total**
Segment A1 — West Great Falls								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	5.4	1.0	10.8	17.2	6.6	1.6	3.5	11.7
Rangeland/ Native	1.0	1.0	6.5	8.5	1.9	2.7	10.7	15.3
Other	0	0.9		0.9	0.1	--	0.1	0.2
Total Miles	**6.4**	**2.9**	**17.3**	**26.6**	**8.6**	**4.3**	**14.3**	**27.2**
Segment A2 — Great Falls Shooting Sports Complex								
Irrigated	-	-	-	-	-	-	-	-
Non-irrigated	1.7	0.5	0.2	2.4	1.7	0.1	0.6	2.4
Rangeland/ Native	1.1	0.0	0.7	1.8	1.1	--	0.7	1.8
Other	0.0	0.0	0.0	0.0	--	--	--	--
Total Miles	**2.8**	**0.5**	**0.9**	**4.2**	**2.8**	**0.1**	**1.3**	**4.2**
Segment B1 — Diamond Valley Right Angle								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	--	--	3.7	3.7	2.5	2.9	--	5.4
Rangeland/ Native	--	--	0.3	0.3	--	0.4	--	0.4
Other	--	--	--	--	--	0.1	--	0.1
Total Miles	**--**	**--**	**4.0**	**4.0**	**2.5**	**3.4**	**--**	**5.9**
Segment B2 — Diamond Valley Diagonal-Teton River								
Irrigated	0.0	0.0	0.0	0.0	-	-	-	-
Non-irrigated	0.0	0.0	5.2	5.2	0.5	0.8	3.7	5.0
Rangeland/ Native	0.0	0.0	0.8	0.8	0.2	0.5	0.7	1.4
Other	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.1
Total Miles	**0.0**	**0.0**	**6.2**	**6.2**	**0.7**	**1.3**	**4.5**	**6.5**
Segment C1 — Brady Frontage								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	--	0.5	12.1	12.6	--	3.8	5.5	9.3
Rangeland/ Native	--	0.1	0.6	0.7	--	0.8	0.0	0.8
Other	--	--	0.2	0.1	--	--	4.9	4.9
Total Miles	**--**	**0.6**	**12.9**	**13.4**	**--**	**4.6**	**10.4**	**15.0**

TABLE A3 MILES OF PARALLEL, PERPENDICULAR, AND DIAGONAL ACROSS CROPLAND AND RANGELAND ALTERNATIVE 2 AND CORRESPONDING AGENCY LOCAL REALIGNMENT SEGMENT								
	Alternative 2				**Agency-proposed Local Realignment Segment**			
	Parallel[a]	**Perpendicular[b]**	**Diagonal[c]**	**Total**	**Parallel[a]**	**Perpendicular[b]**	**Diagonal[c]**	**Total**
Segment C2 — Conrad Realignment								
Irrigated	0.9	--	0.0	0.9	1.2	0.5	-	1.7
Non-irrigated	3.3	--	23.2	26.6	14.8	6.5	5.3	26.6
Rangeland/ Native	0.6	--	3.9	4.5	1.1	1.2	9.8	12.1
Other	0.1	--	0.9	0.9	0.2	-	0.4	0.6
Total Miles	**4.9**	**0.0**	**28.0**	**32.9**	**17.3**	**8.2**	**15.5**	**41.0**
Segment D — Belgian Hill								
Irrigated	0.4	--	--	0.4	--	--	--	--
Non-irrigated	1.0	--	0.6	1.6	2.8	--	--	2.8
Rangeland/ Native	0.2	--	0.1	0.1	--	--	--	--
Other	0.1	--	--	0.1	--	--	--	--
Total Miles	**1.7**	**0**	**0.7**	**2.4**	**--**	**--**	**--**	**2.8**
Segment E — South of Cut Bank								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	0.7	--	--	0.7	--	--	0	--
Rangeland/ Native	0.8	--	0.8	0.8	2.4	--	--	2.4
Other	--	--	--	0	--	--	--	--
Total Miles	**1.5**	**0**	**0.8**	**1.5**	**--**	**--**	**--**	**2.4**

Notes:

[a] parallel to north and south

[b] perpendicular to north and south

[c] diagonal to north and south

-- Not applicable

Sources: Orthophotographs 2005 (Montana NRIS 2006a); MATL 2006b; field verification; photographic interpretation .

The following observations were made:

- Segment A1 (West Great Falls) is 0.6 miles longer than the segment it would replace in Alternative 2, however, it reduces the diagonal crossing of cropland from 10.8 miles to 3.5 miles.
- Segment A2 (Great Falls Shooting Sports Complex) increases the diagonal crossing of non-irrigated cropland from 0.2 in Alternative 2 to 0.6 miles in Alternative 4.
- Segment B1 (Diamond Valley Right Angle) is 1.9 miles longer than the segment it would replace in Alternative 2, however, it eliminates diagonal crossing of cropland, compared to 3.7 miles of diagonal crossing in Alternative 2 for this segment and moves the transmission line alignment onto existing utility corridors or other land uses (non-farm).
- Segment B2 (Diamond Valley Diagonal - Teton River) is 0.3 miles longer than the segment of Alternative 2 it would replace, but it reduces the diagonal crossing of cropland from 5.2 miles to 3.7 and shifts the crossing to parallel (0.5 miles) or perpendicular (0.8 miles).
- Segment C1 (Brady Frontage) is 1.6 miles longer than the segment it would replace in Alternative 2. It would reduce the diagonal crossing of cropland from 12.1 miles to 5.5 miles.
- Segment C2 (Conrad Realignment) is nearly 8 miles longer than the segment of Alternative 2 it would replace (41 miles compared to 32.9 miles), however, it would substantially reduce the diagonal crossing of cropland from 23.2 miles to 5.3 miles. Most (14.8 miles) of the cropland crossed would be parallel to the north-south orientation of crop rows. Approximately 6.5 miles would be crossed perpendicular to the rows. Additionally, more of the alignment (12.1 miles) would cross native vegetation or rangeland, compared to Alternative 2 which has 4.5 miles crossing those vegetation types.
- Segment D (Belgian Hill) is 0.4 miles longer than the segment it would replace in Alternative 2, however, it would remove all the diagonal crossing of cropland in this segment and increase the distance of parallel crossing from 1.4 miles to 2.8 miles. The parallel crossings or alignment near the edges of the fields would not interfere with farming activities as much as diagonal crossings.
- Segment E (South of Cut Bank) is 0.9 miles longer than the segment it would replace in Alternative 2, however, it would remove all crossings of cropland (including diagonal) and move the alignment onto native or rangeland vegetation.

Table A4 compares how many miles of transmission line cross CRP land or cropland under each agency-proposed local realignment segment and how many acres would be affected. Segments B1, C2, and D would result in a slight increase in acres removed from production because of the longer length of the line under these segments (see **Table A4)**.

TABLE A4 Acres of Production in CRP or Cropland Affected by Monopole Structures in Agency-proposed Local Realignments Compared to Alternative 2				
	Alternative 2		Agency-proposed Local Realignment	
Segment	**Miles**	**Acres[a]**	**Miles**	**Acres[a]**
A1 West Great Falls	17.2	1.8	11.7	1.2
A2 Great Falls Shooting Sports Complex	2.4	0.3	2.4	0.3
B1 Diamond Valley Right Angle	3.7	0.4	5.4	0.6
B2 Diamond Valley Diagonal-Teton River	5.2	0.5	5.0	0.5
C1 Brady Frontage	12.6	1.3	9.3	1.0
C2 Conrad Realignment	27.5	2.8	28.3	3.0
D Belgian Hill	2.0	0.2	2.8	0.3
E South of Cut Bank	0.7	0.1	0.0	0.0

Notes:

[a] Acres rounded to nearest 0.01. Calculation based on 0.01 acres per structure at a structure every 500 feet (10.5 structures per mile)

Sources: Orthophotographs, 2005 (Montana NRIS 2006a), NRIS 2000, MATL 2006b; field verification; photographic interpretation

Some segments (B1 - Diamond Valley Right Angle, C1 – Conrad Realignment and D - Belgian Hill) increase the length of power line crossing farmland and CRP slightly (see **Table A4**) over Alternative 2 for those segments.

Conservation Easements and Special Management Areas

Linear miles of lands under federal/state special management and those lands currently under federal or state conservation easements (wetland easements, CRP, and FWP easements) are summarized in **Table A5** for each alignment. Segments A1 and A2 would eliminate crossing the Great Falls Shooting Sports Complex. Some agency-proposed local realignments would increase the number of miles crossing CRP over corresponding Alternative 2 segments they would replace.

TABLE A5 MILES OF FEDERAL/STATE SPECIAL MANAGEMENT AREAS AND CONSERVATION EASEMENTS CROSSED			
	Alternative 2 Corresponding Segment	**Alternative 3**	**Agency-proposed Local Realignments**
State Land (FWP) – Great Falls Shooting Sports Complex			
Segment A1 (West Great Falls)	0.73	--	0
Segment A2 (Great Falls Shooting Sports Complex)	0	0.51	0.76
Segment B1 (Diamond Valley Right Angle)	--	--	--
Segment B2 (Diamond Valley Diagonal-Teton River)	--	--	--
Segment C1 (Brady Frontage)	--	--	--
Segment C2 (Conrad Realignment)	--	--	--
Segment D (Belgian Hill)	--	--	--
Segment E (South of Cut Bank)	--	--	--
Montana State Trust Land (DNRC)			
Segment A1 (West Great Falls)	3.69	--	2.56
Segment A2 (Great Falls Shooting Sports Complex)	0.12	--	0.08
Segment B1 (Diamond Valley Right Angle)	0.00	--	0.00
Segment B2 (Diamond Valley Diagonal-Teton River)	1.24	--	1.24
Segment C1 (Brady Frontage)	1.14	--	2.68
Segment C2 (Conrad Realignment)	1.70	--	4.03
Segment D (Belgian Hill)	0.00	--	0.00
Segment E (South of Cut Bank)	0.00	--	0.00
Conservation Easements			
Segment A1 (West Great Falls)	(CRP) 5.32 (Stewardship) 0.12	--	10.04
Segment A2 (Great Falls Shooting Sports Complex)	0.00	--	0.00
Segment B1 (Diamond Valley Right Angle)	0.00	--	0.00
Segment B2 (Diamond Valley Diagonal-Teton River)	1.54	--	1.54
Segment C1 (Brady Frontage)	0.00	--	3.10
Segment C2 (Conrad Realignment)	2.16	--	4.17
Segment D (Belgian Hill)	1.36	--	1.48
Segment E (South of Cut Bank)	1.04	--	0.90

Notes:
-- = not applicable

Planned Land Use

The Segment A1 West Great Falls local alignment crosses the planned Kyles Addition subdivision. No residences are under construction or completed in this subdivision.

Wetlands Segment Analysis

The length of each segment and the wetlands affected by each segment are shown in **Table A6**, along with the length of the corresponding segment of Alternative 2 which it could replace.

TABLE A6
WETLANDS AFFECTED BY SEGMENTS
AGENCY-PROPOSED LOCAL REALIGNMENT

Alternative Comparison	Segment Length	Palustrine PEM	Palustrine PUS, PUB, & PAB	Lacustrine	Riverine	Total
	(miles)	(acres)	(acres)	(acres)	(acres)	(acres)
West Great Falls Segment A1	27.3	13.25	0.43	0.0	0.0	13.68
Corr. Alt. 2 Segment	26.8	15.72	1.07	0.78	0.0	17.57
Great Falls Shooting Sports Complex Segment A2	4.2	0.0	0.13	3.21	0.0	3.34
Corr. Alt. 2 Segment	5.0	4.13	0.0	0.78	0.0	4.91
Diamond Valley Right Angle Segment B1	5.9	<1 Est.	ND	ND	<1 Est.	ND
Corr. Alt. 2 Segment	4.2	<1 Est.	ND	ND	<1 Est.	ND
Diamond Valley Diagonal-Teton River Segment B2	6.5	1-2	ND	ND	2-3	ND
Corr. Alt. 2 Segment	5.9	1-2	ND	ND	2-3	ND
Brady Frontage Segment C1	15.0	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	13.3	10.12	1.98	0.0	0.0	12.10
Conrad Realignment Segment C2	41.0	18.10	2.01	0.0	0.0	20.11
Corr. Alt. 2 Segment	33.0	13.75	1.98	0.0	0.0	15.73
Belgian Hill Segment D	2.8	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	2.4	0.0	0.41	0.0	0.0	0.41
South of Cut Bank Segment E	2.5	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	2.3	0.0	0.0	0.0	0.0	0.0

<u>Notes:</u>

Alt. Alternative
Corr. Corresponding
PEM Palustrine Emergent wetlands
PUS Palustrine Unconsolidated Shore wetlands
PUB Palustrine Unconsolidated Bottom wetlands
PAB Palustrine Aquatic Bed wetlands
Est. estimated using the 2005 aerial photographs
ND No Data

Potential impacts to wetlands for all eight local realignment segments were evaluated using the wetland data provided in **Table A6**. Total potential wetlands recorded along each local realignment segment were compared to the total wetlands recorded for the corresponding segment of Alternative 2. The total wetland acres was also segregated into four main wetland categories (2 palustrine classes, 1 lacustrine, and 1 riverine) to better evaluate the types of wetlands that each segment may impact. Total wetland acreage does not include any wetlands that may exist in Teton County for the portion of the segments where no official wetland data currently exist. The 2005 National Agricultural Imagery Program aerial photographs were used to visually identify observable wetlands along the local realignment segments in Teton County and to estimate the approximate number of wetlands for these alignments. Even though the wetland acreage could not be quantified from the aerial photographs, it was determined that no single large wetland or concentration of wetlands existed that could not be spanned using 500 foot span lengths.

Potential impacts to wetlands for the local realignment segments were compared only to the corresponding segments of Alternative 2 for which each could substitute. As was determined for the entire analysis area, the majority of the wetlands along all local realignment segments are classified as palustrine, emergent wetlands (PEM).

Segment A1 (West Great Falls) The A1 segment traverses around the southern and western sides of Benton Lake NWR area and would potentially impact 3.89 fewer acres of wetlands, compared to the corresponding segment of Alternative 2. Several smaller areas with palustrine and lacustrine wetlands exist directly north of Great Falls (Black Horse Lake area) and along the western side of Benton Lake NWR. A1 would impact fewer wetlands primarily because it is located along steeper slopes compared to crossing a more flat bench area. No riverine wetlands are delineated along segment A1 facility location. However, segment A1 crosses the Lake Creek channel in Teton County and could potentially impact a small riverine wetland (possibly about 1 acre) at that location.

Segment A2 (Great Falls Shooting Sports Complex Realignment) This 4.2 mile long segment runs north from the Great Falls 230-kV switch yard along the edge of cropland and parallel to the access road to the Great Falls Shooting Sports Complex. The Segment A2 centerline crosses over an actively used gun club, but would not be located over any existing or planned buildings. The segment A2 facility location would potentially impact 1.57 fewer acres of wetlands compared to the corresponding segment of Alternative 2. The primary difference between these two alignments was that the segment A2 realignment would cross a larger portion of the Black Horse Lake Flat that has been mapped as a lacustrine wetland.

Segment B1 (Diamond Valley Right Angle) This 5.9 mile long B1 segment is located in Diamond Valley area of Teton County, approximately 2 to 5 miles south of the Teton River. The types and amounts of wetlands that would be impacted within the 500 foot wide facility location of segment B1 are very similar to those that occur along the 4.2 mile long corresponding Alternative 2 portion. Both segment B1 and the corresponding Alternative 2 centerlines would cross Hunt Coulee; segment B1 would cross this coulee at a straight east to west angle, while the Alternative 2 would cross Hunt Coulee at a southeast to northwest angle. Hunt Coulee has palustrine emergent wetlands (estimated to be less than one acre) and a small area of riverine wetlands (estimated to be less than one acre) in the bottom of the coulee. These wetland areas could be spanned causing minimal impacts to wetlands under both the B1 segment and Alternative 2 alignments.

Segment B2 (Diamond Valley and Teton River) This 6.5 mile long segment B2 is also located in the Diamond Valley area of Teton County, but would utilize the same alignment as Alternative 3 for approximately 3.25 miles where it would parallel the existing NWE 115-kV transmission line. Segment B2 would cross Hunt Coulee approximately ¾ mile north of the Alternative 2 crossing and ¼ mile north of the segment B1 crossing of Hunt Coulee. This alignment would also extend further north and includes a modified crossing of the Teton River that avoids some cropland. The types and amounts of wetlands that would be impacted within the 500 foot wide facility location for segment B2 are very similar to those that occur along the 5.9 mile long corresponding Alternative 2 portion. Both alternative alignments would cross small areas with palustrine emergent wetlands (estimated at one to two acres) and a small area of riverine wetlands (estimated at two to three acres) in the bottom of Hunt Coulee and the Teton River. All wetland areas visually identified on the 2005 aerial photographs for segment B2 could be spanned.

Segment C1 (Brady Frontage Road) Segment C1 is a 15.0 mile long alignment that runs directly east - west along the northern edge of the Teton River bank and then parallels the Interstate 15 frontage road for approximately 11 miles, connecting back with the Alternative 2 alignment just north of Brady, Montana. Segment C1 would potentially impact 12.1 fewer acres of wetlands compared to the Alternative 2 alignment through this area. There are no wetlands of any type mapped along the Brady Frontage Road alignment. Several areas with palustrine wetlands (total of 12.1 acres) exist along the corresponding segment of Alternative 2 through this area.

Segment C2 (Conrad Realignment) Segment C2 is a 41.0 mile long alignment that runs around the Town of Conrad on the east and north sides. Segment C2 takes off from Alternative 2 at the same location as segment C1. Both Alternative C1 and C2 segments would be in the same alignment for approximately 3.25 miles where segment C2 would begin to run north. This alternative alignment would travel north for approximately 20 miles where it would turn west and continue for approximately 18 miles where it would rejoin Alternative 2. This alternative alignment would cross several major coulees (South Pondera, Pondera, Favot, and Big Flat) and the Dry Fork Marias River.

Segment C2 would potentially impact 4.38 more acres of total wetlands compared to the corresponding Alternative 2 alignment through this area. The main reason for the increased number of wetlands crossed by segment C2 is the higher proportion of coulees and unfarmed drainages that were used by this alternative in the avoidance of farmed land. Small areas with palustrine and riverine wetlands exist along most of the major coulees and along the Dry Fork Marias River crossing. Segment C2 also crosses slightly larger and more defined drainages due to its more eastern location. Drainages generally flow west to east in this area and tend to have more defined channels as they flow toward the Missouri River.

Segment D (Belgian Hill) Segment D is a relatively short (2.8 mile) alignment located in the Belgian Hill area. This alternative segment generally parallels Alternative 2, but is located approximately ½ mile to the west. This alignment segment was developed primarily to minimize visual impacts to four residences located along the Alternative 2 alignment. Segment D would potentially impact 0.41 fewer acres of palustrine wetlands compared to Alternative 2 through this locale.

Segment E (South of Cut Bank) Segment E is a relatively short (2.5 mile) segment located in an area southeast of Cut Bank. This alternative segment also parallels the Alternative 2 alignment approximately ½ mile to the west. This alignment segment was developed primarily to minimize visual impacts to residences located along the Alternative 2 alignment and to avoid paralleling a buried gathering pipeline for the oil wells in the local area. There are no mapped wetlands along either segment E or the corresponding Alternative 2 alignment in this locale.

Vegetation Segment Analysis

Rangeland vegetation, such as grassland, improved pasture, seeded grasslands, shrubland, badland, riparian and wetlands, and forested cover types, would be removed by the construction of access roads and structures, and at construction staging areas. Maintenance activities would not likely result in additional ground disturbance. Linear miles of rangeland cover types affected by alternative are presented in **Table A7**. Disturbance resulting from staging areas would be similar for Alternatives 2 and 3.

Agency-proposed local realignment segments total approximately 38.5 miles. The comparable segments of Alternative 2 total almost 20 miles (**Table A8**), nearly doubling the grassland the rangeland cover types under alternative segments. The increased crossing in rangeland cover types would result in more tower structures and access roads, thus increasing rangeland impacts. Disturbance due to maintenance activities would also increase over the life of the project due to increased structure and road placement in rangeland and vegetation (**Table A9**). Disturbance resulting from staging areas would be similar to those of Alternatives 2 and 3.

TABLE A7
Native Vegetation Cover Types Crossed by Alternatives 2, 3, and 4

Rangeland Cover Types	**Alternative 2**		**Alternative 3**		**Agency-proposed Local Realignments**	
	Miles	Total Land Cover (percent)	Miles	Total Land Cover (percent)	Miles	Total Land Cover (percent)[a]
Grassland/ Shrubland	33.6	25.9	21.6	17.8	A1 = 15.3 A2 = 1.8 B1 = 0.4 B2 = 1.3 C1 = 0.8 C2 = 12.0 D = 2.8 E = 2.5	A1 = 56.2 A2 = 42.2 B1 = 7.3 B2 = 19.9 C1 = 5.2 C2 = 29.1 D = 99.0 E = 100.0
Riparian	1.9	1.5	1.3	1.1	A1 = 0.2 A2 = 0.03 B1 = 0.1 B2 = 0.2 C1 = 0.05 C2 = 1.0 D = 0.04 E = 0.0	A1 = 0.7 A2 = 0.7 B1 = 2.2 B2 = 2.8 C1 = 0.3 C2 = 2.3 D = 0.01 E = 0.0
Forest (Cottonwood)	0.0	0.0	0.1	0.1	B2 = 0.04[b]	B2 = 0.6
Total	35.5	27.4	23.0	19.0	--	--
Total Line Length	129.9	--	121.6	--	--	--

Notes:
a Percent of segment..
b Found only in segment B_2
Source: Orthophotographs 2005 (Montana NRIS 2006a) analysis of land cover in vegetation analysis area, October 2006.
-- not applicable

TABLE A8 LINEAR MILES OF VEGETATION CHANGE BETWEEN ALTERNATIVE 2 AND AGENCY-PROPOSED LOCAL REALIGNMENTS		
Native Vegetation Cover Types	**Alternative 2 (miles)**	**Agency-proposed Local Realignments (miles)**
Rangeland	A1 = 8.5 A2 = 1.8 B1 = 0.3 B2 = 0.8 C1 = 0.6 C2 = 4.5 D = 0.3 E = 1.6	A1 = 15.3 A2 = 1.8 B1 = 0.4 B2 = 1.3 C1 = 0.8 C2 = 12.0 D = 2.8 E = 2.5
Riparian	A1 = 0.0 A2 = 0.0 B1 = 0.2 B2 = 0.2 C1 = 0.1 C2 = 0.8 D = 0.1 E = 0.0	A1 = 0.2 A2 = 0.03 B1 = 0.1 B2 = 0.2 C1 = 0.05 C2 = 1.0 D = 0.04 E = 0..0
Forest (Cottonwood)	No Data	B2 = 0.4 [a]

Note:

a Found only in segment B_2

Source: Orthophotographs 2005 (Montana NRIS 2006a) of land cover in vegetation analysis area, October 2006

TABLE A9 [d] ESTIMATED ACRES OF DISTURBANCE DUE TO H-FRAME STRUCTURES IN RANGELAND VEGETATION						
Rangeland Cover Types	**Alternative 2**			**Agency-proposed Local Realignments**		
	Miles[a]	Number of Structures[b]	Acres[c]	Miles	Number of Structures	Acres
Grassland/ Shrubland	18.4	121	0.1	36.9	244	0.2
Riparian	1.4	9	<0.01	1.6	11	<0.01
Total	19.8	130	0.1	38.5	255	0.2

Notes:

a Segment total.

b Average 800-foot span between H-frame structures.

c Based on 36 square feet occupied by an H-frame structure.

[d] New values were updated in 2008 but have not been incorporated into this table.

Riparian Vegetation
The effects to riparian vegetation from the agency-proposed local realignments would be similar to those of Alternative 2 because both alternatives cross similar amounts of riparian habitat (**Table A9**).

Species of Concern
The effects on species of concern from agency-proposed local realignments would be the same as Alternative 2 because both alternatives cross similar amounts of riparian habitat where these species are likely to occur (**Table A10**).

Weed Control
The agency-proposed local realignments would cross more native vegetation than Alternative 2 (**Table A8**). This increase in land area potentially exposed to disturbance and noxious weed invasion would require greater diligence, expense, and coordination to successfully implement a noxious weed control plan (**Table A9**). The MATL Noxious Weed and Invasive Plant Control Plan (**Appendix C**) would adequately reduce the increased risk of noxious weed spread in the analysis area.

Wildlife Segment Analysis

Big Game Species
Impacts on big game species would not be expected. Pronghorn and mule deer does with fawns could be displaced by activities during late spring and early summer, but disturbance within a given portion of the line would be temporary and animals could easily use adjacent habitat during disturbance periods. Activities would not disturb wintering animals as the construction activities would occur during the spring and summer months. The proposed and alternative transmission line alignments would cross through mule deer winter range and there would be some permanent loss of habitat as a result of structures and access roads (see **Table A10).** This habitat loss would not impact mule deer as this is a minor loss relative to the amount of available habitat within the region.

TABLE A10 MULE DEER WINTER RANGE IMPACTED BY ALTERNATIVES				
MULE DEER WINTER RANGE	Alternative			
	2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Miles of Mule Deer Winter Range Bisected by Transmission Line	Alternative 2 Segment A 19	20	A1 = 1.8 A2 = 1.8 B1 = 0 B2 = 1.0 C1 = 0.67 C2 = 9.3 D = 0 E = 0	A1 = 4.2 A2 = 1.8 B1 = 0.9 B2 = 3.0 C1 = 4.8 C2 = 8.8 D = 0 E = 0

Notes:
a Segment of the Alternative 2 alignment that corresponds with the agency-proposed local realignment segment.
b Agency-proposed local realignment segments that correspond to the Alternative 2 segments.

Threatened and Endangered Segment Analysis

The alternative alignments traverse the known habitat range of four Species of Concern and one federally threatened species. **Table A11** lists the linear miles of special status species' habitat range along each of the two action alternatives and local realignments.

TABLE A11 LINEAR MILES OF SPECIAL STATUS SPECIES' HABITAT RANGE BY ALTERNATIVE AND AGENCY-PROPOSED LOCAL REALIGNMENTS					
Common Name	**State Rank**	**Alternative**			
		2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Black-crowned night-heron	S3B	11.2	9.1	A1 = 11.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 2.6 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Black-necked stilt	S3, S4B	11.2	9.1	A1 = 11.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 2.6 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0

TABLE A11 LINEAR MILES OF SPECIAL STATUS SPECIES' HABITAT RANGE BY ALTERNATIVE AND AGENCY-PROPOSED LOCAL REALIGNMENTS					
Common Name	**State Rank**	**Alternative**			
		2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Burrowing owl	S2B	4.2	3.9	A1 = 4.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Ferruginous hawk	S2B	6.5	0	A1 = 6.5 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 5.8 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Peregrine falcon	S2B	2.5	2.2	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Total for All species	--	19.9	11.3	A1 = 17.7 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 8.4 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0

Notes:

Source: MTNHP. 2005. GIS Analyses of Element Occurrence Data. Montana Natural Heritage Program, Helena, Montana. Available at: **http://nhp.nris.state.mt.us/mbd**

State: S2 = Imperiled because of rarity, or because of other factors demonstrably making it very vulnerable to extinction throughout its range; B = a state rank modifier indicating breeding status for a migratory species; S3 = vulnerable because of rarity, or found in restricted range even though it may be abundant at some of its locations; S4 = apparently secure, though it may be quite rare in parts of its range, especially at the periphery; S1 = critically imperiled because of extreme rarity, or because of some factor of its biology making it especially vulnerable to extirpation; SH = Historical, known only from records over 50 years ago; may be rediscovered; N = non-breeding.

a Segment of the Alternative 2 alignment that corresponds with the agency-proposed local realignment segment.
b Agency-proposed local realignment segments that correspond to the Alternative 2 segments.

TABLE A12 [c] TAX BENEFIT ESTIMATES FOR ALTERNATIVES AND SEGMENTS							
	Alignment Length (Miles)	**Value $/Mi.**	**Estimated Value in County (BxC)**	**Class 9 Tax Rate (Valuation Ratio): 12%**	**Taxable Value (DxE)**	**Avg. Rural Mill Levy**	**Property Tax (FxG)**
Cascade							
Alternative 2	12.76	$363,284	$4,635,504	0.12	$556,260	0.50412	$280,422
Alternative 3	12.31	$363,284	$4,472,026	0.12	$536,643	0.50412	$270,533
Alternative 4							
Segment A1 - Alt 2	12.75	$363,284	$4,631,871	0.12	$555,825	0.50412	$280,202
Segment A1 - Alt 4	19.8	$363,284	$7,193,023	0.12	$863,163	0.50412	$435,138
Chouteau							
Alternative 2	5.87	$363,284	$2,132,477	0.12	$255,897	0.43959	$112,490
Alternative 3	10.21	$363,284	$3,709,130	0.12	$445,096	0.43959	$195,660
Alternative 4							
Segment A1 - Alt 2	5.87	$363,284	$2,132,477	0.12	$255,897	0.43959	$112,490
Segment A1 - Alt 4	0	$363,284	$0	0.12	$0	0.43959	$0
Glacier							
Alternative 2	40.41	$363,284	$14,680,306	0.12	$1,761,637	0.53745	$946,792
Alternative 3	37.34	$363,284	$13,565,025	0.12	$1,627,803	0.53745	$874,863
Alternative 4	40.41	$363,284	$14,680,306	0.12	$1,761,637	0.53745	$946,792
Pondera							
Alternative 2	45.69	$363,284	$16,598,446	0.12	$1,991,814	0.52162	$1,038,970
Alternative 3	44.44	$363,284	$16,144,341	0.12	$1,937,321	0.52162	$1,010,545
Alternative 4							
Segment C1 - Alt 2	4.11	$363,284	$1,493,097	0.12	$179,172	0.52162	$93,460
Segment C1 - Alt 4	7.12	$363,284	$2,586,582	0.12	$310,390	0.52162	$161,906
Segment C2 - Alt 2	28.86	$363,284	$10,484,376	0.12	$1,258,125	0.52162	$656,263
Segment C2 - Alt 4	34.66	$363,284	$12,591,423	0.12	$1,510,971	0.52162	$788,153

TABLE A12 [c] TAX BENEFIT ESTIMATES FOR ALTERNATIVES AND SEGMENTS							
	Alignment Length (Miles)	**Value $/Mi.**	**Estimated Value in County (BxC)**	**Class 9 Tax Rate (Valuation Ratio): 12%**	**Taxable Value (DxE)**	**Avg. Rural Mill Levy**	**Property Tax (FxG)**
Teton							
Alternative 2	25.16	$363,284	$9,140,225	0.12	$1,096,827	0.4991	$547,426
Alternative 3	17.32	$363,284	$6,292,079	0.12	$755,049	0.4991	$376,845
Alternative 4							
Segment A1 - Alt 2	8.13	$363,284	$2,953,499	0.12	$354,420	0.4991	$176,891
Segment A1 - Alt 4	7.47	$363,284	$2,713,731	0.12	$325,648	0.4991	$162,531
Segment C1 - Alt 2	4.12	$363,284	$1,496,730	0.12	$179,608	0.4991	$89,642
Segment C1 - Alt 4	7.89	$363,284	$2,866,311	0.12	$343,957	0.4991	$171,669
Segment C2 - Alt 2	4.12	$363,284	$1,496,730	0.12	$179,608	0.4991	$89,642
Segment C2 - Alt 4	6.29	$363,284	$2,285,056	0.12	$274,207	0.4991	$136,857
Notes:							
Sources: Mullen 2006							
Montana Department of Revenue 2004							

Notes:
a Mullen 2006
b Montana Department of Revenue 2004
c. New values were updated in 2008 but have not been incorporated into this table.

$/Mi. = dollars per mile

Socioeconomics Segment Analysis

The socioeconomic impacts described above are essentially equal for all of the alternatives and segments with the exception of differences in the estimated property tax revenue available to each affected county depending on the mileage of the line that would ultimately be constructed within each county's jurisdiction (**Table A12**).

Cultural Resources Segment Analysis

The Class 1 cultural resource searches resulted in the identification of three previously recorded sites considered eligible for the NRHP in sections along the agency-proposed local realignment segments. These sites include the Rainbow Dam Road, an historic transmission line, and the Burlington Northern-Santa Fe Railroad. There are 20 sites where NRHP-eligibility has not been determined, is unknown, or is unresolved. This group includes six tipi ring sites, two lithic scatter sites, two prehistoric camp sites, an historic road or trail, five homesteads, two historic irrigation systems, one historic trash dump, and one historic mining site.

Two NRHP-eligible sites, 24CA416 the Rainbow Dam Road and 24CA1040 an historic transmission line just north of the Missouri River, are located in sections containing both segment A1 and segment A2. The sections crossed by segment A1 contains three of the tipi ring sites, the two lithic scatter sites, the two prehistoric camp sites, three of the homesteads, and the historic mining site in the category of undetermined, unknown, or unresolved NRHP eligibility.

There are no previously recorded cultural resource sites in sections along either segment B1 or segment B2.

One section along segment C1 contains one tipi ring site of undetermined NRHP eligibility. Several sections along segment C2 contain two of the tipi ring sites, two of the homesteads, one of the historic irrigation systems, and the one historic trash dump in the category of undetermined, unknown, or unresolved NRHP eligibility.

Two sections along segment D contain the historic road or trail and one of the historic irrigation systems both of undetermined NRHP eligibility. Two sections along segment E contain the NRHP-eligible Site 24GL191, the Great Northern Railroad – now part of the Burlington Northern-Santa Fe.

Visuals Segment Analysis

Alternative 4 was developed by comparing eight segments that originated and ended at various locations off of Alternative 2 (**Table A13**). Compared to the corresponding segment from Alternative 2, there are fewer residences in the immediate foreground and foreground (0 to ¼ mile and ¼ to ½ mile) of segments A1, A2, B1, B2, C2, and D compared to the corresponding Alternative 2 segments. The differences are all fewer than 5 residences, except A1 (A1 = 13 and corresponding Alternative 2 A1 = 28). Segment E and the corresponding Alternative 2 segment are the same. Segment C1 has a considerably more residences than the corresponding Alternative 2 segment (C1 = 66 versus corresponding Alternative 2 = 0).

Travel corridor comparison (½ to 1 mile) shows that segments A1, A2, and D have a shorter lineal mileage from the major travel routes in the area than do the corresponding Alternative 2 segments. Segment A1 is approximately 3 miles shorter than its corresponding Alternative 2 segment and the other segments are within 1.5 lineal miles of their corresponding Alternative 2 segments. Segment C1 has a considerable amount more lineal mileage within ½ to 1 mile than the corresponding Alternative 2 segment (C1 = 12.38 miles versus corresponding Alternative 2 C1 = 4.83 miles).

All recreation sites were not compared, but those that were are similar in visual impacts.

In summary, segment A1 has less of a visual impact than the corresponding Alternative 2 segment. The corresponding Alternative 2 segment C1 has considerably smaller visual impact than the segment C1. Transmission line alignments in segments D and E were located in consultation with local residents to reduce visual impacts.

TABLE A13 Comparison of Visual Impacts Alternative 2, 3, and 4 Segments										
Alternative	**Segment**	**Number of Residences (Points)**			**Recreation – Benton Lake (Miles)**	**Recreation – State Lands[a] (Miles)**	**Recreation – Lewis & Clark Trail (Lineal Mileage)**			**Travel Corridor[b] (Lineal Mileage)**
		0 to ¼	¼ to ½	½ to 1	Within One Mile	Miles Crossed	0 to ¼	¼ to ½	½ to 1	½ to 1
2		30	60	91	9.42	0.73	7.94	3.39	6.90	19.61
3		34	71	124	8.90	0.49	7.72	2.30	4.96	21.39
4	A1	10	3	29	--	0.77	0.50	0.52	1.07	4.17
	A2	5	8	4	--	--	--	--	--	2.00
	B1	1	0	2	--	--	--	--	--	--
	B2	2	0	1	--	--	--	--	--	--
	C1[c]	9	57	41	--	--	0.64	0.55	0.89	12.38
	C2[c]	8	16	22	--	--	0.50	0.51	0.79	3.34
	D	4	1	2	--	--	--	--	--	2.50
	E	2	3	3	--	--	0.47	0.50	0.50	1.14
2	A1	9	19	34	--	0.73	0.74	1.15	2.05	7.95
	A2	5	10	13	--	--	--	--	--	3.17
	B1	2	0	1	--	--	--	--	--	--
	B2	2	0	1	--	--	--	--	--	--
	C1	0	0	0	--	--	0.70	1.00	1.38	4.83
	C2	9	20	10	--	--	0.70	1.00	1.38	1.88
	D	4	0	2	--	--	--	--	--	2.45
	E	2	3	4	--	--	--	--	--	1.14

Notes:
a Does not include the conservation easement located north of the Missouri River at Great Falls Substation (Lewis and Clark Greenway Conservation Easement)
b Interstate 15, U.S. Highways 2 and 87, and Montana State Highway 44
c C1 and C2 do not have the same endpoints.
-- not available

Diamond Valley and Teton River Realignment Segment B2

Segment B2 is a 6.5-mile-long alignment that would diverge from Alternative 2 at the same location as segment B1. Where the segment B2 alignment intersects the Alternative 3 alignment and existing NWE 115-kV transmission line, it would parallel the line for approximately 3 miles until it would turn west to join Alternative 2 just south of the Teton River. Segment B2 would cross Hunt Coulee approximately ¾ mile north of the Alternative 2 crossing and ¼ mile north of the segment B1 crossing. Segment B2 would then cross the Teton River just east of the location described in Alternative 2. Segment B2 would address a landowner concern over opening a new corridor rather than paralleling an existing line which already has disrupted farming practices in some fields.

Brady Frontage Road Realignment Segment C1

Segment C1 is a 15-mile-long realignment that would diverge from Alternative 2 approximately 8 miles southeast of Brady. Segment C1 would run directly west from the Alternative 2 along the northern edge of the Teton River bank to the Interstate 15 frontage road, and follow the frontage road for about 11 miles past the town of Brady to rejoin Alternative 2 about two miles north of Brady. Segment C1 would closely parallel the existing transportation corridor of Interstate 15 and the frontage road. Segment C1 would decrease crossing of farmland and avoid paralleling one pipeline.

Conrad Realignment Segment C2

Segment C2 is a 41-mile-long realignment that would diverge from Alternative 2 at the same location as segment C1. After approximately 3 miles running directly west, segment C2 would turn northwest for approximately 1½ miles, then turn directly north for approximately 18 miles, then turn directly west, heading for the Dry Fork of the Marias River. After the alignment crosses the existing WAPA 230-kV transmission line, approximately 2 miles south of Ledger, it intersects the river. The alignment generally parallels the Dry Fork of the Marias until it would cross Interstate 15, then head northwest along Big Flat Coulee for approximately 8 miles. The alignment would turn due west for approximately 1 mile before rejoining Alternative 2, approximately 4 miles north of the Dry Fork of the Marias River crossing. This segment would minimize diagonal crossing of farm land, avoid crossing farm land by traversing uncultivated land, and avoid residences and paralleling of pipelines.

Belgian Hill Realignment Segment D

Segment D is a 2.8-mile-long realignment that would move the alignment slightly west from the Alternative 2 alignment for 2 miles, just north of Belgian Hill, farther away from four residences (**Figure A2**). The alignment would generally parallel Alternative 2. Segment D would result in greater potential for general local acceptance. This segment would reduce visual impacts. Some diagonal crossing of farmland would be required.

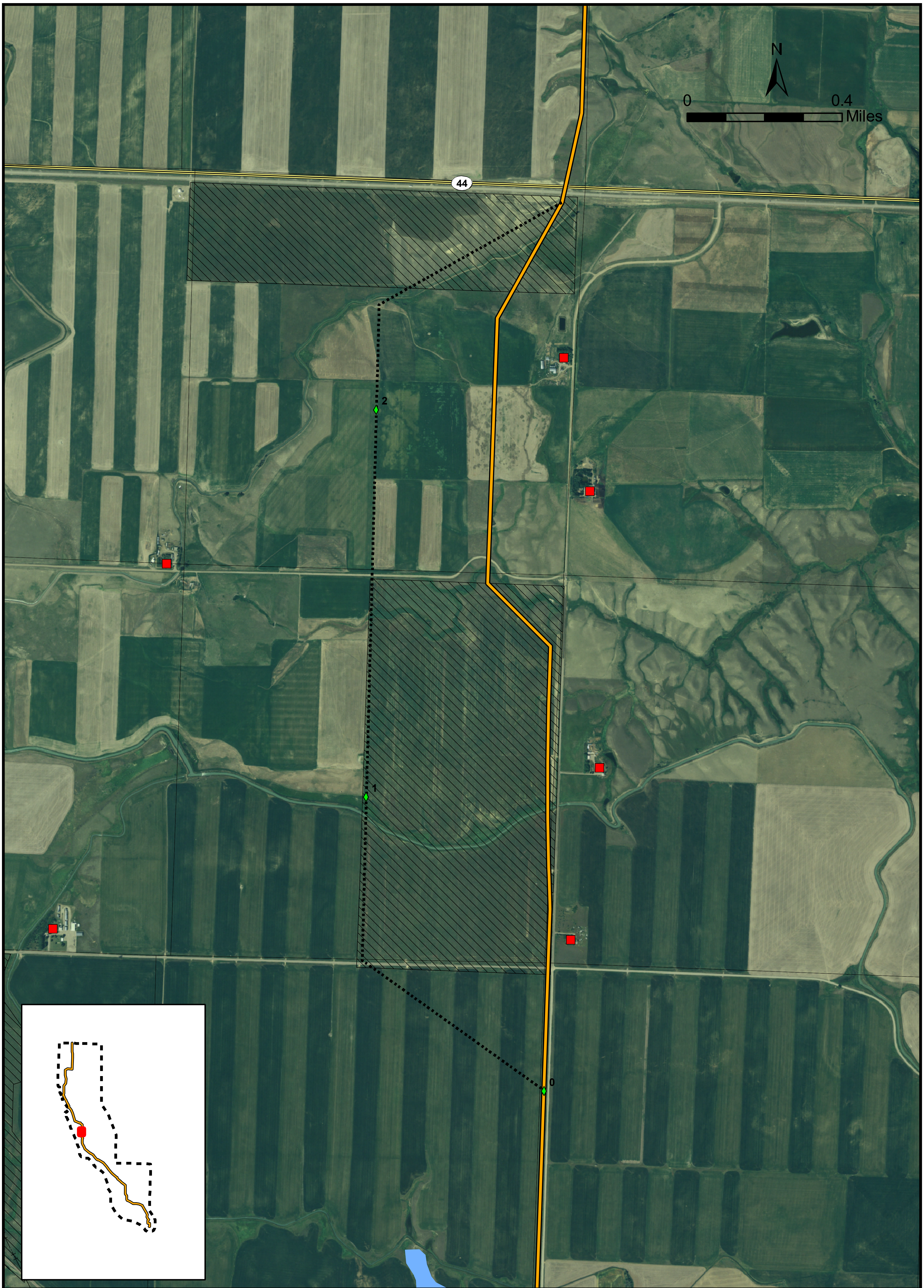


FIGURE A2
SEGMENT D
BELGIAN HILL

LEGEND

ALT2 - ALIGNMENT
SEGMENT D BELGIAN HILL
MILEPOSTS
RESIDENCES OR FARMSTEADS WITHIN 1 MILE OF ALIGNMENTS

EASEMENTS
CONSERVATION RESERVE PROGRAM

CITIES AND TOWNS
ALIGNMENT END AND EXIT POINTS
STUDY AREA
EXISTING TRANSMISSION LINES
MAJOR HIGHWAYS
SECONDARY ROADS
RIVERS AND STREAMS

GIS map by Ed Madej TTEMI-HE FigA2_MATL_Alt4_SegD_021507.mxd

South of Cut Bank Realignment Segment E

Segment E is a 2.5-mile-long realignment that would move the alignment approximately ¼ mile west for a 2-mile stretch, just south of the Alternative 2 intersection with Highway 2. Segment E would move the alignment to follow property boundaries better and is located farther away from residential areas and result in greater potential for general local acceptance. Segment E would generally parallel Alternative 2.

Land Use Segment Analysis

Table A1 shows how many miles of cropland and CRP would be crossed by each agency-proposed local realignment segment in comparison to the same segment of Alternative 2.

TABLE A1
AGENCY SEGMENT CROPLAND COMPARISON TO ALTERNATIVE 2 SEGMENTS

	Linear Miles	Acres in 500-Foot Wide Buffer	Miles Crossing CRP or Cropland
Segment A1 **(West Great Falls)**	**27.3**	1,652	11.7
Alternative 2 Corresponding segment	**26.8**	1,621	17.2
Segment A2 **(Shooting Sports Complex)**	**4.2**	255	2.4
Alternative 2 Corresponding segment	**5.0**	301	2.4
Segment B1 **(Diamond Valley Right Angle)**	**5.9**	357	5.4
Alternative 2 Corresponding segment	**4.2**	256	3.7
Segment B2 **(Diamond Valley & Teton River)**	**6.5**	393	5
Alternative 2 Corresponding segment	**5.9**	358	5.2
Segment C1 **(Brady Frontage)**	**15.0**	904	9.3
Alternative 2 Corresponding segment	**13.3**	804	12.6
Segment C2 **(Conrad Realignment)**	**41.0**	2,481	28.3
Alternative 2 Corresponding segment	**33.0**	1,999	27.5
Segment D **(Belgian Hill)**	**2.8**	170	2.8
Alternative 2 Corresponding segment	**2.4**	73	2.2
Segment E **(South of Cut Bank)**	**2.5**	149	0
Alternative 2 Corresponding segment	**2.3**	140	.7

Notes: Alternative 4 would require the use of monopole on cropland or CRP. The overall Alternative 2 alignment crosses 92.7 miles of cropland and CRP.

Table A2 shows the types of land use crossed by Alternatives 2 and 3, and how many miles of farm land are crossed parallel to farming rows, perpendicular to farming rows, or at a diagonal to farming rows.

TABLE A2
TYPES OF LAND USE CROSSED BY ALTERNATIVES 2 AND 3 (MILES)

	Alternative 2				Alternative 3			
	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total	Parallel[a]	Perpendicular[b]	Diagonal[c]	Total
Irrigated cropland	1.4	0	0.1	1.5	0	0	6.8	6.8
Non-irrigated cropland	34.5	3.9	52.8	91.2	27.3	0	63.6	90.9
Rangeland	6.3	1.8	25.5	33.6	5.2	0.2	16.2	21.6
Road/Right of Way	0.2	0.9	0.2	1.3	0.1	0	0.2	0.3
Residential	0	0	0	0	0	0	0.1	0.1
Forest	0	0	0	0	0	0	0.1	0.1
Riparian	0.6	0	1.3	1.9	0.1	0	1.2	1.3
Water	0	0	0	0	0	0	0.1	0.1
Total Miles	43.0	6.6	79.9	129.5	32.7	0.2	88.3	121.2

Notes:

[a] parallel to north and south

[b] perpendicular to north and south

[c] diagonal to north and south

Sources: Orthophotographs 2005 (Montana NRIS 2006a); NRIS 2000; MATL 2006b; field verification; photographic interpretation

The agency-proposed local realignment segments were developed, in part, to reduce the impacts on farming from the proposed transmission line. The numbers of miles of crossings parallel to, perpendicular to, and diagonal to irrigated cropland, non-irrigated cropland, and rangeland are summarized for corresponding segments of Alternative 2 and agency-proposed local realignments (**Table A3**).

TABLE A3 MILES OF PARALLEL, PERPENDICULAR, AND DIAGONAL ACROSS CROPLAND AND RANGELAND ALTERNATIVE 2 AND CORRESPONDING AGENCY LOCAL REALIGNMENT SEGMENT								
	Alternative 2				**Agency-proposed Local Realignment Segment**			
	Parallel[a]	**Perpendicular[b]**	**Diagonal[c]**	**Total**	**Parallel[a]**	**Perpendicular[b]**	**Diagonal[c]**	**Total**
Segment A1 — West Great Falls								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	5.4	1.0	10.8	17.2	6.6	1.6	3.5	11.7
Rangeland/ Native	1.0	1.0	6.5	8.5	1.9	2.7	10.7	15.3
Other	0	0.9		0.9	0.1	--	0.1	0.2
Total Miles	**6.4**	**2.9**	**17.3**	**26.6**	**8.6**	**4.3**	**14.3**	**27.2**
Segment A2 — Great Falls Shooting Sports Complex								
Irrigated	-	-	-	-	-	-	-	-
Non-irrigated	1.7	0.5	0.2	2.4	1.7	0.1	0.6	2.4
Rangeland/ Native	1.1	0.0	0.7	1.8	1.1	--	0.7	1.8
Other	0.0	0.0	0.0	0.0	--	--	--	--
Total Miles	**2.8**	**0.5**	**0.9**	**4.2**	**2.8**	**0.1**	**1.3**	**4.2**
Segment B1 — Diamond Valley Right Angle								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	--	--	3.7	3.7	2.5	2.9	--	5.4
Rangeland/ Native	--	--	0.3	0.3	--	0.4	--	0.4
Other	--	--	--	--	--	0.1	--	0.1
Total Miles	**--**	**--**	**4.0**	**4.0**	**2.5**	**3.4**	**--**	**5.9**
Segment B2 — Diamond Valley Diagonal-Teton River								
Irrigated	0.0	0.0	0.0	0.0	-	-	-	-
Non-irrigated	0.0	0.0	5.2	5.2	0.5	0.8	3.7	5.0
Rangeland/ Native	0.0	0.0	0.8	0.8	0.2	0.5	0.7	1.4
Other	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.1
Total Miles	**0.0**	**0.0**	**6.2**	**6.2**	**0.7**	**1.3**	**4.5**	**6.5**
Segment C1 — Brady Frontage								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	--	0.5	12.1	12.6	--	3.8	5.5	9.3
Rangeland/ Native	--	0.1	0.6	0.7	--	0.8	0.0	0.8
Other	--	--	0.2	0.1	--	--	4.9	4.9
Total Miles	**--**	**0.6**	**12.9**	**13.4**	**--**	**4.6**	**10.4**	**15.0**

TABLE A3 MILES OF PARALLEL, PERPENDICULAR, AND DIAGONAL ACROSS CROPLAND AND RANGELAND ALTERNATIVE 2 AND CORRESPONDING AGENCY LOCAL REALIGNMENT SEGMENT								
	Alternative 2				**Agency-proposed Local Realignment Segment**			
	Parallel[a]	**Perpendicular[b]**	**Diagonal[c]**	**Total**	**Parallel[a]**	**Perpendicular[b]**	**Diagonal[c]**	**Total**
Segment C2 — Conrad Realignment								
Irrigated	0.9	--	0.0	0.9	1.2	0.5	-	1.7
Non-irrigated	3.3	--	23.2	26.6	14.8	6.5	5.3	26.6
Rangeland/ Native	0.6	--	3.9	4.5	1.1	1.2	9.8	12.1
Other	0.1	--	0.9	0.9	0.2	-	0.4	0.6
Total Miles	**4.9**	**0.0**	**28.0**	**32.9**	**17.3**	**8.2**	**15.5**	**41.0**
Segment D — Belgian Hill								
Irrigated	0.4	--	--	0.4	--	--	--	--
Non-irrigated	1.0	--	0.6	1.6	2.8	--	--	2.8
Rangeland/ Native	0.2	--	0.1	0.1	--	--	--	--
Other	0.1	--	--	0.1	--	--	--	--
Total Miles	**1.7**	**0**	**0.7**	**2.4**	**--**	**--**	**--**	**2.8**
Segment E — South of Cut Bank								
Irrigated	--	--	--	--	--	--	--	--
Non-irrigated	0.7	--	--	0.7	--	--	0	--
Rangeland/ Native	0.8	--	0.8	0.8	2.4	--	--	2.4
Other	--	--	--	0	--	--	--	--
Total Miles	**1.5**	**0**	**0.8**	**1.5**	**--**	**--**	**--**	**2.4**

Notes:

[a] parallel to north and south

[b] perpendicular to north and south

[c] diagonal to north and south

-- Not applicable

Sources: Orthophotographs 2005 (Montana NRIS 2006a); MATL 2006b; field verification; photographic interpretation .

The following observations were made:

- Segment A1 (West Great Falls) is 0.6 miles longer than the segment it would replace in Alternative 2, however, it reduces the diagonal crossing of cropland from 10.8 miles to 3.5 miles.
- Segment A2 (Great Falls Shooting Sports Complex) increases the diagonal crossing of non-irrigated cropland from 0.2 in Alternative 2 to 0.6 miles in Alternative 4.
- Segment B1 (Diamond Valley Right Angle) is 1.9 miles longer than the segment it would replace in Alternative 2, however, it eliminates diagonal crossing of cropland, compared to 3.7 miles of diagonal crossing in Alternative 2 for this segment and moves the transmission line alignment onto existing utility corridors or other land uses (non-farm).
- Segment B2 (Diamond Valley Diagonal - Teton River) is 0.3 miles longer than the segment of Alternative 2 it would replace, but it reduces the diagonal crossing of cropland from 5.2 miles to 3.7 and shifts the crossing to parallel (0.5 miles) or perpendicular (0.8 miles).
- Segment C1 (Brady Frontage) is 1.6 miles longer than the segment it would replace in Alternative 2. It would reduce the diagonal crossing of cropland from 12.1 miles to 5.5 miles.
- Segment C2 (Conrad Realignment) is nearly 8 miles longer than the segment of Alternative 2 it would replace (41 miles compared to 32.9 miles), however, it would substantially reduce the diagonal crossing of cropland from 23.2 miles to 5.3 miles. Most (14.8 miles) of the cropland crossed would be parallel to the north-south orientation of crop rows. Approximately 6.5 miles would be crossed perpendicular to the rows. Additionally, more of the alignment (12.1 miles) would cross native vegetation or rangeland, compared to Alternative 2 which has 4.5 miles crossing those vegetation types.
- Segment D (Belgian Hill) is 0.4 miles longer than the segment it would replace in Alternative 2, however, it would remove all the diagonal crossing of cropland in this segment and increase the distance of parallel crossing from 1.4 miles to 2.8 miles. The parallel crossings or alignment near the edges of the fields would not interfere with farming activities as much as diagonal crossings.
- Segment E (South of Cut Bank) is 0.9 miles longer than the segment it would replace in Alternative 2, however, it would remove all crossings of cropland (including diagonal) and move the alignment onto native or rangeland vegetation.

Table A4 compares how many miles of transmission line cross CRP land or cropland under each agency-proposed local realignment segment and how many acres would be affected. Segments B1, C2, and D would result in a slight increase in acres removed from production because of the longer length of the line under these segments (see **Table A4)**.

TABLE A4 Acres of Production in CRP or Cropland Affected by Monopole Structures in Agency-proposed Local Realignments Compared to Alternative 2				
	Alternative 2		Agency-proposed Local Realignment	
Segment	**Miles**	**Acres[a]**	**Miles**	**Acres[a]**
A1 West Great Falls	17.2	1.8	11.7	1.2
A2 Great Falls Shooting Sports Complex	2.4	0.3	2.4	0.3
B1 Diamond Valley Right Angle	3.7	0.4	5.4	0.6
B2 Diamond Valley Diagonal-Teton River	5.2	0.5	5.0	0.5
C1 Brady Frontage	12.6	1.3	9.3	1.0
C2 Conrad Realignment	27.5	2.8	28.3	3.0
D Belgian Hill	2.0	0.2	2.8	0.3
E South of Cut Bank	0.7	0.1	0.0	0.0

Notes:

[a] Acres rounded to nearest 0.01. Calculation based on 0.01 acres per structure at a structure every 500 feet (10.5 structures per mile)

Sources: Orthophotographs, 2005 (Montana NRIS 2006a), NRIS 2000, MATL 2006b; field verification; photographic interpretation

Some segments (B1 - Diamond Valley Right Angle, C1 – Conrad Realignment and D - Belgian Hill) increase the length of power line crossing farmland and CRP slightly (see **Table A4**) over Alternative 2 for those segments.

Conservation Easements and Special Management Areas

Linear miles of lands under federal/state special management and those lands currently under federal or state conservation easements (wetland easements, CRP, and FWP easements) are summarized in **Table A5** for each alignment. Segments A1 and A2 would eliminate crossing the Great Falls Shooting Sports Complex. Some agency-proposed local realignments would increase the number of miles crossing CRP over corresponding Alternative 2 segments they would replace.

TABLE A5 MILES OF FEDERAL/STATE SPECIAL MANAGEMENT AREAS AND CONSERVATION EASEMENTS CROSSED			
	Alternative 2 Corresponding Segment	**Alternative 3**	**Agency-proposed Local Realignments**
State Land (FWP) – Great Falls Shooting Sports Complex			
Segment A1 (West Great Falls)	0.73	--	0
Segment A2 (Great Falls Shooting Sports Complex)	0	0.51	0.76
Segment B1 (Diamond Valley Right Angle)	--	--	--
Segment B2 (Diamond Valley Diagonal-Teton River)	--	--	--
Segment C1 (Brady Frontage)	--	--	--
Segment C2 (Conrad Realignment)	--	--	--
Segment D (Belgian Hill)	--	--	--
Segment E (South of Cut Bank)	--	--	--
Montana State Trust Land (DNRC)			
Segment A1 (West Great Falls)	3.69	--	2.56
Segment A2 (Great Falls Shooting Sports Complex)	0.12	--	0.08
Segment B1 (Diamond Valley Right Angle)	0.00	--	0.00
Segment B2 (Diamond Valley Diagonal-Teton River)	1.24	--	1.24
Segment C1 (Brady Frontage)	1.14	--	2.68
Segment C2 (Conrad Realignment)	1.70	--	4.03
Segment D (Belgian Hill)	0.00	--	0.00
Segment E (South of Cut Bank)	0.00	--	0.00
Conservation Easements			
Segment A1 (West Great Falls)	(CRP) 5.32 (Stewardship) 0.12	--	10.04
Segment A2 (Great Falls Shooting Sports Complex)	0.00	--	0.00
Segment B1 (Diamond Valley Right Angle)	0.00	--	0.00
Segment B2 (Diamond Valley Diagonal-Teton River)	1.54	--	1.54
Segment C1 (Brady Frontage)	0.00	--	3.10
Segment C2 (Conrad Realignment)	2.16	--	4.17
Segment D (Belgian Hill)	1.36	--	1.48
Segment E (South of Cut Bank)	1.04	--	0.90

Notes:
-- = not applicable

Planned Land Use

The Segment A1 West Great Falls local alignment crosses the planned Kyles Addition subdivision. No residences are under construction or completed in this subdivision.

Wetlands Segment Analysis

The length of each segment and the wetlands affected by each segment are shown in **Table A6**, along with the length of the corresponding segment of Alternative 2 which it could replace.

TABLE A6
WETLANDS AFFECTED BY SEGMENTS
AGENCY-PROPOSED LOCAL REALIGNMENT

Alternative Comparison	Segment Length	Palustrine PEM	Palustrine PUS, PUB, & PAB	Lacustrine	Riverine	Total
	(miles)	(acres)	(acres)	(acres)	(acres)	(acres)
West Great Falls Segment A1	27.3	13.25	0.43	0.0	0.0	13.68
Corr. Alt. 2 Segment	26.8	15.72	1.07	0.78	0.0	17.57
Great Falls Shooting Sports Complex Segment A2	4.2	0.0	0.13	3.21	0.0	3.34
Corr. Alt. 2 Segment	5.0	4.13	0.0	0.78	0.0	4.91
Diamond Valley Right Angle Segment B1	5.9	<1 Est.	ND	ND	<1 Est.	ND
Corr. Alt. 2 Segment	4.2	<1 Est.	ND	ND	<1 Est.	ND
Diamond Valley Diagonal-Teton River Segment B2	6.5	1-2	ND	ND	2-3	ND
Corr. Alt. 2 Segment	5.9	1-2	ND	ND	2-3	ND
Brady Frontage Segment C1	15.0	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	13.3	10.12	1.98	0.0	0.0	12.10
Conrad Realignment Segment C2	41.0	18.10	2.01	0.0	0.0	20.11
Corr. Alt. 2 Segment	33.0	13.75	1.98	0.0	0.0	15.73
Belgian Hill Segment D	2.8	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	2.4	0.0	0.41	0.0	0.0	0.41
South of Cut Bank Segment E	2.5	0.0	0.0	0.0	0.0	0.0
Corr. Alt. 2 Segment	2.3	0.0	0.0	0.0	0.0	0.0

<u>Notes:</u>

Alt. Alternative
Corr. Corresponding
PEM Palustrine Emergent wetlands
PUS Palustrine Unconsolidated Shore wetlands
PUB Palustrine Unconsolidated Bottom wetlands
PAB Palustrine Aquatic Bed wetlands
Est. estimated using the 2005 aerial photographs
ND No Data

Potential impacts to wetlands for all eight local realignment segments were evaluated using the wetland data provided in **Table A6**. Total potential wetlands recorded along each local realignment segment were compared to the total wetlands recorded for the corresponding segment of Alternative 2. The total wetland acres was also segregated into four main wetland categories (2 palustrine classes, 1 lacustrine, and 1 riverine) to better evaluate the types of wetlands that each segment may impact. Total wetland acreage does not include any wetlands that may exist in Teton County for the portion of the segments where no official wetland data currently exist. The 2005 National Agricultural Imagery Program aerial photographs were used to visually identify observable wetlands along the local realignment segments in Teton County and to estimate the approximate number of wetlands for these alignments. Even though the wetland acreage could not be quantified from the aerial photographs, it was determined that no single large wetland or concentration of wetlands existed that could not be spanned using 500 foot span lengths.

Potential impacts to wetlands for the local realignment segments were compared only to the corresponding segments of Alternative 2 for which each could substitute. As was determined for the entire analysis area, the majority of the wetlands along all local realignment segments are classified as palustrine, emergent wetlands (PEM).

Segment A1 (West Great Falls) The A1 segment traverses around the southern and western sides of Benton Lake NWR area and would potentially impact 3.89 fewer acres of wetlands, compared to the corresponding segment of Alternative 2. Several smaller areas with palustrine and lacustrine wetlands exist directly north of Great Falls (Black Horse Lake area) and along the western side of Benton Lake NWR. A1 would impact fewer wetlands primarily because it is located along steeper slopes compared to crossing a more flat bench area. No riverine wetlands are delineated along segment A1 facility location. However, segment A1 crosses the Lake Creek channel in Teton County and could potentially impact a small riverine wetland (possibly about 1 acre) at that location.

Segment A2 (Great Falls Shooting Sports Complex Realignment) This 4.2 mile long segment runs north from the Great Falls 230-kV switch yard along the edge of cropland and parallel to the access road to the Great Falls Shooting Sports Complex. The Segment A2 centerline crosses over an actively used gun club, but would not be located over any existing or planned buildings. The segment A2 facility location would potentially impact 1.57 fewer acres of wetlands compared to the corresponding segment of Alternative 2. The primary difference between these two alignments was that the segment A2 realignment would cross a larger portion of the Black Horse Lake Flat that has been mapped as a lacustrine wetland.

Segment B1 (Diamond Valley Right Angle) This 5.9 mile long B1 segment is located in Diamond Valley area of Teton County, approximately 2 to 5 miles south of the Teton River. The types and amounts of wetlands that would be impacted within the 500 foot wide facility location of segment B1 are very similar to those that occur along the 4.2 mile long corresponding Alternative 2 portion. Both segment B1 and the corresponding Alternative 2 centerlines would cross Hunt Coulee; segment B1 would cross this coulee at a straight east to west angle, while the Alternative 2 would cross Hunt Coulee at a southeast to northwest angle. Hunt Coulee has palustrine emergent wetlands (estimated to be less than one acre) and a small area of riverine wetlands (estimated to be less than one acre) in the bottom of the coulee. These wetland areas could be spanned causing minimal impacts to wetlands under both the B1 segment and Alternative 2 alignments.

Segment B2 (Diamond Valley and Teton River) This 6.5 mile long segment B2 is also located in the Diamond Valley area of Teton County, but would utilize the same alignment as Alternative 3 for approximately 3.25 miles where it would parallel the existing NWE 115-kV transmission line. Segment B2 would cross Hunt Coulee approximately ¾ mile north of the Alternative 2 crossing and ¼ mile north of the segment B1 crossing of Hunt Coulee. This alignment would also extend further north and includes a modified crossing of the Teton River that avoids some cropland. The types and amounts of wetlands that would be impacted within the 500 foot wide facility location for segment B2 are very similar to those that occur along the 5.9 mile long corresponding Alternative 2 portion. Both alternative alignments would cross small areas with palustrine emergent wetlands (estimated at one to two acres) and a small area of riverine wetlands (estimated at two to three acres) in the bottom of Hunt Coulee and the Teton River. All wetland areas visually identified on the 2005 aerial photographs for segment B2 could be spanned.

Segment C1 (Brady Frontage Road) Segment C1 is a 15.0 mile long alignment that runs directly east - west along the northern edge of the Teton River bank and then parallels the Interstate 15 frontage road for approximately 11 miles, connecting back with the Alternative 2 alignment just north of Brady, Montana. Segment C1 would potentially impact 12.1 fewer acres of wetlands compared to the Alternative 2 alignment through this area. There are no wetlands of any type mapped along the Brady Frontage Road alignment. Several areas with palustrine wetlands (total of 12.1 acres) exist along the corresponding segment of Alternative 2 through this area.

Segment C2 (Conrad Realignment) Segment C2 is a 41.0 mile long alignment that runs around the Town of Conrad on the east and north sides. Segment C2 takes off from Alternative 2 at the same location as segment C1. Both Alternative C1 and C2 segments would be in the same alignment for approximately 3.25 miles where segment C2 would begin to run north. This alternative alignment would travel north for approximately 20 miles where it would turn west and continue for approximately 18 miles where it would rejoin Alternative 2. This alternative alignment would cross several major coulees (South Pondera, Pondera, Favot, and Big Flat) and the Dry Fork Marias River.

Segment C2 would potentially impact 4.38 more acres of total wetlands compared to the corresponding Alternative 2 alignment through this area. The main reason for the increased number of wetlands crossed by segment C2 is the higher proportion of coulees and unfarmed drainages that were used by this alternative in the avoidance of farmed land. Small areas with palustrine and riverine wetlands exist along most of the major coulees and along the Dry Fork Marias River crossing. Segment C2 also crosses slightly larger and more defined drainages due to its more eastern location. Drainages generally flow west to east in this area and tend to have more defined channels as they flow toward the Missouri River.

Segment D (Belgian Hill) Segment D is a relatively short (2.8 mile) alignment located in the Belgian Hill area. This alternative segment generally parallels Alternative 2, but is located approximately ½ mile to the west. This alignment segment was developed primarily to minimize visual impacts to four residences located along the Alternative 2 alignment. Segment D would potentially impact 0.41 fewer acres of palustrine wetlands compared to Alternative 2 through this locale.

Segment E (South of Cut Bank) Segment E is a relatively short (2.5 mile) segment located in an area southeast of Cut Bank. This alternative segment also parallels the Alternative 2 alignment approximately ½ mile to the west. This alignment segment was developed primarily to minimize visual impacts to residences located along the Alternative 2 alignment and to avoid paralleling a buried gathering pipeline for the oil wells in the local area. There are no mapped wetlands along either segment E or the corresponding Alternative 2 alignment in this locale.

Vegetation Segment Analysis

Rangeland vegetation, such as grassland, improved pasture, seeded grasslands, shrubland, badland, riparian and wetlands, and forested cover types, would be removed by the construction of access roads and structures, and at construction staging areas. Maintenance activities would not likely result in additional ground disturbance. Linear miles of rangeland cover types affected by alternative are presented in **Table A7**. Disturbance resulting from staging areas would be similar for Alternatives 2 and 3.

Agency-proposed local realignment segments total approximately 38.5 miles. The comparable segments of Alternative 2 total almost 20 miles (**Table A8**), nearly doubling the grassland the rangeland cover types under alternative segments. The increased crossing in rangeland cover types would result in more tower structures and access roads, thus increasing rangeland impacts. Disturbance due to maintenance activities would also increase over the life of the project due to increased structure and road placement in rangeland and vegetation (**Table A9**). Disturbance resulting from staging areas would be similar to those of Alternatives 2 and 3.

TABLE A7
Native Vegetation Cover Types Crossed by Alternatives 2, 3, and 4

Rangeland Cover Types	**Alternative 2**		**Alternative 3**		**Agency-proposed Local Realignments**	
	Miles	Total Land Cover (percent)	Miles	Total Land Cover (percent)	Miles	Total Land Cover (percent)[a]
Grassland/ Shrubland	33.6	25.9	21.6	17.8	A1 = 15.3 A2 = 1.8 B1 = 0.4 B2 = 1.3 C1 = 0.8 C2 = 12.0 D = 2.8 E = 2.5	A1 = 56.2 A2 = 42.2 B1 = 7.3 B2 = 19.9 C1 = 5.2 C2 = 29.1 D = 99.0 E = 100.0
Riparian	1.9	1.5	1.3	1.1	A1 = 0.2 A2 = 0.03 B1 = 0.1 B2 = 0.2 C1 = 0.05 C2 = 1.0 D = 0.04 E = 0.0	A1 = 0.7 A2 = 0.7 B1 = 2.2 B2 = 2.8 C1 = 0.3 C2 = 2.3 D = 0.01 E = 0.0
Forest (Cottonwood)	0.0	0.0	0.1	0.1	B2 = 0.04[b]	B2 = 0.6
Total	35.5	27.4	23.0	19.0	--	--
Total Line Length	129.9	--	121.6	--	--	--

Notes:
a Percent of segment..
b Found only in segment B_2
Source: Orthophotographs 2005 (Montana NRIS 2006a) analysis of land cover in vegetation analysis area, October 2006.
-- not applicable

TABLE A8 LINEAR MILES OF VEGETATION CHANGE BETWEEN ALTERNATIVE 2 AND AGENCY-PROPOSED LOCAL REALIGNMENTS		
Native Vegetation Cover Types	**Alternative 2 (miles)**	**Agency-proposed Local Realignments (miles)**
Rangeland	A1 = 8.5 A2 = 1.8 B1 = 0.3 B2 = 0.8 C1 = 0.6 C2 = 4.5 D = 0.3 E = 1.6	A1 = 15.3 A2 = 1.8 B1 = 0.4 B2 = 1.3 C1 = 0.8 C2 = 12.0 D = 2.8 E = 2.5
Riparian	A1 = 0.0 A2 = 0.0 B1 = 0.2 B2 = 0.2 C1 = 0.1 C2 = 0.8 D = 0.1 E = 0.0	A1 = 0.2 A2 = 0.03 B1 = 0.1 B2 = 0.2 C1 = 0.05 C2 = 1.0 D = 0.04 E = 0..0
Forest (Cottonwood)	No Data	B2 = 0.4 [a]

Note:

a Found only in segment B_2

Source: Orthophotographs 2005 (Montana NRIS 2006a) of land cover in vegetation analysis area, October 2006

TABLE A9 ESTIMATED ACRES OF DISTURBANCE DUE TO H-FRAME STRUCTURES IN RANGELAND VEGETATION						
Rangeland Cover Types	**Alternative 2**			**Agency-proposed Local Realignments**		
	Miles[a]	Number of Structures[b]	Acres[c]	Miles	Number of Structures	Acres
Grassland/ Shrubland	18.4	121	0.1	36.9	244	0.2
Riparian	1.4	9	<0.01	1.6	11	<0.01
Total	19.8	130	0.1	38.5	255	0.2

Notes:

a Segment total.

b Average 800-foot span between H-frame structures.

c Based on 36 square feet occupied by an H-frame structure.

Riparian Vegetation
The effects to riparian vegetation from the agency-proposed local realignments would be similar to those of Alternative 2 because both alternatives cross similar amounts of riparian habitat (**Table A9**).

Species of Concern
The effects on species of concern from agency-proposed local realignments would be the same as Alternative 2 because both alternatives cross similar amounts of riparian habitat where these species are likely to occur (**Table A10**).

Weed Control
The agency-proposed local realignments would cross more native vegetation than Alternative 2 (**Table A8**). This increase in land area potentially exposed to disturbance and noxious weed invasion would require greater diligence, expense, and coordination to successfully implement a noxious weed control plan (**Table A9**). The MATL Noxious Weed and Invasive Plant Control Plan (**Appendix C**) would adequately reduce the increased risk of noxious weed spread in the analysis area.

Wildlife Segment Analysis

Big Game Species
Impacts on big game species would not be expected. Pronghorn and mule deer does with fawns could be displaced by activities during late spring and early summer, but disturbance within a given portion of the line would be temporary and animals could easily use adjacent habitat during disturbance periods. Activities would not disturb wintering animals as the construction activities would occur during the spring and summer months. The proposed and alternative transmission line alignments would cross through mule deer winter range and there would be some permanent loss of habitat as a result of structures and access roads (see **Table A10).** This habitat loss would not impact mule deer as this is a minor loss relative to the amount of available habitat within the region.

TABLE A10 MULE DEER WINTER RANGE IMPACTED BY ALTERNATIVES				
MULE DEER WINTER RANGE	Alternative			
	2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Miles of Mule Deer Winter Range Bisected by Transmission Line	Alternative 2 Segment A 19	20	A1 = 1.8 A2 = 1.8 B1 = 0 B2 = 1.0 C1 = 0.67 C2 = 9.3 D = 0 E = 0	A1 = 4.2 A2 = 1.8 B1 = 0.9 B2 = 3.0 C1 = 4.8 C2 = 8.8 D = 0 E = 0

Notes:

a Segment of the Alternative 2 alignment that corresponds with the agency-proposed local realignment segment.

b Agency-proposed local realignment segments that correspond to the Alternative 2 segments.

Threatened and Endangered Segment Analysis

The alternative alignments traverse the known habitat range of four Species of Concern and one federally threatened species. **Table A11** lists the linear miles of special status species' habitat range along each of the two action alternatives and local realignments.

TABLE A11 LINEAR MILES OF SPECIAL STATUS SPECIES' HABITAT RANGE BY ALTERNATIVE AND AGENCY-PROPOSED LOCAL REALIGNMENTS					
Common Name	**State Rank**	**Alternative**			
		2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Black-crowned night-heron	S3B	11.2	9.1	A1 = 11.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 2.6 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Black-necked stilt	S3, S4B	11.2	9.1	A1 = 11.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 2.6 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0

TABLE A11 LINEAR MILES OF SPECIAL STATUS SPECIES' HABITAT RANGE BY ALTERNATIVE AND AGENCY-PROPOSED LOCAL REALIGNMENTS					
Common Name	**State Rank**	**Alternative**			
		2	3	2 Corresponding to Agency-proposed Local Realignments[a]	Agency-proposed Local Realignment by Segments[b]
Burrowing owl	S2B	4.2	3.9	A1 = 4.2 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Ferruginous hawk	S2B	6.5	0	A1 = 6.5 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 5.8 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Peregrine falcon	S2B	2.5	2.2	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 0 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0
Total for All species	--	19.9	11.3	A1 = 17.7 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0	A1 = 8.4 A2 = 0 B1 = 0 B2 = 0 C1 = 0 C2 = 0 D = 0 E = 0

Notes:

Source: MTNHP. 2005. GIS Analyses of Element Occurrence Data. Montana Natural Heritage Program, Helena, Montana. Available at: **http://nhp.nris.state.mt.us/mbd**

State: S2 = Imperiled because of rarity, or because of other factors demonstrably making it very vulnerable to extinction throughout its range; B = a state rank modifier indicating breeding status for a migratory species; S3 = vulnerable because of rarity, or found in restricted range even though it may be abundant at some of its locations; S4 = apparently secure, though it may be quite rare in parts of its range, especially at the periphery; S1 = critically imperiled because of extreme rarity, or because of some factor of its biology making it especially vulnerable to extirpation; SH = Historical, known only from records over 50 years ago; may be rediscovered; N = non-breeding.

a Segment of the Alternative 2 alignment that corresponds with the agency-proposed local realignment segment.
b Agency-proposed local realignment segments that correspond to the Alternative 2 segments.

Socioeconomics Segment Analysis

The socioeconomic impacts described above are essentially equal for all of the alternatives and segments with the exception of differences in the estimated property tax revenue available to each affected county depending on the mileage of the line that would ultimately be constructed within each county's jurisdiction (**Table A12**).

Cultural Resources Segment Analysis

The Class 1 cultural resource searches resulted in the identification of three previously recorded sites considered eligible for the NRHP in sections along the agency-proposed local realignment segments. These sites include the Rainbow Dam Road, an historic transmission line, and the Burlington Northern-Santa Fe Railroad. There are 20 sites where NRHP-eligibility has not been determined, is unknown, or is unresolved. This group includes six tipi ring sites, two lithic scatter sites, two prehistoric camp sites, an historic road or trail, five homesteads, two historic irrigation systems, one historic trash dump, and one historic mining site.

Two NRHP-eligible sites, 24CA416 the Rainbow Dam Road and 24CA1040 an historic transmission line just north of the Missouri River, are located in sections containing both segment A1 and segment A2. The sections crossed by segment A1 contains three of the tipi ring sites, the two lithic scatter sites, the two prehistoric camp sites, three of the homesteads, and the historic mining site in the category of undetermined, unknown, or unresolved NRHP eligibility.

There are no previously recorded cultural resource sites in sections along either segment B1 or segment B2.

One section along segment C1 contains one tipi ring site of undetermined NRHP eligibility. Several sections along segment C2 contain two of the tipi ring sites, two of the homesteads, one of the historic irrigation systems, and the one historic trash dump in the category of undetermined, unknown, or unresolved NRHP eligibility.

Two sections along segment D contain the historic road or trail and one of the historic irrigation systems both of undetermined NRHP eligibility. Two sections along segment E contain the NRHP-eligible Site 24GL191, the Great Northern Railroad – now part of the Burlington Northern-Santa Fe.

TABLE A12 TAX BENEFIT ESTIMATES FOR ALTERNATIVES AND SEGMENTS							
	Alignment Length (Miles)	**Value $/Mi.**	**Estimated Value in County (BxC)**	**Class 9 Tax Rate (Valuation Ratio): 12%**	**Taxable Value (DxE)**	**Avg. Rural Mill Levy**	**Property Tax (FxG)**
Cascade							
Alternative 2	12.76	$363,284	$4,635,504	0.12	$556,260	0.50412	$280,422
Alternative 3	12.31	$363,284	$4,472,026	0.12	$536,643	0.50412	$270,533
Alternative 4							
Segment A1 - Alt 2	12.75	$363,284	$4,631,871	0.12	$555,825	0.50412	$280,202
Segment A1 - Alt 4	19.8	$363,284	$7,193,023	0.12	$863,163	0.50412	$435,138
Chouteau							
Alternative 2	5.87	$363,284	$2,132,477	0.12	$255,897	0.43959	$112,490
Alternative 3	10.21	$363,284	$3,709,130	0.12	$445,096	0.43959	$195,660
Alternative 4							
Segment A1 - Alt 2	5.87	$363,284	$2,132,477	0.12	$255,897	0.43959	$112,490
Segment A1 - Alt 4	0	$363,284	$0	0.12	$0	0.43959	$0
Glacier							
Alternative 2	40.41	$363,284	$14,680,306	0.12	$1,761,637	0.53745	$946,792
Alternative 3	37.34	$363,284	$13,565,025	0.12	$1,627,803	0.53745	$874,863
Alternative 4	40.41	$363,284	$14,680,306	0.12	$1,761,637	0.53745	$946,792
Pondera							
Alternative 2	45.69	$363,284	$16,598,446	0.12	$1,991,814	0.52162	$1,038,970
Alternative 3	44.44	$363,284	$16,144,341	0.12	$1,937,321	0.52162	$1,010,545
Alternative 4							
Segment C1 - Alt 2	4.11	$363,284	$1,493,097	0.12	$179,172	0.52162	$93,460
Segment C1 - Alt 4	7.12	$363,284	$2,586,582	0.12	$310,390	0.52162	$161,906
Segment C2 - Alt 2	28.86	$363,284	$10,484,376	0.12	$1,258,125	0.52162	$656,263
Segment C2 - Alt 4	34.66	$363,284	$12,591,423	0.12	$1,510,971	0.52162	$788,153

TABLE A12 TAX BENEFIT ESTIMATES FOR ALTERNATIVES AND SEGMENTS							
	Alignment Length (Miles)	**Value $/Mi.**	**Estimated Value in County (BxC)**	**Class 9 Tax Rate (Valuation Ratio): 12%**	**Taxable Value (DxE)**	**Avg. Rural Mill Levy**	**Property Tax (FxG)**
Teton							
Alternative 2	25.16	$363,284	$9,140,225	0.12	$1,096,827	0.4991	$547,426
Alternative 3	17.32	$363,284	$6,292,079	0.12	$755,049	0.4991	$376,845
Alternative 4							
Segment A1 - Alt 2	8.13	$363,284	$2,953,499	0.12	$354,420	0.4991	$176,891
Segment A1 - Alt 4	7.47	$363,284	$2,713,731	0.12	$325,648	0.4991	$162,531
Segment C1 - Alt 2	4.12	$363,284	$1,496,730	0.12	$179,608	0.4991	$89,642
Segment C1 - Alt 4	7.89	$363,284	$2,866,311	0.12	$343,957	0.4991	$171,669
Segment C2 - Alt 2	4.12	$363,284	$1,496,730	0.12	$179,608	0.4991	$89,642
Segment C2 - Alt 4	6.29	$363,284	$2,285,056	0.12	$274,207	0.4991	$136,857
Notes:							
Sources: Mullen 2006							
Montana Department of Revenue 2004							

Notes:
a Mullen 2006
b Montana Department of Revenue 2004
$/Mi. = dollars per mile

Visuals Segment Analysis

Alternative 4 was developed by comparing eight segments that originated and ended at various locations off of Alternative 2 (**Table A13**). Compared to the corresponding segment from Alternative 2, there are fewer residences in the immediate foreground and foreground (0 to ¼ mile and ¼ to ½ mile) of segments A1, A2, B1, B2, C2, and D compared to the corresponding Alternative 2 segments. The differences are all fewer than 5 residences, except A1 (A1 = 13 and corresponding Alternative 2 A1 = 28). Segment E and the corresponding Alternative 2 segment are the same. Segment C1 has a considerably more residences than the corresponding Alternative 2 segment (C1 = 66 versus corresponding Alternative 2 = 0).

Travel corridor comparison (½ to 1 mile) shows that segments A1, A2, and D have a shorter lineal mileage from the major travel routes in the area than do the corresponding Alternative 2 segments. Segment A1 is approximately 3 miles shorter than its corresponding Alternative 2 segment and the other segments are within 1.5 lineal miles of their corresponding Alternative 2 segments. Segment C1 has a considerable amount more lineal mileage within ½ to 1 mile than the corresponding Alternative 2 segment (C1 = 12.38 miles versus corresponding Alternative 2 C1 = 4.83 miles).

All recreation sites were not compared, but those that were are similar in visual impacts.

In summary, segment A1 has less of a visual impact than the corresponding Alternative 2 segment. The corresponding Alternative 2 segment C1 has considerably smaller visual impact than the segment C1. Transmission line alignments in segments D and E were located in consultation with local residents to reduce visual impacts.

TABLE A13 Comparison of Visual Impacts Alternative 2, 3, and 4 Segments										
Alternative	**Segment**	**Number of Residences (Points)**			**Recreation – Benton Lake (Miles)**	**Recreation – State Lands[a] (Miles)**	**Recreation – Lewis & Clark Trail (Lineal Mileage)**			**Travel Corridor[b] (Lineal Mileage)**
		0 to ¼	¼ to ½	½ to 1	Within One Mile	Miles Crossed	0 to ¼	¼ to ½	½ to 1	½ to 1
2		30	60	91	9.42	0.73	7.94	3.39	6.90	19.61
3		34	71	124	8.90	0.49	7.72	2.30	4.96	21.39
4	A1	10	3	29	--	0.77	0.50	0.52	1.07	4.17
	A2	5	8	4	--	--	--	--	--	2.00
	B1	1	0	2	--	--	--	--	--	--
	B2	2	0	1	--	--	--	--	--	--
	C1[c]	9	57	41	--	--	0.64	0.55	0.89	12.38
	C2[c]	8	16	22	--	--	0.50	0.51	0.79	3.34
	D	4	1	2	--	--	--	--	--	2.50
	E	2	3	3	--	--	0.47	0.50	0.50	1.14
2	A1	9	19	34	--	0.73	0.74	1.15	2.05	7.95
	A2	5	10	13	--	--	--	--	--	3.17
	B1	2	0	1	--	--	--	--	--	--
	B2	2	0	1	--	--	--	--	--	--
	C1	0	0	0	--	--	0.70	1.00	1.38	4.83
	C2	9	20	10	--	--	0.70	1.00	1.38	1.88
	D	4	0	2	--	--	--	--	--	2.45
	E	2	3	4	--	--	--	--	--	1.14

Notes:

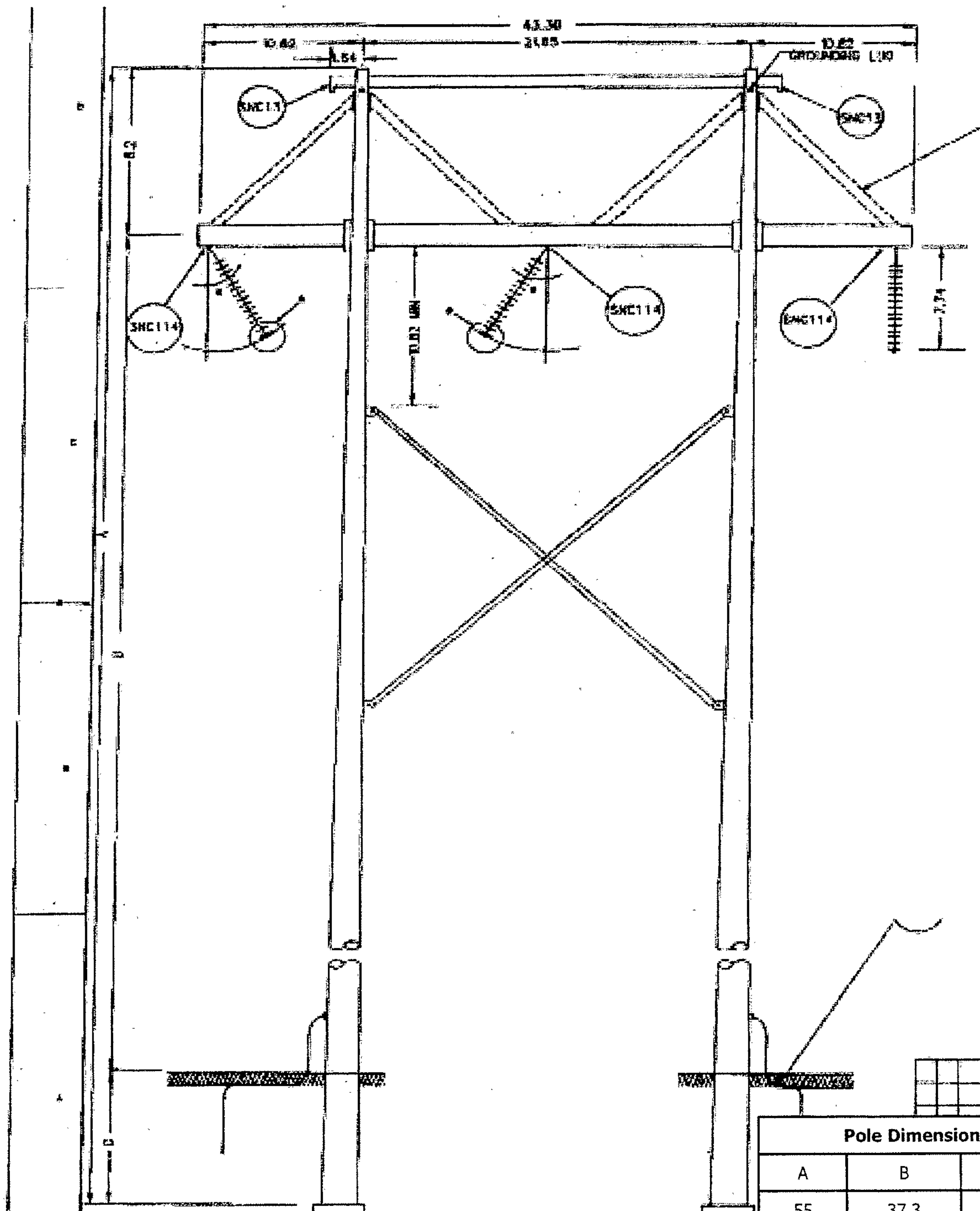
a Does not include the conservation easement located north of the Missouri River at Great Falls Substation (Lewis and Clark Greenway Conservation Easement)

b Interstate 15, U.S. Highways 2 and 87, and Montana State Highway 44

c C1 and C2 do not have the same endpoints.

-- not available

APPENDIX B:
TYPES OF H-FRAME STRUCTURES

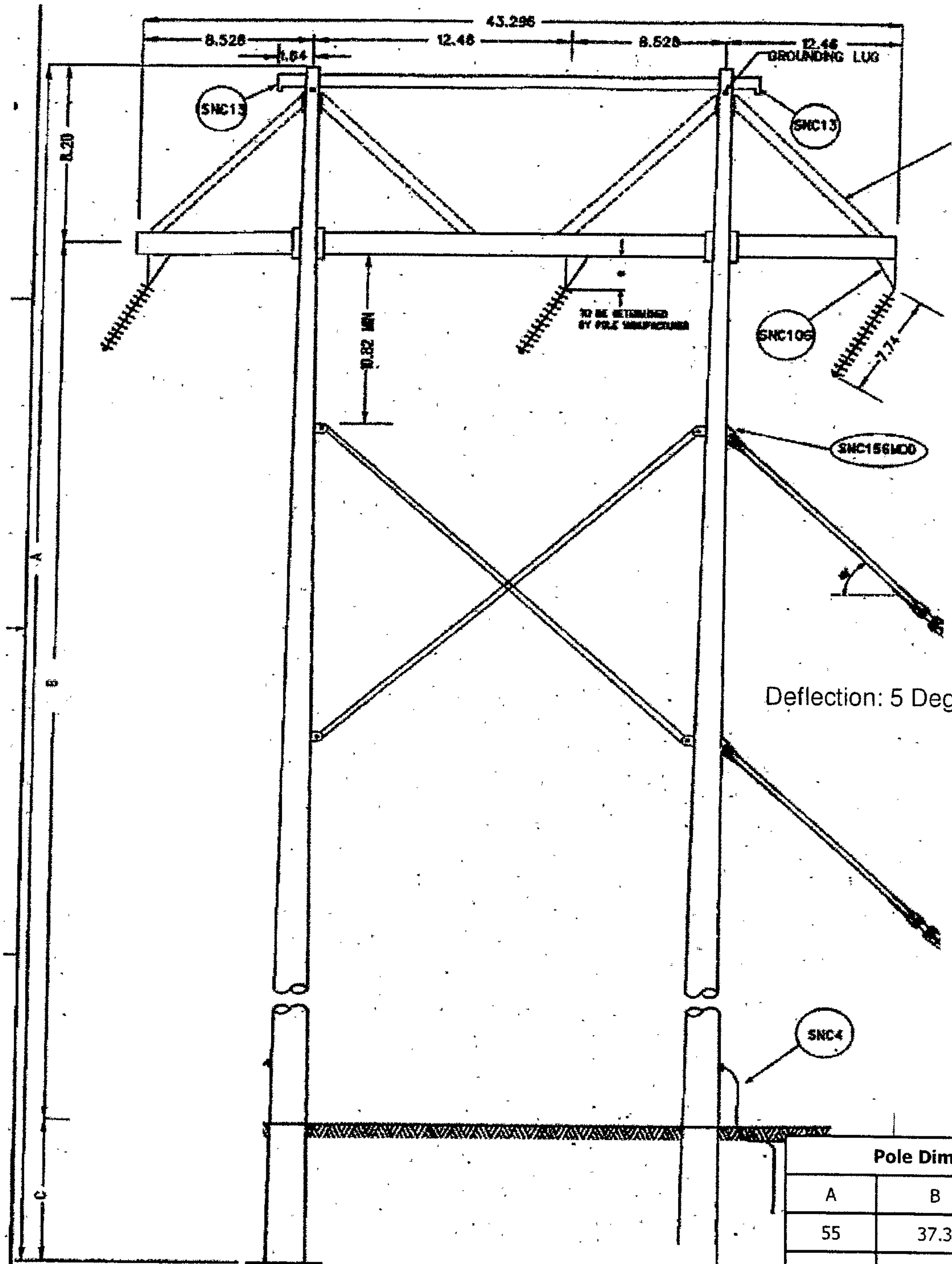


H-Frame ROW Detail		
Pole Location	ROW Distance (feet)	Safety Zone Distance (feet)
County Road ROW	30.9	30
Outside County Road ROW	37.46	30
Through Farmers Field	45	30 (either side of ROW)

Deflection: 1 Degree Line Angle

Pole Dimensions		
A	B	C
55	37.3	9.5
60	41.8	10
65	46.3	10.5
70	50.8	11
75	55.3	11.5
80	59.8	12
85	64.3	12.5
90	68.8	13

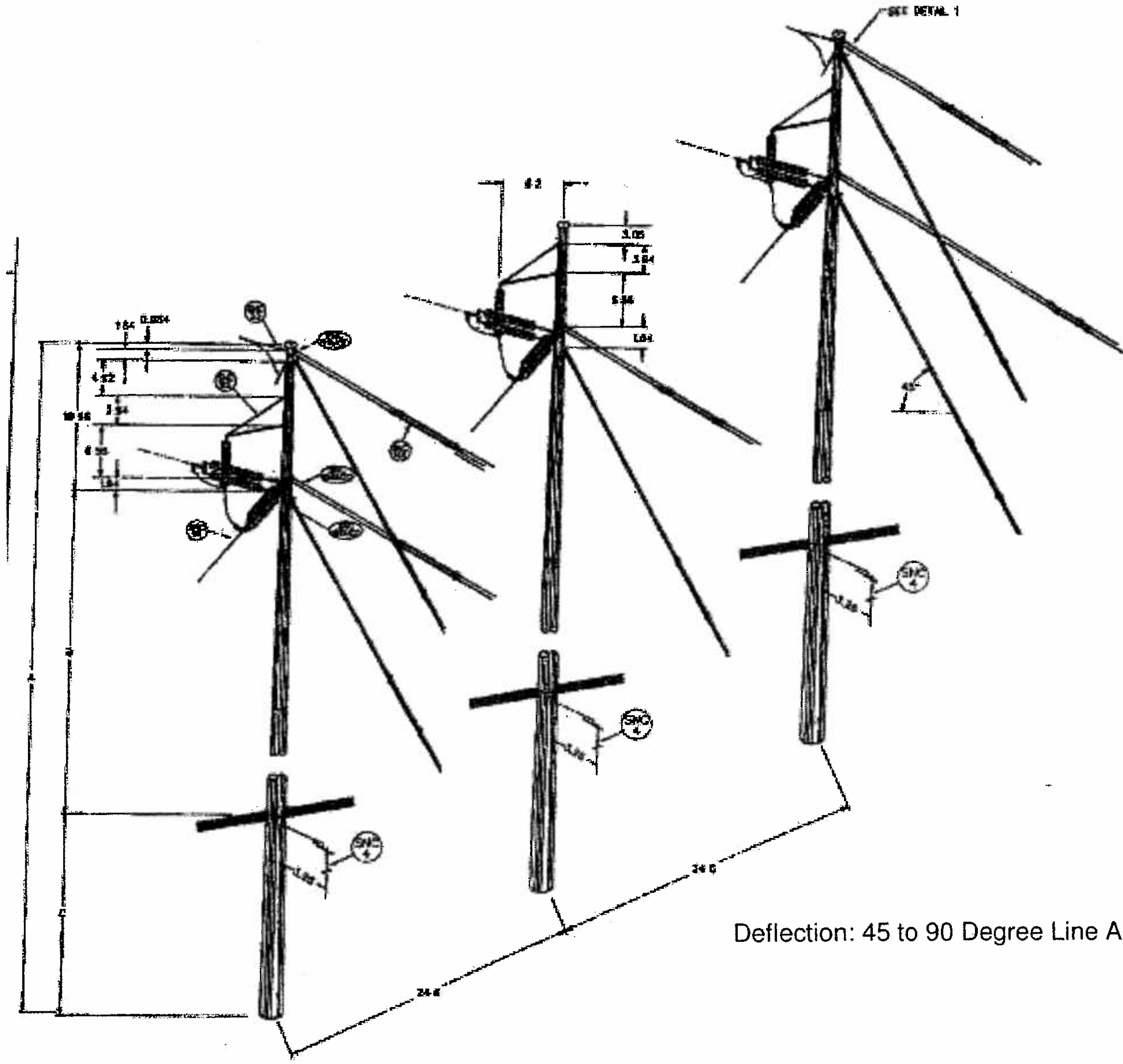
Figure 5-1
240kV H-Frame Tangent Structure



H-Frame ROW Detail		
Pole Location	ROW Distance (feet)	Safety Zone Distance (feet)
County Road ROW	30.9	30
Outside County Road ROW	37.46	30
Through Farmers Field	45	30 (either side of ROW)

Pole Dimensions		
A	B	C
55	37.3	9.5
60	41.8	10
65	46.3	10.5
70	50.8	11
75	55.3	11.5
80	59.8	12
85	64.3	12.5
90	68.8	13

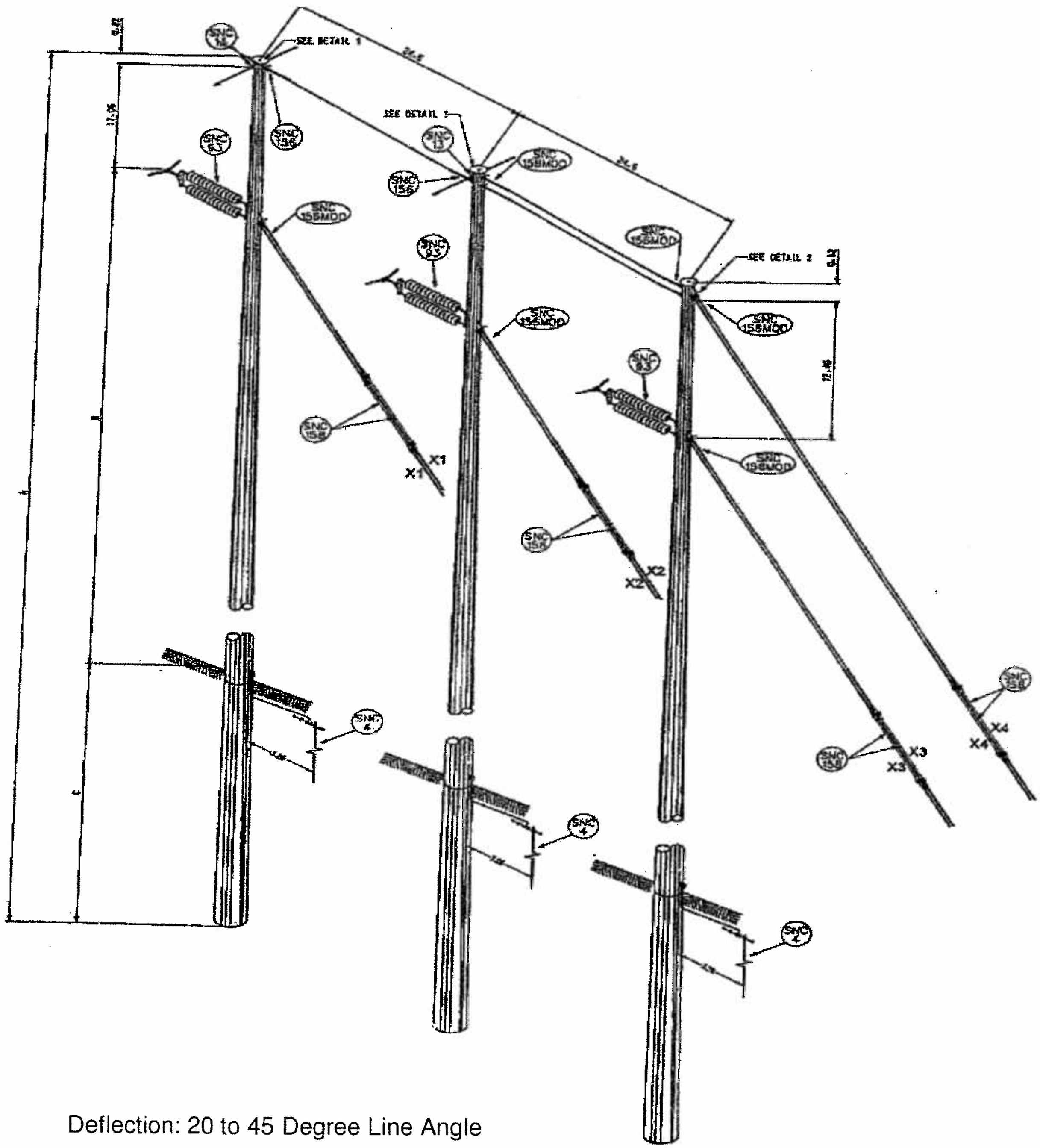
Figure 5-2
240kV H-Frame Light Angle Structure



Deflection: 45 to 90 Degree Line Angle

Pole Dimensions		
A	B	C
60	30.62	10
65	34.82	10.5
70	39.32	11
75	43.82	11.5
80	48.32	12

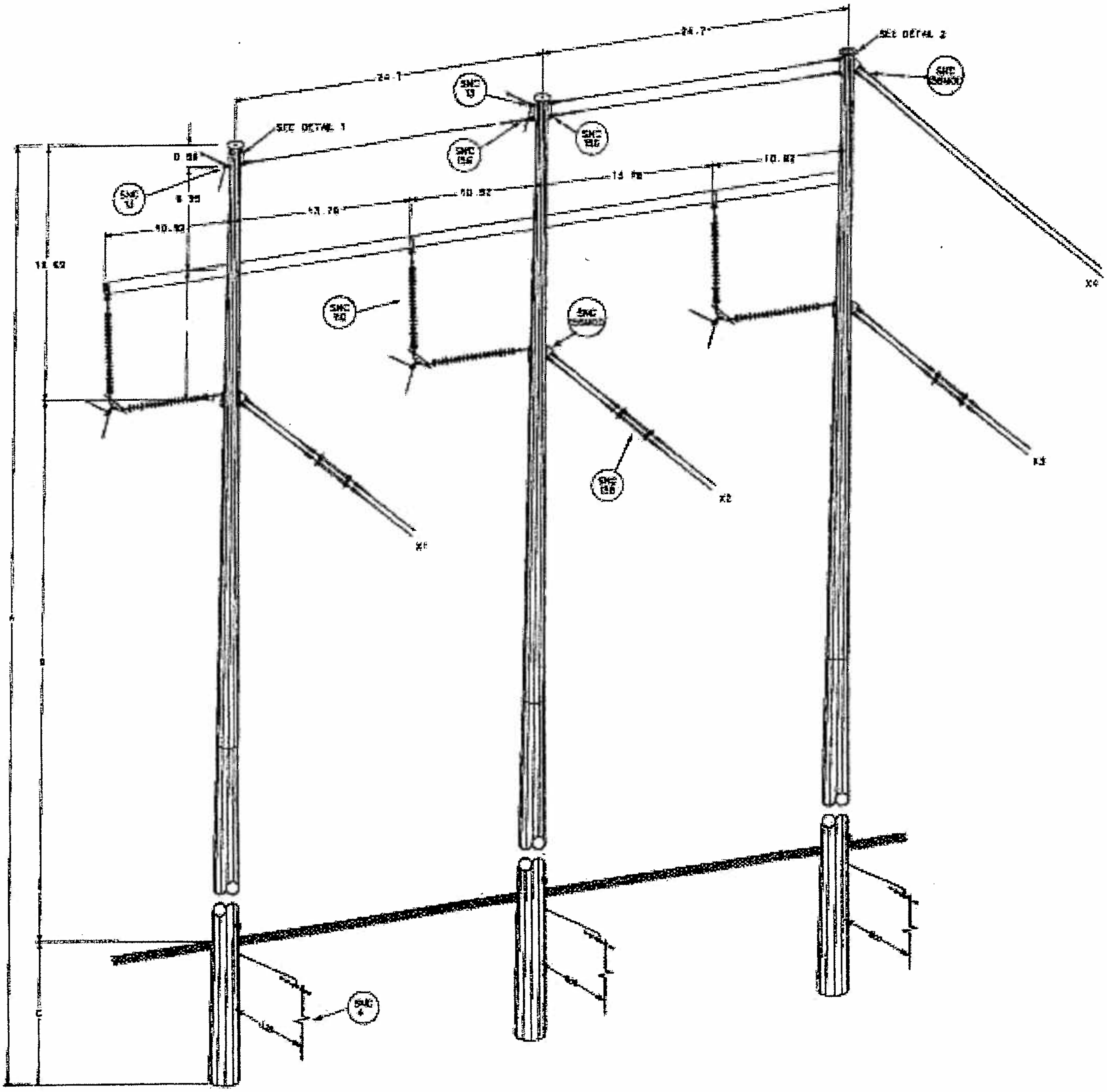
Figure 5-3
240kV Three Pole Dead-End Structure



Deflection: 20 to 45 Degree Line Angle

Pole Dimensions		
A	B	C
65	36.62	10.5
70	41.12	11
75	45.62	11.5
80	50.12	12
85	54.62	12.5

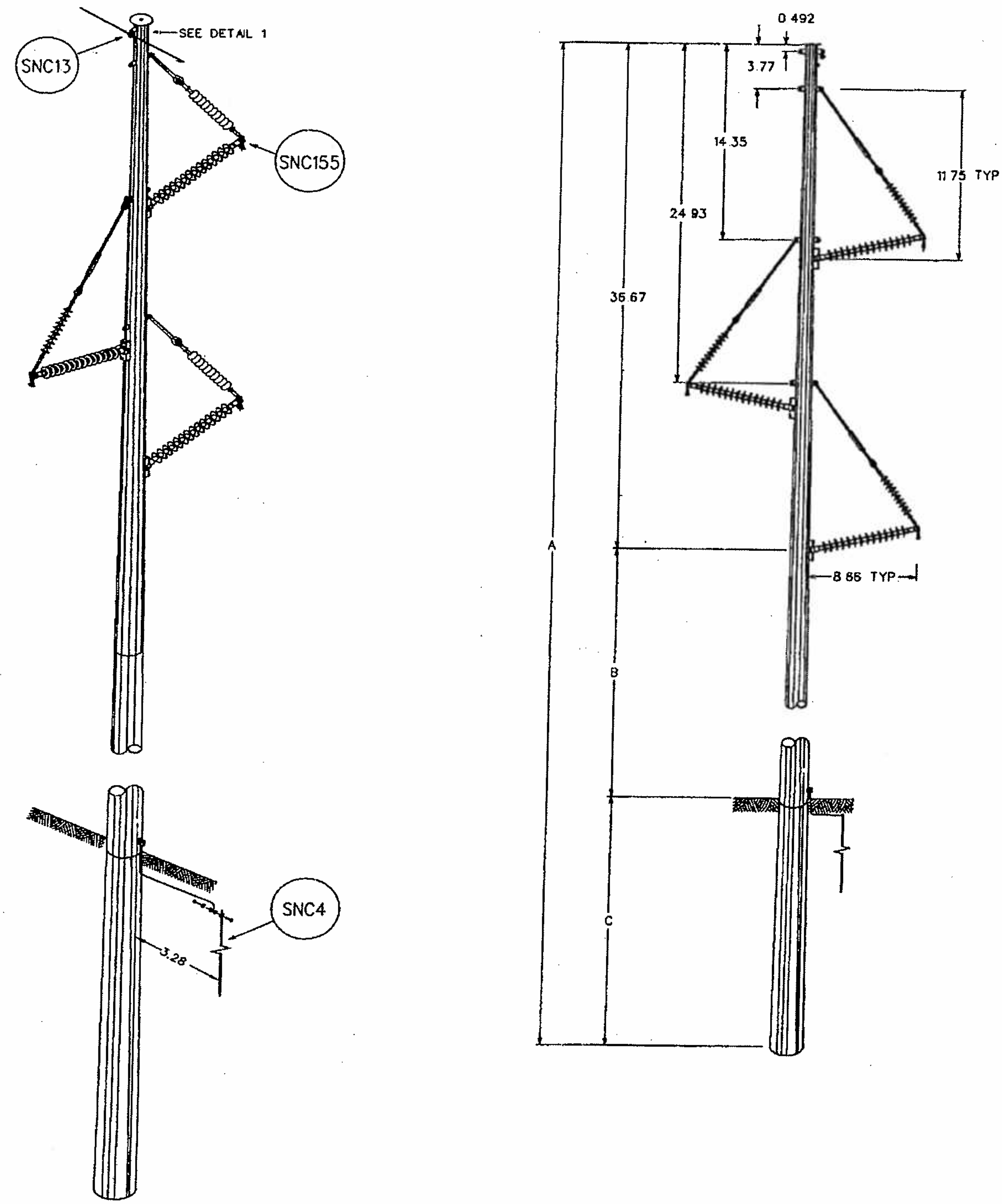
Figure 5-4
240kV Three Pole Heavy Angle Structure



Deflection: 5 to 20 Degree Line Angle

Pole Dimensions		
A	B	C
75	48.78	11.5
80	51.28	12
85	55.81	12.5
90	80.3	13

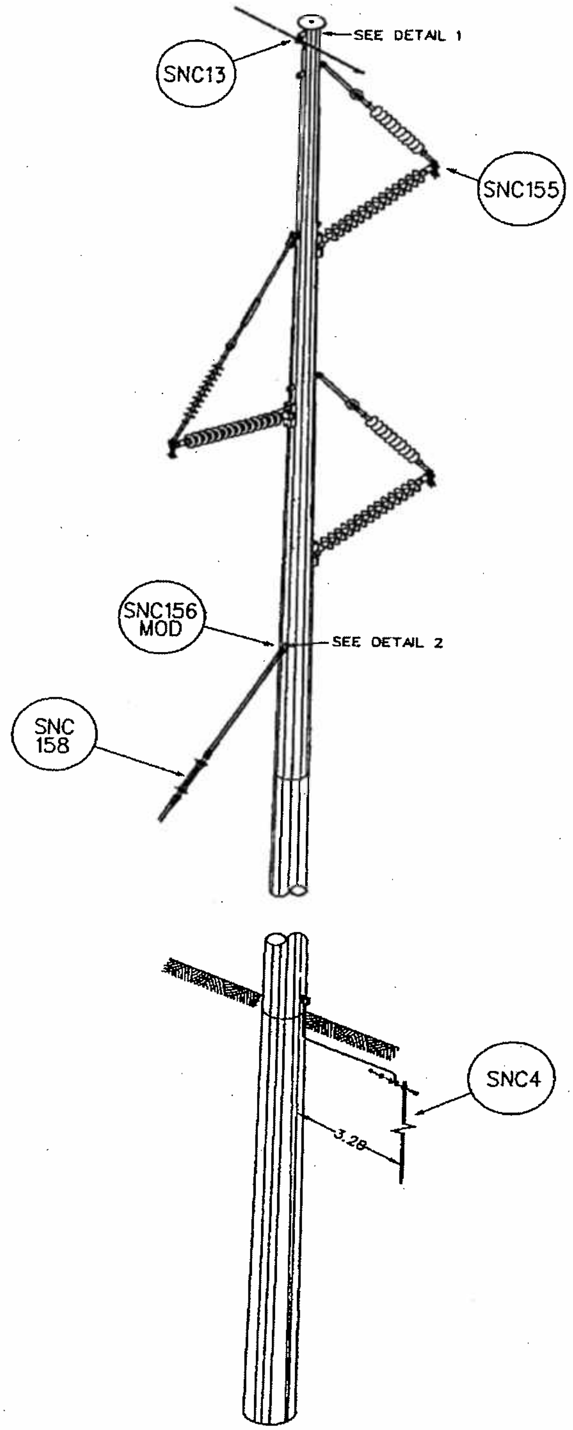
Figure 5-5
240kV Three Pole Medium Angle Structure

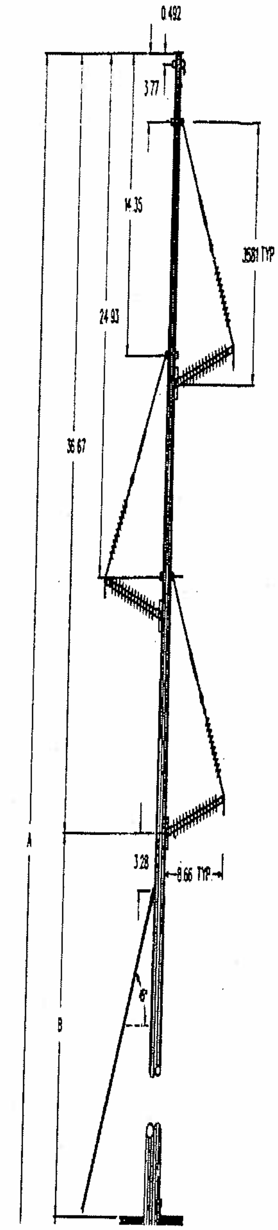


Single Pole ROW Detail		
Pole Location	ROW Distance (feet)	Safety Zone Distance (feet)
County Road ROW	6.72	20
Outside County Road ROW	13.28	20
Through Farmers Field	20	20 (either side of ROW)

Pole Dimensions		
A	B	C
80	31.28	12
85	35.78	12.5
90	40.28	13
95	44.78	13.5
100	49.28	14

Figure 5-6
240Kv Monopole Tangent Structure





Single Pole ROW Detail		
Pole Location	ROW Distance (feet)	Safety Zone Distance (feet)
County Road ROW	6.72	20
Outside County Road ROW	13.28	20
Through Farmers Field	20	20 (either side of ROW)

Pole Dimensions		
A	B	C
80	31.28	12
85	35.78	12.5
90	40.28	13
95	44.78	13.5
100	49.28	14

Figure 5-7
240kV Monopole Light Angle Structure

APPENDIX C:
MATL NOXIOUS WEED CONTROL PLAN

THIS DOCUMENT IS INCLUDED AS APPENDIX N TO THE MATL MFSA APPLICATION

Montana Alberta Tie Ltd.
230-kV Transmission Line Project from
Lethbridge, Alberta to Great Falls, Montana

APPENDIX N

Noxious Weed and
Invasive Plant Control Plan

DRAFT- June 2006

TABLE OF CONTENTS

LIST OF TABLES

1.0 Introduction

This plan was developed to identify noxious weed and invasive plant control practices that would be implemented for the US portion of the Montana Alberta Tie Ltd (MATL) 230-kV transmission line project from the Canadian border to Great Falls, Montana. A noxious weed is a weed arbitrarily defined by law as being especially undesirable, troublesome, or difficult to control. Invasive plants are alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health (USFR 1999). Equipment and supplies necessary for construction and future operation and maintenance (O&M) activities, and the activities themselves, are possible agents for the spread of noxious and invasive plants (Sheley and others, 1999). Construction and maintenance vehicles can potentially carry seeds into the project area, and from one part of the area to another. The risk of establishing a weed and invasive plant community increases with ground disturbing maintenance activities (Sheley and others, 1999).

Executive Order 13112 requires that each federal agency 1) prevent the introduction and spread of invasive species, 2) detect and respond rapidly to control such species, 3) monitor invasive species populations, and 4) provide for restoration of native species and habitat conditions in ecosystems that have been invaded (USFR 1999). The Montana County Weed Control Act (Title 7, Chapter 22 Part 21) provides for weed management at the county level. The law requires counties to develop a long-term management plan for the control of noxious weeds in their county.

Table 1-1 below provides a summary of the categories of noxious weeds identified in the state of Montana's Weed Management Plan along with each weed's reported distribution within the six project area counties; Glacier, Toole, Pondera, Teton, Cascade and Chouteau Counties.

Table 1-1 Designated Noxious Weeds of Montana

Category 1 – Widespread Noxious Weeds*	
Canada Thistle (*Cirsium arvense*)	Reported in All Project Area Counties
Field Bindweed (*Convolvulus arvensis*)	Reported in All Project Area Counties
Leafy Spurge (*Euphorbia esula*)	Reported in All Project Area Counties
Russian Knapweed (*Centaurea repens*)	Reported in All Project Area Counties
Spotted Knapweed (*Centaurea maculosa*)	Reported in All Project Area Counties
Whitetop or Hoary Cress (*Cardaria draba)*	Reported in All Project Area Counties except Glacier County (historically present)
Diffuse Knapweed (*Centaurea diffusa*)	Reported in Teton, Cascade and Chouteau Counties

Dalmatian Toadflax (*Linaria dalmatica*)	Reported in All Project Area Counties
St. Johnswort (*Hypericum perforatum*)	Reported in Glacier, Cascade and Chouteau Counties. Historically present in Teton County.
Sulfur (Erect) Cinquefoil (*Potentilla recta*)	Reported in Glacier, Pondera, Cascade and Chouteau Counties. Historically present in Toole County.
Common tansy (*Tanacetum vulgare*)	Reported in Glacier, Cascade and Chouteau Counties. Historically present in Toole and Pondera Counties.
Ox-eye Daisy (*Chrysanthemum leucanthemum* L.)	Reported in Glacier, Cascade and Chouteau Counties. Historically present in Pondera and Teton Counties.
Houndstongue (*Cynoglossum officinale* L.)	Reported in All Project Area Counties
Yellow toadflax (*Linaria vulgaris*)	Reported in All Project Area Counties
Diffuse Knapweed (*Centaurea diffusa*)	Reported in All Project Area Counties
Category 2 – Established New Invaders*	
Dyers Woad (*Isatis tinctoria*)	Historically present in Pondera and Chouteau Counties, but not currently reported.
Purple Loosestrife or Lythrum (*Lythrum salicaria*, *L virgatum*, and any hybrid crosses thereof).	Reported in Pondera and Cascade Counties. Historically present in Toole County.
Tansy Ragwort (*Senecio jacobea* L)	Not reported in any Project Area County.
Meadow Hawkweed Complex (*Hieracium pratense*, *H. floribundum*, *H. piloselloides*)	Historically present in Pondera and Chouteau Counties.
Orange Hawkweed (*Hieracium aurantiacum* L.)	Not reported in any Project Area County.
Tall Buttercup (*Ranunculus acris* L.)	Reported in Glacier County. Historically present in Teton County.
Tamarisk [Saltcedar] (*Tamarix* spp.)	Reported in Cascade and Chouteau Counties. Historically present in Teton County.
Perennial pepperweed (*Lepidium latifolium*)	Reported in Toole, Pondera, Teton, Cascade and Chouteau Counties.
Category 3 – Non-Established New Invaders*	
Yellow Starthistle (*Centaurea solstitialis*)	Not reported in any Project Area

	County.
Common Crupina (*Crupina vulgaris*)	Not reported in any Project Area County.
Rush Skeletonweed (*Chondrilla juncea*)	Not reported in any Project Area County.
Eurasian watermilfoil (*Myriophyllum spicatum*)	Not reported in any Project Area County.
Yellow flag iris (*Iris pseudacoru)*	Reported in Cascade County.

**As reported in the 2005 update of the Montana Weed Management Plan*

2.0 Plan Purpose

The weed control plan is part of the overall restoration program. The overall goal of the restoration program is to preserve the native plant species, community, and functioning ecosystem within the Project Study Area. The purpose of this weed control plan is to prevent and control the spread of noxious weeds and invasive plants during and following construction of the proposed project. MATL and its contractors will be responsible for carrying out the methods described in this plan. Reasonable alternatives may be substituted or methods employed to the extent agreed upon jointly by MATL and the State Inspector (or DEQ personnel).

The Noxious Weed and Invasive Plant Control Plan will implement preventative measures to keep construction sites within the Project Study Area free of species that are not yet established there but which are known to be pests elsewhere in the region. The Plan will set priorities for the control or elimination of weeds that have already established on the site, according to their actual and potential impacts on native species and communities, particularly on our conservation targets. MATL and its contractors will take action only when careful consideration indicates leaving the weed unchecked will result in more damage than controlling it with available methods. This strategy will be developed in coordination with the BLM, State of Montana and the impacted County Weed Districts (Glacier, Pondera, Teton, Chouteau, and Cascade Counties). The focus of MATL's noxious weed and invasive plant control efforts will be to prevent the spread of new populations resulting from project activities, and to assist landowners in their weed control responsibilities by reducing or eliminating existing infestations in the project area. Without concurrent control of weed infestations by landowners on surrounding lands, weed control efforts in the project area by MATL will likely be unsuccessful.

3.0 Objectives

For the project area, the objectives of noxious weed and invasive plant control are: 1) to acquire information on the occurrence, distribution and abundance of noxious weeds and invasive plants in the project area prior to construction, 2) to reduce or eliminate existing infestations and prevent the spread of new and existing populations of noxious weeds and invasive plants within the project area to the extent feasible for the life of the project following each construction phase, 3) to ensure any populations of rare plants within the project area are not negatively impacted by control activities, and 4) to coordinate and consult with designated BLM, State of Montana and County weed personnel regarding all noxious weed control activities conducted by MATL to ensure compatibility with existing weed control protocol.

4.0 Weed Control Area

The area for noxious weed and invasive plant control (hereafter referred to as the 'weed control area') includes all lands disturbed by construction activities plus a 30-foot buffer area around disturbances. Newly constructed roadways, where needed, are expected to be about 14 feet wide with varying widths of cut and fill slopes. To buffer all disturbed areas it is estimated that the 'weed control area' will consist of an approximately 100-foot corridor along all roadways and tensioning sites that are used for construction, and all lands within 50 feet of each new transmission line structure. MATL will assume responsibility to control noxious and invasive plants in the weed control area.

5.0 Pre-Construction Surveys

Noxious weed and invasive plant inventories in the project area will be conducted by MATL-designated botanists who are familiar with the taxonomic characteristics and typical habitat preferences of noxious weeds and invasive plants. Prior to construction, surveys will be conducted along existing and proposed new roads to be used for the project, structure locations, pulling and tensioning sites, staging and laydown areas, excavated sites, and other construction sites along the ROW. The Project area will be divided into small survey units (e.g., one or more segments between transmission line structures, including transmission line structure locations) and botanists will record all noxious weed and invasive species present within the survey unit.

Relative abundance of each noxious weed and invasive plant will be recorded for the following three zones (including travelways in and out of the three zones):

- Zone 1: Immediately on the existing or proposed disturbed sites (e.g., roadbeds, structure locations, cut/fill slopes);
- Zone 2: within 30 feet of disturbances, and

- Zone 3: in the general area greater than 30 feet from disturbances.

Ground surveys will be conducted in Zones 1 and 2; Zone 3 will receive a reconnaissance-level survey based on what is visible adjacent to the 30 ft buffer. Relative abundance of noxious and invasive plant species found in surveyed areas will be recorded. The project botanist will identify locations of any rare plant species that could potentially be affected by control activities and identify conditions necessary to avoid adverse impacts to these locations.

Maps illustrating noxious weed and invasive species abundances in survey units will be produced at an appropriate scale to assist with monitoring and control activities. Other ancillary thematic layers will also be plotted on the maps to assist with navigation and planning.

The dates of all pre-construction surveys will be coordinated with designated BLM, State of Montana, and weed boards/coordinators in Glacier, Pondera, Teton, Chouteau, and Cascade Counties. It is MATL's intent to conduct the survey at an appropriate time in the growing season to positively identify targeted noxious weeds and invasive species and to establish baseline conditions for future control activities. It is anticipated that the pre-construction survey will occur in late summer 2006.

6.0 Noxious Weed Management

Weeds and invasive species are spread by a variety of means including humans (e.g., workers, hikers and recreationalists, etc.), vehicles, construction equipment, construction and reclamation materials, livestock, and wildlife. Implementation of preventive measures to control the spread of noxious weeds and invasive plants is the most cost-effective management approach.

7.0 Preventive Measures

The following preventive measures would be implemented to prevent the spread of noxious/invasive plants during construction and future O&M activities:

1. Prior to construction, the construction contractor will be trained on methods for cleaning equipment, identification of problem plant species in the project area, and procedures to follow when an invasive or noxious weed is located. To assist in identification, the contractor will be supplied with a list and pictures of noxious and invasive species that may exist within the project area.
2. Prior to any construction disturbance, all known weed populations will be flagged so that they may be avoided.
3. Prior to entering the project area, vehicles and construction equipment will be cleaned (pressure wash or forced air) of all mud, dirt, and plant parts where there is a potential to import weeds. This will be done to

remove weed seed that may be attached to this equipment. Washing will occur at designated sites (i.e., construction yards), that include appropriate containment systems.

4. Equipment, materials, and vehicles will be stored at specified work areas or construction yards. All personal vehicles, sanitary facilities, and staging areas will be confined to a limited number of specified weed-free locations to decrease chances of incidental disturbance and spread of noxious weeds and invasive plants.
5. Disturbed areas will be promptly seeded following completion of construction activities to reduce the potential for the spread and establishment of noxious weeds and invasive plants. Seeding should occur as soon as possible following construction and during the optimal time period. Landowners will be contacted and asked to, if possible, refrain from grazing or moving cattle through populations of noxious weeds and newly planted areas. Only county/state-approved mixtures of certified "weed-free" seed will be used. All other introduced construction materials used for the Proposed Project, such as straw and fill, shall also be weed-free.
6. To limit new or improved accessibility into the area by OHVs and other motorized vehicles, all new access roads undesired or not required for maintenance would be controlled in accordance with management directives of BLM, State of Montana, and private landowners.

8.0 Control Measures

If pesticides are used in the project area, an integrated pest management plan would be developed to ensure that applications will be conducted consistent with BLM and Department of Interior (DOI) policies.

Assuming the project will begin construction in late 2006 or early 2007, MATL will flag all known noxious/invasive plants (for avoidance) prior to the time of construction (e.g., September 2006) to prevent the spread of existing populations found in the designated weed control area. Following construction, annual spraying will begin, likely during the months of May and June; however the potential for fall treatment does exist for some species. Annual spraying will continue as necessary to control noxious/invasive plants in the weed control area for the life of the Proposed Project.

Using the prior years' survey information, annual spraying will be planned by MATL and coordinated with BLM, the State of Montana, and County weed coordinators/boards to ensure spraying will be conducted at the proper growing period, during favorable environmental conditions, and will use the appropriate chemicals to control targeted species. The chemicals used must be approved for use.

Only EPA-registered pesticides will be used. Pesticide use shall be limited to nonpersistent, immobile pesticides and will be applied in accordance with label and application permit directions. Spraying will be conducted using a qualified contractor as deemed appropriate by MATL and in consultation with designated BLM personnel, State of Montana personnel, and County weed coordinators/boards. The applicator used must possess a Montana State Pesticide Applicators License. Rather than broad application, the intent of applying herbicide will be to treat only designated areas.

It is anticipated that most spraying will be conducted using ATV-mounted spray equipment, supported by one or more four-wheel drive pickups equipped with water tanks. Pickups will carry necessary chemicals, fluid pumps, tools, and water to provide a base station for refilling of ATV spray tanks. Spraying infestations within the weed control area will be conducted by ATV, using hand-held spray guns with 25 to 50 foot hoses attached to spray tanks or by using 8 to 12 foot spray booms. The spray booms will be utilized for treating larger areas on roadbeds and on gentle to moderately steep terrain. All spraying equipment shall be calibrated to ensure the proper rate of herbicide is applied.

Following annual spraying, a monitoring survey will be conducted to verify locations of noxious weeds and invasive plants in the project vicinity. These monitoring surveys are expected to occur in the late summer/early fall (August-September) and will be conducted using MATL's-designated botanist personnel in the same manner described for the pre-construction surveys.

9.0 Reporting

Beginning with the fall/winter of 2007 (November 2007 to February 2008), MATL will prepare and submit a status report to designated federal, state and county personnel regarding the previous years' weed control activities. The winter 2007 report will detail baseline conditions regarding the occurrence, distribution, and abundance of listed species located in the project area, weed control activities accomplished to date, and expected activities for the following year. Each subsequent years' report will 1) detail the current status of noxious weed and invasive plant occurrence, distribution and abundance, 2) summarize activities conducted in the project area during previous years, and 3) outline projected activities for the following year. This will include timing of surveys, herbicide treatments, amount and types of chemicals applied, and a list of participants and their activities. These reports will continue annually from winter 2007 for the life of the project, or as required by designated federal, state and county personnel to ensure long-term noxious/invasive plan control measures are met in the weed control area.

10.0 References

Montana Department of Agriculture. 2005. Montana Noxious Weed List. Montana Dept. of Agriculture, Helena, Montana. Available at http://agr.state.mt.us/weedpest/noxiousweedslist2.asp.

Sheley, R.L., Manoukian, M., and G. Marks. 1999. "Preventing Noxious Weed Invasion," pages 69-72 in, R.L. Sheley and J.K. Petroff, editors. Biology and Management of Noxious Rangeland Weeds. Oregon State University Press, Corvallis, OR.

USFR (U.S. Federal Register). 1999. "Presidential Document, Executive Order 13112. Invasive Species," Federal Register 64:6183-6186.

APPENDIX D:
DRAFT MATL RECLAMATION AND REVEGETATION PLAN

THIS DOCUMENT IS INCLUDED AS APPENDIX O TO THE MATL MFSA APPLICATION

Montana Alberta Tie Ltd.
230-kV Transmission Line Project from Lethbridge, Alberta to Great Falls, Montana

Appendix O

Revegetation and Reclamation Plan

DRAFT

TABLE OF CONTENTS

1. Overview

As part of its MFSA Application, MATL has prepared a draft Revegetation and Reclamation Plan as Appendix K to the "DEQ Environmental Specifications for Montana Alberta Tie Ltd (MATL)" report. The plan is required to specify, at a minimum, seeding mixtures and rates, and procedures to abide by the requirements of ARM 17.20.1902(10). This rule states that following construction work in rangeland areas, the coverage of desirable perennial plant species shall be 30% or more of that of adjacent rangeland of similar slope and topography the year following revegetation, and 90% or more of the coverage of similar adjacent lands within five years. In forested lands, revegetated land other than that in the right-of-way or permanent access roads will be planted with trees so that after five years the stand density of the adjacent forest will be attained at maturity.

This plan also provides the framework to satisfy any identified landowner specifications for their property, as well as any necessary requirements of the General Permit for Storm Water Discharges Associated with Construction Activity, Montana Department of Natural Resources and Conservation requirements for an easement and construction on State lands, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service and state and county requirements for mitigation associated with construction impacts to waters of the US and the state including streams and wetlands.

2. Objectives

The short term objectives of reclamation are to control erosion and sedimentation, thereby minimizing impacts on adjacent lands and waterways. Properly timed and executed construction practices will mitigate short-term impacts. Long term objectives include erosion and sedimentation control, reclamation of topography, soils and vegetation to a condition equal to that existing prior to disturbance, and reclamation of lands to productive uses consistent with that existing prior to disturbance and applicable land management policies. These objectives will be attained by adherence to practices outlined in the DEQ Environmental Specifications for Montana Alberta Tie Ltd (MATL) document, as well as practices outlined in this reclamation and revegetation plan to the extent feasible (Appendix K to that document). Reasonable alternatives may be substituted or methods employed to the extent agreed upon jointly by MATL and the State Inspector (or DEQ personnel).

3. Reclamation

Clearing, Grading, and Topsoil Handling: Per the standards identified in the "DEQ Environmental Specifications for Montana Alberta Tie Ltd (MATL)" report, soil disturbance and earth moving will be kept to a minimum and will follow typical procedures to minimize impacts and enhance reclamation. In addition, right-of-way clearing shall be kept to the minimum necessary to meet the requirements of the National Electric Safety Code.

The permanent easement and temporary work space (the construction right-of-way) will be sized to provide space for all construction activities including temporary storage of any graded material and salvaged topsoil. To prevent wind erosion and facilitate reclamation, the roots of existing vegetation will be retained in place to the extent practical.

In any areas where topsoil must be temporarily removed, a minimum of 3 inches and a maximum of 12 inches of topsoil will be salvaged. Topsoil is defined as an upper layer of the soil, composed primarily of a mixture of organic matter and mineral matter; it is alive with microscopic and small macroscopic organisms (McKinney and Schoch 2006). Topsoil will not be mixed or stored with spoil material. In addition, topsoil will not be stripped during excessively wet or inordinately windy conditions.

Following any necessary clearing for work space, these areas will be graded as necessary to create a level work surface for the passage of heavy construction equipment and other vehicles. Any areas graded during construction will be re-graded to reestablish pre-disturbance landforms. Every reasonable effort will be made to complete final grading and installation of permanent erosion control measures as soon as practicable following construction. All disturbed areas (including temporary access roads and other ancillary facilities) will be returned to pre-excavation grades with allowance for settling. If any discontinuity between natural topography and re-graded ground results, MATL will undertake additional grading work to smooth the transition zone. The elevation of the re-graded right-of-way will not be lower than the natural grade.

For disturbed areas where topsoil was removed, redistribution depths will vary between 3 and 12 inches depending upon depth of topsoil stripped. Topsoil will not be mixed with spoil material at any time during soil handling operations and to the extent practical only topsoil will be re-spread on the surface. Topsoil from un-stripped areas will not be utilized to cover adjacent disturbances.

In addition:

- All garbage and debris will be removed from the re-graded areas before topsoil is replaced.
- Any excess rock not buried or blended with the natural terrain will be disposed of at an approved location.

- The length of time that topsoil is stored will be minimized based on the proposed construction schedule. Topsoil redistribution will begin immediately after re-grading (weather permitting).
- Replaced topsoil will be left in a roughened condition to discourage wind and water erosion. Additional erosion control and soil stabilization may be required on steeper slopes, on topsoil easily transported by wind, etc.
- If it is necessary to alleviate compaction, rutting or crusting prior to seeding, the replaced topsoil will be worked with a harrow, disc, spring, tooth, chisel plow or similar implement.
- Fertilization is not recommended since soil will only be stockpiled for a short period of time and fertilizer may enhance weed growth.

In addition, agricultural areas occupied during construction will be ripped, as necessary, in order to remediate compaction. This effort will be sufficient to relieve compaction to its actual depth.

4. Revegetation

In general, revegetation will be conducted on the right-of-way and at other disturbed areas (temporary access roads, staging areas) to restore vegetative cover that is similar to pre-construction condition, or if requested, meet any other reasonable landowner requests once site work is completed. Disturbed areas will be reclaimed by appropriate contouring and replanting with an approved seed mix. All seed mixtures will be certified "weed free". Noxious weeds will be controlled through implementation of a Noxious and Invasive Plant Control Plan (Appendix F to the "DEQ Environmental Specifications for Montana Alberta Tie Ltd (MATL)" report, which will be approved, before construction, by the county weed boards affected by the project bounds.

5. Description of Existing Vegetation

Agriculture dominates land use within the Project Study Area and is interspersed with patches of non-farmland mostly in the form of low to moderately covered grasslands. In upland communities not converted to dryland farming such as rangeland, coulees, and slopes, the dominant grass communities include grama (*Bouteloua* spp.)-needlegrass (*Stipa* spp.) and wheatgrass (*Agropyron* spp.), and wheatgrass-needlegrass (Kuchler 1964). North of Cut Bank toward the Canadian border where the Foothill Grassland and Milk River Pothole Upland ecoregions exist, the natural vegetation is characterized by blue grama grass, wheatgrass, and, to a lesser extent, June grass (*Koelaria* spp.). A variety of shrubs and herbs also occur, but sagebrush (*Artemesia cana* and *Artemesia tridentata*) are most abundant, and on drier sites yellow cactus and prickly pear (*Opuntia* spp.) can be found. Saline areas support alkali grass (*Puccinellia* spp.), wild barley (*Hordeum* spp.), greasewood (*Sarcobatus* *vermiculatus*), saltwort (*Salicornia rubra*) and Pursh seepweed (*Suaeda calceoliformis*). Land that has been converted from dryland farming into the Conservation Reserve Program (CRP) is dominated by wheatgrass (*Agropyron* spp.), alfalfa (*Medicago* spp.), clover (*Trifolium pratense*) and annual weeds (e.g. *Tragopogon dubius*).

The Marias and Teton rivers support the most significant forested riparian habitats in the Project Study Area. Riparian habitats along the Marias and Teton rivers include oxbow marshes and shrub-dominated terraces, but the defining feature is the cottonwood gallery forest that lines the rivers. Despite the fact that these riparian cottonwood forests have been reduced and fragmented by conversion of the floodplain to irrigated agriculture and pasture, they remain the only significant forested habitat within the Project Study Area. The width of the cottonwood gallery forest varies between 30 and 500 feet.

6. Revegetation Mixtures

Revegetation seed mixtures will be agreed upon by MATL and DEQ personnel prior to any revegetation activities taking place on disturbed areas.

Species Selected: Selection of adapted plant species for revegetation is primarily based on existing species occurrence on adjacent lands, and community compositions. Consideration will also be given to establishment potential, growth characteristics, soil stabilizing qualities, availability of seed, and landowner and agency recommendations. MATL will utilize revegetation mixtures based on inventories and knowledge of vegetative types based on field visits conducted to date, and based on any specific recommendations made by the county weed boards.

Species Composition and Rates: The use of native graminoids will be emphasized throughout much of the project area. If noxious weeds invade revegetated areas, control measures, identified in consultation with the county weed board, would be initiated. If any revegetation is required in riparian areas containing woody plants, MATL will plant native shrubs and trees in these locations.

Final seeding and planting rates and species composition will be determined through consultation with DEQ, county weed board members, and land managers on any public lands crossed. Unless otherwise appropriate, approximately 20 pounds per acre of a mix of grasses and forbs seeds should be planted using the broadcast method. A post-seeding pass with a cultipacker would ensure adequate contact of the seed with the soil.

Reseeding will take place in the first appropriate season (Spring or Fall) after construction and at the landowners' discretion. Seeds are best planted in the spring. Seeds planted in the fall are going to be more susceptible to frost-heave and being eaten by rodents. Weed control is also less effective in the fall. Areas disturbed by the Project that supported native vegetation will be revegetated with native species.

Plant Materials: Typically, plant material dealers providing commercial seed will be encouraged to supply seed of local origin. Seed will be purchased in accordance with pure live seed specifications for seed mixtures, emphasizing the use of weed-free certified seed. All seed will be tested to ensure it is noxious weed-free. Seed certification/testing tags will be submitted to DEQ or the counties if requested. Seed will be utilized within 12 months of testing. Containerized or bare root stock will be utilized for native shrub or tree plantings and local stock will be utilized if available.

Seeding Methods: Soil will be conditioned to prepare a good seedbed., Seed will be broadcast utilizing manually operated bucket spreaders, mechanical seed spreaders, blowers or hydroseeders. Seed will be mixed frequently in spreader hoppers to discourage settling. Seeded areas will be chained, harrowed or cultipacked to cover the seed and provide better seed/soil contact. On any areas of steeper slopes, broadcast seeded or hydroseeded areas will be dozer tracked perpendicular to the slope to provide for better seed germination. When hydroseeding is used, seed and mulch will be sprayed in one application. On small areas of revegetation or inaccessible sites, seed will be covered via hand raking.

Construction schedules and seasonal conditions will impact revegetation activities. Seeding and planting will occur as soon after seedbed preparation as possible, either in the fall or spring. Spring seeding, if required, will be conducted as early as possible to maximize the benefits of spring soil moisture.

Planting Methods: In disturbed areas where native shrub or trees need to be planted, MATL will typically utilize stock located as close to the project area as possible. Topsoil salvaged from construction disturbance (assuming no noxious weeds are present) will also be utilized to help promote the re-establishment of existing plant communities.

Tree and shrub planting procedures will follow guidelines set forth in US Forest Service Reforestation Handbook (See FSH 2409.26b, Chapter 700).

7. Erosion Control

In accordance with requirements of the General Permit for Storm Water Discharges Associated with Construction Activity, erosion and sediment control measures will be implemented at disturbed areas to minimize soil movement and improve the potential for revegetation and help ensure successful reclamation. Prior to construction, MATL will prepare a Storm Water Pollution Prevention Plan as part of the application for a General Permit in order to assess the potential for storm water runoff in the areas surrounding the disturbed sites, identify sources of pollutants from the disturbed sites and identify best management practices or control measures to minimize or eliminate these pollutants from entering any surface waters. Drawings of typical techniques that MATL proposes to utilize during construction to control erosion and sediment load to streams and wetlands are presented in Attachment A of this plan (forthcoming from SNC-Lavalin).

8. Monitoring

Revegetated areas will be monitored for a period of at least five years to identify success of reestablishing vegetative cover. This includes monitoring and controlling any noxious weed introduction as discussed further in MATL's Noxious and Invasive Plant Control Plan (Appendix F to the "DEQ Environmental Specifications for Montana Alberta Tie Ltd"). Monitoring efforts identified in this plan will be coordinated with efforts set forth in Appendix F.

Per requirements of ARM 17.20.1902(10), the coverage of desirable perennial plant species will be reviewed against the standard that the revegetative cover be 30% or more of that of adjacent rangeland of similar slope and topography the year following, and 90% or more of the coverage of similar adjacent lands within five years. At the end of the five years, the vegetative cover will be surveyed and documented, and if at that time it is determined that additional monitoring and control will be necessary, DEQ and the appropriate county weed control board will be consulted to determine a plan of action.

Specifically, qualified specialists (identified by MATL) will complete quantitative monitoring on an annual basis to compare adjacent, undisturbed vegetation to the revegetated areas. Evaluation factors will include percent of total vegetative cover, percent litter cover, percent bare ground, species diversity, species composition, woody plant survival (if planted in that area), and presence of noxious weeds. Areas with poor regeneration will be evaluated to identify what reclamation techniques could be utilized to address the problem (address soil fertility, soil erosion, etc.)

9. Reporting

Beginning with the fall/winter of 2007 (November 2007 to February 2008), MATL will prepare and submit a status report to designated state personnel regarding the previous years monitoring activities. The winter 2007 report will detail baseline conditions regarding typical vegetative cover located in the project area, reclamation and revegetation activities accomplished to date, and expected activities for the following year. Each subsequent years report will 1) detail the current status of vegetative cover, as compared to adjacent land cover, 2) summarize activities conducted in the project area during previous years, and 3) outline projected activities for the following year. This effort will be coordinated with reporting requirements for Appendix F (Noxious and Invasive Plant Control Plan). These reports will continue annually from winter 2007 as required by designated state personnel to ensure long-term revegetative measures are met.

Literature Cited

McKinney, M.L. and R.M. Schoch. 2006. Environmental Science, Systems and Solutions. Third Edition. Available at http://environment.jbpub.com/mckinney/interactive_glossary_showterm.cfm?term=topsoil%20. Accessed 24 May 2006.

Appendix E:
Drainages and Wetland Areas That Would Be Avoided

These Tables were Presented in the MATL MFSA application as Tables 4.5-7 and 4.5-12

APPENDIX E-1 DRAINAGES AND WATER BODIES CROSSED NORTH TO SOUTH BY PREFFERED ALTERNATIVE A MONTANA ALBERTA TIE LTD., LETHBRIDGE, AB – GREAT FALLS, MT	
Water body	**River Miles[1]**
Red River	8.00 miles
Fitzpatrick Coulee	8.97 miles
Old Maids Coulee	4.95, 5.06 and 10.09 miles
Marias River	171.23 miles
Bullhead Creek	9.94 miles
Winginaw Coulee	0.22 miles
Ringwald Coulee	0.37 miles
Schultz Creek	21.87 miles
Dry Fork Marias River	27.59 miles
Spring Creek	4.55 miles
Pondera Coulee	95.85 miles
Railroad Coulee	3.75 miles
South Pondera Coulee	16.86, 17.15 and 17.30 miles
Brady Coulee	3.83 miles
Rocky Coulee	16.15 miles
Teton River	96.04 miles
Hunt Coulee	2.17 miles
Kinley Coulee	6.34 miles
Unnamed Stream	1.36 miles
Timber Coulee	16.58 miles
Unnamed Stream	3.11 miles
Huntley Coulee	25.21 miles

[1] Source: Montana Fish, Wildlife, and Parks. River miles listed are the point locations at which the alternative would cross the particular water body. River miles are published as an aid to people using the river for commerce, recreation and emergency services. As one travels upstream, the numbers increase until the last listed mile of the navigation map. If multiple river miles are listed then the alignment crosses that particular water body multiple times.

APPENDIX E-2
LINEAR MILES OF WETLANDS ALONG THE TRANSMISSION LINE ALTERNATIVES
MONTANA ALBERTA TIE, LTD., LETHBRIDGE, AB – GREAT FALLS, MT

	Preferred Alternative A	**Alternative B**	**Alternative C**	***Western Alt. Segment***	***Eastern Alt. Segment***
Wetland Class	**Length (Miles)**	**Length (Miles)**	**Length (Miles)**	***Length (Miles)***	***Length (Miles)***
L2ABF	0.00	0.00	0.00	*0.00*	*0.00*
L2USA	0.00	0.00	0.00	*0.00*	*0.00*
L2USAd	0.00	0.00	0.00	*0.00*	*0.00*
PABF	0.00	0.01	0.00	*0.00*	*0.00*
PABFh	0.09	0.09	0.09	*0.00*	*0.00*
PABFx	0.00	0.00	0.00	*0.00*	*0.00*
PEMA	0.64	0.14	0.39	*0.03*	*0.11*
PEMAd	0.08	0.02	0.02	*0.00*	*0.00*
PEMAh	0.00	0.00	0.04	*0.00*	*0.00*
PEMB	0.09	0.00	0.03	*0.00*	*0.00*
PEMC	0.18	0.39	0.20	*0.15*	*0.14*
PEMCh	0.00	0.03	0.03	*0.00*	*0.00*
PEMF	0.00	0.02	0.00	*0.00*	*0.00*
PEMFh	0.00	0.02	0.00	*0.00*	*0.00*
PSSA	0.00	0.00	0.06	*0.00*	*0.00*
PUBFx	0.00	0.00	0.05	*0.00*	*0.00*
PUSA	0.02	0.00	0.00	*0.00*	*0.02*
PUSAh	0.00	0.00	0.04	*0.00*	*0.00*
R3UBH	0.00	0.03	0.04	*0.00*	*0.00*
R3USC	0.04	0.04	0.00	*0.00*	*0.00*
Total Wetlands	1.14	0.77	0.99	*0.18*	*0.27*
U	106.49	98.77	118.02	*18.32*	*18.13*
No Data	22.26	24.89	17.48	--	*0.01*
Total Length of Alternative	129.89	124.43	136.49	*18.50*	*18.41*

APPENDIX F:
Revised DRAFT DEQ ENVIRONMENTAL SPECIFICATIONS

Revised Draft DEQ Environmental Specifications

The following specifications have been developed by the DEQ for projects receiving a Certificate of Compliance and would become conditions to the Certificate of Compliance if it is approved.

CONTENTS

DEFINITIONS

ACCESS EASEMENT: Any land area over which the OWNER has received an easement or other permission from a LANDOWNER allowing travel to and from the project. Access easements may or may not include access roads.

ACCESS ROAD: Any travel course which is constructed by substantial recontouring of land and which is intended to permit passage by most four-wheeled vehicles.

BEGINNING OF CONSTRUCTION: Any project-related earthmoving or removal of vegetation (except for clearing of survey lines).

BOND: Performance bond to guarantee successful reclamation and revegetation of the project as allowed under 75-20-302(2),MCA

CERTIFICATE: Certificate of Compliance issued by the Department of Environmental Quality.

CONTRACTOR: Constructors of the Facility (agent of owner)

DFWP: Montana Department of Fish, Wildlife, and Parks

DNRC: Montana Department of Natural Resources and Conservation

DOT: Montana Department of Transportation

DEQ: Montana Department of Environmental Quality

LANDOWNER: The owner of private property or the managing agency for public lands.

OWNER: The owner(s) of the facility, or the owner's agent.

SENSITIVE AREA: Area which exhibits environmental characteristics that may make it especially susceptible to impact from construction of a transmission facility. The extent of these areas is defined for each project but may include any of the areas listed in Circular MFSA-2 Sections 3.2(1)(d) and 3.4(1).

SHPO: State Historic Preservation Office

STATE INSPECTOR: DEQ employee or DEQ designee with the responsibility for monitoring the OWNER's and contractor's compliance with terms and conditions of the Certificate of Compliance issued for a project.

INTRODUCTION

The purpose of these specifications is to ensure mitigation of potential environmental impacts during the construction, operation and maintenance of a transmission facility.

For non-exempt facilities, the Montana Major Facility Siting Act supersedes all state and local environmental permit requirements except for those dealing with air and water quality, public health and safety, water appropriations and diversions, and easements across state lands (75-20-103 and 401, MCA). A major purpose of these conditions is to ensure that the intent of the laws which are superseded is met, even though the procedures of applying for and obtaining permits from various state agencies are not. As specified later in this document, the STATE INSPECTOR will have the responsibility for arranging reviews and inspections by other state agencies, which would otherwise have been done through a permit application process.

Appendices A through Q refer to the site-specific concerns and areas that apply for a specific project. These addenda, as needed, will be prepared by DEQ working in consultation with the OWNER prior to the start of construction. If these specifications conflict with MATL's proposal (WAPA Standard 13), more environmentally protective of the two would apply.

0.0 GENERAL SPECIFICATIONS

0.1. SCOPE

These specifications apply to all lands affected by the project. Where the LANDOWNER requests practices other than those listed in these specifications, the OWNER may authorize such a change provided that the STATE INSPECTOR is notified in writing of the change and that the change would not be in violation of: (1) the intent of any state law which is superseded by the Montana Major Facility Siting Act; (2) the Certificate; (3) any conditions imposed by DEQ; (4) DEQ's finding of minimum adverse impact; or (5) the regulations in ARM 17.20.1901 and 17.20.1902.

0.2. ENVIRONMENTAL PROTECTION

The OWNER shall conduct all operations in a manner to protect the quality of the environment and to reduce impacts to the greatest extent practical.

0.3. CONTRACT DOCUMENTS

These specifications shall be part of or incorporated into the contract documents; therefore, the OWNER and the OWNER'S agents shall be held responsible for adherence to these specifications in performing the work

0.4. BRIEFING OF EMPLOYEES

The OWNER shall ensure that the CONTRACTOR and all field supervisors are provided with a copy of these specifications and informed of which sections are applicable to specific procedures. It is the responsibility of the OWNER, its CONTRACTOR and the CONTRACTOR's Construction Supervisors to ensure that the intent of these measures is met. Supervisors shall inform all employees on the applicable environmental constraints spelled out herein prior to and during construction. Site-specific measures spelled out in the appendices attached hereto shall be incorporated into the design and construction specifications or other appropriate contract document.

0.5. COMPLIANCE WITH REGULATIONS

All project-related activities of the OWNER shall comply with all applicable local, state, and federal laws, regulations, and requirements.

0.6. LIMITS OF LIABILITY

The OWNER is not responsible for correction of environmental damage or destruction of property caused by negligent acts of DEQ employees during construction monitoring activities.

0.7. DESIGNATION OF SENSITIVE AREAS

DEQ, in its evaluation of the project, has designated certain areas along the right-of-way or access roads as SENSITIVE AREAS. The OWNER shall take all reasonable actions to avoid adverse impacts in these SENSITIVE AREAS and adopt the measures in appendix A.

0.8. PERFORMANCE BOND

To ensure compliance with these specifications, the OWNER shall submit to the State of Montana or its authorized agent a BOND or BONDS pertaining specifically to the restoration of the right-of-way and adjacent land damaged during construction and revegetation. Post-construction monitoring by DEQ will determine compliance with these specifications and other mitigating measures included herein. At the time cleanup and restoration are complete, and revegetation is progressing satisfactorily, the OWNER shall be released from its obligation for restoration. At the time the OWNER is released, a portion of this BOND or a separate BOND shall be established by the OWNER and submitted to the State of Montana or its authorized agent. This BOND shall be held for five years or until monitoring by DEQ indicates that reclamation and road closures have been adequate. The amount and bonding mechanisms for this section shall be specified by DEQ and agreed to by the OWNER under provisions established by 17.20.1902(9) as specified in Appendix B and attached. Proof of bond shall be submitted to DEQ two weeks prior to the start of construction.

0.9. DESIGNATION OF STRUCTURES

Each structure for the project shall be designated by a unique number on plan and profile maps, and a shape file, route, or geodatabase showing line, structure, and access locations submitted to DEQ. References to specific poles or towers in Appendices A through Q shall use these numbers. If this information is not available because the survey is not complete, station numbers or mileposts shall indicate locations along the centerline. Station numbers or mileposts of all angle points shall be designated on plan and profile maps.

0.10. ACCESS

When easements for construction access are obtained for construction personnel, provision will be made by the OWNER to ensure that DEQ personnel or contractors will be allowed access to the right-of-way and to any off-right-of-way access roads used for construction during the term of the CERTIFICATE. Liability for damage caused by providing such access for the STATE INSPECTOR shall be limited by section 0.6 LIMITS OF LIABILITY.

0.11. DESIGNATION OF STATE INSPECTOR

DEQ shall designate a STATE INSPECTOR or INSPECTORS to monitor the OWNER'S compliance with these specifications and any other project–specific mitigation measures adopted by DEQ as provided in ARM 17.20.1901 through 17.20.1902. The STATE INSPECTOR shall be the OWNER's liaison with the State of Montana on construction, post-construction, and reclamation activities. All communications regarding the project shall be directed to the STATE INSPECTOR. The name of the STATE INSPECTOR can be obtained by contacting the Bureau Chief of the Environmental Management Bureau, Permitting and Compliance Division, Department of Environmental Quality, or the Bureau Chief's successor (see Appendix P).

1.0. PRE-CONSTRUCTION PLANNING AND COORDINATION

1.1. PLANNING

1.1.1. Planning of all stages of construction and maintenance activities is essential to ensure that construction-related impacts will be kept to a minimum. The CONTRACTOR and OWNER shall, to the extent possible, plan the timing of construction, construction and maintenance access and requirements, location of special use sites, and other details before the commencement of construction.

1.1.2. Preferably thirty days, but at least fifteen days before the start of construction, the OWNER shall submit plan and profile map(s) and an electronic equivalent acceptable to the STATE INSPECTOR depicting the location of the centerline and of all construction access roads, maintenance access roads, structures, clearing backlines, and, if known, special use sites. The scale of the map for special use sites shall be 1:24,000 or larger.

1.1.3. If special use sites are not known at the time of submission of the plan and profile, the following information shall be submitted no later than five days prior to the start of construction. The location of special use sites including staging sites, pulling sites, batch plant sites, splicing sites, borrow pits, and storage or other buildings shall be plotted on one of the following and submitted to DEQ: ortho-photomosaics of a scale 1:24,000 or larger, or available USGS 7.5′ plan and profile maps of a scale 1:24,000 or larger, or an electronic equivalent acceptable to the STATE INSPECTOR.

1.1.4. Changes or updates to the information submitted in 1.1.2 and 1.1.3 shall be submitted to DEQ as they become available. In no case shall a change be submitted less than five (5) days prior to its anticipated date of construction. Changes in these locations prior to construction where designated SENSITIVE AREAS are affected must be submitted to DEQ seven (7) days before construction and approved by the STATE INSPECTOR prior to construction.

1.1.5. Long-term maintenance routes to all points on the line should be planned before construction begins. Where known, new construction access roads intended to be maintained for permanent use shall be differentiated from temporary access roads on the maps required under 1.1.2 above.

1.2. PRE-CONSTRUCTION CONFERENCE

1.2.1. At least one week before commencement of any construction activities, the OWNER shall schedule a pre-construction conference. The STATE INSPECTOR shall be notified of the date and location for this meeting. One of the purposes of this conference shall be to brief the CONTRACTOR and land management agencies regarding the content of these specifications and other DEQ approved mitigating measures, and to make all parties aware of the roles of the STATE INSPECTOR and of the federal inspectors (if any).

1.2.2. The OWNER's representative, the CONTRACTOR's representative, the STATE INSPECTOR, and representatives of affected state and federal agencies who have land management or permit and easement responsibilities shall be invited to attend the pre-construction conference.

1.3. PUBLIC CONTACT

1.3.1. Written notification by the OWNER's field representative or the CONTRACTOR shall be given to local public officials in each affected community prior to the beginning of construction to provide information on the temporary increase in population, when the increase is expected, and where the workers will be stationed. If local officials require further information, the OWNER shall hold meetings to discuss potential temporary changes. Officials contacted shall include the county commissioners, city administrators, and law enforcement officials. It is also suggested that local fire departments, emergency service providers, and a representative of the Chamber of Commerce be contacted.

1.3.2. The OWNER shall negotiate with the LANDOWNER in determining the best location for access easements and the need for gates.

1.3.3. The OWNER shall contact local government officials, or the managing agency, as appropriate, regarding implementation of required traffic safety measures.

1.4. HISTORICAL AND ARCHAEOLOGICAL SURVEY

1.4.1. The OWNER must develop and carry out a plan submitted to the State Historic Preservation Office (SHPO) that includes steps which have been and will be taken to identify, evaluate, and avoid or mitigate damage to cultural resources affected by the project. The plan (Appendix I) shall include: (1) actions taken to identify cultural resources during initial intensive survey work; (2) an evaluation of the significance of the identified sites and likely impacts caused by the project; (3) recommended treatments or measures to avoid or mitigate damage to known cultural sites; (4) steps to be taken in the event other sites are identified after approval of the plan; and (5) provisions for monitoring construction to protect cultural resources. Except for monitoring, all steps of the plan must be carried out prior to the start of construction. The requirements for this plan should not be construed to exempt or alter compliance by the OWNER or managing agency with 36 CFR 800. This plan must be filed with SHPO.

2.0 CONSTRUCTION

2.1. GENERAL

2.1.1. The preservation of the natural landscape contours and environmental features shall be an important consideration in the location of all construction facilities, including roads, storage areas, and buildings. Construction of these facilities shall be planned and conducted so as to minimize destruction, scarring, or defacing of the natural vegetation and landscape. Any necessary earthmoving shall be planned and designed to be as compatible as possible with natural landforms.

2.1.2. Temporary construction sites and staging areas shall be the minimum size necessary to perform the work. Such areas shall be located where most environmentally compatible, considering slope, fragile soils or vegetation, and risk of erosion. After construction, these areas shall be restored as specified in Section 3.0 of these specifications unless the STATE INSPECTOR authorizes a specific exemption in writing.

2.1.3. All work areas shall be maintained in a neat, clean, and sanitary condition at all times. Trash or construction debris (in addition to solid wastes described in section 2.14) shall be regularly removed during the construction, restoration, and reclamation periods.

2.1.4. In areas where mixing of soil horizons would lead to a significant reduction in soil productivity, increased difficulty in establishing permanent vegetation, or an increase in weeds, mixing of soil horizons shall be avoided insofar as possible. This may be done by removing and stockpiling topsoil, where practical, so that it may be spread over subsoil during site restoration. Known areas where stockpiling of topsoil is required are listed in Appendix L. Prior to construction the STATE INSPECTOR may designate other areas.

2.1.5. Vegetation such as trees, plants, shrubs, and grass on or adjacent to the right-of-way which do not interfere with the performance of construction work or operation of the line itself shall be preserved.

2.1.6. The OWNER shall take all necessary actions to avoid adverse impacts to SENSITIVE AREAS listed in Appendix A. The STATE INSPECTOR shall be notified two working days in advance of initial clearing or construction activity in these areas. The OWNER shall mark or flag the clearing backlines and limits of disturbance in certain SENSITIVE AREAS as indicated in Appendix A. All construction activities must be conducted within this marked area.

2.1.7. The OWNER shall either acquire appropriate land rights or provide compensation for damage for the land area that will be disturbed by construction. The width of the area disturbed by construction shall not exceed a reasonable distance from the centerline as necessary to perform the work. For this project, work should be contained within the area specified in Appendix C.

2.1.8. Flow in a stream course may not be permanently diverted. If temporary diversion is necessary, flow will be restored before a major runoff season or the next spawning season, as determined by the STATE INSPECTOR in consultation with the managing agency.

2.2. CONSTRUCTION MONITORING

2.2.1. The STATE INSPECTOR is responsible for implementing the monitoring plan required by ARM 17.20.1902. The plan specifies the type of monitoring data and activities required, and terms and schedules of monitoring data collection, and assigns responsibilities for data collection, inspection reporting, and other monitoring activities. It is attached as Appendix Q.

2.2.2. The STATE INSPECTOR, the OWNER, and the OWNER'S agents will attempt to rely upon a cooperative working relationship to reconcile potential problems relating to construction in SENSITIVE AREAS and compliance with these specifications. When construction activities would cause excessive environmental impacts due to seasonal field conditions or damage to sensitive features, the STATE INSPECTOR will discuss possible mitigating measures or minor construction rescheduling to avoid these impacts with the OWNER. The STATE INSPECTOR will be prepared to provide the OWNER with written documentation of the reasons for the modifications within 24 hours of their imposition.

2.2.3. The STATE INSPECTOR may require mitigating measures or procedures at some sites beyond those listed in Appendix A in order to minimize environmental damage due to unique circumstances that arise during construction, such as unanticipated discovery of a cultural site. The STATE INSPECTOR will follow procedures described in the monitoring plan when such situations arise.

2.2.4. In the event that the STATE INSPECTOR shows reasonable cause that compliance with these specifications is not being achieved, DEQ would take corrective action as described in 75-20-408, MCA.

2.3. TIMING OF CONSTRUCTION

2.3.1. Construction and motorized travel may be restricted or prohibited at certain times of the year in certain areas. Exemptions to these timing restrictions may be granted by DEQ in writing if the OWNER can clearly demonstrate that no environmental impacts will occur as a result. These areas, listed in Appendix D, include areas deemed as SENSITIVE AREAS.

2.3.2. In order to prevent rutting and excessive damage to vegetation, construction will not take place during periods of high soil moisture when construction vehicles will cause severe rutting.

2.4. PUBLIC SAFETY

2.4.1. All construction activities shall be done in compliance with existing health and safety laws.

2.4.2. Requirements for aeronautical hazard marking shall be determined by the OWNER in consultation with the Montana Aeronautical Division, the FAA, and DEQ. These requirements are listed in Appendix E. Where required, aeronautical hazard markings shall be installed at the time the wires are strung, according to the specifications listed in Appendix E.

2.4.3. Noise levels shall not exceed established DEQ standards as a result of operation of the facility and associated facilities. For electric transmission facilities, the average annual noise levels, as expressed by an A-weighted day-night scale (Ldn) will not exceed 50 decibels at the edge of the right-of-way in residential and subdivided areas unless the affected LANDOWNER waives this condition.

2.4.4. The facility shall be designed, constructed, and operated to adhere to the National Electric Safety Code regarding transmission lines.

2.4.5. The electric field at the edge of the right-of-way will not exceed 1 kilovolt per meter measured 1 meter above the ground in residential or subdivided areas unless the affected LANDOWNER waives this condition, and the electric field at road crossings under the facility will not exceed 7 kilovolts per meter measured 1 meter above the ground.

2.5. PROTECTION OF PROPERTY

2.5.1. Construction operations shall not take place over or upon the right-of-way of any railroad, public road, public trail, or other public property until negotiations and/or necessary approvals have been completed with the managing agency. Roads and trails will be protected and kept open for public use. Where it is necessary to cross a trail with access roads, the trail corridor will be restored. Adequate signing and/or blazes will be established so the user can find the route. All roads and trails designated by government agencies as needed for fire protection or other purposes shall be kept free of logs, brush, and debris resulting from operations under this agreement. Any such road or trail damaged by project construction or maintenance shall be promptly restored to its original condition.

2.5.2. Reasonable precautions shall be taken to protect, in place, all public land monuments and private property corners or boundary markers. If any such land markers or monuments are destroyed, the marker shall be reestablished and referenced in accordance with the procedures outlined in the "Manual of Instruction for the Survey of the Public Land of the United States" or, in the case of private property, the specifications of the county engineer. Reestablishment of survey markers will be at the expense of the OWNER

2.5.3. Construction shall be conducted so as to prevent any damage to existing real property including but not limited to transmission lines, distribution lines, telephone lines, railroads, ditches, and public roads crossed. If such property is damaged by operations under this agreement, the OWNER shall repair such damage immediately to a reasonably satisfactory condition in consultation with the property owner.

2.5.4. In areas with livestock, the OWNER shall make a reasonable effort to comply with the reasonable requests of LANDOWNERs regarding measures to control livestock. Unless requested by a LANDOWNER, care shall be taken to ensure that all gates are closed after entry or exit. Gates shall be inspected and repaired when necessary during construction and missing padlocks shall be replaced. The OWNER shall ensure that gates are not left open at night or during periods of no construction activity unless the LANDOWNER makes other requests. Any fencing or gates cut, removed, damaged, or destroyed by the OWNER shall immediately be replaced with new materials. Fences installed shall be of the same height and general type as a nearby fence on the same property, and shall be stretched tight with a fence stretcher before stapling or securing to the fence post. Temporary gates shall be of sufficiently high quality to withstand repeated opening and closing during construction, to the satisfaction of the LANDOWNER.

The LANDOWNER shall be compensated for any losses to personal property due to construction or maintenance activities.

2.5.5. The CONTRACTOR must notify the OWNER, the STATE INSPECTOR, and, if possible, the affected LANDOWNER within two working days of damage to land, crops, property, or irrigation facilities, contamination or degradation of water, or livestock injury caused by the OWNER's construction activities, and the OWNER shall reasonably restore any damaged resource or property or provide reasonable compensation to the affected party.

2.5.6. Pole holes and anchor holes must be covered or fenced in any fields, pastures, or ranges being used for livestock grazing or where a LANDOWNER's requests can be reasonably accommodated.

2.5.7. When requested by the LANDOWNER, all fences crossed by permanent access roads shall be provided with a gate. All fences to be crossed by access roads shall be braced before the fence is cut. Fences not to be gated should be restrung temporarily during construction and restrung permanently within 30 days following construction, subject to the reasonable desires of the LANDOWNER.

2.5.8. Where new access roads cross fence lines, the OWNER shall make reasonable effort to accommodate the LANDOWNER's wishes on gate location and width.

2.5.9. Any breaching of natural barriers to livestock movement by construction activities will require fencing sufficient to control livestock.

2.6. TRAFFIC CONTROL

2.6.1. At least 30 days before any construction within or over any state or federal highway right-of-way or paved secondary highway maintained by DOT, the OWNER will notify the appropriate DOT field office to review the proposed occupancy and to obtain appropriate permits and authorizations. The OWNER must supply DEQ with documentation that this consultation has occurred. This documentation should include any measures recommended by DOT and to what extent the OWNER has agreed to comply with these measures. In the event that recommendations or regulations were not followed, a statement as to why the OWNER chose not to follow them should be included. If there is a dispute, DEQ will resolve the matter.

2.6.2. In areas where project construction creates a hazard, traffic will be controlled according to the applicable DOT regulations. Safety signs advising motorists of construction equipment shall be placed on major state highways, as recommended by DOT. The installation of proper road signing will be the responsibility of the OWNER.

2.6.3. The managing agency shall be notified, as soon as practicable, when it is necessary to close public roads to public travel for short periods to provide safety during construction.

2.6.4. Construction vehicles and equipment will be operated at speeds safe for existing road and traffic conditions.

2.6.5. Traffic delays will be restricted on primary access routes, as determined by DOT or the managing agency.

2.6.6. Access for fire and emergency vehicles will be provided for at all times.

2.6.7. Public travel through and use of active construction areas shall be limited at the discretion of the managing agency.

2.7. ACCESS ROADS AND VEHICLE MOVEMENT

2.7.1. Construction of new roads shall be the minimum reasonably required to construct and maintain the facility. State, county, and other existing roads shall be used for construction access wherever possible. Access roads intended to be permanent should be initially designed as such. The location of access roads and towers shall be established in consultation with affected LANDOWNERs, and LANDOWNER concerns shall be accommodated where reasonably possible and not in contradiction to these specifications or other DEQ conditions.

2.7.2. All new roads, both temporary and permanent, shall be constructed with the minimum possible clearing and soil disturbance to minimize erosion, as specified in Section 2.11 of these specifications.

2.7.3. Where practical, all roads shall be initially designed to accommodate one-way travel of the largest piece of equipment that will be required to use them; road width shall be no wider than necessary.

2.7.4. Roads shall be located in the right-of-way insofar as possible. Travel outside the right-of-way to enable traffic to avoid cables and conductors during conductor-stringing shall be kept to the minimum possible. Road crossings of the right-of-way should be near support structures.

2.7.5. Where practical, temporary roads shall be constructed on the most level land available. Where temporary roads cross flat land they shall not be graded or bladed unless necessary, but will be flagged or otherwise marked to show their location and to prevent travel off the roadway.

2.7.6. In order to minimize soil disturbance and erosion potential, no cutting and filling for access road construction shall be allowed in areas of up to 5 percent sideslope. In areas of over 5 percent sideslope, road building that may be required shall conform to a 4 percent outslope. The roads shall be constructed to prevent channeling of runoff, and shoulders or berms that would channel runoff shall be avoided.

2.7.7. The OWNER will maintain all permanent access roads, including drainage facilities, which are constructed for use during the period of construction. In the event that a road would be left in place, the OWNER and LANDOWNER may enter into agreements regarding maintenance for erosion control following construction.

2.7.8. Any damage to existing private roads, including rutting, resulting from project construction or maintenance shall be repaired and restored to a condition as good or better than original as soon as possible unless otherwise specified by landowners during land owner negotiations . Repair and restoration of roads should be accomplished during and following construction as necessary to reduce erosion.

2.7.9. All permanent access road surfaces, including those under construction, will be prepared with the necessary erosion control practices as determined by the STATE INSPECTOR or the managing agency prior to the onset of winter.

2.7.10. Any necessary snow removal shall be done in a manner to preserve and protect roads signs and culverts, to ensure safe and efficient transportation, and to prevent excessive erosion damage to roads, streams, and adjacent land.

2.7.11. At the conclusion of line construction, final maintenance will be performed on all existing private roads used for construction access by the CONTRACTOR. These roads will be returned to a condition as good as or better than when construction began.

2.7.12. At least 30 days prior to construction of a new access road approach intersecting a state or federal highway, or of any structure encroaching upon a highway right-of-way, the OWNER shall submit to DOT a plan and profile map showing the location of the proposed construction. At least five days prior to construction, the OWNER shall provide the STATE INSPECTOR written documentation of this consultation and actions to be taken by the OWNER as provided in 2.6.1.   If there is a disagreement over state (non-federal) highway crossings, the matter will be resolved by the STATE INSPECTOR.

2.8. EQUIPMENT OPERATION

2.8.1. During construction, unauthorized cross-country travel and the development of roads other than those approved shall be prohibited. The OWNER shall be liable for any damage, destruction, or disruption of private property and land caused by his construction personnel and equipment as a result of unauthorized cross-country travel and/or road development.

2.8.2. To prevent excessive soil damage in areas where a graded roadway has not been constructed, the limits and locations of access for construction equipment and vehicles shall be clearly marked or specified at each new site before any equipment is moved to the site. Construction foremen and personnel should be well versed in recognizing these markers and shall understand the restriction on equipment movement that is involved.

2.8.3. Dust control measures shall be implemented on access roads where required by the managing agency or where dust would pose a nuisance to residents. Construction activities and travel shall be conducted to minimize dust. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used. Oil or similar petroleum-derivatives shall not be used.

2.8.4. Work crew foremen shall be qualified and experienced in the type of work being accomplished by the crew they are supervising. Earthmoving equipment shall be operated only by qualified, experienced personnel. Correction of environmental damage resulting from operation of equipment will be the responsibility of the OWNER. Repair of damage to a condition reasonably satisfactory to the LANDOWNER, managing agency, or if necessary, DEQ, is required.

2.8.5. Sock lines will be strung using methods that minimize disturbance of soils and vegetation.

2.8.6. Following construction in areas designated by the local weed control board or STATE INSPECTOR as a noxious weed area the CONTRACTOR shall thoroughly wash all vehicles and equipment to remove weed parts and seeds immediately prior to leaving the area.

2.9. RIGHT-OF-WAY CLEARING AND SITE PREPARATION

2.9.1. The STATE INSPECTOR shall be notified at least ten days prior to any timber clearing. The STATE INSPECTOR shall be responsible for notifying the DNRC Forestry Division.

2.9.2. During clearing of survey lines or the right-of-way, shrubs shall be preserved to the greatest extent possible. Shrub removal shall be limited to crushing where necessary. Shrubs may be cut off at ground level, leaving roots undisturbed so that they may re-sprout.

2.9.3. Right-of-way clearing shall be kept to the minimum necessary to meet the requirements of the National Electric Safety Code. Trees to be saved within the clearing backlines and danger trees located outside the clearing backlines shall be marked. Clearing backlines in SENSITIVE AREAS will be indicated on plan and profile maps. All snags and old growth trees that do not endanger the line or maintenance equipment shall be preserved. In designated SENSITIVE AREAS, the STATE INSPECTOR shall approve clearing boundaries prior to clearing.

2.9.4. In no case should the entire nominal width of the right-of-way be cleared of trees up to the edge, unless approved by the STATE INSPECTOR and the LANDOWNER. Clearing should instead produce a “feathered edge” right-of-way configuration, where only specified hazard trees and those that interfere with construction or conductor clearance are removed. In areas where there is potential for long, tunnel views of transmission lines or access roads as identified in Appendix A, care shall be taken to screen the lines from view. For areas identified in Appendix A, a separating screen of vegetation shall be retained where the right-of-way parallels or crosses highways and rivers.

2.9.5. During construction, care will be taken to avoid damage to small trees and shrubs on the right-of-way that do not interfere with the clearing requirements under 2.9.3. and would not grow to create a hazard over a ten-year period.

2.9.6. Soil disturbance and earth moving will be kept to a minimum.

2.9.7. The OWNER shall be held liable for any unauthorized cutting, injury or destruction to timber whether such timber is on or off the right-of-way.

2.9.8. Unless otherwise requested by the LANDOWNER or managing agency, felling shall be directional in order to minimize damage to remaining trees. Maximum stump height shall be no more than 12 inches on the uphill side or 1/3 the tree diameter whichever is greater. Trees will not be pushed or pulled over. Stumps will not be removed unless they conflict with a structure, anchor, or roadway.

2.9.9. Special logging, clearing, or excavation techniques may be required in certain highly sensitive or fragile areas, as listed in Appendix A.

2.9.10. Crane landings shall be constructed on level ground unless extreme conditions (such as slope, soft, or marshy ground) make other construction necessary. In areas where more than one crane landing per tower site would be built, the STATE INSPECTOR will be notified at least 5 days prior to the beginning of construction at those sites.

2.9.11. No motorized travel on, scarification of, or displacement of talus slopes shall be allowed except where approved by the STATE INSPECTOR and LANDOWNER.

2.9.12. To avoid unnecessary ground disturbance, grounding wires or counterpoise should be placed or buried in disturbed areas whenever possible.

2.9.13. Slash resulting from project clearing that may be washed out by high water the following spring shall be removed and piled outside the floodplain before runoff. Instream slash resulting from project clearing must be removed within 24 hours.

2.9.14. Streamside trees will be felled away from streams rather than into or across streams.

2.10. GROUNDING

Grounding of fences, buildings, and other structures on and adjacent to the right-of-way shall be done according to the specifications of the National Electric Safety Code and any other specifications listed in Appendix G.

2.11. EROSION AND SEDIMENT CONTROL

2.11.1. Clearing and grubbing for roads and rights-of-way and excavations for stream crossings shall be carefully controlled to minimize silt or other water pollution downstream from the rights-of-way. At a minimum, erosion control measures described in the OWNER's Storm Water Control Plan shall be implemented. Sediment retention basins will be installed as required by the STATE INSPECTOR or managing agency.

2.11.2. Roads shall cross drainage bottoms at sharp or nearly right angles and level with the stream bed whenever possible. Temporary bridges, fords, culverts, or other structures will be installed to avoid stream bank damage.

2.11.3. Under no circumstances shall stream bed materials be removed for use as backfill, embankments, road surfacing, or for other construction purposes.

2.11.4. No excavations shall be allowed on any river or perennial stream channels or floodways at locations likely to cause detrimental erosion or offer a new channel to the river or stream at times of flooding.

2.11.5. Installation of culverts, bridges, or other structures in perennial streams along with clearing on stream beds and banks will be done as specified by the STATE INSPECTOR following on-site inspections with DEQ, DFWP, and local conservation districts. All culverts shall be installed with the culvert inlet and outlet at natural stream grade or ground level.

2.11.6. Construction of access roads, bridges, fill slopes, culverts, or impoundments, or channel changes within the high-water mark of any perennial stream, lake, or pond, requires consultation with DFWP and the local conservation district and application of applicable water quality standards. Within 15 days prior to the start of construction, the OWNER shall submit written documentation that consultation has occurred. Included in this documentation should be the recommendation of the agencies consulted and the actions that OWNER expects to take to completely implement them.

2.11.7. No blasting shall be allowed in streams. Blasting may be allowed near streams if precautions are taken to protect the stream from debris and from entry of nitrates or other contaminants into the stream.

2.11.8. The OWNER shall maintain private roads while using them. All ruts made by machinery shall be filled or graded to prevent channeling. In addition, the OWNER must take measures to prevent the occurrence of erosion caused by wind or water during and after use of these roads. Some erosion-preventive measures include but are not limited to, installing or using cross-logs, drain ditches, water bars, and wind erosion inhibitors such as water, straw, gravel, or combinations of these. Erosion control shall be accomplished as described in the Montana Pollution Discharge Elimination System (MPDES) General Permit for Storm Water Discharges Associated with Construction Activity.

2.11.9. The OWNER shall prevent material from being deposited in any watercourse or stream channel. Where necessary, measures such as hauling of fill material, construction of temporary barriers, or other approved methods shall be used to keep excavated materials and other extraneous materials out of watercourses. Any such materials entering watercourses shall be removed immediately.

2.11.10. The OWNER shall be responsible for the stability of all embankments created during construction. Embankments and backfills shall contain no stream sediments, frozen material, large roots, sod, or other materials that may reduce their stability.

2.11.11. Culverts, arch bridges, or other stream crossing structures shall be installed at all permanent crossings of flowing or dry watercourses where fill is likely to wash out during the life of the road. Culvert or bridge installation is prohibited in areas of important fish spawning beds identified by DFWP and during specified fish spawning seasons on less sensitive streams or rivers. All culverts shall be large enough to handle approximately 15-year floods. Culvert size shall be determined by standard procedures taking into account the variations in vegetation and climatic zones in Montana, the amount of fill, and the drainage area above the crossing, and shall be approved as specified in 2.11.6. All culverts shall be installed at the time of road construction and maintained for the life of the project. The areas where stream-crossing measures must be taken are listed in Appendix H.

2.11.12. No fill material other than that necessary for road construction shall be piled within the high water zone of streams where floods can transport it directly into the stream. Excess floatable debris shall be removed from areas immediately above crossings to prevent obstruction of culverts or bridges during periods of high water.

2.11.13. No skidding of logs or driving of vehicles across a perennial watercourse shall be allowed, except via authorized construction roads.

2.11.14. No perennial watercourses shall be permanently blocked or diverted.

2.11.15. Skidding with tractors shall not be permitted within 100 feet of streams containing flowing water except in places designated in advance, and in no event shall skid roads be located on these stream courses. Skid trails shall be located high enough out of draws, swales, and valley bottoms to permit diversion of runoff water to natural undisturbed forest ground cover.

2.11.16. Construction methods shall prevent accidental spillage of solid matter, contaminants, debris, petroleum products, and other objectionable pollutants and wastes into watercourses, lakes, and underground water sources. Secondary containment catchment basins capable of containing the maximum accidental spill shall be installed at areas where fuel, chemicals or oil are stored. Any accidental spills of such materials shall be cleaned up immediately.

2.11.17. To reduce the amount of sediment entering streams, a strip of undisturbed ground or vegetation will be provided for 50 feet between areas of disturbance (such as road construction or tower construction) and wetlands, stream courses, and around first order or larger streams that have a well-defined stream course or aquatic or riparian vegetation, unless otherwise required by the LANDOWNER. Buffer strip width is measured from the high water line of a channel or wetland and will be determined by the STATE INSPECTOR and managing agency. When braided streams with more than one discernible channel (ephemeral or permanent) are encountered, the high water line of the outermost channel shall be used. In the event that vegetation cannot be left undisturbed, structural sediment containment, approved by the STATE INSPECTOR, must be substituted before soil-disturbing activity commences.

2.11.18. When no longer needed, all temporary structures or fill installed to aid stream crossing shall be removed and the course of the stream reestablished to prevent future erosion.

2.11.19. All temporary dams built on the right-of-way shall be removed after line construction unless otherwise approved by the STATE INSPECTOR. Dams allowed to remain shall be upgraded to permanent structures and shall be provided with spillways or culverts, a continuous sod cover on their tops, and downstream slopes meeting dam safety standards. Spillways may be protected against erosion with riprap or equivalent means.

2.11.20. Damage resulting from erosion or other causes shall be repaired after completion of grading and before revegetation is begun.

2.11.21. Point discharge of water will be dispersed in a manner to avoid erosion or sedimentation of streams as required in DEQ permits.

2.11.22. Riprap or other erosion control activities will be planned based on possible downstream consequences of activity, and installed during the low flow season if possible.

2.11.23. Water used in embankment material processing, aggregate processing, concrete curing, foundation and concrete lift cleanup, and other wastewater processes shall not be discharged into surface waters without a valid discharge permit from DEQ.

2.12. ARCHAEOLOGICAL, HISTORICAL AND PALEONTOLOGIC RESOURCES

2.12.1. All construction activities shall be conducted so as to prevent damage to significant archaeological, historical, or paleontologic resources, in accordance with the requirements of 1.4.1 and Appendix I.

2.12.2. Any relics, artifacts, fossils or other items of historical, paleontologic, or archaeological value shall be preserved in a manner acceptable to both the LANDOWNER and the State Historic Preservation Officer. If any such items are discovered during construction, SHPO shall be notified immediately. Work that could disturb the materials or surrounding area must cease until the site can be properly evaluated by a qualified archaeologist (either employed by the OWNER, managing agency or representing SHPO) and recommendations made by that person based on the Historic Preservation Plan outlined in Appendix I (but in no case more than 10 days). For significant sites, the OWNER must follow recommendations of SHPO.

2.12.3. The OWNER shall conform to treatments recommended for cultural resources by either SHPO or the Advisory Council on Historic Preservation (ACHP).

2.13. PREVENTION AND CONTROL OF FIRES

2.13.1. Burning, fire prevention, and fire control shall comply with the burning plan and fire plan in Appendix J. These plans shall meet the requirements of the managing agency and/or the fire control agencies having jurisdiction. The STATE INSPECTOR shall be invited to attend all meetings with these agencies to discuss or prepare these plans. The STATE INSPECTOR, in turn, shall notify DNRC of all such meetings.

2.13.2. The OWNER shall direct the CONTRACTOR to comply with regulations of any county, town, state or governing municipality having jurisdiction regarding fire laws and regulations.

2.13.3. Blasting caps, powder, and other explosives shall be stored only in approved areas and containers and always separate from each other.

2.13.4. The OWNER shall direct the CONTRACTOR to properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The OWNER shall direct the CONTRACTOR not to burn refuse such as trash, rags, tires, plastics, or other debris, except as permitted by the county, town, state, or governing municipality having jurisdiction.

2.14. WASTE DISPOSAL

2.14.1. The OWNER shall direct the CONTRACTOR to use licensed solid waste disposal sites. Inert materials (Group III wastes) may be disposed of at licensed Class III landfill sites; mixed refuse (Group II wastes) must be disposed of at licensed Class II landfill sites.

2.14.2. Emptied pesticide containers or other chemical containers must be triple rinsed to render them acceptable for disposal in Class II landfills or for scrap recycling pursuant to ARM 17.54.201 for treatment or disposal. Pesticide residue and pesticide containers shall be disposed of in accordance with ARM 17.30.637.

2.14.3. All waste materials constituting a hazardous waste defined in ARM 16.44.303, and wastes containing any concentration of polychlorinated biphenyls must be transported to an approved designated hazardous waste management facility (as defined in ARM 17.53.201) for treatment or disposal.

2.14.4. All used oil shall be hauled away and recycled or disposed of in a licensed Class II landfill authorized to accept liquid wastes or in accordance with 2.14.2 and 2.14.3 above. There shall be no intentional release of crankcase oil or other toxic substances into streams or soil. In the event of an accidental spill into a waterway, the substances will be cleaned up and the STATE INSPECTOR will be contacted immediately. Any spill of refined petroleum products greater than 25 gallons must be reported to the State at Disaster and Emergency Services at 406-841-03911.

2.14.5. Sewage shall not be discharged into streams or streambeds. The OWNER shall direct the CONTRACTOR to provide refuse containers and sanitary chemical toilets, convenient to all principal points of operation. These facilities shall comply with applicable federal, state, and local health laws and regulations. A septic tank pump licensed by the State shall service these facilities.

2.14.6. In order to reduce fire hazard, small trees and brush cut during construction should be chipped, burned, and/or scattered. Slash 3 inches in diameter or greater may be scattered in quantities of up to 15 tons/acre unless otherwise requested by the LANDOWNER. Tops, limbs and brush less than 3 inches in diameter and 3 feet in length may be left in quantities less than 3 tons per acre except on cropland and residential land or where otherwise specified by the LANDOWNER. In certain cases the STATE INSPECTOR will authorize chipping and scattering of tops, limbs and brush in excess of 3 tons per acre as an erosion control measure. Merchantable timber should be decked and removed at the direction of the LANDOWNER or managing agency

2.14.7. Refuse burning shall require the prior approval of the LANDOWNER and a Montana Open Burning Permit must be obtained from DEQ. Any burning of wastes shall comply with section 2.13 of these specifications.

2.15. SPECIAL MEASURES

2.15.1. Poles with a low reflectivity constant should be used to reduce potential for visual contrast.

2.15.2.. At river crossings, strategic placement of structures should be done both as a means to screen views of the transmission line and right-of-way and to minimize the need for vegetative clearing. Crossings of rivers should be designed to avoid diagonal crossings.

3.0 POST-CONSTRUCTION CLEANUP AND RECLAMATION

3.1. CLEANUP

3.1.1. All litter resulting from construction is to be removed from the right-of-way and along access roads leading to the right-of-way. Such litter shall be legally disposed of as soon as possible, but in no case later than 60 days following completion of wire clipping. If requested by the LANDOWNER, the OWNER shall provide for removal of any additional construction-related debris discovered after this initial cleanup.

3.1.2. Insofar as practical, all signs of temporary construction facilities such as haul roads, work areas, buildings, foundations or temporary structures, soil stockpiles, excess or waste materials, or any other vestiges of construction shall be removed and the areas restored to as natural a condition as practical, in consultation with the LANDOWNER.

3.2. RESTORATION, RECLAMATION, AND REVEGETATION

3.2.1 Restoration, reclamation, and revegetation of the right-of-way, access roads, crane pads, splicing or stringing sites, borrow sites, gravel fill, stone, or aggregate excavation, or any other disturbance shall be in accordance with the reclamation and revegetation plan (Appendix K). The OWNER may choose to develop this plan in consultation with appropriate land management agencies as part of easement negotiations. In this case, the OWNER shall provide written documentation of consultation with those agencies and a copy of the agreed-to plan. This plan and any conditions to the Certificate approved by DEQ shall be attached as Appendix K.

3.2.2. Scarring or damage to any landscape feature listed in Appendix A shall be restored as nearly as practical to its original condition. Bare areas created by construction activities will be reseeded in compliance with Appendices K and L to prevent soil erosion.

3.2.3. After construction is complete, and in cooperation with the LANDOWNER, temporary roads shall be closed.

3.2.4. In agricultural areas where soil has been compacted by movement of construction equipment and unless otherwise specified by the LANDOWNER, the OWNER shall direct the CONTRACTOR to rip the soil deep enough to restore productivity, or if complete restoration is not possible, the OWNER shall compensate the LANDOWNER for lost productivity.

3.2.5. Earth next to access roads that cross streams shall be replaced at slopes less than the normal angle of repose for the soil type involved.

3.2.6. All drainage channels shall be restored to a gradient and width that will prevent accelerated gully erosion.

3.2.6. Drive-through dips, open-top box culverts, waterbars, or cross drains shall be added to roads at the proper spacing and angle as necessary to prevent erosion.

3.2.7. Interrupted drainage systems shall be restored.

3.2.8. Sidecasting of waste materials may be allowed on slopes over 40 percent after approval by the LANDOWNER, however, this will not be allowed within the buffer strip established for stream courses, in areas of high or extreme soil instability, or in other SENSITIVE AREAS identified in Appendix A. Surplus materials shall be hauled to LANDOWNER-approved sites in such areas.

3.2.9. Seeding prescriptions to be used in revegetation, requirements for hydroseeding, fertilizing, and mulching, as jointly determined by representatives of the OWNER, DEQ, and other involved state and federal agencies, are specified in Appendix L.

3.2.10. Piling and windrowing of material for burning shall use methods that will prevent significant amounts of soil from being included in the material to be burned and minimize destruction of ground cover. Non-mechanized methods are recommended if necessary to minimize soil erosion and vegetation disturbance. Piles shall be located so as to minimize danger to timber and damage to ground cover when burned.

3.2.11. During restoration in areas where topsoil has been stockpiled, the site will be graded to near natural contours and the topsoil will be replaced on the surface.

3.2.12. Excavated material not suitable or required for backfill shall be evenly filled back onto the cleared area prior to spreading any stockpiled soil. Large rocks and boulders uncovered during excavation and not buried in the backfill will be disposed of as approved by the STATE INSPECTOR and/or LANDOWNER.

3.2.13. Application rates and timing of seeds and fertilizer, and purity and germination rates of seed mixtures, shall be as determined in consultation with DEQ. Reseeding shall be done at the first appropriate opportunity after construction ends.

3.2.14. Where appropriate, hydro seeding, drilling, or other appropriate methods shall be used to aid revegetation. Mulching with straw, wood chips, or other means shall be used where necessary. Areas requiring such treatment are listed in Appendix L.

3.2.15. All temporary roads shall be obliterated and reclaimed (with the concurrence of the LANDOWNER), as specified in Appendix M. All temporary roadways shall be graded and scarified as specified to permit the growth of vegetation and to discourage traffic. Permanent unsurfaced roadbeds not open to public use will be revegetated as soon after use as possible unless specified otherwise by the LANDOWNER.

3.3. MONITORING

3.3.1. Upon notice by the OWNER, the STATE INSPECTOR will schedule initial post-construction field inspections following cleanup and road closure. Follow-up visits will be scheduled as required to monitor the effectiveness of erosion controls, reseeding measures, and the right-of-way management plan (Appendix N). The STATE INSPECTOR will contact the LANDOWNER for post-construction access and to determine LANDOWNER satisfaction with the OWNER's restoration measures.

3.3.2. The STATE INSPECTOR shall document observations for inclusion in monitoring reports regarding bond release or the success of mitigating measures required by DEQ.

3.3.2. Failure of the OWNER to adequately reclaim all disturbed areas in accordance with section 3.2 and ARM 17.20.1902(10) shall be cause for forfeiture of the reclamation BOND(s) or penalties described in Section 0.3. Success of revegetation shall be based on criteria specified in ARM 17.20.1902(10). Failure of the OWNER to achieve adequate revegetation of disturbed areas may be cause for forfeiture of the revegetation BOND(s) or penalties described in Section 0.3.

4.0. OPERATION AND MAINTENANCE

4.1. RIGHT-OF-WAY MANAGEMENT AND ROAD MAINTENANCE

4.1.1. Maintenance of the right-of-way and permanent access roads shall be as specified in the right-of-way management plan (Appendix N). This plan shall provide for the protection of SENSITIVE AREAS identified prior to and during construction as well as control of erosion on permanent access roads.

4.1.2. Vegetation that has been saved through the construction process and which does not pose a hazard or potential hazard to the transmission line, particularly that of value to fish and wildlife as specified in Appendix A, shall be allowed to grow on the right-of-way.

4.1.3. Vegetative cover adjacent to the transmission line in areas other than cropland shall be maintained in cooperation with the LANDOWNER.

4.1.4. Grass cover, water bars, cross drains, the proper slope, and other agreed to measures shall be maintained on permanent access roads and service roads in order to prevent soil erosion.

4.2. MAINTENANCE INSPECTIONS

4.2.1. The OWNER shall have responsibility to correct soil erosion, noxious weed, or revegetation problems on the right-of-way or access roads as they become known. Appropriate corrective action will be taken where necessary. The OWNER, through agreement with the LANDOWNER or managing agency, may provide a mechanism to identify and correct such problems but the OWNER is responsible for correcting these problems.

4.2.2. Operation and maintenance inspections using ground vehicles shall be timed so that routine maintenance will be done when access roads are firm, dry, or frozen, wherever possible. Maintenance vegetative clearing shall be done according to criteria spelled out in Appendix N.

4.3. CORRECTION OF LANDOWNER PROBLEMS

4.3.1. When the facility causes interference with radio, TV, other stationary communication systems, or GPS signals after the facility is operating, the OWNER will correct the interference with mechanical corrections to facility hardware, or antennas, or will install remote antennas or repeater stations, or will use other reasonable means to correct the problem.

4.3.2. The OWNER will respond to complaints of interference with radio, TV or GPS signals by investigating complaints to determine the origin of the interference. If the interference is not caused by the facility, the OWNER shall so inform the person bringing the complaint. The OWNER shall provide the STATE INSPECTOR with documentation of the evidence regarding the source of the interference if the person brings the complaint to the STATE INSPECTOR or DEQ.

4.4. HERBICIDES AND WEED CONTROL

4.4.1. Weed control, including any application of herbicides in the right-of-way, will be done by applicators currently licensed in Montana and in accordance with recommendations of the Montana Department of Agriculture, and in accordance with the right-of-way maintenance plan in Appendix N.

4.4.2. Herbicides will not be used in certain areas identified by DEQ and DFWP, as listed in Appendix O or as requested by the LANDOWNER.

4.4.3. Proper herbicide application methods will be used to keep drift and nontarget damage to a minimum.

4.4.4. Herbicides must be applied according to label specifications and in accordance with 4.4.1 above. Only herbicides registered in compliance with applicable federal and state laws may be applied.

4.4.5. Herbicides shall not be sprayed during heavy rains or threat of heavy rains. Vegetation buffer zones shall be left along all identifiable stream channels. Herbicides shall not be used in any public water supply watershed identified by DEQ.

4.4.6. In areas disturbed by the transmission line, the OWNER will cooperate with LANDOWNERs in control of noxious weeds as designated by the weed control board having jurisdiction in the county crossed by the line.

4.4.6. The OWNER shall notify the STATE INSPECTOR in writing 30 days prior to any broadcast or aerial spraying of herbicides. The notice shall provide details as to the time, place, and justification for such spraying. DEQ, DFWP, and the Montana Department of Agriculture shall have the opportunity to inspect the portion of the right-of-way or access roads, schedule for such treatment before, during, and after spraying.

4.4.7. During the second and third growing seasons following the completion of restoration and reseeding, the OWNER and STATE INSPECTOR shall inspect the right-of-way and access roads for newly established stands of noxious weeds. The county weed control supervisor shall be invited to attend this inspection. In the event that stands of weeds are encountered, the OWNER shall take appropriate control measures.

4.5. MONITORING

4.5.1. DEQ may continue to monitor operation and maintenance activities for the life of the project in order to ensure compliance with the specifications in this section (see Appendix Q).

4.5.2. The OWNER will be responsible to DEQ for the term of the reclamation BOND (Section 0.8). Following BOND release, the OWNER will report to individual LANDOWNERs and managing agencies except as specified in conditions to the certificate.

4.5.3. Upon reasonable complaint from an affected LANDOWNER or managing agency, DEQ may require the OWNER to fund additional monitoring efforts to resolve problems that develop after release of the BONDs. Such efforts would be limited to determining compliance with these specifications and other conditions of the Certificate.

5.0 ABANDONMENT

When the transmission line is no longer used or useful, structures, conductors, and ground wires shall be removed and disturbed areas reclaimed using methods outlined in Appendix K.

APPENDICES

APPENDIX A: SENSITIVE AREAS FOR THE MATL TRANSMISSION LINE PROJECT

The following sensitive areas have been identified where special measures would be implemented to reduce impacts:

Land Use/Infrastructure

To minimize impacts to farming, DEQ could require the use of monopoles where the line crosses cropland and CRP. Whenever reasonably possible, structures should be located along field boundaries. Where span lengths are too long and structures must be located within field boundaries, structures should be placed at the edges of field strips where reasonably possible, in consultation with affected landowners. MATL will consult with landowners and make reasonable accommodation for vehicle movement along field roads.

During seeding and harvest seasons, MATL would use pilot vehicles during equipment mobilization and delivery of large, long loads on secondary roads to minimize conflict with ongoing farming activities.

Where feasible, MATL will maintain a minimum distance of 132 feet from wellheads and the edges of existing pipeline rights-of-way or the pipe itself. It may not be feasible to maintain this buffer on the western most of the Belgian Hill Local Routing Option.

On the Agency Preferred Alternative, the Northwest of Conrad Local Routing Option would be located on rangeland where reasonably possible. Cultural resource sites outside of existing access trails would be identified, fenced, and would not be disturbed unless approved by the landowner.

Geological/Soils

Precision mapping for unstable soils would be conducted along the alignment between the milepost markers identified below:

Diamond Valley Area

On the Agency Preferred Alternative between mileposts 36.92 and 37.22, 38.22 and 38.33, and between 38.41 and 38.46.

Teton River Crossing Area

On the Agency Preferred Alternative between mileposts 35.3 and 35.8, 36.2 and 36.6, and between mileposts 36.9 and 37.4.

Marias River Crossing Area

On the Agency Preferred Alternative between mileposts 92.27 and 92.35, 92.62 and 92.75, 92.78 and 92.89, 93.33 and 94.25.

At the Teton River crossing, on the Agency Preferred Alternative, the alignment would be widened by an additional 250 feet north of the centerline between mileposts 40.47 and 42.4 to avoid areas of slope instability in this area.

At the Teton and Marias River valleys, after design but prior to construction, proposed road locations would be reviewed in the field to ensure that unnecessary road construction related disturbance does not occur. Existing access trails would be used to the fullest extent possible.

Wildlife

On the selected alternative, areas of native vegetation that have not been surveyed for grouse leks would be surveyed prior to construction. Construction would not occur during the leking season within 2 miles of leks.

Overhead ground wires must be marked in the following areas within 2 miles of leks to reduce the potential for avian collisions with the transmission line. Support structures that cross within the 2-mile buffer area around the documented leks would be fitted with raptor perch deterrents to reduce predation.

Alternative 2 between mileposts 85.7 and 92

Alternative 3 between mileposts 81 and 87

Alternative 4 between mileposts 9.5 and 10.5 and 95.5 and 101.5

Line marking devices would be installed, at intervals suggested by manufacturer's recommendations, on overhead ground wires within all stream, river and wetland crossings, such as crossings of the Marias River, the Dry Fork Marias River, and Teton River. Line marking devices would also be placed within a ¼ mile buffer on either side of streams, rivers, or wetlands. Such marking devices have been reported to reduce mortality by approximately 40 to 90 percent.

Impacts to raptors would not be expected; in the event that a raptor nest was identified during construction activities, MATL would consult with the FWP and USFWS and take precautions to minimize impacts on nesting raptors**.**

Overhead ground wires within ¼ mile of wetlands will be marked to reduce the potential for collisions after inspection and a determination of the need for marking in consultation with FWP and FWS biologist.

Visual Resources

To decrease the line's contrast and visibility, non-shiny conductors would be used.

Cultural Resources

Cultural resource surveys would be completed along unsurveyed areas with a high probability of discovering new sites. If cultural resource sites are discovered, structure locations and access routes would be modified to avoid sensitive features or the site recorded.

Unevaluated cultural resource properties and Traditional Cultural Properties along the route must be individually evaluated in terms of Project effect. In addition, an intensive cultural resource inventory of areas not previously inventoried to Montana SHPO standards is necessary to comply with regulations in the Montana Antiquities Act, as amended (1995).

A professional archeologist would observe construction in high probability areas listed below during pole placement. If cultural resources are discovered during excavation, construction would be temporarily halted while the owner completes recovery of artifacts. Artifacts are the property of the landowner.

The Agency Preferred Alternative between mileposts 0 and 15, 31 and 42.3, 56.25 and 62.6, 66.9 and 68, 68.98 and 69.57, 70.44 and 71.81, 74.9 and 87.2, 91.6 and 94.25, 96.3 and 103.1, 106 and 112.6, 110.66 and 112.64, and 115.5 and 128.7.

Wetlands

MATL would delineate wetlands within 500 feet of the alignment of the approved alternative and construction activities would not be allowed within 50 feet of wetlands. .

Floodplains

MATL would avoid placing roads and poles in designated 100 year floodplains.

Vegetation

Additional areas for monitoring or for application of mitigation measures may be identified following the pre-construction monitoring trip by the State Inspector or the Inspector's designee.

APPENDIX B: PERFORMANCE BOND SPECIFICATIONS

Construction and reclamation bonds shall be used to ensure performance with these specifications and will be specified at the time of the certification decision.

APPENDIX C: VARIATIONS IN RIGHT-OF-WAY WIDTH

See Appendix A for variations in right-of way widths.

DEQ does not recommend specific widths for construction easements. In accordance with the specifications, construction activities shall be contained in the minimum area necessary for safe and prudent construction.

DEQ does not recommend specific variations in right-of-way widths beyond those required to meet the National Electric Safety Code for electric transmission line operations and those necessary to meet standards established in ARM 17.20.1607(2).

APPENDIX D: AREAS WHERE CONSTRUCTION TIMING RESTRICTIONS APPLY

Except for those areas described in Appendix A, no restrictions in the timing of construction are recommended, beyond those considered necessary on the basis of on-site inspections of stream crossings required in Section 2.11.6 of these specifications and in other sections of these specifications, or as negotiated by LANDOWNERs in individual easement agreements.

APPENDIX E: AERONAUTICAL HAZARD MARKINGS

For all alternatives, the OWNER would install FAA-recommended colored aerial markers for aviation safety, as well as at crossings of the Conoco pipeline and crossings of the Cenex pipeline.

For all alternatives, the OWNER would install FAA-recommended aerial markers to make the line more visible to low flying aircraft at crossings of Interstate 15 and U.S. Highways 87 and 2. Marker balls would also be placed at all river crossings.

APPENDIX F: NOXIOUS WEED AREAS

MATL's weed control program incorporates a baseline inventory and marking of existing noxious weed populations prior to construction; preventative measures (that is, washing vehicles, flagging weed populations to be avoided, and seeding following disturbance); and an integrated control program involving spraying target species in coordination with the BLM, state weed coordinator, and county weed boards and landowners. Mitigation practices such as washing vehicles and equipment would occur throughout construction and continue during future line maintenance activities. MATL would report annually to Federal, state (DNRC and DEQ), and county personnel on the condition and progress of this effort. The MATL integrated weed control plan would reduce the threat of noxious weed invasion following ground disturbance resulting from project construction and long-term maintenance. This weed control program must be implemented for the life of the project or as required by designated Federal, state(DEQ), and county personnel to ensure long-term noxious/invasive plant control measures are met in the weed control area.

APPENDIX G: GROUNDING SPECIFICATIONS

Powerlines, fences, and pipelines shall be grounded in accordance with the National Electrical Safety Code. The OWNER shall ensure that operation of the transmission line does not interfere with operation of cathodic protection systems of any pipelines crossed or paralleled. Prior to construction, the OWNER must consult with owners of pipelines crossed and paralleled (within 2,000 feet) and implement any measures requested by the pipeline owner or operator to prevent interference with the cathodic protection system and shocks to workers. In addition, MATL would comply with all Federal and State regulations concerning co-locating near buried gas pipeline.

APPENDIX H: CULVERT AND BRIDGE REQUIREMENTS

It does not appear that new culverts or bridges will be needed during construction. In the event a culvert or bridge is needed, it shall be installed to the standards set forth in Section 2.11.11 of the specifications and following review and approval of the proposed installation by the State Inspector. The state inspector may require site specific measures to reduce impacts.

APPENDIX I: HISTORIC PRESERVATION PLAN

The OWNER, in consultation with SHPO, shall develop a plan for identification and treatment of historical or archaeological sites affected by construction. Copies of these plans shall be part of this Appendix. The plan shall identify proposed treatments to be employed to avoid, mitigate or offset project effects on cultural resource sites or culturally significant tribal resources as agreed to by SHPO.

APPENDIX J: BURNING PLAN AND FIRE PLAN

The need for a detailed burning or fire plan is not anticipated for this project. In the event that burning is required prior to or during construction, such burning shall occur in accordance with sections 0.5, 2.13, and 2.14 of the specifications.

APPENDIX K: RECLAMATION AND REVEGETATION PLAN

At least 30 days prior to the start of construction, a reclamation and revegetation plan must be developed and submitted to DEQ for approval. This plan must, at a minimum, specify seeding mixtures, rates, seeding methods and timing of seeding. It must address LANDOWNER wishes, and satisfy requirements of the MPDES General Permit for Storm Water Discharges Associated with Construction Activity and ARM 17.20.1902(10).

If a LANDOWNER's management practices prevent the attainment of 90 percent perennial ground cover after five (5) years, revegetation on that land will be deemed adequate when portions of the right-of-way disturbed by construction and temporary roads are reclaimed to a state of usefulness similar to that existing prior to construction as determined by the State Inspector.

APPENDIX L: AREAS WHERE STOCKPILING OF TOPSOIL, HYDRO SEEDING, FERTILIZING, OR MULCHING IS REQUIRED

At each area where cut and fill would be necessary to construct a road or crane pad, the OWNER shall salvage and stockpile topsoil, and spread the topsoil over disturbed areas following construction to increase re-vegetation success.

APPENDIX M: ROADS TO BE CLOSED AND/OR OBLITERATED

If permanent roads are necessary for construction or maintenance of the project, the OWNER shall close or obliterate the roads during decommissioning as requested by the LANDOWNER.

APPENDIX N: RIGHT-OF-WAY MANAGEMENT PLAN

DEQ does not recommend a specific right-of-way management plan. To the extent possible, all maintenance and operation activities shall be performed to comply with the requirements of the environmental specifications.

APPENDIX O: WATERSHEDS AND OTHER AREAS WHERE HERBICIDES ARE PROHIBITED

DEQ does not recommend any areas or watersheds where herbicide use is prohibited. Herbicide use shall conform to all applicable local, state, and federal restrictions.

APPENDIX P: NAME AND ADDRESS OF STATE INSPECTOR

STATE INSPECTOR	OWNER'S LIAISON
Environmental Science Specialist Montana Dept of Environmental Quality P.O. Box 200901 1520 East Sixth Avenue Helena, Montana 59620-0901 (406) 444-_____	

APPENDIX Q: MONITORING PLAN

The STATE INSPECTOR is responsible for implementing this monitoring plan required by 75-20-303(b) and (c), MCA, and for reporting whether terms of the Certificate of Compliance and Environmental Specifications are being met, along with any conditions in the Storm Water Pollution Prevention Plan and state land easements. The STATE INSPECTOR may identify additional mitigating measures in order to minimize environmental damage due to unique circumstances that arise during construction.

In addition to participating in preconstruction conferences the State Inspector shall conduct on-site inspections during the period of construction. At a minimum the Inspectors will be present at the start of construction and during the initiation of construction in sensitive areas. Subsequently Inspectors shall strive to conduct on-site reviews of construction activities on at least a weekly schedule. More frequent monitoring may be necessary in sensitive areas, during the peak(s) of construction activities or if monitoring reveals a pattern of non-compliance.

Inspectors shall record the dates of inspection, areas inspected, and instances where construction activities are not in conformance with Environmental Specifications or terms and conditions of the Certificate of Compliance for the project. Inspection reports shall be submitted to the OWNER's field representative in a timely manner. Follow-up work identified in the inspection reports will be the responsibility of the OWNER and will be carried out in a timely manner.

Upon the completion of construction in an area, the Inspectors will determine whether or not environmental specifications have been followed; that cleanup is complete; that damage has been repaired; that recontouring, site restoration, erosion control are complete; that road closures are adequate and that revegetation is progressing satisfactorily. Within 60 days of the completion of construction, the amount of reclamation bond that will be released will be determined by DEQ.

In the event the DEQ finds that the certificate holder is not correcting damage created during construction in a satisfactory manner or that initial revegetation is not progressing satisfactorily, DEQ may determine the amount and disposition of all or a portion of the reclamation bond to correct any damage that has not been corrected by the certificate holder.

At the time the reclamation bond is released by DEQ, the certificate holder shall submit a reclamation bond. Pursuant to the certificate, portions of this bond or bonds may be held for five years, or until the department determines that revegetation adequately meet the requirements specified in the certificate and in ARM 17.20.1902(10).

In the event the department finds that revegetation has not attained the growth required after five years specified in ARM 17.20.1902(10), the department may find the certificate holder in substantive noncompliance with the terms of the certificate and may determine the amount and disposition of all or a portion of the bond or bonds to achieve satisfactory revegetation.

The STATE INSPECTOR or designee shall record the dates of inspection, areas inspected, and instances where construction activities are not in conformance with Environmental Specifications or terms and conditions of the Certificate of Compliance for the project. Inspection reports shall be submitted in a timely manner to the Owner's Liaison who will see that corrections are made or that such measures are implemented in a timely manner. When violations of the Certificate are identified, the STATE INSPECTOR shall report the violation in writing to the OWNER, who shall immediately take corrective action. If violations continue, penalties described in 75-20-408, MCA may be imposed.

APPENDIX G:
ALTERNATIVES CONSIDERED BUT DISMISSED BY MATL

APPENDIX G-1
SUMMARY OF MATL'S DISMISSED ALTERNATIVES AND ALIGNMENT SEGMENTS

Name of Alternatives or Segment	Location	Reasons for Not Carrying Forward
Old Primary – Segment (1)	Original Primary Alignment from Canadian Border to Cut Bank	This alignment was dropped because of its close proximity to two residences, many diagonal farmland crossings, and proximity to wells. This alignment was also dropped because of changes to the preferred Canadian border crossing, and because of limited right-of-way space due to a prairie pothole along Santa Rita Road.
Old Primary – Segment (2)	A subsequent segment revision of the Primary alignment with its border crossing farther west, connecting back to A1 approximately 8 miles to the south.	This segment was further modified (to what is shown as A3 on the map) and ultimately dropped. This change was based on a final revision to the preferred Canadian border crossing location to what is now shown on the proposed route. A2 was also dropped due to diagonal crossings of farmland/cropland and proximity to wells.
Old Primary – Segment (3)	A subsequent Primary Route segment revision altering A2, moving the Canadian border crossing slightly farther west. A3 connects back to A2 approximately 4 miles to the south of the Canadian border.	This segment of the Old Primary Route was further modified to what is now the proposed route as part of initial engineering/surveying in Spring '06 because it crossed wetland areas. This effort allowed for re-routing that better avoided wetlands and prairie potholes.
Old Primary – Segment (4)	Original Primary Route Segment – Camp Nine Road south to old Marias River Crossing	This segment was dropped because it did not make use of the available public lands near the Marias River crossing as is required under MFSA. Routing was modified to that of the proposed route to take advantage of these public lands (BLM).
Old Primary – Segment (5)	Original Primary Route Segment from south of the Marias River Crossing to Bullhead Road	This segment was dropped because it did not utilize available nearby rangeland and had a greater impact on croplands in this location. The proposed route better utilizes rangeland and has less impact on croplands.
Old Primary – Segment (6)	Original Primary Route Segment from Bullhead Creek to Burlington Northern Railroad	This segment was dropped due to many diagonal crossings of farmland/cropland. Routing was modified to that of the proposed route to minimize these impacts to agricultural lands and utilize available rangeland to a much greater extent.
Old Primary – Segment (7)	A subsequent Primary Route Segment 3-4 miles southwest of Conrad near Pondera Coulee.	This segment alternative was dropped due to the proximity of an occupied residence. This segment came within .2 miles to the east of a residence.
Old Primary – Segment (8)	Original Primary Route Segment 2-3 miles southwest of Conrad near Pondera Coulee.	This segment alternative was also dropped due to the proximity of an occupied residence. This segment came within .4 miles of a residence to the west.
Old Primary – Segment (9)	Original Primary Route Segment from two miles north of Brady to approximately three miles north of the Teton River	This segment was dropped to that of the proposed route in this location primarily to avoid impacts to six residences, and to lessen impacts to cropland. In particular this segment came within 0.5 mile of four residences north of Brady as well as within .5 mile of a school.

APPENDIX G-1
SUMMARY OF MATL'S DISMISSED ALTERNATIVES AND ALIGNMENT SEGMENTS

Name of Alternatives or Segment	Location	Reasons for Not Carrying Forward
Old Primary – Segment (9-south)	Original Primary Route Segment around the Teton River Crossing	This segment was dropped because it did not take advantage of nearby public lands (DNRC lands to the west) for the Teton River Crossing and because of probable cultural resources (tipi ring sites) on the northern bluffs of the Teton River in this specific location. The Teton River crossing was moved to the west in order to make use of available public lands and avoid potential cultural impacts, as well as to avoid mature riparian cottonwood forest.
Old Primary – Segment (10)	A subsequent Primary Route Segment that heads west from a point along the Current Primary Route south of Dutton, and continues 4-5 miles to the east where it connects with the Old Primary Route and continues two miles south.	This segment was dropped due to environmental and engineering constraints (slope stability issues) in constructing the line across Timber Coulee in this locale. In addition, this segment alternative did not resolve the goal of minimizing diagonal crossings of farmland to the extent of the current proposed route.
Old Primary – Segment (11)	Another subsequent Primary Route Segment starting several miles south of A10, that heads west ~7 miles to where it connects with the Old Primary Route	This segment was dropped because it crosses close to an existing range/farm near its eastern terminus. In addition, this segment alternative did not resolve the goal of minimizing diagonal crossings of farmland to the extent of the Current Primary Route.
Old Primary – Segment (12)	Original Alternative that followed east of the Great Falls Shooting Sports Complex	This segment conflicts with plans for expansion of the shooting sports complex, including plans for new and expanded buildings. Given this conflict, this segment was dropped in favor of the proposed route which is located west of the complex.
Old Alternative B Segment (1)	Original Alternative B from Canadian Border to where it connects with the Old Primary Route	Original Alternative B was modified and moved to the east to what is labeled as B2 to further avoid impacts to wetlands. In addition the original Alternative B also crossed within .25 mile of an occupied residence.
Old Alternative B Segment (2)	A subsequent Alternative B segment from Canadian Border to (new) Primary Route	This segment was dropped to avoid impacts to nearby residences and because there is no longer a Canadian Alternative or border crossing in this specific location. Alternative B now starts near Cut Bank and continues south to the Great Falls terminus.
Old Alternative B Segment (3)	Original Alternative B near Bullhead Creek	Various small sections of this segment were modified to what is now the proposed alignment to better avoid residences and irrigated croplands, avoid wetlands, as well as to improve the alignment of the route with property boundaries.
Old Alternative B Segment (4)	Original Alternative B from Dry Fork of the Marias south to South Pondera Coulee	Various small sections of this segment were modified to what is now the proposed alignment to better avoid residences and irrigated croplands, as well as to improve the alignment of the route with property boundaries.
Original Route C	From Canadian Border to Great Falls	Original Route which was modified to what is labeled as "Modified Route C" (C2) below to better avoid residences and passage across irrigated croplands, as well as to improve the alignment of the route with property boundaries.

APPENDIX G-1 SUMMARY OF MATL'S DISMISSED ALTERNATIVES AND ALIGNMENT SEGMENTS		
Name of Alternatives or Segment	**Location**	**Reasons for Not Carrying Forward**
Modified Route C	From Canadian Border to Great Falls	The entire C2 routing was dismissed because it was the longest of the considered routes and would be the most costly to design/construct. More estimated acreage would be required (access roads, staging areas, etc.) than the Primary Route (43 acres versus 37 acres). Alternative C also had relatively higher potential impacts to visual resources (comes within 1 mile of 160 developed residences as compared to 146 for the Preferred Route). C2 also had a larger impact to prime farmland (44 miles versus 33 miles) and farmland of statewide importance (47 miles versus 43 miles) as compared to the Primary Route. In addition, this route did not match up with the finalized secondary Canadian border crossing alternative (moved to the east).
August Version Route C	From Canadian Border to Great Falls	This route was prepared for the MFSA application. This route was dismissed because it is the longest alternative, would require more disturbance, and very close to or crosses four houses.
Old Western Great Falls Alternative	Original agency alternative that connects with Great Falls to the south and west of the Primary Alternative	This alternative was originally identified in order to provide another alternative in the in the southern quarter of the project area that made wide use of rangeland instead of cropped land. However, this alternative was dropped/modified to what is labeled as W2 in order to avoid crossing the existing WAPA line and improve its alignment with property and section line boundaries.
Modified Western Great Falls Alternative	Modified agency alternative that connects with Great Falls to the south and west of the Primary Alternative	After flyover verification, this revised W2 alternative was developed to minimize deflections and parallel the WAPA line more closely. This alternative has been retained because of its use of range land and pasture as well as its more extensive use of section and property boundaries.
Cut Bank to Shelby Alternative	Alternative that follows from Cut Bank to Shelby	This alternative was dismissed in the original application due to the need for extended diagonal traversing of agricultural lands. This alternative also had more engineering requirements and land requirements, and would have resulted in higher project costs.
Shelby South Alternative	Alternative that follows from Shelby south to Great Falls	This alternative was dismissed in the original application due to engineering constraints and the potential for disturbing many more cultural and archaeological sites near the Maris River breaks area south of Shelby.
Eastern Alternative	Alternative that follows Interstate 15 from Border to Shelby	This alternative was dismissed in the original application due to difficulties with the connection required via the Shelby South alternative described above.
NWE Alternative	Rebuilds the existing NWE 115-kV line.	This alternative was dismissed in the original application. This route was considered infeasible for economic reasons, and there would also have been a logistical difficulty in maintaining service while upgrading the existing line.

APPENDIX H:
LAND USE TYPES BY MILEPOST

The following tables provide a breakdown of land uses along the alignments analyzed in the EIS. Mile posts run from south to north. The analysis was done with GIS based on photo interpretation of the land uses.

TABLE H- 1
LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2

Mile Post Begin	Mile Post End	Distance (Miles)[1]	Land Use
0.000	0.827	0.827	**Non-Irrigated**
0.827	0.865	0.038	**ROW**
0.865	1.142	0.277	**Non-Irrigated**
1.142	1.179	0.036	**Riparian**
1.179	1.358	0.180	**Rangeland/Native**
1.358	1.836	0.477	**Non-Irrigated**
1.836	2.800	0.964	**ROW**
2.800	3.770	0.971	**Non-Irrigated**
3.770	3.798	0.028	**ROW**
3.798	3.930	0.132	**Rangeland/Native**
3.930	4.471	0.541	**Non-Irrigated**
4.471	5.000	0.528	**Rangeland/Native**
5.000	5.044	0.044	**ROW**
5.044	5.490	0.446	**Rangeland/Native**
5.490	5.503	0.014	**ROW**
5.503	5.647	0.144	**Rangeland/Native**
5.647	5.654	0.007	**ROW**
5.654	5.756	0.102	**Rangeland/Native**
5.756	5.769	0.013	**ROW**
5.769	6.140	0.371	**Rangeland/Native**
6.140	6.450	0.310	**Non-Irrigated**
6.450	6.922	0.472	**Rangeland/Native**
6.922	11.329	4.406	**Non-Irrigated**
11.329	11.358	0.029	**ROW**
11.358	15.098	3.740	**Non-Irrigated**
15.098	15.125	0.027	**Rangeland/Native**
15.125	15.503	0.378	**Non-Irrigated**
15.503	15.508	0.005	**ROW**
15.508	15.960	0.451	**Non-Irrigated**
15.960	15.962	0.003	**ROW**
15.962	16.720	0.758	**Non-Irrigated**
16.720	16.725	0.005	**ROW**
16.725	17.639	0.914	**Non-Irrigated**
17.639	17.799	0.160	**Rangeland/Native**
17.799	18.197	0.398	**Non-Irrigated**
18.197	18.625	0.428	**Rangeland/Native**
18.625	18.637	0.012	**ROW**
18.637	19.550	0.913	**Rangeland/Native**
19.550	19.569	0.019	**ROW**
19.569	19.644	0.075	**Rangeland/Native**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
19.644	19.730	0.085	**Non-Irrigated**
19.730	19.741	0.011	**ROW**
19.741	21.662	1.921	**Rangeland/Native**
21.662	22.034	0.372	**Non-Irrigated**
22.034	22.050	0.016	**ROW**
22.050	22.585	0.536	**Non-Irrigated**
22.585	23.329	0.744	**Rangeland/Native**
23.329	23.347	0.018	**ROW**
23.347	23.824	0.477	**Rangeland/Native**
23.824	24.340	0.516	**Non-Irrigated**
24.340	24.348	0.009	**ROW**
24.348	25.338	0.990	**Non-Irrigated**
25.338	25.406	0.067	**Rangeland/Native**
25.406	25.784	0.378	**Non-Irrigated**
25.784	25.881	0.097	**Rangeland/Native**
25.881	27.750	1.869	**Non-Irrigated**
27.750	27.774	0.025	**ROW**
27.774	28.710	0.936	**Non-Irrigated**
28.710	28.738	0.028	**Riparian**
28.738	29.656	0.918	**Non-Irrigated**
29.656	29.703	0.047	**Rangeland/Native**
29.703	29.752	0.048	**Non-Irrigated**
29.752	29.789	0.037	**ROW**
29.789	29.975	0.186	**Non-Irrigated**
29.975	30.072	0.097	**Rangeland/Native**
30.072	30.498	0.427	**Non-Irrigated**
30.498	30.561	0.063	**Rangeland/Native**
30.561	31.442	0.881	**Non-Irrigated**
31.442	31.476	0.034	**Rangeland/Native**
31.476	31.492	0.016	**Riparian**
31.492	31.528	0.037	**Rangeland/Native**
31.528	31.719	0.191	**Non-Irrigated**
31.719	31.729	0.010	**ROW**
31.729	31.750	0.020	**Non-Irrigated**
31.750	31.756	0.007	**ROW**
31.756	31.934	0.178	**Non-Irrigated**
31.934	31.954	0.020	**Rangeland/Native**
31.954	33.588	1.634	**Non-Irrigated**
33.588	33.754	0.166	**Riparian**
33.754	34.135	0.381	**Non-Irrigated**
34.135	34.152	0.017	**ROW**
34.152	35.342	1.190	**Non-Irrigated**
35.342	35.562	0.220	**Rangeland/Native**
35.562	35.594	0.031	**Riparian**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
35.594	35.678	0.084	**Rangeland/Native**
35.678	35.838	0.160	**Non-Irrigated**
35.838	35.848	0.011	**Rangeland/Native**
35.848	36.097	0.249	**Non-Irrigated**
36.097	36.102	0.005	**ROW**
36.102	36.339	0.237	**Non-Irrigated**
36.339	36.388	0.049	**Rangeland/Native**
36.388	36.395	0.007	**Riparian**
36.395	36.561	0.166	**Rangeland/Native**
36.561	37.023	0.463	**Non-Irrigated**
37.023	37.237	0.214	**Rangeland/Native**
37.237	37.339	0.102	**Non-Irrigated**
37.339	37.369	0.030	**Rangeland/Native**
37.369	37.443	0.074	**Riparian**
37.443	37.452	0.010	**Rangeland/Native**
37.452	37.985	0.532	**Non-Irrigated**
37.985	38.335	0.350	**Rangeland/Native**
38.335	38.620	0.286	**Non-Irrigated**
38.620	39.053	0.432	**Rangeland/Native**
39.053	39.208	0.155	**Non-Irrigated**
39.208	39.275	0.067	**Rangeland/Native**
39.275	39.522	0.247	**Non-Irrigated**
39.522	39.838	0.317	**Rangeland/Native**
39.838	40.866	1.028	**Non-Irrigated**
40.866	40.881	0.015	**ROW**
40.881	41.158	0.277	**Non-Irrigated**
41.158	41.173	0.015	**ROW**
41.173	45.128	3.954	**Non-Irrigated**
45.128	45.141	0.013	**ROW**
45.141	45.250	0.109	**Non-Irrigated**
45.250	45.269	0.019	**ROW**
45.269	47.518	2.249	**Non-Irrigated**
47.518	47.543	0.025	**Riparian**
47.543	48.056	0.513	**Non-Irrigated**
48.056	48.142	0.087	**Rangeland/Native**
48.142	48.451	0.309	**Non-Irrigated**
48.451	48.465	0.013	**Riparian**
48.465	48.476	0.011	**ROW**
48.476	48.490	0.014	**Riparian**
48.490	48.499	0.009	**ROW**
48.499	49.161	0.662	**Non-Irrigated**
49.161	49.173	0.012	**ROW**
49.173	50.864	1.691	**Non-Irrigated**
50.864	50.885	0.020	**ROW**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
50.885	51.120	0.235	**Non-Irrigated**
51.120	51.170	0.051	**Riparian**
51.170	51.759	0.589	**Non-Irrigated**
51.759	51.833	0.074	**Rangeland/Native**
51.833	52.229	0.396	**Non-Irrigated**
52.229	52.249	0.020	**ROW**
52.249	52.748	0.499	**Non-Irrigated**
52.748	52.820	0.071	**Rangeland/Native**
52.820	52.883	0.064	**ROW**
52.883	53.043	0.160	**Rangeland/Native**
53.043	53.331	0.288	**Non-Irrigated**
53.331	53.723	0.392	**Rangeland/Native**
53.723	53.774	0.051	**Non-Irrigated**
53.774	53.803	0.028	**Rangeland/Native**
53.803	53.870	0.068	**Non-Irrigated**
53.870	53.912	0.042	**Riparian**
53.912	53.936	0.024	**Non-Irrigated**
53.936	53.983	0.046	**Riparian**
53.983	55.399	1.416	**Non-Irrigated**
55.399	55.425	0.026	**ROW**
55.425	55.906	0.481	**Non-Irrigated**
55.906	56.305	0.399	**Rangeland/Native**
56.305	56.347	0.042	**ROW**
56.347	56.536	0.189	**Non-Irrigated**
56.536	56.815	0.279	**Rangeland/Native**
56.815	56.857	0.042	**Non-Irrigated**
56.857	56.988	0.131	**Rangeland/Native**
56.988	57.355	0.367	**Non-Irrigated**
57.355	57.548	0.192	**Rangeland/Native**
57.548	57.669	0.121	**Non-Irrigated**
57.669	57.791	0.122	**Rangeland/Native**
57.791	57.833	0.042	**ROW**
57.833	57.898	0.065	**Non-Irrigated**
57.898	57.998	0.100	**Rangeland/Native**
57.998	58.032	0.033	**Non-Irrigated**
58.032	58.147	0.115	**Rangeland/Native**
58.147	58.437	0.290	**Non-Irrigated**
58.437	58.455	0.019	**Rangeland/Native**
58.455	58.470	0.015	**ROW**
58.470	58.547	0.077	**Rangeland/Native**
58.547	58.764	0.217	**Non-Irrigated**
58.764	58.800	0.036	**Rangeland/Native**
58.800	59.819	1.019	**Non-Irrigated**
59.819	59.840	0.021	**ROW**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
59.840	60.607	0.767	**Non-Irrigated**
60.607	60.642	0.036	**ROW**
60.642	60.779	0.136	**Non-Irrigated**
60.779	60.925	0.146	**Rangeland/Native**
60.925	61.538	0.614	**Non-Irrigated**
61.538	61.559	0.021	**ROW**
61.559	62.296	0.737	**Non-Irrigated**
62.296	62.317	0.021	**Rangeland/Native**
62.317	62.334	0.018	**Riparian**
62.334	62.385	0.051	**Rangeland/Native**
62.385	62.928	0.543	**Non-Irrigated**
62.928	62.939	0.011	**ROW**
62.939	63.747	0.808	**Non-Irrigated**
63.747	63.759	0.011	**ROW**
63.759	64.042	0.284	**Non-Irrigated**
64.042	64.052	0.010	**ROW**
64.052	64.316	0.264	**Non-Irrigated**
64.316	65.448	1.132	**Rangeland/Native**
65.448	65.991	0.543	**Non-Irrigated**
65.991	66.025	0.034	**ROW**
66.025	66.431	0.405	**Non-Irrigated**
66.431	66.989	0.558	**Rangeland/Native**
66.989	67.469	0.480	**Non-Irrigated**
67.469	67.478	0.008	**ROW**
67.478	68.135	0.658	**Non-Irrigated**
68.135	68.150	0.014	**Water**
68.150	69.55	1.400	**Non-Irrigated**
69.550	69.565	0.015	**Rangeland/Native**
69.565	69.582	0.016	**ROW**
69.582	69.796	0.214	**Irrigated**
69.796	69.820	0.024	**ROW**
69.820	70.181	0.361	**Irrigated**
70.181	70.188	0.007	**Water**
70.188	70.727	0.538	**Irrigated**
70.727	70.741	0.015	**Water**
70.741	71.569	0.828	**Non-Irrigated**
71.569	71.581	0.013	**ROW**
71.581	71.980	0.398	**Non-Irrigated**
71.980	72.002	0.022	**Riparian**
72.002	72.660	0.658	**Non-Irrigated**
72.660	72.681	0.021	**Riparian**
72.681	72.694	0.013	**Rangeland/Native**
72.694	72.702	0.007	**ROW**
72.702	72.784	0.082	**Rangeland/Native**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
72.784	72.808	0.025	**Riparian**
72.808	72.899	0.090	**Rangeland/Native**
72.899	73.148	0.249	**Non-Irrigated**
73.148	73.319	0.171	**Irrigated**
73.319	73.559	0.240	**Rangeland/Native**
73.559	73.576	0.017	**Water**
73.576	73.661	0.085	**Rangeland/Native**
73.661	73.700	0.039	**ROW**
73.700	73.897	0.197	**Non-Irrigated**
73.897	74.221	0.325	**Rangeland/Native**
74.221	74.917	0.695	**Non-Irrigated**
74.917	74.934	0.017	**Rangeland/Native**
74.934	75.789	0.855	**Non-Irrigated**
75.789	75.847	0.058	**Rangeland/Native**
75.847	76.590	0.743	**Non-Irrigated**
76.590	76.665	0.076	**Rangeland/Native**
76.665	76.868	0.203	**Non-Irrigated**
76.868	77.015	0.147	**Rangeland/Native**
77.015	77.045	0.030	**Non-Irrigated**
77.045	77.195	0.150	**Rangeland/Native**
77.195	77.289	0.094	**Non-Irrigated**
77.289	77.665	0.376	**Rangeland/Native**
77.665	77.740	0.075	**Non-Irrigated**
77.740	77.805	0.065	**Rangeland/Native**
77.805	77.866	0.061	**Non-Irrigated**
77.866	77.936	0.069	**Rangeland/Native**
77.936	77.979	0.043	**Non-Irrigated**
77.979	78.000	0.021	**Rangeland/Native**
78.000	78.065	0.065	**Non-Irrigated**
78.065	78.258	0.193	**Rangeland/Native**
78.258	78.371	0.113	**Non-Irrigated**
78.371	79.505	1.134	**Rangeland/Native**
79.505	79.746	0.242	**Non-Irrigated**
79.746	79.786	0.040	**Rangeland/Native**
79.786	79.794	0.008	**Riparian**
79.794	80.203	0.409	**Non-Irrigated**
80.203	80.894	0.692	**Rangeland/Native**
80.894	80.911	0.016	**ROW**
80.911	80.960	0.049	**Rangeland/Native**
80.960	80.968	0.009	**ROW**
80.968	81.189	0.221	**Rangeland/Native**
81.189	81.200	0.011	**Riparian**
81.200	81.340	0.140	**Rangeland/Native**
81.340	81.513	0.173	**Non-Irrigated**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
81.513	81.521	0.008	**ROW**
81.521	81.616	0.095	**Non-Irrigated**
81.616	81.624	0.008	**Water**
81.624	82.402	0.778	**Non-Irrigated**
82.402	82.424	0.022	**Rangeland/Native**
82.424	82.737	0.313	**Non-Irrigated**
82.737	82.808	0.071	**Rangeland/Native**
82.808	83.089	0.281	**Non-Irrigated**
83.089	83.094	0.005	**ROW**
83.094	84.288	1.195	**Non-Irrigated**
84.288	84.446	0.158	**Rangeland/Native**
84.446	84.468	0.022	**Non-Irrigated**
84.468	84.649	0.181	**Rangeland/Native**
84.649	84.802	0.154	**Non-Irrigated**
84.802	84.916	0.114	**Rangeland/Native**
84.916	85.218	0.302	**Non-Irrigated**
85.218	85.226	0.008	**ROW**
85.226	85.321	0.095	**Non-Irrigated**
85.321	85.460	0.138	**Irrigated**
85.460	85.823	0.364	**Rangeland/Native**
85.823	86.903	1.080	**Non-Irrigated**
86.903	86.909	0.006	**ROW**
86.909	87.508	0.599	**Non-Irrigated**
87.508	87.513	0.006	**ROW**
87.513	88.185	0.671	**Non-Irrigated**
88.185	88.228	0.044	**Rangeland/Native**
88.228	88.416	0.187	**Non-Irrigated**
88.416	89.181	0.766	**Rangeland/Native**
89.181	89.190	0.008	**ROW**
89.190	89.359	0.169	**Rangeland/Native**
89.359	89.371	0.012	**ROW**
89.371	89.745	0.375	**Rangeland/Native**
89.745	89.764	0.019	**Riparian**
89.764	89.804	0.040	**Water**
89.804	89.822	0.018	**Riparian**
89.822	89.992	0.170	**Rangeland/Native**
89.992	90.165	0.173	**Non-Irrigated**
90.165	90.219	0.054	**Rangeland/Native**
90.219	90.367	0.148	**Non-Irrigated**
90.367	90.739	0.372	**Rangeland/Native**
90.739	91.124	0.385	**Non-Irrigated**
91.124	91.137	0.013	**ROW**
91.137	91.692	0.555	**Non-Irrigated**
91.692	91.696	0.004	**ROW**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
91.696	91.940	0.244	**Non-Irrigated**
91.940	92.198	0.258	**Rangeland/Native**
92.198	92.575	0.378	**Non-Irrigated**
92.575	92.582	0.006	**ROW**
92.582	92.809	0.227	**Non-Irrigated**
92.809	92.813	0.005	**ROW**
92.813	93.913	1.100	**Rangeland/Native**
93.913	93.933	0.020	**ROW**
93.933	94.101	0.169	**Rangeland/Native**
94.101	94.138	0.037	**ROW**
94.138	94.920	0.782	**Rangeland/Native**
94.920	95.059	0.139	**Non-Irrigated**
95.059	95.828	0.769	**Rangeland/Native**
95.828	95.836	0.008	**Riparian**
95.836	96.061	0.225	**Rangeland/Native**
96.061	96.077	0.016	**Riparian**
96.077	97.026	0.949	**Rangeland/Native**
97.026	97.038	0.012	**Riparian**
97.038	98.837	1.799	**Rangeland/Native**
98.837	98.840	0.003	**ROW**
98.840	99.529	0.689	**Rangeland/Native**
99.529	99.532	0.003	**ROW**
99.532	99.893	0.361	**Non-Irrigated**
99.893	99.974	0.081	**ROW**
99.974	100.159	0.185	**Non-Irrigated**
100.159	100.164	0.005	**ROW**
100.164	101.103	0.939	**Non-Irrigated**
101.103	101.115	0.011	**ROW**
101.115	102.349	1.234	**Non-Irrigated**
102.349	102.354	0.005	**ROW**
102.354	102.518	0.165	**Non-Irrigated**
102.518	102.673	0.155	**Riparian**
102.673	102.942	0.269	**Non-Irrigated**
102.942	103.051	0.109	**Riparian**
103.051	103.565	0.514	**Non-Irrigated**
103.565	103.576	0.011	**ROW**
103.576	104.665	1.089	**Non-Irrigated**
104.665	104.672	0.007	**ROW**
104.672	108.203	3.530	**Non-Irrigated**
108.203	108.213	0.010	**ROW**
108.213	110.405	2.192	**Non-Irrigated**
110.405	110.434	0.029	**Riparian**
110.434	110.716	0.282	**Non-Irrigated**
110.716	110.735	0.019	**ROW**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
110.735	111.698	0.963	**Non-Irrigated**
111.698	111.836	0.138	**Rangeland/Native**
111.836	111.858	0.021	**ROW**
111.858	112.900	1.042	**Rangeland/Native**
112.900	113.374	0.474	**Non-Irrigated**
113.374	113.400	0.026	**ROW**
113.400	114.031	0.631	**Non-Irrigated**
114.031	114.082	0.051	**Rangeland/Native**
114.082	114.641	0.559	**Non-Irrigated**
114.641	114.898	0.257	**Rangeland/Native**
114.898	114.907	0.009	**ROW**
114.907	116.412	1.505	**Non-Irrigated**
116.412	116.417	0.004	**ROW**
116.417	117.304	0.888	**Non-Irrigated**
117.304	117.321	0.017	**Riparian**
117.321	117.643	0.321	**Non-Irrigated**
117.643	117.779	0.136	**Riparian**
117.779	117.904	0.125	**Rangeland/Native**
117.904	117.919	0.015	**ROW**
117.919	118.334	0.415	**Non-Irrigated**
118.334	118.676	0.342	**Rangeland/Native**
118.676	118.914	0.238	**Non-Irrigated**
118.914	118.917	0.003	**ROW**
118.917	120.155	1.238	**Non-Irrigated**
120.155	120.172	0.017	**ROW**
120.172	120.715	0.543	**Non-Irrigated**
120.715	120.748	0.033	**Riparian**
120.748	121.663	0.915	**Non-Irrigated**
121.663	124.585	2.923	**Rangeland/Native**
124.585	125.515	0.929	**Non-Irrigated**
125.515	125.532	0.018	**ROW**
125.532	127.454	1.922	**Non-Irrigated**
127.454	127.491	0.037	**Rangeland/Native**
127.491	127.833	0.342	**Non-Irrigated**
127.833	127.852	0.020	**Riparian**
127.852	127.868	0.016	**Non-Irrigated**
127.868	127.904	0.036	**Riparian**
127.904	128.020	0.116	**Non-Irrigated**
128.020	128.030	0.011	**ROW**
128.030	128.145	0.115	**Non-Irrigated**
128.145	128.166	0.020	**Rangeland/Native**
128.166	128.226	0.060	**Riparian**
128.226	128.303	0.077	**Rangeland/Native**
128.303	128.355	0.052	**Riparian**

TABLE H- 1 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 2			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
128.355	128.383	0.029	**Rangeland/Native**
128.383	129.349	0.966	**Non-Irrigated**
129.349	129.363	0.014	**Rangeland/Native**
129.363	129.883	0.520	**Non-Irrigated**
0.000	129.883	129.883	**Total**

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

DEQ has developed alternative alignments for Alternative 2 to reduce some of the effects on farming. Table H-2 through Table H-12 indicate the mileposts in Alternative 2 and the land use associated with the potential realignment.

TABLE H- 2
DIAMOND VALLEY MIDDLE
(REPLACES ALTERNATIVE 2 MILEPOST 30.519 TO 36.734)

Mile Post Begin	Mile Post End	Distance (Miles)[1]	Land Use
0.000	0.037	0.037	**Rangeland/Native**
0.037	0.919	0.882	**Non-Irrigated**
0.919	0.952	0.033	**Rangeland/Native**
0.952	0.963	0.011	**Riparian**
0.963	1.000	0.037	**Rangeland/Native**
1.000	1.195	0.194	**Non-Irrigated**
1.195	1.205	0.010	**ROW**
1.205	1.215	0.011	**Non-Irrigated**
1.215	1.231	0.016	**ROW**
1.231	4.220	2.989	**Non-Irrigated**
4.220	4.303	0.084	**Riparian**
4.303	5.186	0.883	**Non-Irrigated**
5.186	5.193	0.006	**ROW**
5.193	6.101	0.909	**Non-Irrigated**
6.101	6.518	0.416	**Rangeland/Native**
6.518	7.177	0.659	**Non-Irrigated**
7.177	7.399	0.222	**Rangeland/Native**
7.399	7.571	0.172	**Non-Irrigated**
0.000	7.571	7.571	**Total**

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 3 DIAMOND VALLEY NORTH (REPLACES ALTERNATIVE 2 MILEPOST 30.519 TO 36.734)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.040	0.040	Rangeland/Native
0.040	0.922	0.882	Non-Irrigated
0.922	0.957	0.034	Rangeland/Native
0.957	0.967	0.010	Riparian
0.967	1.006	0.039	Rangeland/Native
1.006	1.200	0.194	Non-Irrigated
1.200	1.213	0.013	ROW
1.213	1.441	0.228	Non-Irrigated
1.441	1.485	0.044	Rangeland/Native
1.485	2.215	0.729	Non-Irrigated
2.215	2.221	0.007	ROW
2.221	3.209	0.988	Non-Irrigated
3.209	3.224	0.015	ROW
3.224	3.764	0.540	Non-Irrigated
3.764	3.842	0.077	Rangeland/Native
3.842	3.847	0.005	ROW
3.847	3.990	0.143	Non-Irrigated
3.990	4.088	0.099	Rangeland/Native
4.088	5.746	1.658	Non-Irrigated
5.746	5.753	0.006	Rangeland/Native
5.753	5.764	0.011	ROW
5.764	6.324	0.560	Non-Irrigated
6.324	6.681	0.358	Rangeland/Native
6.681	6.687	0.006	Riparian
6.687	6.839	0.151	Rangeland/Native
6.839	7.317	0.478	Non-Irrigated
7.317	7.321	0.005	ROW
7.321	7.387	0.065	Non-Irrigated
7.387	7.680	0.294	Rangeland/Native
7.680	7.875	0.194	Non-Irrigated
0	7.875	7.875	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 4 DIAMOND VALLEY SOUTH (REPLACES ALTERNATIVE 2 MILEPOST 30.519 TO 36.734)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.025	0.025	Rangeland/Native
0.025	0.333	0.309	Non-Irrigated
0.333	0.428	0.095	Rangeland/Native
0.428	0.448	0.020	Riparian
0.448	0.616	0.168	Rangeland/Native
0.616	2.381	1.765	Non-Irrigated
2.381	2.482	0.101	Rangeland/Native
2.482	2.577	0.217	Non-Irrigated
2.577	2.699	0.217	Rangeland/Native
2.699	2.737	0.037	Non-Irrigated
2.737	2.746	0.010	Riparian
2.746	2.761	0.015	Non-Irrigated
2.761	3.070	0.309	Rangeland/Native
3.070	3.081	0.010	ROW
3.081	3.577	0.496	Rangeland/Native
3.577	5.032	1.455	Non-Irrigated
5.032	5.045	0.013	ROW
5.045	5.882	0.837	Non-Irrigated
5.882	6.199	0.317	Rangeland/Native
6.199	6.282	0.083	Non-Irrigated
6.282	6.292	0.010	Rangeland/Native
6.292	6.297	0.005	Riparian
6.297	6.322	0.025	Rangeland/Native
6.322	7.041	0.719	Non-Irrigated
7.041	7.044	0.003	ROW
7.044	7.178	0.134	Non-Irrigated
7.178	7.266	0.087	Rangeland/Native
7.266	7.269	0.004	Riparian
7.269	7.543	0.273	Rangeland/Native
7.543	7.686	0.144	Non-Irrigated
7.686	7.890	0.204	Rangeland/Native
7.890	8.028	0.138	Non-Irrigated
0.000	8.028	8.245	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 5 TETON RIVER CROSSING (REPLACES ALTERNATIVE 2 MILEPOST 37.240 TO 37.984)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.170	0.170	Non-Irrigated
0.170	0.179	0.009	Rangeland/Native
0.179	0.190	0.011	Forest Total
0.190	0.263	0.073	Riparian
0.263	0.275	0.012	Water
0.275	0.285	0.010	Riparian
0.285	0.892	0.606	Rangeland/Native
0.000	0.892	0.892	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 6 SOUTHEAST OF CONRAD (REPLACES ALTERNATIVE 2 MILEPOST 53.723 TO 56.629)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.054	0.054	Non-Irrigated
0.054	0.077	0.023	Rangeland/Native
0.077	0.168	0.091	Non-Irrigated
0.168	0.181	0.013	Rangeland/Native
0.181	0.250	0.069	Non-Irrigated
0.250	0.275	0.025	Riparian
0.275	0.637	0.362	Non-Irrigated
0.637	0.671	0.035	Rangeland/Native
0.671	0.687	0.015	Non-Irrigated
0.687	0.738	0.051	Rangeland/Native
0.738	0.746	0.008	Non-Irrigated
0.746	1.062	0.316	Rangeland/Native
1.062	1.096	0.034	ROW
1.096	1.312	0.216	Rangeland/Native
1.312	1.525	0.214	Non-Irrigated
1.525	2.010	0.484	Rangeland/Native
2.010	2.073	0.063	Non-Irrigated
2.073	2.645	0.572	Rangeland/Native
2.645	2.693	0.048	ROW
2.693	2.893	0.201	Non-Irrigated
2.893	2.987	0.093	Rangeland/Native
0.000	2.987	2.987	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 7 WEST OF CONRAD (REPLACES ALTERNATIVE 2 MILEPOST 62.307 TO 63.755)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.638	0.638	Rangeland/Native
0.638	0.641	0.004	ROW
0.641	1.210	0.568	Non-Irrigated
1.210	1.225	0.015	ROW
1.225	1.954	0.729	Non-Irrigated
0.000	1.954	1.954	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 8 NORTHWEST OF CONRAD (REPLACES ALTERNATIVE 2 MILEPOST 66.735 TO 69.505)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.283	0.283	Rangeland/Native
0.283	0.763	0.481	Non-Irrigated
0.763	0.774	0.010	ROW
0.774	1.147	0.374	Non-Irrigated
1.147	1.452	0.305	Rangeland/Native
1.452	1.465	0.012	ROW
1.465	1.536	0.071	Rangeland/Native
1.536	1.786	0.250	Non-Irrigated
1.786	2.540	0.754	Rangeland/Native
2.540	2.891	0.350	Non-Irrigated
0	2.891	2.891	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 9 BELGIAN HILL (REPLACES ALTERNATIVE 2 MILEPOST 71.237 TO 73.661)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.432	0.432	Non-Irrigated
0.432	0.444	0.012	ROW
0.444	0.740	0.296	Non-Irrigated
0.740	0.749	0.009	Water
0.749	0.767	0.018	Rangeland/Native
0.767	1.401	0.634	Non-Irrigated
1.401	1.422	0.021	Riparian
1.422	1.470	0.048	Non-Irrigated
1.470	1.480	0.010	ROW
1.480	1.573	0.093	Non-Irrigated
1.573	1.693	0.120	Rangeland/Native
1.693	1.932	0.239	Non-Irrigated
1.932	2.130	0.198	Irrigation Total
2.130	2.236	0.106	Rangeland/Native
2.236	2.244	0.009	Water
2.244	2.548	0.303	Rangeland/Native
0.000	2.548	2.548	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 10 BULLHEAD COULEE SOUTH (REPLACES ALTERNATIVE 2 MILEPOST 76.374 TO 77.740)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.185	0.185	Non-Irrigated
0.185	0.415	0.230	Rangeland/Native
0.415	1.138	0.724	Non-Irrigated
1.138	1.652	0.514	Rangeland/Native
1.652	1.714	0.062	Non-Irrigated
0.000	1.714	1.714	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 11 BULLHEAD COULEE NORTH (REPLACES ALTERNATIVE 2 MILEPOST 82.089 TO 83.709)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.998	0.998	Non-Irrigated
0.998	1.004	0.006	ROW
1.004	1.646	0.643	Non-Irrigated
0.000	1.646	1.646	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 12 SOUTH OF CUT BANK (REPLACES ALTERNATIVE 2 MILEPOST 97.227 TO 99.532)			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.739	0.739	Rangeland/Native
0.739	0.745	0.006	ROW
0.745	1.513	0.768	Rangeland/Native
1.513	1.519	0.006	ROW
1.519	2.405	0.886	Rangeland/Native
2.405	2.411	0.006	ROW
2.411	2.447	0.036	Rangeland/Native
2.447	2.455	0.008	ROW
0.000	2.455	2.455	Total

[1] Subtracting the beginning miles from the ending miles does not necessarily equal the total miles displayed due to rounding.

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.040	0.040	Non-Irrigated
0.040	0.568	0.527	Rangeland/Native
0.568	0.586	0.019	Riparian
0.586	0.650	0.064	Rangeland/Native
0.650	0.654	0.004	Riparian
0.654	0.670	0.016	Rangeland/Native
0.670	0.673	0.002	ROW
0.673	0.694	0.021	Rangeland/Native
0.694	0.697	0.003	ROW
0.697	0.733	0.037	Rangeland/Native
0.733	0.739	0.006	ROW
0.739	0.755	0.016	Rangeland/Native
0.755	0.774	0.018	Non-Irrigated
0.774	0.783	0.009	Rangeland/Native
0.783	0.925	0.142	ROW
0.925	2.312	1.387	Non-Irrigated
2.312	2.339	0.027	ROW
2.339	3.310	0.971	Non-Irrigated
3.310	3.338	0.028	ROW
3.338	3.465	0.128	Rangeland/Native
3.465	4.008	0.543	Non-Irrigated
4.008	4.540	0.532	Rangeland/Native
4.540	4.583	0.043	ROW
4.583	5.029	0.446	Rangeland/Native
5.029	5.042	0.014	ROW
5.042	5.186	0.144	Rangeland/Native
5.186	5.193	0.007	ROW

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
5.193	5.296	0.102	Rangeland/Native
5.296	5.308	0.013	ROW
5.308	5.677	0.369	Rangeland/Native
5.677	5.989	0.312	Non-Irrigated
5.989	6.464	0.475	Rangeland/Native
6.464	10.741	4.278	Non-Irrigated
10.741	10.762	0.020	ROW
10.762	14.869	4.107	Non-Irrigated
14.869	14.888	0.019	ROW
14.888	19.022	4.134	Non-Irrigated
19.022	19.102	0.080	Rangeland/Native
19.102	19.256	0.155	Non-Irrigated
19.256	19.268	0.012	ROW
19.268	19.481	0.213	Non-Irrigated
19.481	19.510	0.028	Rangeland/Native
19.510	20.914	1.405	Non-Irrigated
20.914	20.980	0.066	Rangeland/Native
20.980	21.060	0.080	Riparian
21.060	21.119	0.058	Rangeland/Native
21.119	21.772	0.653	Non-Irrigated
21.772	21.837	0.066	Rangeland/Native
21.837	21.885	0.048	Riparian
21.885	22.159	0.274	Rangeland/Native
22.159	22.801	0.642	Non-Irrigated
22.801	22.807	0.006	ROW
22.807	23.362	0.555	Non-Irrigated
23.362	23.379	0.017	Rangeland/Native
23.379	23.664	0.285	Non-Irrigated
23.664	23.678	0.014	ROW
23.678	23.733	0.055	Rangeland/Native
23.733	23.769	0.035	Riparian
23.769	23.883	0.115	Rangeland/Native
23.883	24.511	0.627	Non-Irrigated
24.511	24.542	0.031	ROW
24.542	24.819	0.277	Non-Irrigated
24.819	24.864	0.046	Riparian
24.864	25.128	0.264	Non-Irrigated
25.128	25.140	0.011	ROW
25.140	26.315	1.175	Non-Irrigated
26.315	26.383	0.068	Rangeland/Native
26.383	26.398	0.015	Riparian
26.398	26.410	0.012	Rangeland/Native
26.410	26.770	0.360	Non-Irrigated
26.770	26.777	0.007	ROW

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
26.777	27.620	0.843	Non-Irrigated
27.620	27.638	0.018	ROW
27.638	27.820	0.182	Non-Irrigated
27.820	27.827	0.007	ROW
27.827	28.365	0.538	Non-Irrigated
28.365	28.389	0.024	Riparian
28.389	28.725	0.336	Non-Irrigated
28.725	28.742	0.017	Riparian
28.742	28.986	0.244	Non-Irrigated
28.986	28.997	0.011	ROW
28.997	30.349	1.352	Non-Irrigated
30.349	30.363	0.014	ROW
30.363	30.834	0.472	Non-Irrigated
30.834	30.869	0.035	Riparian
30.869	31.699	0.830	Non-Irrigated
31.699	31.711	0.012	ROW
31.711	32.241	0.529	Non-Irrigated
32.241	32.266	0.026	Rangeland/Native
32.266	32.304	0.038	Non-Irrigated
32.304	32.454	0.150	Rangeland/Native
32.454	32.470	0.015	Riparian
32.470	32.717	0.248	Rangeland/Native
32.717	33.010	0.292	Non-Irrigated
33.010	33.021	0.011	ROW
33.021	33.093	0.072	Non-Irrigated
33.093	33.723	0.630	Rangeland/Native
33.723	33.828	0.105	Riparian
33.828	33.862	0.034	Forest
33.862	34.097	0.235	Rangeland/Native
34.097	36.462	2.366	Non-Irrigated
36.462	36.473	0.010	ROW
36.473	36.890	0.417	Non-Irrigated
36.890	36.903	0.014	ROW
36.903	38.477	1.574	Non-Irrigated
38.477	38.492	0.015	ROW
38.492	41.334	2.841	Non-Irrigated
41.334	41.355	0.022	ROW
41.355	42.421	1.066	Non-Irrigated
42.421	42.436	0.015	ROW
42.436	44.327	1.891	Non-Irrigated
44.327	44.344	0.017	Riparian
44.344	44.627	0.284	Non-Irrigated
44.627	44.663	0.035	Rangeland/Native
44.663	44.759	0.096	Non-Irrigated

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
44.759	44.770	0.011	ROW
44.770	45.017	0.247	Non-Irrigated
45.017	45.032	0.015	ROW
45.032	45.188	0.156	Non-Irrigated
45.188	45.199	0.010	ROW
45.199	45.953	0.754	Non-Irrigated
45.953	45.968	0.015	ROW
45.968	47.526	1.558	Non-Irrigated
47.526	47.543	0.017	ROW
47.543	47.785	0.242	Non-Irrigated
47.785	47.865	0.079	Rangeland/Native
47.865	47.905	0.040	Riparian
47.905	47.929	0.024	Water
47.929	48.144	0.216	Non-Irrigated
48.144	48.362	0.217	Agriculture
48.362	48.513	0.151	Rangeland/Native
48.513	48.533	0.020	Riparian
48.533	48.994	0.461	Non-Irrigated
48.994	49.015	0.021	ROW
49.015	49.321	0.307	Non-Irrigated
49.321	49.505	0.184	Rangeland/Native
49.505	49.542	0.037	Riparian
49.542	49.690	0.147	Rangeland/Native
49.690	49.724	0.035	Riparian
49.724	49.755	0.031	Rangeland/Native
49.755	49.773	0.017	Riparian
49.773	50.053	0.280	Non-Irrigated
50.053	50.173	0.120	ROW
50.173	50.222	0.049	Non-Irrigated
50.222	50.238	0.016	Rangeland/Native
50.238	50.288	0.050	Non-Irrigated
50.288	50.335	0.046	Rangeland/Native
50.335	50.434	0.099	Non-Irrigated
50.434	50.463	0.029	Rangeland/Native
50.463	50.733	0.270	Non-Irrigated
50.733	50.811	0.078	Rangeland/Native
50.811	51.996	1.186	Non-Irrigated
51.996	52.018	0.022	ROW
52.018	52.522	0.504	Non-Irrigated
52.522	52.531	0.009	Rangeland/Native
52.531	52.536	0.006	ROW
52.536	52.871	0.335	Rangeland/Native
52.871	52.906	0.035	ROW
52.906	53.081	0.175	Non-Irrigated

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
53.081	53.394	0.313	Rangeland/Native
53.394	53.534	0.139	Non-Irrigated
53.534	53.574	0.040	Rangeland/Native
53.574	53.920	0.346	Non-Irrigated
53.920	53.932	0.012	ROW
53.932	54.045	0.112	Rangeland/Native
54.045	54.162	0.118	Non-Irrigated
54.162	54.209	0.047	Rangeland/Native
54.209	54.216	0.007	ROW
54.216	54.236	0.020	Rangeland/Native
54.236	54.290	0.054	Non-Irrigated
54.290	54.376	0.087	Rangeland/Native
54.376	55.640	1.264	Non-Irrigated
55.640	55.657	0.017	ROW
55.657	56.997	1.340	Non-Irrigated
56.997	57.016	0.019	ROW
57.016	57.170	0.154	Non-Irrigated
57.170	57.179	0.010	ROW
57.179	57.224	0.044	Non-Irrigated
57.224	57.262	0.038	Residential
57.262	57.332	0.070	ROW
57.332	58.006	0.674	Non-Irrigated
58.006	58.097	0.091	Rangeland/Native
58.097	58.122	0.024	Riparian
58.122	58.151	0.029	Water
58.151	58.181	0.031	Riparian
58.181	58.310	0.129	Non-Irrigated
58.310	58.393	0.083	Rangeland/Native
58.393	58.478	0.085	Riparian
58.478	58.516	0.038	Rangeland/Native
58.516	58.686	0.170	Non-Irrigated
58.686	58.689	0.003	Water
58.689	58.954	0.264	Irrigated
58.954	58.962	0.008	ROW
58.962	59.925	0.963	Irrigated
59.925	59.936	0.011	ROW
59.936	59.981	0.044	Non-Irrigated
59.981	59.992	0.012	ROW
59.992	60.843	0.850	Non-Irrigated
60.843	61.611	0.768	Rangeland/Native
61.611	62.234	0.624	Non-Irrigated
62.234	62.243	0.008	ROW
62.243	62.393	0.150	Rangeland/Native
62.393	62.408	0.015	Riparian

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
62.408	62.454	0.046	Rangeland/Native
62.454	62.563	0.109	Riparian
62.563	62.631	0.068	Rangeland/Native
62.631	62.988	0.357	Irrigated
62.988	63.016	0.027	Riparian
63.016	63.126	0.111	Non-Irrigated
63.126	63.132	0.006	ROW
63.132	63.382	0.250	Non-Irrigated
63.382	63.390	0.008	ROW
63.390	63.722	0.332	Non-Irrigated
63.722	63.739	0.016	Rangeland/Native
63.739	64.004	0.266	Non-Irrigated
64.004	64.013	0.009	ROW
64.013	65.169	1.156	Non-Irrigated
65.169	65.272	0.104	Rangeland/Native
65.272	65.613	0.341	Non-Irrigated
65.613	65.650	0.037	Rangeland/Native
65.650	65.900	0.251	Non-Irrigated
65.900	66.144	0.244	Rangeland/Native
66.144	66.157	0.012	Riparian
66.157	66.208	0.051	Rangeland/Native
66.208	66.404	0.196	Irrigated
66.404	66.470	0.066	Non-Irrigated
66.470	66.486	0.016	Riparian
66.486	66.512	0.026	Rangeland/Native
66.512	66.523	0.011	ROW
66.523	66.940	0.417	Non-Irrigated
66.940	67.000	0.060	Rangeland/Native
67.000	67.085	0.086	Non-Irrigated
67.085	67.121	0.036	Rangeland/Native
67.121	67.285	0.164	Riparian
67.285	67.317	0.032	Rangeland/Native
67.317	67.353	0.037	Riparian
67.353	67.548	0.194	Rangeland/Native
67.548	67.562	0.014	Riparian
67.562	67.697	0.135	Rangeland/Native
67.697	67.716	0.019	ROW
67.716	67.775	0.058	Riparian
67.775	67.893	0.119	Rangeland/Native
67.893	68.639	0.746	Non-Irrigated
68.639	68.652	0.013	ROW
68.652	68.688	0.036	Residential
68.688	68.767	0.079	Non-Irrigated
68.767	68.792	0.025	Riparian

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	Mile Post End	Distance (Miles)[1]	Land Use
68.792	68.848	0.055	Non-Irrigated
68.848	68.871	0.023	Riparian
68.871	68.889	0.018	Non-Irrigated
68.889	68.910	0.021	Riparian
68.910	69.104	0.194	Non-Irrigated
69.104	69.115	0.010	ROW
69.115	69.379	0.265	Non-Irrigated
69.379	69.407	0.028	Riparian
69.407	69.498	0.090	Non-Irrigated
69.498	69.652	0.155	Rangeland/Native
69.652	70.519	0.867	Non-Irrigated
70.519	70.533	0.014	Riparian
70.533	70.568	0.035	Rangeland/Native
70.568	70.876	0.308	Irrigated
70.876	70.890	0.014	Rangeland/Native
70.890	70.907	0.017	ROW
70.907	70.928	0.022	Rangeland/Native
70.928	71.352	0.424	Irrigated
71.352	71.384	0.032	ROW
71.384	71.628	0.244	Irrigated
71.628	71.672	0.043	Riparian
71.672	71.990	0.318	Non-Irrigated
71.990	71.997	0.007	ROW
71.997	72.270	0.273	Non-Irrigated
72.270	72.395	0.125	Irrigated
72.395	72.585	0.189	Non-Irrigated
72.585	72.599	0.015	Riparian
72.599	73.077	0.477	Non-Irrigated
73.077	73.082	0.005	ROW
73.082	73.491	0.409	Non-Irrigated
73.491	73.500	0.009	Riparian
73.500	73.993	0.493	Non-Irrigated
73.993	74.017	0.024	ROW
74.017	74.160	0.143	Non-Irrigated
74.160	74.170	0.010	ROW
74.170	74.440	0.270	Non-Irrigated
74.440	74.668	0.228	Rangeland/Native
74.668	75.189	0.521	Non-Irrigated
75.189	75.215	0.026	Riparian
75.215	75.459	0.245	Irrigated
75.459	75.467	0.008	ROW
75.467	75.705	0.238	Non-Irrigated
75.705	75.777	0.072	Rangeland/Native
75.777	75.801	0.025	Riparian

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
75.801	75.876	0.074	Rangeland/Native
75.876	75.897	0.021	Riparian
75.897	76.026	0.129	Rangeland/Native
76.026	76.190	0.165	Non-Irrigated
76.190	76.202	0.011	ROW
76.202	76.356	0.155	Non-Irrigated
76.356	76.362	0.006	Water
76.362	77.235	0.873	Non-Irrigated
77.235	77.247	0.012	ROW
77.247	77.521	0.274	Non-Irrigated
77.521	77.532	0.011	Rangeland/Native
77.532	77.666	0.134	Non-Irrigated
77.666	77.670	0.003	Rangeland/Native
77.670	77.679	0.009	ROW
77.679	78.712	1.033	Non-Irrigated
78.712	78.737	0.025	ROW
78.737	78.908	0.171	Rangeland/Native
78.908	79.324	0.416	Non-Irrigated
79.324	79.330	0.005	Rangeland/Native
79.330	79.637	0.307	Non-Irrigated
79.637	79.645	0.008	Water
79.645	79.707	0.062	Rangeland/Native
79.707	79.884	0.177	Non-Irrigated
79.884	79.904	0.021	Riparian
79.904	79.973	0.068	Non-Irrigated
79.973	79.991	0.018	ROW
79.991	80.417	0.426	Non-Irrigated
80.417	80.646	0.228	Irrigated
80.646	82.121	1.476	Non-Irrigated
82.121	82.149	0.028	ROW
82.149	82.188	0.039	Non-Irrigated
82.188	82.192	0.004	ROW
82.192	83.429	1.237	Non-Irrigated
83.429	83.703	0.274	Rangeland/Native
83.703	83.712	0.009	ROW
83.712	84.350	0.639	Rangeland/Native
84.350	84.376	0.026	Non-Irrigated
84.376	84.425	0.048	Rangeland/Native
84.425	84.509	0.084	Forest
84.509	84.572	0.063	Water
84.572	84.728	0.156	Rangeland/Native
84.728	85.425	0.697	Non-Irrigated
85.425	85.458	0.033	Rangeland/Native
85.458	85.937	0.479	Non-Irrigated

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
85.937	85.948	0.011	ROW
85.948	86.508	0.560	Non-Irrigated
86.508	86.512	0.004	ROW
86.512	86.798	0.286	Non-Irrigated
86.798	87.075	0.277	Rangeland/Native
87.075	87.570	0.495	Non-Irrigated
87.570	87.588	0.017	Rangeland/Native
87.588	87.595	0.007	ROW
87.595	87.622	0.027	Non-Irrigated
87.622	87.625	0.003	Rangeland/Native
87.625	87.630	0.004	ROW
87.630	88.753	1.123	Rangeland/Native
88.753	88.769	0.016	ROW
88.769	88.981	0.212	Rangeland/Native
88.981	88.985	0.004	ROW
88.985	89.060	0.075	Rangeland/Native
89.060	89.096	0.037	ROW
89.096	89.119	0.023	Rangeland/Native
89.119	89.123	0.005	ROW
89.123	89.157	0.033	Rangeland/Native
89.157	89.172	0.015	Riparian
89.172	89.195	0.023	Rangeland/Native
89.195	89.222	0.027	ROW
89.222	89.470	0.248	Rangeland/Native
89.470	89.523	0.053	ROW
89.523	90.569	1.046	Rangeland/Native
90.569	90.575	0.006	Riparian
90.575	90.886	0.311	Rangeland/Native
90.886	90.903	0.017	Riparian
90.903	93.693	2.789	Rangeland/Native
93.693	93.698	0.006	ROW
93.698	94.386	0.687	Rangeland/Native
94.386	94.390	0.004	ROW
94.390	94.749	0.359	Non-Irrigated
94.749	94.833	0.084	ROW
94.833	95.017	0.184	Non-Irrigated
95.017	95.021	0.004	ROW
95.021	95.961	0.940	Non-Irrigated
95.961	95.968	0.007	ROW
95.968	97.205	1.237	Non-Irrigated
97.205	97.211	0.006	ROW
97.211	97.327	0.117	Non-Irrigated
97.327	97.375	0.048	Agriculture
97.375	97.532	0.157	Riparian

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	Mile Post End	Distance (Miles)[1]	Land Use
97.532	97.796	0.264	Non-Irrigated
97.796	97.909	0.112	Riparian
97.909	98.424	0.515	Non-Irrigated
98.424	98.435	0.011	ROW
98.435	99.522	1.087	Non-Irrigated
99.522	99.529	0.007	ROW
99.529	102.368	2.839	Non-Irrigated
102.368	102.390	0.022	Rangeland/Native
102.390	103.023	0.633	Non-Irrigated
103.023	103.038	0.016	ROW
103.038	105.525	2.486	Non-Irrigated
105.525	105.539	0.015	ROW
105.539	106.282	0.743	Non-Irrigated
106.282	106.950	0.668	Rangeland/Native
106.950	106.971	0.021	Riparian
106.971	107.536	0.565	Rangeland/Native
107.536	107.539	0.003	ROW
107.539	108.554	1.015	Non-Irrigated
108.554	108.558	0.004	ROW
108.558	109.550	0.991	Non-Irrigated
109.550	109.564	0.015	ROW
109.564	109.993	0.429	Non-Irrigated
109.993	109.997	0.004	ROW
109.997	110.631	0.634	Non-Irrigated
110.631	110.680	0.049	Rangeland/Native
110.680	110.843	0.163	Non-Irrigated
110.843	110.847	0.004	ROW
110.847	111.645	0.798	Non-Irrigated
111.645	111.910	0.265	Rangeland/Native
111.910	112.067	0.156	Non-Irrigated
112.067	113.597	1.530	Rangeland/Native
113.597	114.088	0.492	Non-Irrigated
114.088	114.339	0.251	Rangeland/Native
114.339	115.431	1.092	Non-Irrigated
115.431	115.491	0.060	Rangeland/Native
115.491	115.539	0.048	ROW
115.539	115.670	0.130	Rangeland/Native
115.670	117.245	1.575	Non-Irrigated
117.245	117.308	0.063	Rangeland/Native
117.308	117.325	0.017	Riparian
117.325	117.514	0.189	Rangeland/Native
117.514	118.198	0.684	Non-Irrigated
118.198	118.230	0.033	Riparian
118.230	118.762	0.532	Rangeland/Native

TABLE H- 13 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 3			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
118.762	118.777	0.015	ROW
118.777	119.750	0.974	Non-Irrigated
119.750	119.766	0.015	ROW
119.766	119.957	0.192	Non-Irrigated
119.957	119.975	0.018	Rangeland/Native
119.975	120.080	0.105	Non-Irrigated
120.080	120.109	0.029	Rangeland/Native
120.109	120.268	0.159	Non-Irrigated
120.268	120.272	0.003	ROW
120.272	121.594	1.322	Non-Irrigated
121.594	121.621	0.027	Rangeland/Native
0	121.621	121.621	Total

[1] Subtracting the beginning Distance (Miles)1 from the ending Distance (Miles)1 does not necessarily equal the total Distance (Miles)1 displayed due to rounding.

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
0.000	0.126	0.126	Non-Irrigated
0.126	0.734	0.608	Rangeland/Native
0.734	0.782	0.048	Riparian
0.782	0.817	0.035	Rangeland/Native
0.817	0.823	0.006	ROW
0.823	0.872	0.049	Rangeland/Native
0.872	2.552	1.680	Non-Irrigated
2.552	2.566	0.014	ROW
2.566	2.692	0.125	Non-Irrigated
2.692	2.706	0.014	ROW
2.706	3.153	0.447	Non-Irrigated
3.153	3.662	0.509	Rangeland/Native
3.662	3.685	0.024	ROW
3.685	4.044	0.359	Non-Irrigated
4.044	4.854	0.810	Rangeland/Native
4.854	5.090	0.236	Non-Irrigated
5.090	5.468	0.378	Rangeland/Native
5.468	5.521	0.054	Non-Irrigated
5.521	5.802	0.280	Rangeland/Native
5.802	5.817	0.015	Riparian
5.817	6.016	0.199	Non-Irrigated
6.016	6.330	0.314	Rangeland/Native
6.330	6.337	0.007	ROW
6.337	6.833	0.496	Rangeland/Native
6.833	6.838	0.005	ROW
6.838	7.281	0.443	Rangeland/Native
7.281	7.450	0.169	Non-Irrigated
7.450	8.052	0.602	Rangeland/Native
8.052	8.061	0.009	Riparian
8.061	9.941	1.880	Rangeland/Native
9.941	9.955	0.014	ROW
9.955	10.097	0.142	Rangeland/Native
10.097	10.250	0.153	Non-Irrigated
10.250	10.569	0.319	Rangeland/Native
10.569	10.575	0.006	Riparian
10.575	11.714	1.138	Rangeland/Native
11.714	11.722	0.008	Riparian
11.722	11.991	0.269	Rangeland/Native
11.991	12.411	0.421	Non-Irrigated
12.411	12.770	0.359	Rangeland/Native
12.770	12.969	0.199	Non-Irrigated
12.969	14.662	1.693	Rangeland/Native
14.662	15.130	0.467	Non-Irrigated

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
15.130	15.216	0.086	Rangeland/Native
15.216	15.730	0.515	Non-Irrigated
15.730	15.770	0.040	ROW
15.770	16.769	0.999	Non-Irrigated
16.769	16.778	0.008	ROW
16.778	18.781	2.004	Non-Irrigated
18.781	18.799	0.018	ROW
18.799	19.732	0.933	Non-Irrigated
19.732	21.548	1.816	Rangeland/Native
21.548	21.858	0.310	Non-Irrigated
21.858	21.867	0.009	ROW
21.867	21.942	0.075	Rangeland/Native
21.942	21.959	0.017	Riparian
21.959	22.790	0.831	Rangeland/Native
22.790	22.835	0.045	Riparian
22.835	23.316	0.480	Rangeland/Native
23.316	23.328	0.012	Riparian
23.328	23.403	0.076	Rangeland/Native
23.403	23.769	0.365	Non-Irrigated
23.769	23.802	0.034	Riparian
23.802	24.102	0.300	Non-Irrigated
24.102	24.112	0.010	ROW
24.112	24.934	0.823	Non-Irrigated
24.934	24.945	0.010	ROW
24.945	25.122	0.177	Non-Irrigated
25.122	25.179	0.057	Rangeland/Native
25.179	25.188	0.009	ROW
25.188	26.157	0.969	Rangeland/Native
26.157	26.182	0.025	Riparian
26.182	26.288	0.106	Rangeland/Native
26.288	26.724	0.437	Non-Irrigated
26.724	26.837	0.113	Rangeland/Native
26.837	28.266	1.430	Non-Irrigated
28.266	28.290	0.024	ROW
28.290	29.226	0.936	Non-Irrigated
29.226	29.254	0.028	Riparian
29.254	30.172	0.918	Non-Irrigated
30.172	30.219	0.047	Rangeland/Native
30.219	30.268	0.048	Non-Irrigated
30.268	30.278	0.010	Rangeland/Native
30.278	30.295	0.018	ROW
30.295	30.305	0.010	Rangeland/Native
30.305	30.491	0.186	Non-Irrigated
30.491	30.588	0.097	Rangeland/Native

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
30.588	31.014	0.427	Non-Irrigated
31.014	31.077	0.063	Rangeland/Native
31.077	31.958	0.881	Non-Irrigated
31.958	31.992	0.034	Rangeland/Native
31.992	32.008	0.016	Riparian
32.008	32.044	0.037	Rangeland/Native
32.044	32.235	0.191	Non-Irrigated
32.235	32.248	0.013	ROW
32.248	32.476	0.229	Non-Irrigated
32.476	32.525	0.049	Riparian
32.525	34.659	2.134	Non-Irrigated
34.659	34.726	0.066	Rangeland/Native
34.726	35.524	0.799	Non-Irrigated
35.524	35.538	0.014	ROW
35.538	36.177	0.639	Non-Irrigated
36.177	36.414	0.237	Rangeland/Native
36.414	36.425	0.012	Riparian
36.425	36.439	0.013	Rangeland/Native
36.439	36.466	0.027	Riparian
36.466	36.692	0.226	Rangeland/Native
36.692	37.175	0.483	Non-Irrigated
37.175	37.179	0.004	ROW
37.179	37.270	0.091	Non-Irrigated
37.270	37.389	0.119	Rangeland/Native
37.389	37.400	0.011	Riparian
37.400	37.529	0.129	Rangeland/Native
37.529	38.019	0.490	Non-Irrigated
38.019	38.231	0.212	Riparian
38.231	38.390	0.160	Non-Irrigated
38.390	38.432	0.042	Forest
38.432	38.514	0.082	Riparian
38.514	38.563	0.049	Non-Irrigated
38.563	38.908	0.346	Rangeland/Native
38.908	39.097	0.189	Non-Irrigated
39.097	39.447	0.350	Rangeland/Native
39.447	39.733	0.286	Non-Irrigated
39.733	40.166	0.432	Rangeland/Native
40.166	40.198	0.032	Non-Irrigated
40.198	40.219	0.021	Rangeland/Native
40.219	40.321	0.102	Non-Irrigated
40.321	40.391	0.071	Rangeland/Native
40.391	40.634	0.243	Non-Irrigated
40.634	41.136	0.502	Rangeland/Native
41.136	41.264	0.127	Non-Irrigated

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
41.264	41.369	0.106	Rangeland/Native
41.369	41.650	0.280	Non-Irrigated
41.650	41.715	0.066	Rangeland/Native
41.715	41.726	0.011	ROW
41.726	43.160	1.434	Non-Irrigated
43.160	43.165	0.004	ROW
43.165	43.716	0.551	Non-Irrigated
43.716	43.720	0.004	ROW
43.720	45.067	1.348	Non-Irrigated
45.067	45.076	0.009	ROW
45.076	48.161	3.084	Non-Irrigated
48.161	48.176	0.015	ROW
48.176	49.887	1.712	Non-Irrigated
49.887	49.918	0.030	Riparian
49.918	50.665	0.747	Non-Irrigated
50.665	50.680	0.015	ROW
50.680	52.180	1.500	Non-Irrigated
52.180	52.184	0.004	ROW
52.184	54.210	2.026	Non-Irrigated
54.210	54.220	0.009	ROW
54.220	54.712	0.493	Non-Irrigated
54.712	54.716	0.004	ROW
54.716	55.213	0.497	Non-Irrigated
55.213	55.219	0.006	ROW
55.219	55.815	0.596	Non-Irrigated
55.815	55.851	0.036	Rangeland/Native
55.851	57.273	1.422	Non-Irrigated
57.273	57.284	0.011	ROW
57.284	58.282	0.998	Non-Irrigated
58.282	58.287	0.006	ROW
58.287	59.042	0.754	Non-Irrigated
59.042	59.302	0.261	Rangeland/Native
59.302	59.801	0.498	Non-Irrigated
59.801	59.806	0.005	ROW
59.806	60.299	0.493	Non-Irrigated
60.299	60.319	0.020	ROW
60.319	60.451	0.132	Non-Irrigated
60.451	60.509	0.058	Rangeland/Native
60.509	60.518	0.009	Riparian
60.518	60.559	0.041	Rangeland/Native
60.559	60.586	0.027	Riparian
60.586	60.675	0.089	Rangeland/Native
60.675	61.257	0.582	Non-Irrigated
61.257	61.307	0.050	Rangeland/Native

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
61.307	61.333	0.026	Non-Irrigated
61.333	62.333	1.001	Irrigated
62.333	62.345	0.011	ROW
62.345	62.841	0.496	Non-Irrigated
62.841	62.938	0.097	Rangeland/Native
62.938	63.041	0.104	Riparian
63.041	63.098	0.056	Rangeland/Native
63.098	63.288	0.190	Irrigated
63.288	63.442	0.154	Rangeland/Native
63.442	63.883	0.441	Irrigated
63.883	63.893	0.010	Rangeland/Native
63.893	63.916	0.023	ROW
63.916	64.794	0.878	Non-Irrigated
64.794	64.921	0.128	Rangeland/Native
64.921	65.399	0.478	Non-Irrigated
65.399	65.468	0.069	Rangeland/Native
65.468	65.501	0.033	Non-Irrigated
65.501	65.654	0.153	Rangeland/Native
65.654	65.728	0.074	Non-Irrigated
65.728	65.732	0.004	Rangeland/Native
65.732	65.993	0.260	Non-Irrigated
65.993	66.009	0.016	ROW
66.009	66.689	0.680	Non-Irrigated
66.689	66.789	0.099	Rangeland/Native
66.789	66.919	0.130	Non-Irrigated
66.919	67.025	0.106	Rangeland/Native
67.025	67.479	0.454	Non-Irrigated
67.479	67.484	0.005	ROW
67.484	68.240	0.756	Non-Irrigated
68.240	68.246	0.006	ROW
68.246	69.661	1.415	Non-Irrigated
69.661	69.663	0.002	ROW
69.663	69.842	0.179	Non-Irrigated
69.842	69.961	0.119	Rangeland/Native
69.961	70.025	0.063	Non-Irrigated
70.025	70.157	0.132	Rangeland/Native
70.157	70.165	0.008	ROW
70.165	70.451	0.286	Non-Irrigated
70.451	70.488	0.037	Rangeland/Native
70.488	70.492	0.005	Riparian
70.492	71.987	1.495	Rangeland/Native
71.987	72.000	0.012	ROW
72.000	72.553	0.553	Rangeland/Native
72.553	72.639	0.087	ROW

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
72.639	72.799	0.160	Rangeland/Native
72.799	72.819	0.020	ROW
72.819	72.899	0.080	Non-Irrigated
72.899	72.918	0.020	Rangeland/Native
72.918	72.949	0.031	Riparian
72.949	73.411	0.462	Rangeland/Native
73.411	73.489	0.077	Non-Irrigated
73.489	73.523	0.034	Rangeland/Native
73.523	73.534	0.011	ROW
73.534	73.555	0.021	Rangeland/Native
73.555	73.605	0.050	Non-Irrigated
73.605	73.635	0.030	Rangeland/Native
73.635	73.641	0.006	Riparian
73.641	73.704	0.063	Rangeland/Native
73.704	73.713	0.009	ROW
73.713	73.938	0.226	Rangeland/Native
73.938	74.005	0.066	Riparian
74.005	74.528	0.523	Rangeland/Native
74.528	74.542	0.015	ROW
74.542	75.262	0.720	Rangeland/Native
75.262	75.272	0.011	ROW
75.272	75.645	0.373	Rangeland/Native
75.645	75.648	0.003	Riparian
75.648	75.660	0.011	Rangeland/Native
75.660	75.664	0.005	Riparian
75.664	75.691	0.027	Rangeland/Native
75.691	75.695	0.004	Riparian
75.695	75.744	0.049	Rangeland/Native
75.744	75.817	0.073	Non-Irrigated
75.817	75.999	0.182	Rangeland/Native
75.999	76.338	0.340	Non-Irrigated
76.338	76.384	0.046	Rangeland/Native
76.384	76.434	0.051	Riparian
76.434	76.628	0.194	Rangeland/Native
76.628	76.871	0.242	Non-Irrigated
76.871	77.630	0.760	Rangeland/Native
77.630	77.640	0.009	ROW
77.640	77.844	0.204	Rangeland/Native
77.844	77.854	0.010	Agriculture
77.854	78.490	0.636	Rangeland/Native
78.490	78.642	0.153	Non-Irrigated
78.642	78.693	0.051	Rangeland/Native
78.693	78.700	0.007	Riparian
78.700	79.150	0.450	Rangeland/Native

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
79.150	79.391	0.241	Non-Irrigated
79.391	79.485	0.094	Rangeland/Native
79.485	79.785	0.300	Non-Irrigated
79.785	79.957	0.171	Rangeland/Native
79.957	80.171	0.214	Non-Irrigated
80.171	80.496	0.325	Rangeland/Native
80.496	80.506	0.010	Riparian
80.506	81.028	0.522	Rangeland/Native
81.028	81.047	0.020	Riparian
81.047	81.518	0.471	Rangeland/Native
81.518	81.525	0.006	ROW
81.525	81.670	0.146	Rangeland/Native
81.670	81.708	0.038	Riparian
81.708	81.750	0.042	Rangeland/Native
81.750	81.766	0.016	Riparian
81.766	81.807	0.041	Rangeland/Native
81.807	82.029	0.222	ROW
82.029	82.762	0.733	Non-Irrigated
82.762	82.773	0.011	Water
82.773	83.279	0.506	Rangeland/Native
83.279	83.301	0.021	ROW
83.301	83.484	0.184	Rangeland/Native
83.484	83.536	0.051	Non-Irrigated
83.536	83.624	0.088	Rangeland/Native
83.624	83.661	0.037	Non-Irrigated
83.661	83.695	0.035	Rangeland/Native
83.695	83.708	0.012	Non-Irrigated
83.708	83.822	0.114	Rangeland/Native
83.822	84.517	0.695	Non-Irrigated
84.517	84.531	0.013	Rangeland/Native
84.531	85.390	0.859	Non-Irrigated
85.390	85.445	0.056	Rangeland/Native
85.445	86.190	0.745	Non-Irrigated
86.190	86.266	0.076	Rangeland/Native
86.266	86.469	0.203	Non-Irrigated
86.469	86.616	0.147	Rangeland/Native
86.616	86.646	0.030	Non-Irrigated
86.646	86.796	0.150	Rangeland/Native
86.796	86.915	0.119	Non-Irrigated
86.915	87.265	0.350	Rangeland/Native
87.265	87.340	0.075	Non-Irrigated
87.340	87.406	0.065	Rangeland/Native
87.406	87.467	0.061	Non-Irrigated
87.467	87.537	0.069	Rangeland/Native

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
87.537	87.580	0.043	Non-Irrigated
87.580	87.601	0.021	Rangeland/Native
87.601	87.666	0.065	Non-Irrigated
87.666	87.859	0.193	Rangeland/Native
87.859	87.972	0.113	Non-Irrigated
87.972	89.106	1.134	Rangeland/Native
89.106	89.346	0.240	Non-Irrigated
89.346	89.387	0.041	Rangeland/Native
89.387	89.395	0.008	Riparian
89.395	89.800	0.405	Non-Irrigated
89.800	90.190	0.389	Rangeland/Native
90.190	90.203	0.014	Riparian
90.203	90.495	0.292	Rangeland/Native
90.495	90.511	0.017	ROW
90.511	90.564	0.052	Rangeland/Native
90.564	90.570	0.006	Riparian
90.570	90.653	0.083	Rangeland/Native
90.653	90.662	0.009	ROW
90.662	90.791	0.129	Rangeland/Native
90.791	90.802	0.011	Riparian
90.802	90.946	0.144	Rangeland/Native
90.946	91.112	0.166	Non-Irrigated
91.112	91.125	0.013	ROW
91.125	91.217	0.092	Non-Irrigated
91.217	91.226	0.009	Water
91.226	92.003	0.777	Non-Irrigated
92.003	92.025	0.022	Rangeland/Native
92.025	92.338	0.313	Non-Irrigated
92.338	92.409	0.071	Rangeland/Native
92.409	92.690	0.281	Non-Irrigated
92.690	92.695	0.005	ROW
92.695	93.889	1.194	Non-Irrigated
93.889	94.048	0.159	Rangeland/Native
94.048	94.069	0.021	Non-Irrigated
94.069	94.250	0.181	Rangeland/Native
94.250	94.403	0.154	Non-Irrigated
94.403	94.470	0.067	Rangeland/Native
94.470	94.488	0.018	Riparian
94.488	94.563	0.075	Rangeland/Native
94.563	94.819	0.256	Non-Irrigated
94.819	94.827	0.008	ROW
94.827	94.922	0.095	Non-Irrigated
94.922	95.061	0.138	Irrigated
95.061	95.424	0.364	Rangeland/Native

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
95.424	96.504	1.079	Non-Irrigated
96.504	96.510	0.006	ROW
96.510	97.109	0.599	Non-Irrigated
97.109	97.113	0.004	ROW
97.113	97.783	0.670	Non-Irrigated
97.783	97.827	0.044	Rangeland/Native
97.827	98.017	0.190	Non-Irrigated
98.017	98.781	0.764	Rangeland/Native
98.781	98.791	0.010	ROW
98.791	98.962	0.171	Rangeland/Native
98.962	98.972	0.010	ROW
98.972	99.346	0.374	Rangeland/Native
99.346	99.372	0.026	Riparian
99.372	99.406	0.034	Water
99.406	99.422	0.016	Riparian
99.422	99.593	0.170	Rangeland/Native
99.593	99.766	0.173	Non-Irrigated
99.766	99.819	0.054	Rangeland/Native
99.819	99.967	0.148	Non-Irrigated
99.967	100.340	0.372	Rangeland/Native
100.340	100.726	0.386	Non-Irrigated
100.726	100.737	0.011	ROW
100.737	101.293	0.556	Non-Irrigated
101.293	101.298	0.005	ROW
101.298	101.536	0.239	Non-Irrigated
101.536	101.798	0.262	Rangeland/Native
101.798	102.176	0.377	Non-Irrigated
102.176	102.181	0.005	ROW
102.181	102.409	0.228	Non-Irrigated
102.409	102.414	0.006	ROW
102.414	103.516	1.101	Rangeland/Native
103.516	103.531	0.015	ROW
103.531	103.700	0.169	Rangeland/Native
103.700	103.739	0.039	ROW
103.739	104.520	0.781	Rangeland/Native
104.520	104.658	0.139	Non-Irrigated
104.658	105.428	0.770	Rangeland/Native
105.428	105.438	0.010	Riparian
105.438	105.651	0.213	Rangeland/Native
105.651	105.680	0.029	Riparian
105.680	106.625	0.945	Rangeland/Native
106.625	106.638	0.013	Riparian
106.638	107.567	0.929	Rangeland/Native
107.567	107.573	0.006	ROW

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
107.573	108.341	0.768	Rangeland/Native
108.341	108.347	0.006	ROW
108.347	109.233	0.886	Rangeland/Native
109.233	109.239	0.006	ROW
109.239	109.275	0.035	Rangeland/Native
109.275	109.284	0.009	ROW
109.284	109.615	0.331	Non-Irrigated
109.615	109.644	0.029	Agriculture
109.644	109.725	0.081	ROW
109.725	109.910	0.186	Non-Irrigated
109.910	109.914	0.004	ROW
109.914	110.855	0.941	Non-Irrigated
110.855	110.862	0.007	ROW
110.862	112.099	1.237	Non-Irrigated
112.099	112.104	0.005	ROW
112.104	112.219	0.115	Non-Irrigated
112.219	112.269	0.050	Agriculture
112.269	112.424	0.155	Riparian
112.424	112.693	0.269	Non-Irrigated
112.693	112.802	0.109	Riparian
112.802	113.318	0.515	Non-Irrigated
113.318	113.325	0.008	ROW
113.325	114.416	1.091	Non-Irrigated
114.416	114.423	0.007	ROW
114.423	117.955	3.532	Non-Irrigated
117.955	117.964	0.009	ROW
117.964	120.156	2.192	Non-Irrigated
120.156	120.185	0.029	Riparian
120.185	120.472	0.288	Non-Irrigated
120.472	120.477	0.005	ROW
120.477	121.449	0.972	Non-Irrigated
121.449	121.590	0.141	Rangeland/Native
121.590	121.609	0.019	ROW
121.609	122.651	1.042	Rangeland/Native
122.651	123.126	0.476	Non-Irrigated
123.126	123.148	0.022	ROW
123.148	123.782	0.634	Non-Irrigated
123.782	123.833	0.051	Rangeland/Native
123.833	124.392	0.559	Non-Irrigated
124.392	124.648	0.256	Rangeland/Native
124.648	124.658	0.009	ROW
124.658	126.163	1.506	Non-Irrigated
126.163	126.167	0.004	ROW
126.167	127.055	0.888	Non-Irrigated

TABLE H- 14 LAND USES CATEGORIES CROSSED BY ALTERNATIVE 4			
Mile Post Begin	**Mile Post End**	**Distance (Miles)[1]**	**Land Use**
127.055	127.072	0.017	Riparian
127.072	127.394	0.321	Non-Irrigated
127.394	127.530	0.136	Riparian
127.530	127.657	0.126	Rangeland/Native
127.657	127.671	0.015	ROW
127.671	128.085	0.414	Non-Irrigated
128.085	128.427	0.342	Rangeland/Native
128.427	128.665	0.238	Non-Irrigated
128.665	128.667	0.002	ROW
128.667	129.908	1.241	Non-Irrigated
129.908	129.922	0.013	ROW
129.922	130.466	0.544	Non-Irrigated
130.466	130.498	0.033	Riparian
130.498	131.414	0.915	Non-Irrigated
131.414	134.329	2.915	Rangeland/Native
134.329	135.265	0.937	Non-Irrigated
135.265	135.283	0.018	ROW
135.283	137.583	2.300	Non-Irrigated
137.583	137.603	0.020	Riparian
137.603	137.619	0.016	Non-Irrigated
137.619	137.655	0.036	Riparian
137.655	137.770	0.116	Non-Irrigated
137.770	137.781	0.011	ROW
137.781	137.896	0.115	Non-Irrigated
137.896	137.917	0.020	Rangeland/Native
137.917	137.977	0.060	Riparian
137.977	138.054	0.077	Rangeland/Native
138.054	138.106	0.052	Riparian
138.106	138.131	0.026	Rangeland/Native
138.131	139.100	0.969	Non-Irrigated
139.100	139.116	0.016	Rangeland/Native
139.116	139.634	0.517	Non-Irrigated
0	139.634	139.634	Total

[1] Subtracting the beginning Distance (Miles)1 from the ending Distance (Miles)1 does not necessarily equal the total Distance (Miles)1 displayed due to rounding.

APPENDIX I:
IMPAIRED RIVER SEGMENTS SUMMARY SHEETS

Montana Department of Environmental Quality

Clean Water Act Information C

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2006 Water Quality Information

Water Information

Waterbody Id	MT41Q005_020	**Water Type**	FRESHWATER LAKE
Name	Benton Lake	**Hydro Unit**	10030102 - Upper Missour
Location	BENTON LAKE T22N R3E	**Basin**	Upper Missouri
Size (Miles/Acres)	5600	**Watershed**	Missouri-Sun-Smith
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-3
County	CASCADE	**Trophic Status and Trend**	Eutrophic
Water Quality Category	5 - One or more uses are impaired and a TMDL is required.		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information
Agricultural		✓			
Aquatic Life			✓		
Drinking Water			✓		
Industrial	✓				
Primary Contact Recreation		✓			
Warm Water Fishery			✓		

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
Excess Algal Growth	Agriculture Irrigated Crop Production	Primary Contact Recreation	NO
Nitrogen (Total)	Agriculture Irrigated Crop Production	Aquatic Life Warm Water Fishery	NO
Salinity	Agriculture Irrigated Crop Production	Agricultural Aquatic Life Warm Water Fishery	NO
Selenium	Agriculture Irrigated Crop Production	Aquatic Life Drinking Water Warm Water Fishery	NO
Sulfates	Agriculture Irrigated Crop Production	Aquatic Life Warm Water Fishery	NO

Assessment Information

Assessment Type	Associated Uses	Co
	Agricultural Aquatic Life	

PHYSICAL/CHEMICAL	Drinking Water Industrial Primary Contact Recreation Warm Water Fishery	FAIR

Assessment Method	Associated Uses
NA	NA

Comments

Overall Assessment
NA

Use	Comment
NA	NA

Cause	Comment
NA	NA

Source	Comment
NA	NA

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2006 Water Quality Information

Water Information

Waterbody Id	MT41L001_040	**Water Type**	RIVER
Name	Cut Bank Creek	**Hydro Unit**	10030202 - Cut Bank
Location	CUT BANK CREEK, Blackfeet Reservation boundary to the mouth (Marias River)	**Basin**	Lower Missouri
Size (Miles/Acres)	23.1	**Watershed**	Marias
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-2
County	GLACIER	**Trophic Status and Trend**	NA
Water Quality Category	5 - One or more uses are impaired and a TMDL is required.		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information
Agricultural	✓				
Aquatic Life			✓		
Cold Water Fishery			✓		
Drinking Water	✓				
Industrial	✓				
Primary Contact Recreation			✓		

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
Low flow alterations	Flow Alterations from Water Diversions	Aquatic Life Cold Water Fishery	NO
Nitrate/Nitrite (Nitrite + Nitrate as N)	Irrigated Crop Production Municipal Point Source Discharges Non-irrigated Crop Production	Aquatic Life Cold Water Fishery Primary Contact Recreation	NO
Temperature, water	Flow Alterations from Water Diversions Irrigated Crop Production	Aquatic Life Cold Water Fishery	NO

Assessment Information

Assessment Type	Associated Uses	Co
BIOLOGICAL	Primary Contact Recreation	FAIR
BIOLOGICAL	Aquatic Life Cold Water Fishery	GOOD
HABITAT	Primary Contact Recreation	FAIR
	Aquatic Life	

HABITAT	Cold Water Fishery	GOOD
PHYSICAL/CHEMICAL	Agricultural Drinking Water Industrial Primary Contact Recreation	FAIR
PHYSICAL/CHEMICAL	Aquatic Life Cold Water Fishery	GOOD

Assessment Method	Associated Uses
Benthic macroinvertebrate surveys	Aquatic Life Cold Water Fishery
Fish surveys	Aquatic Life Cold Water Fishery
Land use information and location of sources	Aquatic Life Cold Water Fishery
Non-fixed station physical/chemical monitoring (conventional pollutant only)	Agricultural Aquatic Life Cold Water Fishery Drinking Water Industrial Primary Contact Recreation
Primary producer surveys (phytoplankton/periphyton/macrophyton)	Aquatic Life Cold Water Fishery Primary Contact Recreation

Comments

Overall Assessment
NA

Use	Comment
NA	NA

Cause	Comment
NA	NA

Source	Comment
NA	NA

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2006 Water Quality Information

Water Information

Waterbody Id	MT41P002_010	**Water Type**	RIVER
Name	Dry Fork Marias River	**Hydro Unit**	10030203 - Marias
Location	DRY FORK MARIAS RIVER, Big Flat Coulee to the mouth (Marias River)	**Basin**	Lower Missouri
Size (Miles/Acres)	21	**Watershed**	Marias
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-3
County	PONDERA, TOOLE	**Trophic Status and Trend**	NA
Water Quality Category	1 - All uses assessed and fully supported.		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information
Agricultural	✓				
Aquatic Life	✓				
Drinking Water	✓				
Industrial	✓				
Primary Contact Recreation	✓				
Warm Water Fishery	✓				

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
NA	NA	NA	NA

Assessment Information

Assessment Type	Associated Uses	Co
BIOLOGICAL	Aquatic Life Primary Contact Recreation Warm Water Fishery	FAIR
HABITAT	Aquatic Life Primary Contact Recreation Warm Water Fishery	FAIR
PHYSICAL/CHEMICAL	Agricultural Aquatic Life Drinking Water Industrial Primary Contact Recreation Warm Water Fishery	FAIR

Assessment Method	Associated Uses

Benthic macroinvertebrate surveys	Aquatic Life Warm Water Fishery
Fish surveys	Aquatic Life Warm Water Fishery
Non-fixed station physical/chemical monitoring (conventional pollutant only)	Agricultural Aquatic Life Drinking Water Industrial Warm Water Fishery
Primary producer surveys (phytoplankton/periphyton/macrophyton)	Agricultural Aquatic Life Industrial Primary Contact Recreation Warm Water Fishery
Visual observation, may not quantify some parameters; single season; by prof.	Agricultural Aquatic Life Industrial Primary Contact Recreation Warm Water Fishery

Comments

Overall Assessment
NA

Use	**Comment**
NA	NA

Cause	**Comment**
NA	NA

Source	**Comment**
NA	NA

Montana Department of Environmental Quality

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2006 Water Quality Information

Water Information

Waterbody Id	MT41P001_010	**Water Type**	RIVER
Name	Marias River	**Hydro Unit**	10030203 - Marias
Location	MARIAS RIVER, Tiber Reservoir to the Two Medicine River-Cut Bank Creek Confluence	**Basin**	Lower Missouri
Size (Miles/Acres)	60	**Watershed**	Marias
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-2
County	GLACIER, PONDERA, TOOLE	**Trophic Status and Trend**	NA
Water Quality Category	1 - All uses assessed and fully supported.		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information
Agricultural	✓				
Aquatic Life	✓				
Cold Water Fishery	✓				
Drinking Water	✓				
Industrial	✓				
Primary Contact Recreation	✓				

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
NA	NA	NA	NA

Assessment Information

Assessment Type	Associated Uses	Co
BIOLOGICAL	Primary Contact Recreation	FAIR
BIOLOGICAL	Aquatic Life Cold Water Fishery	GOOD
HABITAT	Primary Contact Recreation	FAIR
HABITAT	Aquatic Life Cold Water Fishery	GOOD
PHYSICAL/CHEMICAL	Agricultural Aquatic Life Cold Water Fishery Drinking Water Industrial	FAIR

Assessment Method	Associated Uses
	Primary Contact Recreation
Benthic macroinvertebrate surveys	Aquatic Life Cold Water Fishery
Ecological/habitat surveys	Aquatic Life Cold Water Fishery
Fish surveys	Aquatic Life Cold Water Fishery
Land use information and location of sources	Aquatic Life Cold Water Fishery Drinking Water
Non-fixed station physical/chemical monitoring (conventional pollutant only)	Agricultural Aquatic Life Cold Water Fishery Drinking Water Industrial Primary Contact Recreation
Primary producer surveys (phytoplankton/periphyton/macrophyton)	Aquatic Life Cold Water Fishery
Quan. measurements of instream parms, channel morphology, floodplain; 1-2 seasons; by prof	Aquatic Life Cold Water Fishery
Surveys of fish and game biologists/other professionals	Aquatic Life Cold Water Fishery
Visual observation, may not quantify some parameters; single season; by prof.	Aquatic Life Cold Water Fishery Primary Contact Recreation

Comments

Overall Assessment
NA

Use	Comment
NA	NA

Cause	Comment
NA	NA

Source	Comment
NA	NA

Montana Department of Environmental Quality

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2006 Water Quality Information

Water Information

Waterbody Id	MT41Q001_011	**Water Type**	RIVER
Name	Missouri River	**Hydro Unit**	10030102 - Upper Missour
Location	MISSOURI RIVER, Sun River to Rainbow Dam	**Basin**	Upper Missouri
Size (Miles/Acres)	7.6	**Watershed**	Missouri-Sun-Smith
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-2
County	CASCADE	**Trophic Status and Trend**	NA
Water Quality Category	5 - One or more uses are impaired and a TMDL is required.		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information
Agricultural	✓				
Aquatic Life			✓		
Cold Water Fishery			✓		
Drinking Water			✓		
Industrial		✓			
Primary Contact Recreation	✓				

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
Chromium (total)	Contaminated Sediments Industrial Point Source Discharge Industrial/Commercial Site Stormwater Discharge (Permittted)	Aquatic Life Cold Water Fishery Drinking Water	NO
Mercury	Contaminated Sediments Industrial Point Source Discharge Industrial/Commercial Site Stormwater Discharge (Permittted)	Aquatic Life Cold Water Fishery	NO
Pentachlorobenzene	Contaminated Sediments Industrial Point Source Discharge Industrial/Commercial Site Stormwater Discharge (Permittted)	Aquatic Life Cold Water Fishery	NO
Physical substrate habitat alterations	Dam Construction (Other than Upstream Flood Control Projects) Industrial/Commercial Site Stormwater Discharge (Permittted) Irrigated Crop Production	Aquatic Life Cold Water Fishery	NO

Sedimentation/Siltation	Contaminated Sediments Industrial/Commercial Site Stormwater Discharge (Permittted)	Aquatic Life Cold Water Fishery	NO
Selenium	Contaminated Sediments Industrial Point Source Discharge Industrial/Commercial Site Stormwater Discharge (Permittted)	Aquatic Life Cold Water Fishery	NO
Solids (Suspended/Bedload)	Contaminated Sediments Industrial Point Source Discharge Industrial/Commercial Site Stormwater Discharge (Permittted)	Aquatic Life Cold Water Fishery Industrial	NO
Turbidity	Contaminated Sediments Dam Construction (Other than Upstream Flood Control Projects) Industrial Point Source Discharge Industrial/Commercial Site Stormwater Discharge (Permittted) Irrigated Crop Production	Aquatic Life Cold Water Fishery Industrial	NO

Assessment Information

Assessment Type	Associated Uses	Co
PHYSICAL/CHEMICAL	Agricultural Aquatic Life Cold Water Fishery Drinking Water Industrial Primary Contact Recreation	FAIR

Assessment Method	Associated Uses
NA	NA

Comments

Overall Assessment
NA

Use	Comment
NA	NA

Cause	Comment
NA	NA

Source	Comment
NA	NA

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2006 Water Quality Information

Water Information

Waterbody Id	MT41O002_090	**Water Type**	RIVER
Name	Muddy Creek	**Hydro Unit**	10030205 - Teton
Location	MUDDY CREEK, headwaters to mouth (Teton River)	**Basin**	Lower Missouri
Size (Miles/Acres)	82.7	**Watershed**	Marias
Ecoregion	Canadian Rockies, Northwestern Glaciated Plains	**Use Class**	B-2
County	PONDERA, TETON	**Trophic Status and Trend**	NA
Water Quality Category	3 - Insufficient data to assess any use.		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information
Agricultural					
Aquatic Life					
Cold Water Fishery					
Drinking Water					
Industrial					
Primary Contact Recreation					

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
NA	NA	NA	NA

Assessment Information

Assessment Type	Associated Uses	Co
NA	NA	NA

Assessment Method	Associated Uses
NA	NA

Comments

Overall Assessment
NA

Use	Comment
NA	NA

Cause	Comment
NA	NA
Source	**Comment**
NA	NA

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2006 Water Quality Information

Water Information

Waterbody Id	MT41L001_010	**Water Type**	RIVER
Name	Old Maids Coulee	**Hydro Unit**	10030202 - Cut Bank
Location	OLD MAIDS COULEE, headwaters to the mouth (Cutbank Creek)	**Basin**	Lower Missouri
Size (Miles/Acres)	16.4	**Watershed**	Marias
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-1
County	GLACIER	**Trophic Status and Trend**	NA
Water Quality Category	5 - One or more uses are impaired and a TMDL is required. 2B - Available data and/or information indicate that a water quality standard is exceeded due to natural source in the absence of any identified anthropogenic sources.		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information	
Agricultural			✓			
Aquatic Life			✓			
Cold Water Fishery					✓	
Drinking Water	✓					
Industrial			✓			
Primary Contact Recreation			✓			

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
Ammonia (Total)	Crop Production (Crop Land or Dry Land) Municipal Point Source Discharges	Aquatic Life Primary Contact Recreation	NO
Chloride	Crop Production (Crop Land or Dry Land)	Agricultural Aquatic Life Industrial	NO
Nitrate/Nitrite (Nitrite + Nitrate as N)	Crop Production (Crop Land or Dry Land) Municipal Point Source Discharges	Aquatic Life Primary Contact Recreation	NO
Phosphorus (Total)	Crop Production (Crop Land or Dry Land) Municipal Point Source Discharges	Aquatic Life Primary Contact Recreation	NO
Specific Conductance	Crop Production (Crop Land or Dry Land)	Agricultural Aquatic Life Industrial	NO
Total Dissolved Solids	Crop Production (Crop Land or Dry Land)	Agricultural Aquatic Life Industrial	NO

Assessment Information

Assessment Type	Associated Uses	Co
BIOLOGICAL	Primary Contact Recreation	FAIR
BIOLOGICAL	Aquatic Life Cold Water Fishery	GOOD
HABITAT	Primary Contact Recreation	FAIR
HABITAT	Aquatic Life Cold Water Fishery	GOOD
PHYSICAL/CHEMICAL	Agricultural Aquatic Life Cold Water Fishery Drinking Water Industrial Primary Contact Recreation	FAIR

Assessment Method	Associated Uses
Benthic macroinvertebrate surveys	Aquatic Life Cold Water Fishery
Land use information and location of sources	Aquatic Life Cold Water Fishery
Non-fixed station physical/chemical monitoring (conventional pollutant only)	Agricultural Aquatic Life Cold Water Fishery Drinking Water Industrial Primary Contact Recreation
Primary producer surveys (phytoplankton/periphyton/macrophyton)	Aquatic Life Cold Water Fishery Primary Contact Recreation
Visual observation, may not quantify some parameters; single season; by prof.	Aquatic Life Cold Water Fishery

Comments

Overall Assessment
NA

Use	Comment
Cold Water Fishery	There is insufficient information to evaluate the cold water fishery for Old Maids C does not support the use likely due to natural conditions (Category 2B).

Cause	Comment
NA	NA

Source	Comment
NA	NA

Montana Department of Environmental Quality

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2006 Water Quality Information

Water Information

Waterbody Id	MT41O001_010	**Water Type**	RIVER
Name	Teton River	**Hydro Unit**	10030205 - Teton
Location	TETON RIVER, Muddy Creek to the mouth (Marias River)	**Basin**	Lower Missouri
Size (Miles/Acres)	110.6	**Watershed**	Marias
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-3
County	CHOUTEAU, TETON	**Trophic Status and Trend**	NA
Water Quality Category	4A - All TMDLs needed have been completed.		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information
Agricultural	✓				
Aquatic Life		✓			
Drinking Water	✓				
Industrial	✓				
Primary Contact Recreation	✓				
Warm Water Fishery		✓			

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
Low flow alterations	Flow Alterations from Water Diversions	Aquatic Life Warm Water Fishery	NO
Salinity	Agriculture Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Streambank Modifications/destablization	Aquatic Life Warm Water Fishery	YES
Sedimentation/Siltation	Channelization Highways, Roads, Bridges, Infrasturcture (New Construction) Impacts from Hydrostructure Flow Regulation/modification Streambank Modifications/destablization	Aquatic Life Warm Water Fishery	YES
Sulfates	Agriculture Impacts from Hydrostructure Flow Regulation/modification Irrigated Crop Production Streambank Modifications/destablization	Aquatic Life Warm Water Fishery	YES

Total Dissolved Solids	Agriculture Irrigated Crop Production	Aquatic Life Warm Water Fishery	YES

Assessment Information

Assessment Type	Associated Uses	Co
BIOLOGICAL	Aquatic Life Warm Water Fishery	GOOD
HABITAT	Aquatic Life	GOOD
PHYSICAL/CHEMICAL	Agricultural Aquatic Life Drinking Water Industrial Primary Contact Recreation Warm Water Fishery	GOOD

Assessment Method	Associated Uses
NA	NA

Comments

Overall Assessment
NA

Use	Comment
NA	NA

Cause	Comment
NA	NA

Source	Comment
NA	NA

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2006 Water Quality Information

Water Information

Waterbody Id	MT41M001_010	**Water Type**	RIVER
Name	Two Medicine River	**Hydro Unit**	10030201 - Two Medicine
Location	TWO MEDICINE RIVER, Birch Creek to the mouth (Marias River)	**Basin**	Lower Missouri
Size (Miles/Acres)	4.3	**Watershed**	Marias
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-1
County	GLACIER, PONDERA	**Trophic Status and Trend**	NA
Water Quality Category	2 - Waters for which available data and/or information indicate that some, but not all of the ben are supported. 2A - Available data and/or information indicate that some, but not all of the beneficial uses are :		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information
Agricultural	✓				
Aquatic Life	✓				
Cold Water Fishery					✓
Drinking Water	✓				
Industrial	✓				
Primary Contact Recreation	✓				

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
NA	NA	NA	NA

Assessment Information

Assessment Type	Associated Uses	Co
BIOLOGICAL	Primary Contact Recreation	FAIR
BIOLOGICAL	Aquatic Life Cold Water Fishery	GOOD
HABITAT	Primary Contact Recreation	FAIR
HABITAT	Aquatic Life Cold Water Fishery	GOOD
PHYSICAL/CHEMICAL	Agricultural Cold Water Fishery Drinking Water Industrial Primary Contact Recreation	FAIR

PHYSICAL/CHEMICAL	Aquatic Life	GOOD

Assessment Method	Associated Uses
Benthic macroinvertebrate surveys	Aquatic Life Cold Water Fishery
Fish surveys	Aquatic Life Cold Water Fishery
Land use information and location of sources	Aquatic Life Cold Water Fishery
Non-fixed station physical/chemical monitoring (conventional pollutant only)	Agricultural Aquatic Life Cold Water Fishery Drinking Water Industrial Primary Contact Recreation
Primary producer surveys (phytoplankton/periphyton/macrophyton)	Aquatic Life Cold Water Fishery Primary Contact Recreation
Visual observation, may not quantify some parameters; single season; by prof.	Aquatic Life Cold Water Fishery

Comments

Overall Assessment
NA

Use	Comment
Cold Water Fishery	There is insufficient information to evaluate the cold water fishery use for the Two River; it does not support the use likely due to natural conditions (Category 2B).

Cause	Comment
NA	NA

Source	Comment
NA	NA

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2006 Water Quality Information

Water Information

Waterbody Id	MT41P004_010	**Water Type**	RIVER
Name	Willow Creek	**Hydro Unit**	10030204 - Willow
Location	WILLOW CREEK, headwaters to mouth at Tiber Reservoir	**Basin**	Lower Missouri
Size (Miles/Acres)	71.9	**Watershed**	Marias
Ecoregion	Northwestern Glaciated Plains	**Use Class**	B-2
County	TOOLE	**Trophic Status and Trend**	NA
Water Quality Category	2 - Waters for which available data and/or information indicate that some, but not all of the ben are supported. 2A - Available data and/or information indicate that some, but not all of the beneficial uses are :		

Beneficial Use Support Information

Use Name	Fully Supporting	Partially Supporting	Not Supporting	Threatened	Insufficient Information	
Agricultural						
Aquatic Life	✓					
Drinking Water	✓					
Industrial						
Primary Contact Recreation	✓					
Warm Water Fishery	✓					

Impairment Information

Probable Causes	Probable Sources	Associated Uses	Co
NA	NA	NA	NA

Assessment Information

Assessment Type	Associated Uses	Co
BIOLOGICAL	Warm Water Fishery	GOOD
HABITAT	Aquatic Life	GOOD
PATHOGEN INDICATORS	Drinking Water Primary Contact Recreation	GOOD
PHYSICAL/CHEMICAL	Drinking Water Primary Contact Recreation Warm Water Fishery	GOOD

Assessment Method	Associated Uses
NA	NA

Comments

Overall Assessment	
NA	
Use	**Comment**
NA	NA
Cause	**Comment**
NA	NA
Source	**Comment**
NA	NA

APPENDIX J:
SUMMARY OF SURFACE WATER RESOURCES AND WATER QUALITY

APPENDIX J-1
SUMMARY OF SURFACE WATER IN THE ANALYSIS AREA

Surface Water Body[a]	Number of Crossings[b]			Flow Measured at nearest crossing[c]	Stream Classification[d]	303(d) Status[e]	Water Quality Summary[f]	Percent of Analysis Area Containing SubBasin
	Alt 2	Alt 3	Alt 4					
Upper Missouri-Sun-Smith Basin (HUC 10030102)								10.0
Missouri River	NC	NC	NC	13,100 cfs (2005) Great Falls	B-2	5	Yes	
Black Horse Lake (west finger) 8 acres	1	1	NC	ND	Not classified	NL	No	
Benton Lake	NC	NC	NC	ND	B-3	5	Yes	
Unnamed Lake (22 acres)	NC	1	NC	ND	Not classified	NL	No	
Lake Creek	NC	NC	1	ND	B-3	5	No	
Teton River Basin (HUC 10030205)								18.4
Teton River	1	1	NC	547 cfs (2005) Chouteau	B-3	4A	Yes	
Muddy Creek	NC	NC	NC		B-2	3	Yes	
Marias River Basin (HUC 10030203)								54.7
Unnamed Lake (7 acres)	1	1	NC	ND	Not classified	NL	No	
Unnamed Lake (7.6 acres)	1	1	NC	ND	Not classified	NL	No	
Pondera Coulee	1	1	1	15 cfs (2005) Conrad	B-2	5	No	
Spring Coulee	66.8	62.5	66.8 (Alt 2)	173 cfs (1982) Power	B-2	3	No	
Dry Fork Marias	1	1	1	2,130 cfs (1986) Dupuyer	B-3	1	Yes	
Schultz Coulee	1	NC	1	ND	B-2	NL	No	
Bullhead Creek	1	1	1	ND	B-2	NL	No	
Big Flat Coulee	NC	NC	6	ND	B-2	NL	No	

APPENDIX J-1 SUMMARY OF SURFACE WATER IN THE ANALYSIS AREA								
Surface Water Body[a]	**Number of Crossings[b]**			**Flow Measured at nearest crossing[c]**	**Stream Classification[d]**	**303(d) Status[e]**	**Water Quality Summary[f]**	**Percent of Analysis Area Containing SubBasin**
	Alt 2	**Alt 3**	**Alt 4**					
Little Flat Coulee	NC	NC	NC	ND	B-2	NL	No	54.7
Hilger Coulee	NC	NC	NC	ND	B-2	NL	No	
Sand Coulee	NC	NC	NC	ND	B-2	NL	No	
Rocky Springs Coulee	NC	NC	NC	ND	B-2	NL	No	
Buckley Coulee	NC	NC	NC	ND	B-2	NL	No	
Marias River[g]	1	1	1	5,160 cfs (2005) Shelby	B-2	2	Yes	
Two Medicine River Basin (HUC 10030201)								0.2
Two Medicine River	NC	NC	NC	ND	B-1	2 & 2A	Yes	
Cut Bank Creek Basin (HUC 10030202)								6.7
Cut Bank Creek	NC	NC	NC	4,060 cfs (2005) Cut Bank	B-2	5	Yes	
Old Maids Coulee	NC	NC	NC	ND	B-1	5 & 2B	Yes	
Spring Creek	NC	NC	NC	ND	B-1	NL	No	
Big Rock Coulee	NC	NC	NC	ND	B-1	NL	No	
Hay Lake (115 acres)	1	NC	1	ND	Not classified	NL	No	
Willow Creek Basin (HUC 10030204)								0.4
None crossed	NC	NC	NC	ND	B-2	2 & 2A	Yes	
Upper Milk River Basin (HUC 10050002)								6.7
Grassy Lake (160 acres)	1	NC	1	ND	Not classified	NL	No	
Red River	1	NC	1	ND	B-1	NL	No	
Red River	1	NC	1	ND	B-1	NL	No	
Red River	1	NC	1	ND	B-1	NL	No	
Unnamed Lake (40 acrea)	NC	1	NC	ND	Not classified	NL	No	
Unnamed Lake (63 acres)	NC	1	NC	ND	Not classified	NL	No	

APPENDIX J-1 SUMMARY OF SURFACE WATER IN THE ANALYSIS AREA								
Surface Water Body[a]	Number of Crossings[b]			Flow Measured at nearest crossing[c]	Stream Classification[d]	303(d) Status[e]	Water Quality Summary[f]	Percent of Analysis Area Containing SubBasin
	Alt 2	Alt 3	Alt 4					
Total Stream/River Crossings	10	6	17					
Total Pond/Lake Crossings	4	6	2					
Total Crossings	14	12	19					

Notes

Alt = alternative
cfs = cubic feet per second
NA = Not Applicable
NC = No Crossing
ND= No Data
NL= Not Listed on the 303(d) list

[a]This table lists all perennial streams and rivers in the analysis area, as well as, all ponds or lakes greater than 5 acres that would be crossed by one or more alternatives.

[b]Numbers in each column are the number of crossings for each surface water body per alternative.

[c]Flow measured at nearest crossing is from the U.S. Geological data base (USGS 2006). Stream flow measurement shown in this table is typically annual peak flow or near peak flow in cubic feet per second (cfs). Year and location for measurement are noted.

[d] Stream Classification Explanation

- A-CLOSED. Waters classified A-Closed are suitable for drinking, culinary, and food processing purposes after simple disinfection.
- A-1. Waters classified A-1 are suitable for drinking, culinary, and food processing purposes after conventional treatment for removal of naturally present impurities.
- B-1. Waters classified B-1 are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
- B-2. Waters classified B-2 are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
- B-3. Waters classified B-3 are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

- C-1. Waters classified C-1 are suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
- C-2. Waters classified C-2 are suitable for bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.
- C-3. Waters classified C-3 are suitable for bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of these waters is naturally marginal for drinking, culinary and food processing purposes, agriculture, and industrial water supply.

[e] Categorization of Surface Waters for 303(d) Listing

As of 2004, the EPA has requested that states adopt a five-part scheme for categorizing the assessment status of all waters in each state's water quality monitoring and assessment system. These five categories are used as follows:

- Category 1: Waters for which all applicable beneficial uses have been assessed and all uses are determined to be fully supported.
- Category 2: Waters for which available data and/or information indicate that some, but not all, of the beneficial uses are supported.
  - Subcategory 2A: Available data and/or information indicate that some, but not all, of the beneficial uses are supported.
- Category 3: Waters for which there are insufficient data to assess the use support of any applicable beneficial use, so no use support determinations have been made.
- Category 4: Waters where one or more beneficial uses have been assessed as being impaired, fully supporting but threatened, all TMDLs are completed but impaired beneficial uses have not yet achieved fully supporting status, or impaired and TMDLs are not required:
  - Subcategory 4A: All TMDLs needed to rectify all identified threats or impairments have been completed and approved.
  - Subcategory 4B: Waterbodies are on lands where "other pollution control requirements required by local, state, or federal authority" [see 40 CFR 130.7(b)(1)(iii)] are in place, are expected to address all waterbody-pollutant combinations, and attain all water quality standards in a reasonable period of time. These control requirements act "in lieu of" a TMDL, thus no actual TMDLs are required.
  - Subcategory 4C: Identified threats or impairments result from pollution categories such as dewatering or habitat modification and, thus, the calculation of a TMDL is not required.
- Category 5: Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened and a TMDL is required to address the factors causing the impairment or threat.

[f] All available water quality summaries for surface water in the analysis area are provided in Appendix 3.5.

[g] The Marias River is shown as a Category 1 stream on the Draft 2006 DEQ Water Quality Report.

APPENDIX K:
PRIORITY POLLUTANT MONITORING DATA

APPENDIX K-1
CRITERIA POLLUTANT MONITORING DATA
PM_{10}, $PM_{2.5}$, SO_2, and CO

Site	Year	PM_{10}		$PM_{2.5}$		SO_2		CO	
		Annual Mean (µg/m³)	24-Hour High (µg/m³)	Annual Mean (µg/m³)	24-Hour High (µg/m³)	Annual Mean (ppm)	24-Hour High (ppm)	Annual Mean (ppm)	8-Hour High (ppm)
Great Falls, Montana									
ID: 300130001 NW Corner 10th Ave and 2nd Street Intersection	1996	--	--	--	--	--	--	--	--
	1997	--	--	--	--	--	--	--	--
	1998	--	--	--	--	--	--	--	--
	1999	--	--	--	--	--	--	--	--
	2000	--	--	--	--	--	--	--	--
	2001	--	--	--	--	--	--	--	4.6
	2002	--	--	--	--	--	--	--	3
	2003	--	--	--	--	--	--	--	2.9
	2004	--	--	--	--	--	--	--	3.2
	2005	--	--	--	--	--	--	--	2.0
ID: 300130002 7 Miles NE of Malmstrom AFB	1996	--	--	--	--	--	--	--	--
	1997	--	--	--	--	--	--	--	--
	1998	--	--	--	--	--	--	--	--
	1999	--	--	--	--	--	--	--	--
	2000	--	--	--	--	--	--	--	--
	2001	--	--	--	--	--	--	--	--
	2002	--	--	--	--	--	--	--	--
	2003	--	--	--	--	--	--	--	--
	2004	5	13	--	--	--	--	--	--
	2005	9	26	--	--	--	--	--	--
ID: 300130009 Fire Station 9th Street and 1st Ave S	1996	19	69	--	--	--	--	--	--
	1997	20	62	--	--	--	--	--	--
	1998	--	--	--	--	--	--	--	--
	1999	--	--	--	--	--	--	--	--
	2000	--	--	--	--	--	--	--	--
	2001	--	--	--	--	--	--	--	--
	2002	--	--	--	--	--	--	--	--
	2003	--	--	--	--	--	--	--	--
	2004	--	--	--	--	--	--	--	--
	2005	--	--	--	--	--	--	--	--

APPENDIX K-1 CRITERIA POLLUTANT MONITORING DATA PM_{10}, $PM_{2.5}$, SO_2, and CO									
Site	**Year**	**PM_{10}**		**$PM_{2.5}$**		**SO_2**		**CO**	
		Annual Mean (μg/m³)	**24-Hour High (μg/m³)**	**Annual Mean (μg/m³)**	**24-Hour High (μg/m³)**	**Annual Mean (ppm)**	**24-Hour High (ppm)**	**Annual Mean (ppm)**	**8-Hour High (ppm)**
ID: 300131025 Skyway Conoco 700 10th Ave S	1996	--	--	--	--	--	--	--	8.5
	1997	--	--	--	--	--	--	--	7.4
	1998	--	--	--	--	--	--	--	5.3
	1999	--	--	--	--	--	--	--	3.6
	2000	--	--	--	--	--	--	--	4.6
	2001	--	--	--	--	--	--	--	3.9
	2002	--	--	--	--	--	--	--	--
	2003	--	--	--	--	--	--	--	--
	2004	--	--	--	--	--	--	--	--
	2005	--	--	--	--	--	--	--	--
ID: 300131026 Great Falls HS 3rd South and 17th East	1996	--	--	--	--	--	--	--	--
	1997	--	--	--	--	--	--	--	--
	1998	--	--	--	--	--	--	--	--
	1999	--	--	--	--	--	--	--	--
	2000	--	--	7.5	40	--	--	--	--
	2001	--	--	5.4	33	--	--	--	--
	2002	--	--	5.3	19	--	--	--	--
	2003	--	--	7.5	61	--	--	--	--
	2004	--	--	4.5	21	--	--	--	--
	2005	--	--	5.9	20	--	--	--	--
ID: 300132000 MT Refining @ Wire Mill Road	1996	--	--	--	--	0.004	0.021	--	--
	1997	--	--	--	--	0.003	0.016	--	--
	1998	--	--	--	--	0.003	0.012	--	--
	1999	--	--	--	--	0.003	0.012	--	--
	2000	--	--	--	--	0.003	0.009	--	--
	2001	--	--	--	--	--	--	--	--
	2002	--	--	--	--	--	--	--	--
	2003	--	--	--	--	--	--	--	--
	2004	--	--	--	--	--	--	--	--
	2005	--	--	--	--	--	--	--	--

APPENDIX K-1
CRITERIA POLLUTANT MONITORING DATA
PM_{10}, $PM_{2.5}$, SO_2, and CO

Site	Year	PM_{10}		$PM_{2.5}$		SO_2		CO	
		Annual Mean (μg/m³)	24-Hour High (μg/m³)	Annual Mean (μg/m³)	24-Hour High (μg/m³)	Annual Mean (ppm)	24-Hour High (ppm)	Annual Mean (ppm)	8-Hour High (ppm)
ID: 300132001 1301 27th Ave NE Black Eagle Race Track	1996	--	--	--	--	--	--	--	--
	1997	--	--	--	--	--	--	--	--
	1998	--	--	--	--	--	--	--	--
	1999	--	--	--	--	--	--	--	--
	2000	--	--	--	--	0.004	0.027	--	--
	2001	--	--	--	--	0.006	0.057	--	--
	2002	--	--	--	--	0.004	0.041	--	--
	2003	--	--	--	--	0.003	0.029	--	--
	2004	--	--	--	--	0.003	0.024	--	--
	2005	--	--	--	--	0.003	0.028	--	--
Browning, Montana									
ID: 300350101 Blackfeet Transit Bldg 34	1996	28	61	--	--	--	--	--	--
	1997	47	135	--	--	--	--	--	--
	1998	36	107	--	--	--	--	--	--
	1999	26	87	--	--	--	--	--	--
	2000	20	130	--	--	--	--	--	--
	2001	22	75	--	--	--	--	--	--
	2002	29	117	--	--	--	--	--	--
	2003	24	190	--	--	--	--	--	--
	2004	15	30	--	--	--	--	--	--
	2005	13	21	--	--	--	--	--	--
ID: 300350102 Blackfeet Industrial Park	1996	11	26	--	--	--	--	--	--
	1997	8	18	--	--	--	--	--	--
	1998	--	--	--	--	--	--	--	--
	1999	--	--	--	--	--	--	--	--
	2000	--	--	--	--	--	--	--	--
	2001	--	--	--	--	--	--	--	--
	2002	--	--	--	--	--	--	--	--
	2003	--	--	--	--	--	--	--	--
	2004	--	--	--	--	--	--	--	--
	2005	--	--	--	--	--	--	--	--

Notes:

PM_{10} Particulate Matter < 10 Microns
$PM_{2.5}$ Particulate Matter < 2.5 Microns
μg/m³ micrograms per cubic meter
ppm parts per million
Source: EPA 2006a

APPENDIX L:
PHOTOGRAPHIC SIMULATIONS

APPENDIX L

Photographic Simulations

Technical information on the generation of photographic simulations is provided here. Computer Aided Design (CAD), Geographic Information System (GIS), and 3-dimensional (3-D) modeling and design software, Global Positioning Systems (GPS) equipment, a Digital Single Lens Reflex (dSLR) camera, and direct conversations with individuals responsible for transmission line pole design were used to prepare the photograph simulations. Photographs were taken in the field at the defined viewpoint locations and used as backgrounds in the computer generated images. Several 3-D models were constructed of the topography and transmission line poles. Pole placement was performed using GIS software. The computer camera placed the poles in the 3-D model at the appropriate location and the images were generated.

On-site GPS data were obtained using the Pharos GPS Pocket Navigator package for a hand-held Dell Axim 51 PDA. Data recorded included date, time of day, latitude, longitude, elevation, and heading. Heading was verified with a hand-held compass. On-site photographs were acquired using a Canon 350D dSLR (1.6 crop factor) and a Canon 18-55 mm zoom lens. Camera information recorded and verified from photograph EXIF information included: film speed, focal length, aperture, and shutter speed. Photographs were saved as both unprocessed data from the image sensor and in a compressed format.

Montana Digital Elevation Model (DEM) data were obtained from the National Elevation Dataset (NED) as of April 2002 for each of the viewpoints. The data used included 30-meter X-Y resolution and one foot resolution in the Z-plane. Horizontal datum is North American Datum of 1927 (NAD27) with a transverse mercator projection, and National Geodetic Vertical Datum (NGVD) 1929 vertical datum.

The proposed transmission line route was presented in the MFSA application (MATL 2006b). The transmission line map datum was converted to NAD27, so that the line could be exported and then re-imported into the 3-D modeling software and aligned with the NAD27 based DEMs. Transmission line and proposed pole specifications and details were obtained from SNC-Lavalin ATP Inc. (2006). Scaled 3-D models were constructed for each of the proposed power pole types and placed into the 3-D model along the proposed transmission line alignment using specified or recommended span distances between poles. Typical conductor and ground cable sag specifications were used unless otherwise specified by SNC-Lavalin.

For each simulation, the photograph taken in the field was imported into the 3-D modeling software package and loaded as a background environment within which the view of the 3-D model is generated. To generate the correct view relative to the actual photograph, a software camera was placed at a location identical to where the photograph was taken relating the field location to the DEM location. Using the JEEEP.com coordinate translation applet, GPS recorded camera locations were converted to Universal Transverse Projection (UTM) northing and easting locations to facilitate placement of the software camera.

APPENDIX M:
INTERCONNECTION INFORMATION AND AGREEMENT

MONTANA ALBERTA TIE LTD

MONTANA-ALBERTA TIE LTD. PROJECT REVIEW GROUP

PHASE 2 STUDY REPORT

PROJECT REVIEW GROUP ACCEPTED
JULY 24, 2007

REGISTERED PROFESSIONAL ENGINEER
R. PETER MACKIN
No. 12018
EXP. 9/30/07
ELECTRICAL
STATE OF CALIFORNIA

	Name	Signature	Date
Prepared	Peter Mackin, P.E. Utility Systems Efficiencies, Inc.	R. Peter Mackin	07/24/07
Approved	Mark Abraham, P.Eng. Montana Alberta Tie Ltd.	[illegible]	July 24, 2007

I. EXECUTIVE SUMMARY

Project Overview

Montana Alberta Tie, Ltd. (MATL), a wholly owned subsidiary of Tonbridge Power Inc., is proposing to build a 240/230 kV merchant transmission line from the Lethbridge area in southern Alberta to Great Falls in west-central Montana. This project is Alberta's first direct interconnection to the United States and Montana's first direct interconnection with Alberta. The Project will provide import/export opportunities for power markets in Montana and Alberta and enable wind development opportunities in southern Alberta and northern Montana since the transmission route traverses a region of substantial wind development potential.

The MATL project is a 240/230kV, 330 MVA transmission line designed for continuous bi-directional power transfers of over 300 MW. The project consists of a new substation, named MATL 120S, located approximately 15 km north of the City of Lethbridge, Alberta that ties into the existing 240 kV Alberta Interconnected Electric System (AIES) system. A phase shifting transformer will be installed in the MATL 120S substation to control flows both north and south and to step the voltage down from the Alberta nominal system voltage of 240 kV to transmission line voltage of 230 kV. A mid-point substation named Marias will be built approximately 10 km south of the town of Cut Bank, Montana. The Marias Substation will contain shunt and series capacitance for voltage support and the substation will be a connection point for proposed wind generation projects in the area. At the south end, the MATL transmission line will terminate at the existing Great Falls, Montana, 230 kV substation. The Great Falls Substation is owned and operated by NorthWestern Energy Inc. The transmission line is approximately 346 km long, uses single Falcon 1590 kcmil conductor, and will be built of a combination of monopole and H-frame structures.

Phase 2 Path Rating Process

On August 19, 2005, MATL initiated the WECC Regional Planning Process for the MATL project through an invitation letter to WECC Planning Coordination Committee (PCC) and Technical Studies Subcommittee (TSS) to form a Regional Planning Review group. A project review group was formed and on December 7, 2005, MATL submitted a Regional Planning Project Report to the PCC. No comments were received during the 30 day comment period. Accordingly, on January 23, 2007, the PCC notified MATL that the Regional Planning Project Review had been completed.

On September 20, 2005, MATL initiated the WECC Path Rating Process for the MATL Project through the submittal of a Comprehensive Progress Report to the PCC and TSS as well as an invitation to form a Path Rating Project Review Group (PRG). During the 60-day comment period, MATL received requests from WECC members to participate in the PRG. On February 2, 2006, the TSS confirmed the MATL Project had achieved Phase 2 status.

As a result of a combination of regulatory, commercial and technical factors, MATL made scope changes to the project and notified the PCC and the TSS of these changes on August 30, 2006. The most notable changes were the addition of series compensation to the transmission line at the Marias Substation in order to increase the emergency rating of the MATL project and the inclusion of a 120MW of wind generation connection to the Marias Substation. Because of these major changes, MATL re-opened the PRG to new WECC members. Two new members subsequently joined.

Study Plan

The MATL PRG developed a study plan to analyze the impact of the MATL system on neighboring systems. The Phase 2 study is based on a planned in service date of the MATL project of 2008. The MATL Rating Study Scope included the MATL proposed path rating flows defined as -300 MW power transfers into the connection point in Alberta (MATL 120S) from Montana (north flows) and +325 MW power transfers (metered at MATL 120S) from Alberta toward NorthWestern Energy system in Montana (south flows) under the WECC 2007 Heavy Summer and 2007 Light Spring base cases. These flows are effectively 300 MW delivered at the interface ends of the line as MATL line losses at rated flow are approximately 25 MW. Sensitivities include Great Falls, Montana generation, a wind generation connection at the Marias Substation and wind generation in southern Alberta. The wind generation sensitivity at Marias was subsequently removed from the study scope by MATL (with the concurrence of the MATL PRG) in order to expedite the submittal of the Phase 2 Project Rating Report. The TSS was notified of the removal of the Marias wind generation sensitivity on June 11, 2007.

The MATL PRG has performed and reviewed Phase 2 Rating studies according to the guidelines in the WECC "Procedures for Regional Planning Project Review and Rating Transmission Facilities". The purpose of these studies is to demonstrate that the MATL project conforms, or will be able to conform to, all applicable Reliability Criteria. In addition, these studies:

- identify the planned non-simultaneous transfer capability and the planned simultaneous path transfer capability limits for the proposed project configuration,
- address the mitigation of simultaneous transfer capability issues relative to the existing system, and
- resolve comments from BPA, NWE, and BCTC on the MATL Comprehensive Progress Report.

No changes to the current existing WECC path ratings are contemplated or implied in this report.

Conclusion

In conclusion, the non-simultaneous study demonstrates the MATL project meets NERC/WECC Planning and reliability standards for the proposed path rating of 300 MW northbound and 325 MW southbound, as defined at the MATL 120S metering point, under certain conditions stipulated in this Report.

The conditions identified that require remedial action schemes (RAS) are:

1. Loss of Langdon - Cranbrook,

2. Loss of Cranbrook - Selkirk,
3. Loss of Selkirk - Ashton Creek and Selkirk - Vaseux Lake,
4. Loss of both Ingledow - Custer lines (when BC would separate from the US), and
5. Loss of both Custer - Monroe lines (when BC would separate from the US).

These five contingencies will require a RAS to trip MATL to prevent voltage collapse or transient instability from occurring. The RAS is intended to be armed at all times that the MATL project is in service. If the RAS is out of service for any reason, it is expected that the MATL line will need to be taken out of service to preserve system reliability. Future operating studies may look at possibly defining a lower boundary for RAS arming. If system flows are below the boundary levels defined in the studies, then the RAS may not need to be armed.

In addition to the above RAS, other conditions identified that require mitigation are:

1. Loss of the MATL tie when Nelway - Boundary flow is at or near its limits and the MATL flow is in the same direction as the Nelway - Boundary flow will require either a RAS to trip Nelway - Boundary or an operating procedure to issue a tap changer adjustment order for the Nelway phase shifting transformer.

2. Loss of large amounts of generation in Montana due to operation of the Colstrip ATR can cause a large increase in flows on the MATL project. In order to mitigate these overloads, the MATL phase shifting transformer will need to be adjusted or the MATL line will need to be tripped.

This study also identified simultaneous transfer capability of MATL versus Path 1, Path 3 and Path 8. Nomograms were developed for these simultaneous relationships for the cases studied. In all nomograms, the metering point on MATL is assumed to be the MATL 120S Substation. For the cases studied, MATL and either Path 1 or Path 3 cannot both simultaneously achieve rated transfers due to constraints outside the MATL line and Path 1 or Path 3. Under these operating conditions, simultaneous operating limits (nomograms) or other mitigation methods are required to meet NERC/WECC Planning Standards. Studies for Path 8 indicate there is potential for interaction between MATL and Path 8 transfers. Further operational studies are required to confirm impacts, if any, and corresponding mitigation. These simultaneous conditions are:

1. High simultaneous transfers on Path 1 and MATL,

2. High simultaneous transfers on Path 3 and MATL,

3. High simultaneous transfers on Path 8 and MATL (not confirmed)

Further details regarding the magnitude of the required curtailments and the contingencies that create the need for these curtailments are provided in the Results sections of this report. This report identified limits of simultaneous interactions for specific system conditions defined for MATL path rating purposes. Further studies for a variety of system conditions are needed to establish actual operating limits.

A thorough investigation of flowgates in the Great Falls area has uncovered the existence of five potential flowgates that can limit export from Great Falls in the north-to-south direction.

The first four of these flowgates have limits that allow anywhere from 245 MW to 675 MW of additional power to be injected into the Great Falls 230 kV bus under heavy summer conditions and anywhere from 510 MW to 640 MW of additional power to be injected into the Great Falls 230 kV bus under light spring conditions[1].

The last flowgate (the Great Falls - Landers Fork - Ovando 230 kV flowgate) is constrained by voltage deviations on NWE's 100 kV system in the vicinity of Townsend. Because this constraint is based on voltage deviations, it is difficult to quantify this limit as a function of MW flows through a flowgate. While studies have shown that the other four flowgate limits are usually reached first, there is a possibility that the Great Falls - Landers Fork - Ovando 230 kV flowgate could be limiting. For this reason, either system reinforcements or a RAS may be needed to mitigate the impacts of the Great Falls - Landers Fork - Ovando 230 kV line outage.

The conclusions are based on a comparative analysis between pre-project base case conditions and the base case with the proposed MATL project under the same conditions. This study did not investigate conditions that could not meet WECC/NERC reliability in the pre-project case. In particular, Path 1 flows used in this study were well below the 1000 MW east to west and 1200 MW west to east path rating limit because of limitations in the AIES system.

Mitigation Plan

Also required as part of the Phase 2 process is the mitigation plan. MATL's mitigation plan is to:

- develop a mitigation implementation and responsibility plan
- design and implement protection, control and remedial action schemes to meet the mitigation objectives identified in this report or that may be identified through the operating study process,
- comply with WECC Procedures for Project Rating Review subject to the requirements or orders from the connecting Transmission Service Providers or Path Operators.
- operate within transfer capabilities identified in this report or that may be identified through operational studies,
- design and operate to NERC/WECC Planning Standards,
- develop operating procedures or operate to procedures of respective connecting electrical system operators to maintain WECC reliability, and
- negotiate agreements to resolve conflicts as a means to formulate a mitigation strategy with impacted parties where applicable.

For impacts to Path 3 flows as identified in the MATL vs. Path 3 nomogram, MATL's mitigation plan is to:

[1] Note that these additional power injections are subject to the conditions defined in the base cases and were used for the PRG's analysis of the MATL project. Actual allowable power transfer limits will be determined by the area electrical system operator(s).

A. Develop, fund and implement a RAS mutually acceptable to BCTC and/or AESO as appropriate which will reduce or eliminate the MATL impact

B. If the RAS cannot be implemented prior to MATL being energized, MATL, BCTC and other affected transmission operators will develop operating procedures to keep the amount of power that Path 3 can transfer protected from being diminished due to MATL flows. This operating procedure may include curtailing MATL.

C. If a RAS cannot be implemented to fully protect Path 3 transfers from being diminished due to MATL flows, operating procedures to protect Path 3 transfers will be in place along with the RAS.

The details of the mitigation plan will be developed in coordination with impacted electrical system operators and other impacted parties. MATL proposes to execute this plan in Phase 3.

Next Steps

Completion of Phase 2 (acceptance of this report by WECC) is one step towards the construction and ultimate operation of the proposed Montana – Alberta 240/230 kV merchant transmission line. More operational study work including development of operational procedures and tools as well as the detailed design and implementation of remedial action schemes (RAS) is required to fully define definitely the envelope of operation for this project. The time to study, design and implement the special protection schemes in addition to the necessary review by the WECC Remedial Action Scheme Reliability Subcommittee (RASRS) could be upwards of one year or more, which may restrict the operational capability of the proposed merchant transmission line until final design, review and implementation of the remedial action schemes are complete.

MONTANA ALBERTA TIE LTD

April 2, 2007

Tom Ring
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U.S.A.

COPY

RECEIVED
APR 06 2007
Dept. Environmental Quality
Env. Management Bureau

Dear Mr. Ring:

Subject: Appendix M of the Draft EIS for Public Comment re: MATL Project

Attached is the NorthWestern Energy (NWE) system impact study that is required for Appendix M of the Environmental Impact Statement (EIS) prepared by the DEQ. MATL requests that the DEQ also include the attached interim progress report on the Western Electricity Coordinating Council (WECC) in Appendix M of the EIS.

MATL would like to address the purpose of the NWE Impact Study (Impact Study) and the WECC Path Rating Study (Path Rating Study). The purpose of both the Impact Study and Path Rating Study is to assess impact of the MATL project on the reliability of the electric transmission grid. The Impact Study addresses the impact on the reliability of the NorthWestern transmission grid, whereas the Path Rating Study addresses the impact on the reliability of the greater western interconnected transmission grid, including NorthWestern Energy's grid and that controlled by the Alberta Electric System Operator.

The key steps conducted for both Impact and Path Rating Studies are:

1. Determine which operating conditions (Base Cases) will be studied to assess the reliability of the transmission grid;
2. Determine how the Base Cases are affected under different operating scenarios (Contingencies);
3. Compare the study results to reliability criteria, set by WECC to assess whether the study results meet reliability criteria or not;
4. In the event that a Base Case does not meet reliability criteria under certain Contingencies, determine an appropriate mitigation plan to ensure such Base Cases do meet the applicable reliability criteria. Typical mitigation plans include the setting operational limits, or implementing remediation control schemes.

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Phone: (403) 264-4465 Fax: (403) 265-1299 Website: www.matl.ca

NWE System Impact Study

Currently, MATL and NWE are working together on the facility design and the Interconnection Agreement for the 300MW bi-directional tie at the Great Falls 230 kV Substation. MATL would now like to address the conditions identified in the NWE Impact Study that may limit the transfer capability under certain conditions:

1. The two existing 100 MVA 230/100 kV autotransformers are limiting the power transfer out of the Great Falls 230 kV substation to zero MW.

   MATL's interconnect agreement with NorthWestern stipulates that MATL will pay the cost to replace the two existing 100 MVA autotransformers with two 200 MVA autotransformers, thereby mitigating autotransformer overloads identified in the contingency analysis. As stated in the NWE Impact Study, the existing autotransformers would also need to be replaced to interconnect other projects that are senior to the MATL project in NorthWestern's queue.

2. NorthWestern has requested that MATL consider the operation and voltage set points of the switched shunt capacitors at MATL's Marias substation to prevent high voltage situations.

   MATL will ensure that it's facilities are designed to be operated in accordance with WECC requirements. NorthWestern, in its role as the control area operator of the MATL line in Montana, will have the authority to determine the appropriate set points for the switched shunt capacitors at the Marias substation.

3. Under certain conditions, the south bound flows over the MATL line are constrained in the year 2010LA (light autumn) and year 2012HS (heavy summer) cases to 170-190MW range by the 79 degree angle limit of the phase shifting transformer (PST).

MATL does not consider the PST angle limit as an impediment to commercial operations of the line because the system conditions that create the south bound phase angle limit are typically when south bound flows would be un-economical in any event. The conditions where south bound phase limit occur is when there is heavy power flow east from British Columbia (BC) into Alberta through path #1 and heavy power flow west from Montana into the Pacific North West through Path #8. Short term opportunity power flow would be scheduled in these directions when the market price of electricity was higher in Alberta and the Pacific North West than in BC or Montana and under those same pricing conditions the market would normally want to move power northbound over the MATL line as opposed to southbound.

WECC Path Rating Studies

The enclosed letter from Mr. Peter Mackin, Vice President, Reliability Services & Principal Power System Analyst, Utilities System Efficiencies, confirms that the conclusions of his report dated 16 January 2007 are still valid, that is to say that a path rating of 300 MW, both north to south and south to north, is anticipated at the conclusion of the WECC Path Rating process.

Respectfully,

Robert L. Williams

Bob Williams
Vice President, Regulatory
Enclosures (3)

NorthWestern Energy

Montana Alberta Tie Line (MATL)

Third Revision

System Impact Study

Stand-Alone & Co-Existing

September 26, 2006

Electric Transmission Planning

Table of Contents

Executive Summary

NorthWestern Energy (NWE) has completed the System Impact Study (SIS) for the Montana Alberta Tie Line (MATL) Project on December 22, 2005. As per the request of MATL to reword the conclusions in the original SIS report, NWE made required wording changes and submitted a revised SIS on February 9, 2006. Upon completion of the SIS, the Facilities Study is to commence. At the beginning of the Facilities Study, it is NWE's practice to confirm the SIS results and mitigation requirements. However, MATL made changes to the line design, interconnection point in Alberta and increased the length of the line. As a result of these modifications, another SIS is necessary to identify the problems and mitigation before the Facilities Study commences. Also, the new Great Falls - Ovando 230 kV line included in the original SIS as a fix for a senior queue project is not needed anymore and hence it is removed in the base case for this study. The study results and the necessary mitigation changed with all these modifications.

This System Impact Study examines the physical interconnection to the Great Falls 230 kV Switchyard and does not constitute a request for transmission service. These studies examine the physics of the electrical system and do not imply that the users of the transmission line will receive any transmission required to deliver the output to load beyond the Great Falls 230 kV Switchyard. The users of the MATL transmission line must follow the procedures described in the transmission tariff available on NWE's OASIS site to request and/or reserve Transmission Service or a Generation Interconnection.

The goal of the System Impact Study is to identify improvements or changes needed in NWE's electric transmission system to reliably *interconnect* your project to NWE's transmission system only. This study does not make any specific presumptions or recommendations regarding NWE's system improvements that will be required to move power away from NWE's 230 kV Switchyard. NWE's transmission system mitigation requirements will be fully defined for the specific Transmission Service Requests to move power away from (or to) NWE's Great Falls 230 kV Switchyard once NWE has received the requests. NWE has not received a Transmission Service Request (TSR) or a Generation Interconnect Application (GIA) that will be associated with (or connected to) the MATL line.

This study was designed to answer two questions:

(I) What is the available unused capability of the Great Falls 230 kV Switchyard with the MATL line interconnected?

Stand-Alone and Co-Existing:

- The existing unused capability of the Great Falls 230 kV Switchyard without any system or network upgrades is 0 MW.

(II) What transmission system upgrades are necessary to allow your line to be interconnected.

Stand-Alone and Co-Existing:

- The overload of the two Great Falls 230/100 kV autotransformers must be mitigated. The mitigation required must be coordinated with senior queue N-1 mitigation requirements. With the autotransformer upgrades, the MATL line will be able to connect its 230 kV line to the GF 230 kV Switchyard without further mitigation in the switchyard based on the information provided and analyzed in this study.

- MATL needs to consider the voltage set points of the switched shunts to prevent high voltages during all conditions (N-0, N-1 and N-2). Also, the high voltages at the proposed Marias and MATL 230 kV buses are present for other contingency conditions.

The above mitigation will be required before the MATL project can be connected to NWE's transmission system. The study results may change if there are changes to MATL's queue position or to the line design and interconnection specifications provided by you to NWE. Any variation in the line or interconnect specifications must be reported to NWE, so a thorough review and/or study can be conducted by NWE. Such review and/or study may yield results different from this analysis, and different mitigation requirements may be required.

The following tables are a summary of the high-level non-binding cost estimates. The cost estimates will be finalized in the Facilities Study. (All estimates are denominated in 2006 US dollars).

Table 1. Cost Estimates for MATL to interconnect

Interconnection Cost Estimate	$M *Cost*
230 kV Switchyard Upgrades	5.605*
Transmission Provider Interconnection Facilities	0.145
Total Cost Estimate	5.750

This study examined the physical performance of the electrical transmission system and does not imply: 1) that transmission service will be received, or 2) entitlement to transmission service that is required to deliver the generation output to load. Conducting a Transmission Service Request Study will be required and may identify additional electric transmission system improvements required on NWE's or other electric transmission provider's transmission systems. It must be noted that upgrades to transmission paths that interconnect NWE with other transmission systems may be identified and required as a result of the Transmission Service Request Study. This may make it necessary to enter into a WECC Regional Planning Process and/or a Three Phase Rating Process. It is possible that fulfilling these WECC requirements may take considerable time.

Definitions

Stand-Alone Study

A stand-alone (SA) study is designed to identify changes in the reliability of the local and regional electric transmission system by comparing the performance of the system with and without the addition of the MATL facility. The Stand-Alone Study and associated results represent the transmission system with existing resources and without senior queue generation projects and associated system mitigation that will come online at a later date than the MATL. The mitigation identified for the Stand-Alone Study must be implemented before the MATL facility can interconnect.

Co-Existing Study

A co-existing (CE) study identifies and evaluates the MATL facility's impact to the transmission system when all relevant generators are also interconnected to NWE's system. The relevant generators include all existing generators and potential new generators that are senior to MATL's queue position. MATL must implement mitigation for problems caused by its interconnection as identified in the Co-Existing System Impact Study. Implementation of some of the MATL mitigation requirements may be appropriately timed, and be completed before the commercial operation of senior queued generation that has a commercial operation date later than MATL.

* This cost might be less, as the mitigation listed for the autotransformers (approximately $3.6M) is to be coordinated with the N-1 senior queue mitigation.

Project Description

The following data is used for the Third Revision SIS of the MATL project. The impedance data used in this project are as shown in the Table 1 below.

Table 2. Line Impedance data

	FROM	TO	Length (Mi)	R (pu)	X (pu)	B (pu)
PST Data	N LETH 240 kV	MATL 240 kV	NA	0	0.04697	0
Transformer Data	MATL 240 kV	MATL 230 kV	NA	0	0.01904	0
Line Data	MATL 230 kV	MATL SC1 230 kV	126.56	0.01529	0.17927	0.38589
Series Cap Data	MATL SC1 230 kV	Marias 230 kV	NA	0	-0.11652	0
Series Cap Data	Marias 230 kV	MATL SC2 230 kV	NA	0	-0.06536	0
Line Data	MATL SC2 230 kV	GT Falls 230 kV	91.82	0.01109	0.13072	0.27736

The Phase shifting transformer rating is 330 MVA and the Impedance is 15% on 330 MVA base, with an angle of ±79 degrees. There are two switched shunts, rated 50 MVAr of 2 blocks and 40 MVAr of 4 blocks at the new MATL 240kV and 230 kV substations respectively.

Study Parameters

Senior Queue Network Generators

In modeling the appropriate parameters for the Co-Existing System Impact Study it was necessary to include the following relevant, potential new network generators that are senior to your project's queue position.

1. 188 MW at Judith gap (existing plant)
2. 109 MW at Hardin (existing plant)
3. 12 MW at Thompson Falls (existing plant)
4. 280 MW at Great Falls[1]
5. 48 MW at South Butte (existing plant)
6. 396 MW at Reed Point (in study process)
7. 268 MW at Great Falls (in study process)

[1] NWE has recently received a cancellation request from this project, but the request is not approved until the FERC accepts the request. Removing this resource will not eliminate the overload on the 230/100 kV autotransformers discussed within this report.

8. 500 MW at Colstrip (in study process)

The dispatch of existing network generators and these new network generators were varied as needed to stress the transmission system and meet network load. Both the 2010 Light Autumn (2010LA) and 2012 Heavy Summer (2012HS) cases are studied with Great Falls generation at minimum as well as maximum as they reflect different scenarios. For the Stand-Alone Study, generation and fixes of 268 MW at Great Falls and 500 MW at Colstrip are removed from the base case.

Assumptions

The following network system upgrades required for the senior queued projects were included in the system models for the 2010LA and the 2012HS cases.

1. An Overload Mitigation Scheme (OMS) for the Judith Gap Wind Energy facility to mitigate for the Broadview - Judith Gap South 230 kV line outage.

2. A Remedial Action Scheme (RAS) for the Rocky Mountain Power Plant to mitigate for stability issues for the loss of both Broadview - Garrison 500 kV lines.

3. Replace the existing Great Falls 230/100 kV autotransformers to fix the senior queue project problems.

4. A RAS in service for the 268 MW generator at Great Falls to trip for the Facility - Great Falls 230 kV N-2 contingency.

5. Reconductor the Judith Gap to Judith Gap Tap and Judith Gap Tap to Harlowton 100 kV lines.

6. Replace the existing Judith Gap 100 MVA, 230/100 kV autotransformer with 200 MVA, 230/100 kV transformer.

7. An additional 500 MVA, 500/230 kV autotransformer at Colstrip.

8. An OMS for the loss of one of the three 500/230 kV autotransformers at Colstrip.

9. Increase of the ampere rating of the series capacitors and all related equipment to 3000 Amps in the Colstrip - Broadview, Broadview - Garrison, Garrison - Taft, Taft - Bell, and Taft - Dworshak 500 kV lines.

10. A large (up to 450 MVAr) fast responding switched capacitor bank at the Broadview 230 kV bus. This device is necessary to support the steady-state voltage in the Broadview local area during the Colstrip - Broadview 500 kV single line outage.

11. Increase of the percent compensation of the series capacitors and all related equipment to 70% in the Colstrip - Broadview, Broadview - Garrison, Garrison - Taft, Taft - Bell, and Taft - Dworshak 500 kV lines.

12. A dynamic VAr device (up to 100 MVAr) located at the Garrison 230 kV bus. This device is necessary for voltage support during 500 kV N-1 stability contingencies.

13. A dynamic VAr device (up to 50 MVAr) located at the Broadview 230 kV bus. This device is necessary for voltage support during 500 kV N-1 stability contingencies.

14. A RAS for the new Colstrip facility to mitigate for all 500 kV N-2 contingencies.

Steady-State Power Flow Analysis

The Steady-State Power Flow Analysis examines steady-state system normal operating conditions with no lines out of service (i.e., N-0 conditions) and with one or more lines out of service (i.e., N-1 and N-2 conditions).

Stand-Alone Study Findings

Table 3. 2012HS Thermal Overloads, Great Falls Generation Maximum

Outage	Monitored element	Overload %	Prebc %
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 1	110.5	None
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 2	106.4	None
GT Falls 230/100 kV transformer ckt 2	GT Falls 230/100 kV transformer ckt 1	118.6	None
Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 1	104.1	None
Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 2	101.5	None

Table 4. 2012HS Thermal Overloads, Great Falls Generation Minimum

Outage	Monitored element	Overload %	Prebc %
N-0 conditions	GT Falls 230/100 kV transformer ckt 1	114.4	None
N-0 conditions	GT Falls 230/100 kV transformer ckt 2	110.2	None
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 1	144.5	117.4
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 2	139.2	113.1
GT Falls 230/100 kV transformer ckt 2	GT Falls 230/100 kV transformer ckt 1	184.6	152.4
Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 1	117.2	None
Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 2	112.8	None
GT Falls - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 1	115.9	None
GT Falls - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 2	111.6	None

- When the MATL flows were northbound, a flow of 301.3 MW was achieved at a phase shifting angle of +43.8 degrees in the 2010LA case and a flow of 300.7 was achieved at an angle of +44.9 degrees in the 2012HS case.

- Great Falls 230/100 kV autotransformers are overloaded with the addition of MATL facility under N-0 and N-1 conditions (Tables 5 and 6). These overloads must be mitigated by MATL.

Stand-Alone Study Mitigation

Completing the following can mitigate the above stand-alone problems:

- MATL needs to consider the voltage set points of the switched shunts to prevent high voltages during all conditions (N-0, N-1 and N-2). Also, the high voltages at the proposed Marias and MATL 230 kV buses are present for all the other contingency conditions. Please see the limit checking reports in Attachment B for more details.

- The mitigation required for the overload of the two Great Falls 230/100 kV autotransformers must be completed by MATL. This mitigation will be coordinated with senior queue N-1 mitigation requirements.

Because the MATL project is scheduled to be in-service before the senior queue projects, the above mitigation requirements must be completed by MATL before the project goes commercial.

Co-Existing Study Findings

Co-Existing Simulated Events

The outages studied for the Co-Existing Study are as follows.

Great Falls - Ovando 230 kV line

Great Falls 230/100 kV autotransformer ckt 1

Great Falls - Great Falls 268 generator 230 kV line ckt 1

Great Falls - Judith Gap 230 kV line

Broadview - Judith Gap South 230 kV line (Judith Gap RAS is implemented for this outage)

The Co-Existing Study found the following system problems. The addition of this project and all senior queued Generation Interconnection projects will require system mitigation.

Table 5. 2010LA Thermal Overloads, Great Falls Generation Minimum

Outage	Monitored element	Overload %	Prebc %
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 1	144.5	125.3
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 2	139.1	120.6
GT Falls 230/100 kV transformer ckt 2	GT Falls 230/100 kV transformer ckt 1	151.3	112.5
Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer	103.7	None
GT Falls - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 1	121.3	None
GT Falls - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 2	116.8	None

Table 6. 2010LA Thermal Overloads, Great Falls Generation Maximum

Outage	Monitored element	Overload %	Prebc %
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 1	113.5	102.5
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 2	109.3	None

Table 7. 2012HS Thermal Overloads, Great Falls Generation Minimum

Outage	Monitored element	Overload %	Prebc %
N-0 conditions	GT Falls 230/100 kV transformer ckt 1	141.8	116.7
N-0 conditions	GT Falls 230/100 kV transformer ckt 2	136.6	112.4
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 1	182	156.4
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 2	175.3	150.6
GT Falls 230/100 kV transformer ckt 2	GT Falls 230/100 kV transformer ckt 1	228.9	186.9
Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 1	150.4	126.4

Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 2	144.8	121.7
GT Falls - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 1	165.4	125.4
GT Falls - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 2	159.3	120.8
GT Falls – GT Falls 268 generator 230 kV line ckt 1	GT Falls 230/100 kV transformer ckt 1	141.4	115.8
GT Falls - Great Falls 268 generator 230 kV line ckt 1	GT Falls 230/100 kV transformer ckt 2	136.1	111.5

Table 8. 2012HS Thermal Overloads, Great Falls Generation Maximum

Outage	Monitored element	Overload %	Prebc %
N-0 conditions	GT Falls 230/100 kV transformer ckt 1	102.3	None
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 1	146.6	137.1
GT Falls – Ovando 230 kV line	GT Falls 230/100 kV transformer ckt 2	141.2	132
GT Falls 230/100 kV transformer ckt 2	GT Falls 230/100 kV transformer ckt 1	161.5	145.2
Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 1	112.7	104.4
Broadview - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 2	108.5	100.5
Broadview - JGap South 230 kV line	Threeriv 161/100 kV transformer	109.5	None
GT Falls - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 1	130.3	106
GT Falls - JGap South 230 kV line	GT Falls 230/100 kV transformer ckt 2	125.5	102
GT Falls - Great Falls 268 generator 230 kV line ckt 1	GT Falls 230/100 kV transformer ckt 1	101.5	None

Following conclusions can be drawn from the co-existing findings:

- When the MATL flows were northbound, a flow of 300.3 MW was achieved at a phase shifting angle of +41.7 degrees in the 2010LA case and a flow of 300.8 MW was achieved at an angle of +42.4 degrees in the 2012HS case.

- Great falls 230/100 kV autotransformers are overloaded with the addition of MATL facility in 2010LA case under several N-1 conditions. Mitigation must be completed to fix problems when the overload in the Prebc column is "none", MATL will also be responsible for mitigating the difference in percent overload when the autotransformers are overloaded as identified in the Prebc column.

- Great Falls 230/100 kV autotransformers are overloaded with the addition of MATL facility in 2012HS case under several N-1 conditions. Mitigation must be completed to fix problems when the overload in the Prebc column is "none", MATL will also be responsible for mitigating the difference in percent overload when the autotransformers are overloaded as identified in the Prebc column.

Co-Existing Study Mitigation

Completing the following can mitigate the above stand-alone problems:

- MATL needs to consider the voltage set points of the switched shunts to prevent high voltages during all conditions (N-0, N-1 and N-2). Also, the high voltages at the proposed Marias and MATL 230 kV buses are present for all the other contingency conditions. Please see the limit checking reports in Attachment C for more details.

- The over load of the two Great Falls 230/100 kV autotransformers must be mitigated. The mitigation required must be coordinated with senior queue N-1 mitigation requirements. This is also a stand-alone problem.

Transient Stability Analysis

The Transient Stability Analysis examines the system performance after the loss of one or more transmission line(s), before the system settles to steady state operation.

Stand-Alone Study Findings

Stand-Alone Simulated Events

In each event description below, the term "fault" refers to a short-circuit between either a single-phase conductor and ground, or all three phases. The events simulated were:

1. A three-phase fault at the Great Falls 230 kV bus with the loss of Great Falls - Ovando 230 kV line.
2. A three-phase fault at the Broadview 230 kV bus with the loss of Broadview - Judith Gap South 230 kV line.
3. A three-phase fault at the Great Falls 230 kV bus with the loss of Great Falls - Judith Gap South 230 kV line.

The Stand-Alone Study did not find any stability problems associated with connecting the MATL 230 kV line to the Great Falls 230 kV Switchyard.

Co-Existing Study Findings

Co-Existing Simulated Events

1. A three-phase fault at the Great Falls 230 kV bus with the loss of Great Falls - Ovando 230 kV line.
2. A three-phase fault at the Broadview 230 kV bus with the loss of Broadview - Judith Gap South 230 kV line.
3. A three-phase fault at the Great Falls 230 kV bus with the loss of Great Falls - Judith Gap South 230 kV line.
4. A three-phase fault at the Great Falls 268 generator 230 kV bus with the loss of two Great Falls 268 generator - Great Falls 230 kV lines.

5. A three-phase fault at the Great Falls 268 generator 230 kV bus with the loss of two Great Falls 268 generator - Great Falls 230 kV lines with generator tripping at Great Falls 268 generator.

The Co-Existing Study did not find any stability problems associated with connecting the MATL 230 kV line to the Great Falls 230 kV Switchyard.

Fault Duty Analysis

When a fault or short circuit occurs on a power line, the protective relay equipment detects the increased current (i.e., fault current) flowing in the line and signals the line's circuit breakers to open. When the circuit breakers open they must be capable of interrupting the full fault current. The worst-case fault current is commonly referred to as the "fault-duty". If the circuit breakers cannot interrupt the fault-duty, the line that is faulted may not be switched out of service and voltages could collapse in the surrounding transmission grid. This event could lead to a wide spread outage.

The results from the Fault Duty Analysis identifies whether or not NWE's existing circuit breakers are capable of interrupting the additional fault-duty created by the addition of the proposed facility.

The events that were examined are listed below. In each event description, the term "fault" refers to a short-circuit between either a single-phase conductor and ground, or all three phases.

Stand-Alone Fault Duty Results

1. A three-phase fault at the Great Falls 230 kV bus.

2. A single-phase fault at the Great Falls 230 kV bus.

The breakers in the area have a sufficient interrupt rating to withstand the maximum short circuit current available with the addition of the MATL project. This project does not require improvements to NWE's existing circuit breakers for fault duty.

Co-Existing Fault Duty Results

The same two faults were examined in the Co-Existing Fault Duty Study. The addition of this project does not require improvements to NWE's existing circuit breakers.

Cost Estimates

Table 9 is a summary of the high-level non-binding cost estimates for the MATL Transmission Line Interconnect Project. The detailed cost estimates are listed below the table.

Table 9. Cost Estimates for MATL to interconnect

Interconnection Cost Estimate	$M *Cost*
230 kV Switchyard Upgrades	5.605*
Transmission Provider Interconnection Facilities	0.145
Total Cost Estimate	5.750

Upgrades

Great Falls 230 kV switchyard:

Replace the 2 - 100 MVA, 230/100 kV autotransformers with

2 - 200 MVA, 230/100 kV autotransformers	2@1.80M = $ 3.60* M
Add 2- 230 kV breakers	2@0.25M = $ 0.50 M
4 230 kV Air Brake switches	4@0.02M =$ 0.08 M
Bus work	=$ 0.125 M
Steel	=$ 0.250 M
Foundation	=$ 0.400 M
Relaying	=$ 0.300 M
Land	=$ 0.35 M
Total Cost	$ 5.605 M

In addition to the above costs, there are Transmission Provider Interconnection Facility (TPIF) costs that MATL will be responsible for. These TPIF cost estimates are the same as those presented in the previous SIS report assuming no changes have been made.

* This cost might be less, as the mitigation listed for the autotransformers (approximately $3.6M) is to be coordinated with the N-1 senior queue mitigation.

Transmission Provider Interconnection Facility Cost Estimate

Substation work	= $ 0.12 M
Metering	= $ 0.010 M
SOCC EMS	= $ 0.015 M
Total cost	= $ 0.145 M

Conclusions

This System Impact Study is an evaluation of the MATL projects interconnection to the Great Falls 230 kV Switchyard and does not constitute a request for transmission service. This study does not provide any definitive mitigation, that will be required to move power out of the Great Falls 230 kV Switchyard because NWE has not received a Transmission Service or Generation Interconnection Request. The users of the proposed MATL line must follow the procedures described in the transmission tariff available on NWE's OASIS site to request and/or reserve Transmission Service or a Generation Interconnection. The following conclusions can be made about the MATL projects interconnection to the Great Falls 230 kV Switchyard:

- The unused capability of the Great Falls 230 kV Switchyard without any system or network upgrades is 0 MW.
- The over load of the Great Falls 230/100 kV autotransformers must be mitigated. With the autotransformer upgrades, the MATL line will be able to connect its 230 kV line to the GF 230 kV Switchyard without further mitigation in the switchyard based on the information provided and analyzed in this study. The mitigation required must be coordinated with senior queue mitigation requirements.
- MATL needs to consider the voltage set points of the switched shunts to prevent high voltages during all conditions (N-0, N-1 and N-2). The high voltages at the new Marias and MATL 230 kV buses are present for the other contingency conditions too.

The above mitigation will be required before the MATL project can be connected to NWE's transmission system. The study results may change if there are changes to MATL's queue position or to the line design and interconnection specifications provided by you to NWE. Any variation in the line or interconnect specifications must be reported to NWE, so a thorough review and/or study can be conducted by NWE. Such review and/or study may yield results different from this analysis, and different mitigation requirements may be required.

A summary of the high-level non-binding cost estimates for the MATL Transmission Line Interconnect Project are shown below.

Cost Estimates for MATL to interconnect

Interconnection Cost Estimate	$M *Cost*
230 kV Switchyard Upgrades	5.605*
Transmission Provider Interconnection Facilities	0.145
Total Cost Estimate	5.750

* This cost might be less, as the mitigation listed for the autotransformers (approximately $3.6M) is to be coordinated with the N-1 senior queue mitigation.

Western Electricity Coordinating Council

Brian Silverstein
Chair, Planning Coordination Committee
Bonneville Power Administration

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August 28, 2007

PLANNING COORDINATION COMMITTEE
OPERATING COMMITTEE
TECHNICAL STUDIES SUBCOMMITTEE

Subject: Montana Alberta Tie Ltd. Achieves Phase 3 Status

The MATL project initiated the WECC planning process on September 20, 2005. The Project is a 346 kM, 230/240kV transmission line designed for continuous bidirectional power transfers of over 300 MW. The project consists of a new substation in Alberta that ties into the existing 240 kV Alberta Interconnected Electric System (AIES) system. A phase shifting transformer will be installed to control flows both north and south and to step the voltage down from the Alberta nominal system voltage of 240 kV to the transmission line voltage of 230 kV. A mid-point substation named Marias will be built south of the town of Cut Bank, Montana. The Marias Substation will contain voltage support and be a connection point for proposed wind generation projects in the area. At the south end, the MATL transmission line will terminate at the existing Great Falls, Montana, 230 kV substation.

On February 2, 2006, the Project received Phase II status. A Project Review Group (PRG) was formed and was comprised of representatives from Bonneville Power Administration, Northwestern Energy, Western Area Power Administration, Avista Corporation, AESO, British Columbia Transmission Corporation, TransCanada – Northern Lights Transmission, PacifiCorp, Powerex, and ENMAX Power Corporation.

A Final Draft of the Phase 2 Report was submitted to the MATL Project Review Group (PRG) on June 11, 2007. All comments received have been addressed to the satisfaction of each party providing comments.

On July 25, 2007, MATL sent a request to the PCC to enter Phase 3, along with the PRG Report. No additional comments were received during the 30-day review process. Therefore, in accordance with the WECC Three Phase Project Rating Process, the MATL Project is hereby granted Phase III status with an Accepted Rating of +/- 300 MW.

Sincerely,

Brian Silverstein

Brian Silverstein

cc: Kent Bolton, WECC
Peter Mackin, USE

EXECUTION COPY

December 20, 2007

TRANSMISSION LINE INTERCONNECTION AGREEMENT

Between

MATL LLP

- and -

NORTHWESTERN CORPORATION

EXECUTION COPY

TRANSMISSION LINE INTERCONNECTION AGREEMENT

THIS TRANSMISSION LINE INTERCONNECTION AGREEMENT ("Agreement") is made and entered into this 20th day of December, 2007, by and between MATL LLP, a limited liability partnership organized under the laws of Montana, ("MATL"), and NorthWestern Corporation, a Delaware Corporation d/b/a NorthWestern Energy ("NorthWestern"). MATL and NorthWestern each may be referred to as a "Party" or collectively as the "Parties."

Recitals

WHEREAS, NorthWestern operates the NorthWestern Transmission System; and

WHEREAS, MATL intends to own and/or control and operate the MATL Transmission System;

WHEREAS, MATL and NorthWestern have agreed to enter into this Agreement for the purpose of interconnecting the MATL Transmission System with the NorthWestern Transmission System; and

WHEREAS, MATL and NorthWestern will also enter into the Coordinating Operating Agreement;

WHEREAS, MATL and NorthWestern recognize the need to protect the reliability of their respective transmission systems;

WHEREAS, MATL and NorthWestern intend that the interconnection between their systems will be completed in a manner that promotes reliability and compliance with all applicable statutory and regulatory obligations;

WHEREAS, MATL and NorthWestern recognize that generation connecting to the MATL Transmission System will affect the NorthWestern Transmission System; and

WHEREAS, MATL and NorthWestern wish to work collaboratively, in their respective roles, to establish, approve, enforce, administer, and manage the interconnection of third parties to the MATL system in a manner that promotes reliability and compliance with all applicable statutory and regulatory obligations.

NOW, THEREFORE, in consideration of and subject to the mutual covenants contained herein, it is agreed:

Article 1. Definitions

When used in this Agreement, terms with initial capitalization that are not defined in Article 1 shall have the meanings specified in the Article in which they are used or the Open Access Transmission Tariffs ("OATT") filed by the respective parties as the context requires. In

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30.9 **Amendment.** The Parties may by mutual Agreement amend this Agreement by a written instrument duly executed by the Parties.

30.10 **Modification by the Parties.** The Parties may by mutual Agreement amend the Appendices to this Agreement by a written instrument duly executed by the Parties. Such amendment shall become effective and a part of this Agreement upon satisfaction of all Applicable Laws and Regulations.

30.11 **Reservation of Rights.** Each of MATL and NorthWestern shall have the right to make a unilateral filing with FERC to modify this Agreement with respect to any rates, terms and conditions, charges, classifications of service, rule or regulation under section 205 or any other applicable provision of the *Federal Power Act* and FERC's rules and regulations thereunder and MATL shall have the right to make a unilateral filing with FERC to modify this Agreement pursuant to applicable provision of the *Federal Power Act* and FERC's rules and regulations thereunder, provided that each Party shall have the right to protest any such filing by the other Party and to participate fully in any proceeding before FERC in which such modifications may be considered. Nothing in this Agreement shall limit the rights of the Parties or of FERC under sections 205 or 206 of the *Federal Power Act* and FERC's rules and regulations thereunder, except to the extent that the Parties otherwise mutually agree as provided herein.

30.12 **No Partnership.** This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties or to impose any partnership obligation or partnership liability upon either Party. Neither Party shall have any right, power or authority to enter into any Agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

30.13 **Coordinated Operating Agreement.** Except for purposes of carrying out the Interconnection Study and the filing of this Agreement with FERC and other applicable Governmental Authorities, this Agreement shall only become fully effective upon the Parties executing the Coordinated Operating Agreement.

IN WITNESS WHEREOF, the Parties have executed this Agreement in duplicate originals, each of which shall constitute and be an original effective Agreement between the Parties.

NorthWestern Corporation	**MATL LLP, by its general partner Montana Alberta Tie Ltd.**
By:	By: ____________
Title: President + CEO	Title: ____________
Date: 12/20/07	Date: ____________

30.9 Amendment. The Parties may by mutual Agreement amend this Agreement by a written instrument duly executed by the Parties.

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IN WITNESS WHEREOF, the Parties have executed this Agreement in duplicate originals, each of which shall constitute and be an original effective Agreement between the Parties.

NorthWestern Corporation	**MATL LLP, by its general partner Montana Alberta Tie Ltd.**
By: ______________________	By: ______________________
Title: ______________________	Title: Chief Operating Officer
Date: ______________________	Date: Dec. 20, 2007

EXECUTION COPY

By: Robert L. Williams

Title: Vice President, Regulatory

Date: 20 December 2007

APPENDIX N:
FARM COST REVIEW FOR MATL PROJECT (2007 AND 2008 COSTS)

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

Prepared by:
HydroSolutions Inc
1537 Avenue D
Suite 340
PO Box 80866
Billings, Montana 59108
406-655-9555

Hydro Solutions Inc

and

Fehringer Agricultural Consulting, Inc.
7033 Highway 312
Billings, Montana 59105-5027
406-373-5985

July 12, 2007

July 12, 2007

Mr. Tom Ring
Environmental Management Bureau
Montana Department of Environmental Quality
PO Box 200901
1520 East Sixth Avenue
Helena, Montana 59620-0901

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

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Figure

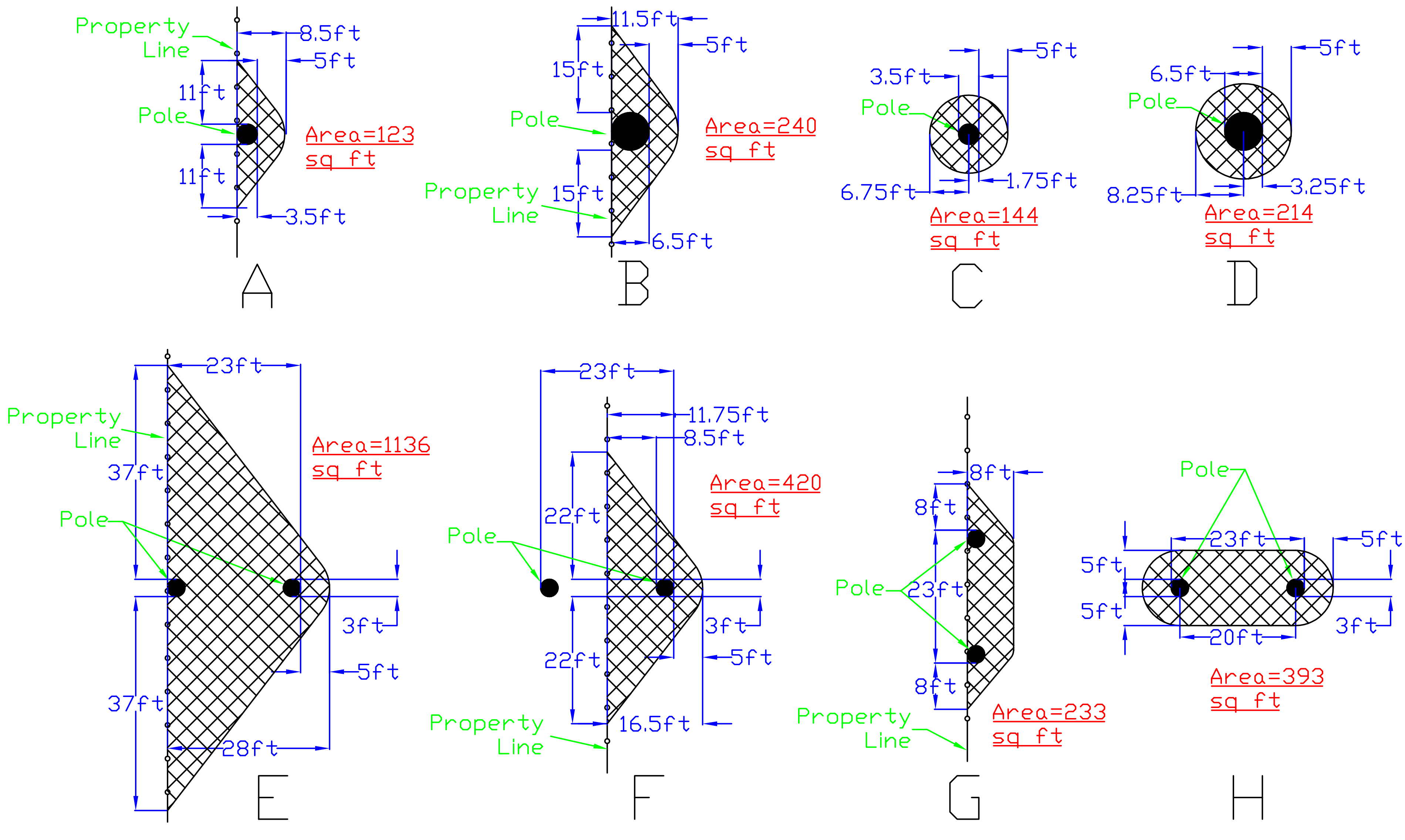

FIGURE # 1

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: Information Source	Farming Practice: Spring Wheat-Fallow: Annual Cost (per structure)[2]	Farming Practice: Continuous Crop: Information Source	Farming Practice: Continuous Crop: 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	Irrigated Cropping: 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.

<u>Total cost per year is: $1071.54</u>

<u>These were 2005 production costs</u>

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

P.O Box 936
Conrad, Montana
59425-0936

Phone: (406) 278-3341

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 Ft²	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 Ft²	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	Overlap 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.

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 Ft²	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 Ft²	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 Ft²	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 Ft²	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.

Farming Cost Review - Revised Report
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-G)
Task Order #02-CII

Prepared by:

HydroSolutions Inc
1537 Avenue D
Suite 340
PO Box 80866
Billings, Montana 59108
406-655-9555

and

Fehringer Agricultural Consulting, Inc.
7033 Highway 312
Billings, Montana 59105-5027
406-373-5985

June 4, 2008

June 4, 2008

Mr. Tom Ring
Environmental Management Bureau
Montana Department of Environmental Quality
PO Box 200901
1520 East Sixth Avenue
Helena, Montana 59620-0901

RE: Farming Cost Review - Revised Report Montana-Alberta Tie Ltd.
DEQ Contract #SPB06-81195O-G Task Order #02-CII

Dear Mr. Ring:

HydroSolutions Inc and Fehringer Agricultural Consulting, Inc., is pleased to provide this Farming Cost Review Revised Report for the Montana-Alberta Tie Ltd. presented under the State of Montana Environmental Services Term Contract (SPB06-81195O-G) for Task Order #02-CII to the Montana Department of Environmental Quality (MDEQ).

A report outlining objective and results of this revised review are attached. The revised report presents the findings of a revised 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,

Shane A. Bofto
Senior Engineer
HydroSolutions Inc

Neal E. Fehringer
Certified Professional Agronomist, C.C.A.
Fehringer Agricultural Consulting, Inc.

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

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Executive Summary

This report presents a revised, detailed cost estimate 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. Updated costs were used to revise the original July 2007 cost estimates.

The revised 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 revised report in accordance with the Scope of Service for the Limited Solicitation for Farming Cost Review – Revised Report, Environmental Permit Preparation, Analysis and Assistance Services Term Contract, Contract # SPB06-81195O-G, Task Order # 02-CII, approved by the Montana Department of Environmental Quality (MDEQ) on May 16, 2008.

On April 18, 2008 the Montana Department of Environmental Quality issued a limited solicitation for a firm to complete the Scope of Services described therein. The Federal Draft Environmental Impact Statement and State of Montana Supplemental Draft Environmental Impact Statement for the Montana-Alberta Tie Ltd. (MATL) 230-kV Transmission Line (EIS) was published in February 2008. Comments received on the final report and the farmer cost portion of the EIS indicated that farmer input costs and crop prices have risen substantially and as a result, a revision to the original farming cost review was requested. Following the submittal of the report, assistance to the DEQ in responding to public moments on the Federal Draft Environmental Impact Statement and State of Montana Supplemental Draft Environmental Impact Statement for the Montana Alberta Tie Ltd. (MATL) 230-kV Transmission Line (EIS) published in February 2008, will be provided.

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

B. Background

In May 2007, the MDEQ contracted for a study to estimate a range of annual costs to farmers for transmission structures located in and along their crop fields. Since the report was submitted, farming costs and crop prices have risen substantially. In response, the MDEQ requested a revision to the previous cost estimates outline in the July 12, 2007 DEQ Farming Review Report prepared by HydroSolutions and Fehringer. The information in this revision will be used with other information in the MDEQ’s 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 included the revision of the July 12, 2007 Farming Review Report that estimated the costs to farmers of operating around electricity transmission line structure, based on an independent estimate of such costs to a ‘representative farmer’ in Conrad, Montana area. The cost estimate incorporated farmer input costs and crop prices that have risen substantially. 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 and compiled representative information and provided estimates of 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 2008 costs and included the following: prices for fuel, chemical and crop prices, modern machinery capabilities to maneuver around structures, 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. Revised Analysis

Based on the review of previous July 12, 2007 Farming Cost Review Report, current prices, operations in the area of the 'representative' farmer scenario, and the MATL DEIS, a revised analysis is presented below.

D.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.

D.2. Representative Farmer

This analysis was 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 2008 prices. Fertilizer prices were obtained from Agri-Basics in Great Falls, CHS in Conrad, Montana Plant Food in Conrad, and Mountain View Coop in Brady (Personal Communications, May 2008). Herbicide costs were taken from Wilbur-Ellis’ 2008 Price List and reflect highest retail cost (Wilbur-Ellis 2008).

A typical dry land field was chosen to grow spring wheat in fallow rotation as well as continuous crop spring wheat. Spring wheat was used because it has the highest value of crops grown in the proposed area. Currently, spring wheat is trading at near $10.50 per bushel. Spring wheat has traded from $5.00 to $20.00 per bushel. For this revised cost estimate, $12.00 per bushel was used as the value. Spring wheat prices could easily reach $12.00 per bushel again if there is much of a reduction in wheat yields. Winter wheat is worth about $8.50 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 $6.00 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 would be less. Spring wheat provided 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 evaluation, spring wheat had surpassed malt barley. Again, using spring wheat for the irrigated crop provided the worst case scenario.

D.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.

D.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.

D.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) involved only one lap around the pole not 1.5 to 2.5 extra revolutions as listed in the Denzer and MacDonald studies outlined in the original July 2007 report.

D.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. Revised implement widths are presented in Table 1. Some implement widths were adjusted to reflect increased machinery size that is typical for 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.

D.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, Agri-Basics, CHS, Montana Plant Food, and Mountain View Coop, respectively) site specific vendor information, and personal communications with regional farmers. Farming rates have been increased to reflect the increase of red dyed diesel from $2.50 per gallon in June 2007 to nearly $4.25 at the time of this evaluation. Another adjustment to the cost of operations has been made for having slow down to go around the pole(s) with larger equipment. All farming/application costs were considered 150% of normal rates for operations without obstructions. 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 A and B, 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 this analysis, two of each of these operations has 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 glyphosate (“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.

With regard to wild oat control, triallate (“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 harrow incorporation. If a grower uses a post-emergent herbicide that can be tank mixed with the broadleaf weed herbicides, then there was 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 reflected the cost spike that occurred from summer 2007 to spring 2008. Phosphate fertilizers (11-52-0, and 18-46-0) have increased from $450 per ton in June 2007 to $1,205 per ton in May 2008. For this revision, $1,300 per ton was used to allow for inflation. Urea (46-0-0) had gone from $450 per ton to $750 per ton during the same time period. $800 per ton is used for this evaluation. For dry land crops, fertilizer banded with the seed was 75 pounds per acre of 11-52-0 or 18-46-0 for fallow wheat and 60 pounds per acre for continuous crop wheat. Total nitrogen for both fallow and continuous crop wheat was figured at 100 actual units (pounds) of nitrogen per acre. Nitrogen comes from 11-52-0 (or 18-46-0) banded with the seed and urea. These amounts of nutrients would be adequate for a spring wheat-fallow rotation yield goal of 60 bushels per acre. For irrigated spring wheat, 90 pounds of 11-52-0 was banded with the seed. Nitrogen applied for a 90 bushel per acre yield goal was a total of 230 pounds per acre. Total nitrogen and phosphate rates were increased in response to grower comments to DEQ. Crop yields listed are also from Fehringer's personal knowledge from production in the area and Montana Agricultural Statistics website (USDA, 2007).

Wheat required three pounds of nitrogen per bushel. However, fertilizer nitrogen is not the only source for plants. Organic matter releases nitrogen during the fallow and growing seasons. Lastly, soil contains nitrogen even after a crop. For 60 bushels per acre wheat, the gross amount of nitrogen required would be 180 pounds, but between nitrogen in the soil profile and organic matter release, only 100 actual pounds of nitrogen was projected to be applied. This has been confirmed by personal communication with growers in the area.

Seeding rate was figured at 70 pounds per acre for dry land and 100 pounds per acre for irrigated land. The price used was for certified seed that was 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 and reflects the increase price of combines, parts, and fuel. 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 was to establish grass in the footprint area. However, this might present a fire danger that MATL does not want. In lieu of having grass established, total vegetation control would be the next best option. Again in response to grower feedback, projected weed control was changed. In wheat-fallow rotation, Roundup was applied three times during the fallow period, Maverick (cheatgrass and mustard herbicide) was applied in the fall after the fallow season, and then in-crop herbicides was applied during the cropping season. This required five total herbicide applications every two year cycle. The time per structure was based on the square footage involved. In many cases, it would take about as much time to drive from pole to pole as it would to apply the herbicide. Time listed for each pole configuration included both application and travel time. For continuous crop and irrigated farming, one each of Roundup, Maverick, and in-crop herbicide application was projected to occur. Farming Cost Sheets for each dry land and irrigated scenarios are included in Appendix A and B, respectively.

D.6. Results

The revised 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 revised 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 cost 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 were not addressed in the alternate analysis because each field would have a unique situation to calculate. Pole(s) in flood irrigated fields would 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 would 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) would also be influenced by the length the water had to travel. Poles should be placed at field edge or at least 200 feet from field edge. With sprayers and Fargo applicators being already 134 foot, 200 foot applicator is not too far off. If poles were placed less than 200 feet, then a substantial amount of overlap and outage would occur behind the pole once application equipment got to be that size.

E. 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.

F. References

Agri-Basics, Great Falls; CHS and Montana Plant Food, Conrad; and Mountain View Coop, Brady. (2008). Personal communication May 2008.

Hewlett, John P. and Sedman, James. (2006). University of Wyoming “Custom Rates for Wyoming Farm and Ranch Operations”, 2004-2006.

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

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

Wilbur-Ellis Company. (2008). 2008 Price List, Term and Conditions, April 1, 2008.

Figure 1

Pole Configuration Footprint Layouts

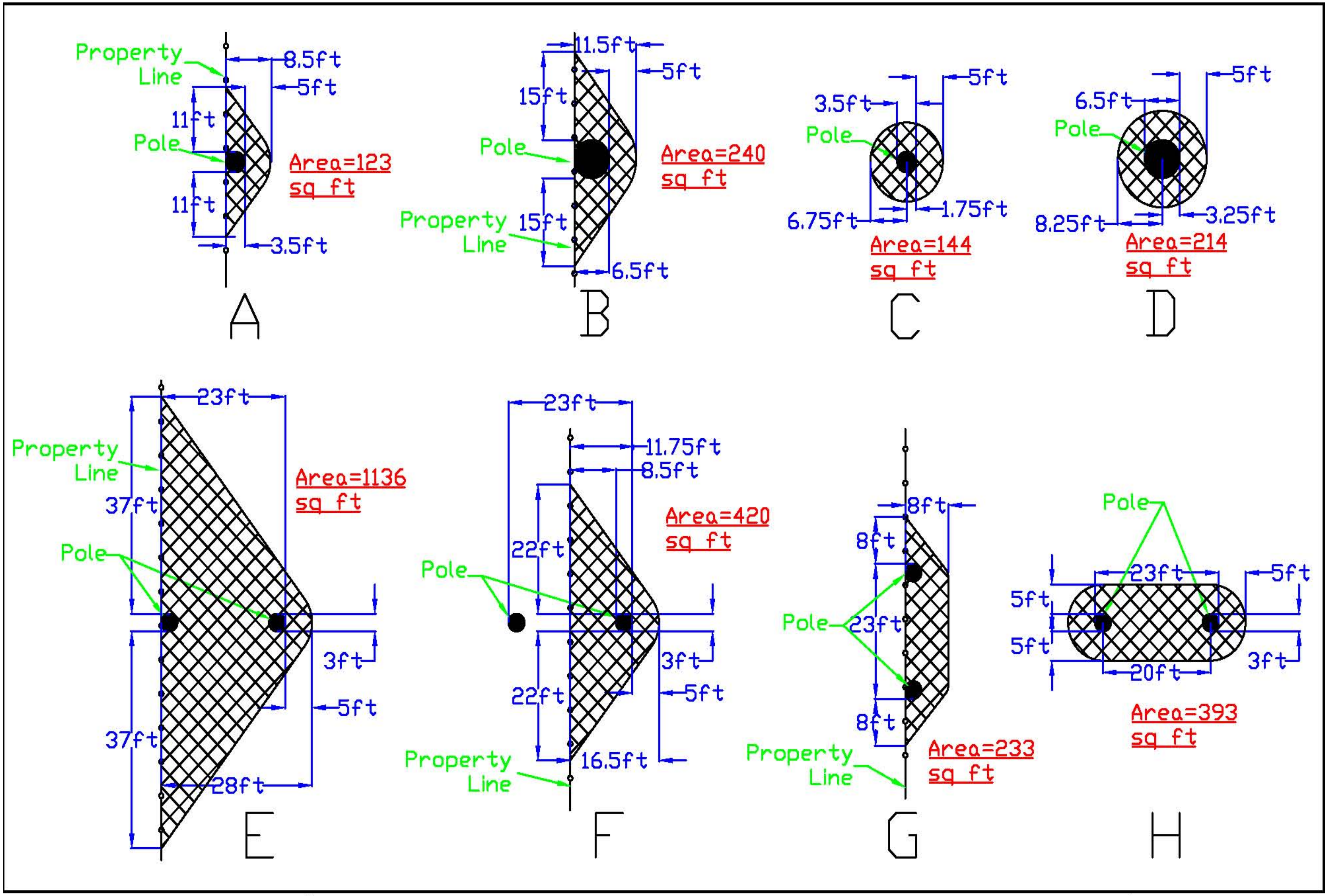

FIGURE #	INT	DATE
1	DRAWN BY: sab	05/23/07
	APP'D BY: sab	05/23/07
	JOB No. DEQ Farming Task II	
	DWG. No. Figure 1	SHEET OF
	SCALE NA	

Pole Configuration Footprint Layouts
Farming Cost Review – Revised Report
Montana–Alberta Tie Ltd
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	134	36	70
							Overlap (square feet)			
							Harrow	Fargo & Spraying	Disc & Combine	Fertilizing, Toolbar & Seeding
A	Mono-pole	3.5	Edge	Regular Span	1.75	123	123	123	123	123
B	Mono-pole	6.5	Edge	Long Span	3.25	240	240	240	240	240
C	Mono-pole	3.5	Interior	Regular Span	1.75	144	18,362	62,093	5,597	18,362
D	Mono-pole	6.5	Interior	Long Span	3.25	214	19,022	63,356	5,937	19,022
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	21,511	68,086	7,237	21,511

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. Revised 6/2/08.

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

Layout[1]	Structure	Pole Diam. (ft)	Location	Orientation	Farming Practice: Spring Wheat-Fallow: Information Source	Spring Wheat-Fallow: Annual Costs (per structure)[2]	Continuous Crop Spring Wheat: Information Source	Continuous Crop Spring Wheat: Annual Costs (per structure)[2]
A	Mono-pole	3.5	Edge	Regular Span	Attachment DL-1	$33.05	Attachment DL-9	$40.10
B	Mono-pole	6.5	Edge	Long Span	Attachment DL-2	34.76	Attachment DL-10	42.57
C	Mono-pole	3.5	Interior	Regular Span	Attachment DL-3	270.38	Attachment DL-11	387.13
D	Mono-pole	6.5	Interior	Long Span	Attachment DL-4	276.60	Attachment DL-12	396.48
E	H-pole	3.0	Edge	Perpendicular	Attachment DL-5	79.10	Attachment DL-13	98.99
F	H-pole	3.0	Edge	Straddling	Attachment DL-6	47.89	Attachment DL-14	58.97
G	H-pole	3.0	Edge	Parallel	Attachment DL-7	34.65	Attachment DL-15	42.42
H	H-pole	3.0	Interior		Attachment DL-8	309.56	Attachment DL-16	443.24

Notes:
[1]From Figure 1.
[2]Cost reflect 2008 prices (i.e. $.4.25 red dyed diesel)
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. Revised 6/2/08.

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

Layout[1]	Structure	Pole Diam. (ft)	Location	Orientation	Irrigated Cropping - Spring Wheat	
					Information Source	Annual Costs (per structure)[2]
A	Mono-pole	3.5	Edge	Regular Span	Attachment IRR-1	$42.73
B	Mono-pole	6.5	Edge	Long Span	Attachment IRR-2	47.70
C	Mono-pole	3.5	Interior	Regular Span	Attachment IRR-3	616.75
D	Mono-pole	6.5	Interior	Long Span	Attachment IRR-4	633.10
E	H-pole	3.0	Edge	Perpendicular	Attachment IRR-5	123.28
F	H-pole	3.0	Edge	Straddling	Attachment IRR-6	67.95
G	H-pole	3.0	Edge	Parallel	Attachment IRR-7	47.40
H	H-pole	3.0	Interior		Attachment IRR-8	705.03

Notes:

[1]From Figure 1.

[2]Cost reflect 2008 prices (i.e. $.4.25 red dyed diesel)

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. Revised 6/2/08.

Appendix A

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 Ft²	Overlap Acre	Overlap Cost
Post Harvest:										
Heavy Harrow	$12.75	acre			1	$12.75	$12.75	123	0.003	$0.04
Chemical Fallow:										
Roundup (RT3)	$60.00	gallon	16	ounce	4	$30.00				
Dicamba	$75.00	gallon	4	ounce	1	2.34				
Ammonium sulfate	$7.00	gallon	16	ounce	4	3.50				
Application	$10.00	acre			4	40.00	75.84	123	0.003	0.21
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	123	0.003	0.10
Fertilizer:										
Banded w/ Seed	$1,300	ton	75	pound	1	$48.75				
Topdress N	$800	ton	200	pound	1	80.00				
Topdress App	$9.75	acre			1	9.75	138.50	123	0.003	0.39
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	123	0.003	0.13
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	123	0.003	0.05
Harvesting:										
Combine	$45.00	acre			1	$45.00	45.00	123	0.003	0.13
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	60	bushel	20%	$144.00	144.00	123	0.003	0.41
Pole Footprint	$12.00	bushel	60	bushel		$720.00	720.00	123	0.003	2.03
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	3	$22.50	22.50	123	0.003	0.06
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	123	0.003	0.03
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	123	0.003	0.02
Labor & Equipment	$50	hour	0.25	hour	5	$62.50	62.50			62.50
TOTAL COST OF 2 YEAR ROTATION										**$66.09**

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$33.05**

Estimated Winter Wheat Yield: 60 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08.

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	$12.75	acre			1	$12.75	$12.75	240	0.006	$0.07
Chemical Fallow:										
Roundup (RT3)	$60.00	gallon	16	ounce	4	$30.00				
Dicamba	$75.00	gallon	4	ounce	1	2.34				
Ammonium sulfate	$7.00	gallon	16	ounce	4	3.50				
Application	$10.00	acre			4	40.00	75.84	240	0.006	0.42
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	240	0.006	0.19
Fertilizer:										
Banded w/ Seed	$1,300	ton	75	pound	1	$48.75				
Topdress N	$800	ton	200	pound	1	80.00				
Topdress App	$9.75	acre			1	9.75	138.50	240	0.006	0.76
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	240	0.006	0.25
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	240	0.006	0.09
Harvesting:										
Combine	$45.00	acre			1	$45.00	45.00	240	0.006	0.25
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	60	bushel	20%	$144.00	144.00	240	0.006	0.79
Pole Footprint	$12.00	bushel	60	bushel		$720.00	720.00	240	0.006	3.97
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	3	$22.50	22.50	240	0.006	0.12
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	240	0.006	0.06
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	240	0.006	0.04
Labor & Equipment	$50	hour	0.25	hour	5	$62.50	62.50			62.50
TOTAL COST OF 2 YEAR ROTATION										**$69.51**

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$34.76**

Estimated Winter Wheat Yield: 60 bu/ac

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

[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08.

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 Ft²	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$12.75	acre			1	$12.75	$12.75	18,362	0.422	$5.37
Chemical Fallow:										
Roundup (RT3)	$60.00	gallon	16	ounce	4	$30.00				
Dicamba	$75.00	gallon	4	ounce	1	2.34				
Ammonium sulfate	$7.00	gallon	16	ounce	4	3.50				
Application	$10.00	acre			4	40.00	75.84	62,093	1.425	108.11
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	62,093	1.425	49.89
Fertilizer:										
Banded w/ Seed	$1,300	ton	75	pound	1	$48.75				
Topdress N	$800	ton	200	pound	1	80.00				
Topdress App	$9.75	acre			1	9.75	138.50	18,362	0.422	58.38
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	18,362	0.422	19.32
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	62,093	1.425	23.63
Harvesting:										
Combine	$45.00	acre			1	$45.00	45.00	5,597	0.128	5.78
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	60	bushel	20%	$144.00	144.00	62,093	1.425	205.27
Pole Footprint	$12.00	bushel	60	bushel		$720.00	720.00	144	0.003	2.38
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	3	$22.50	22.50	144	0.003	0.07
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	144	0.003	0.03
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	144	0.003	0.02
Labor & Equipment	$50	hour	0.25	hour	5	$62.50	62.50			62.50
TOTAL COST OF 2 YEAR ROTATION										**$540.77**

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$270.38**

Estimated Winter Wheat Yield: 60 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08.

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	$12.75	acre			1	$12.75	$12.75	19,022	0.437	$5.57
Chemical Fallow:										
Roundup (RT3)	$60.00	gallon	16	ounce	4	$30.00				
Dicamba	$75.00	gallon	4	ounce	1	2.34				
Ammonium sulfate	$7.00	gallon	16	ounce	4	3.50				
Application	$10.00	acre			4	40.00	75.84	63,356	1.454	110.31
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	63,356	1.454	50.91
Fertilizer:										
Banded w/ Seed	$1,300	ton	75	pound	1	$48.75				
Topdress N	$800	ton	200	pound	1	80.00				
Topdress App	$9.75	acre			1	9.75	138.50	19,022	0.437	60.48
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	19,022	0.437	20.01
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	63,356	1.454	24.11
Harvesting:										
Combine	$45.00	acre			1	$45.00	45.00	5,937	0.136	6.13
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	60	bushel	20%	$144.00	144.00	63,356	1.454	209.44
Pole Footprint	$12.00	bushel	60	bushel		$720.00	720.00	214	0.005	3.54
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	3	$22.50	22.50	214	0.005	0.11
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	214	0.005	0.05
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	214	0.005	0.03
Labor & Equipment	$50	hour	0.25	hour	5	$62.50	62.50			62.50
TOTAL COST OF 2 YEAR ROTATION										**$553.20**

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$276.60**

Estimated Winter Wheat Yield: 60 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08.

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 Ft²	Overlap Acres	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$12.75	acre			1	$12.75	$12.75	1,136	0.026	$0.33
Chemical Fallow:										
Roundup (RT3)	$60.00	gallon	16	ounce	4	$30.00				
Dicamba	$75.00	gallon	4	ounce	1	2.34				
Ammonium sulfate	$7.00	gallon	16	ounce	4	3.50				
Application	$10.00	acre			4	40.00	75.84	1,136	0.026	1.98
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	1,136	0.026	0.91
Fertilizer:										
Banded w/ Seed	$1,300	ton	75	pound	1	$48.75				
Topdress N	$800	ton	200	pound	1	80.00				
Topdress App	$9.75	acre			1	9.75	138.50	1,136	0.026	3.61
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	1,136	0.026	1.20
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	1,136	0.026	0.43
Harvesting:										
Combine	$45.00	acre			1	$45.00	45.00	1,136	0.026	1.17
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	60	bushel	20%	$144.00	144.00	1,136	0.026	3.76
Pole Footprint	$12.00	bushel	60	bushel		$720.00	720.00	1,136	0.026	18.78
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	3	$22.50	22.50	1,136	0.026	0.59
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	1,136	0.026	0.26
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	1,136	0.026	0.17
Labor & Equipment	$50	hour	0.5	hour	5	$125.00	125.00			125.00
TOTAL COST OF 2 YEAR ROTATION										**$158.19**

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$79.10**

Estimated Winter Wheat Yield: 60 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08.

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	$12.75	acre			1	$12.75	$12.75	420	0.010	$0.12
Chemical Fallow:										
Roundup (RT3)	$60.00	gallon	16	ounce	4	$30.00				
Dicamba	$75.00	gallon	4	ounce	1	2.34				
Ammonium sulfate	$7.00	gallon	16	ounce	4	3.50				
Application	$10.00	acre			4	40.00	75.84	420	0.010	0.73
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	420	0.010	0.34
Fertilizer:										
Banded w/ Seed	$1,300	ton	75	pound	1	$48.75				
Topdress N	$800	ton	200	pound	1	80.00				
Topdress App	$9.75	acre			1	9.75	138.50	420	0.010	1.34
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	420	0.010	0.44
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	420	0.010	0.16
Harvesting:										
Combine	$45.00	acre			1	$45.00	45.00	420	0.010	0.43
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	60	bushel	20%	$144.00	144.00	420	0.010	1.39
Pole Footprint	$12.00	bushel	60	bushel		$720.00	720.00	420	0.010	6.94
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	3	$22.50	22.50	420	0.010	0.22
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	420	0.010	0.10
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	420	0.010	0.06
Labor & Equipment	$50	hour	0.334	hour	5	$83.50	83.50			83.50
TOTAL COST OF 2 YEAR ROTATION										**$95.77**

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$47.89**

Estimated Winter Wheat Yield: 60 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08.

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	$12.75	acre			1	$12.75	$12.75	233	0.005	$0.07
Chemical Fallow:										
Roundup (RT3)	$60.00	gallon	16	ounce	4	$30.00				
Dicamba	$75.00	gallon	4	ounce	1	2.34				
Ammonium sulfate	$7.00	gallon	16	ounce	4	3.50				
Application	$10.00	acre			4	40.00	75.84	233	0.005	0.41
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	233	0.005	0.19
Fertilizer:										
Banded w/ Seed	$1,300	ton	75	pound	1	$48.75				
Topdress N	$800	ton	200	pound	1	80.00				
Topdress App	$9.75	acre			1	9.75	138.50	233	0.005	0.74
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	233	0.005	0.25
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	233	0.005	0.09
Harvesting:										
Combine	$45.00	acre			1	$45.00	45.00	233	0.005	0.24
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	60	bushel	20%	$144.00	144.00	233	0.005	0.77
Pole Footprint	$12.00	bushel	60	bushel		$720.00	720.00	233	0.005	3.85
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	3	$22.50	22.50	233	0.005	0.12
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	233	0.005	0.05
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	233	0.005	0.04
Labor & Equipment	$50	hour	0.25	hour	5	$62.50	62.50			62.50
TOTAL COST OF 2 YEAR ROTATION										**$69.31**

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$34.65**

Estimated Winter Wheat Yield: 60 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08.

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	Overlap Cost/Pole
Post Harvest:										
Heavy Harrow	$12.75	acre			1	$12.75	$12.75	21,511	0.494	$6.30
Chemical Fallow:										
Roundup (RT3)	$60.00	gallon	16	ounce	4	$30.00				
Dicamba	$75.00	gallon	4	ounce	1	2.34				
Ammonium sulfate	$7.00	gallon	16	ounce	4	3.50				
Application	$10.00	acre			4	40.00	75.84	68,086	1.563	118.55
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	68,086	1.563	54.71
Fertilizer:										
Banded w/ Seed	$1,300	ton	75	pound	1	$48.75				
Topdress N	$800	ton	200	pound	1	80.00				
Topdress App	$9.75	acre			1	9.75	138.50	21,511	0.494	68.39
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	21,511	0.494	22.63
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	68,086	1.563	25.91
Harvesting:										
Combine	$45.00	acre			1	$45.00	45.00	6,982	0.160	7.21
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	60	bushel	20%	$144.00	144.00	68,086	1.563	225.08
Pole Footprint	$12.00	bushel	60	bushel		$720.00	720.00	393	0.009	6.50
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	3	$22.50	22.50	393	0.009	0.20
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	393	0.009	0.09
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	393	0.009	0.06
Labor & Equipment	$50	hour	0.334	hour	5	$83.50	83.50			83.50
TOTAL COST OF 2 YEAR ROTATION										**$619.13**

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$309.56**

Estimated Winter Wheat Yield: 60 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08.

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	$12.75	acre			1	$12.75	$12.75	123	0.003	$0.04
Post Harvest/Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	2	$15.00				
Ammonium sulfate	$7.00	gallon	16	ounce	2	1.75				
Application	$10.00	acre			2	20.00	36.75	123	0.003	0.10
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	123	0.003	0.10
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	60	pound	1	$39.00				
Topdress N[2]	$800	ton	205	pound	1	82.00				
Topdress App	$9.75	acre			1	9.75	130.75	123	0.003	0.37
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	123	0.003	0.13
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	123	0.003	0.05
Harvesting:										
Combine	$42.00	acre			1	$42.00	42.00	123	0.003	0.12
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	40	bushel	20%	$96.00	96.00	123	0.003	0.27
Pole Footprint	$12.00	bushel	40	bushel		$480.00	480.00	123	0.003	1.36
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	123	0.003	0.02
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	123	0.003	0.03
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	123	0.003	0.02
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$40.10**

Estimated Spring Wheat Yield: 40 bu/ac

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

[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08

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	$12.75	acre			1	$12.75	$12.75	240	0.006	$0.07
Post Harvest/Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	2	$15.00				
Ammonium sulfate	$7.00	gallon	16	ounce	2	1.75				
Application	$10.00	acre			2	20.00	36.75	240	0.006	0.20
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	240	0.006	0.19
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	60	pound	1	$39.00				
Topdress N[2]	$800	ton	205	pound	1	82.00				
Topdress App	$9.75	acre			1	9.75	130.75	240	0.006	0.72
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	240	0.006	0.25
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	240	0.006	0.09
Harvesting:										
Combine	$42.00	acre			1	$42.00	42.00	240	0.006	0.23
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	40	bushel	20%	$96.00	96.00	240	0.006	0.53
Pole Footprint	$12.00	bushel	40	bushel		$480.00	480.00	240	0.006	2.64
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	240	0.006	0.04
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	240	0.006	0.06
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	240	0.006	0.04
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50
ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE AT FIELD EDGE										**$42.57**

Estimated Spring Wheat Yield: 40 bu/ac

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

[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08

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	$12.75	acre			1	$12.75	$12.75	18,362	0.422	$5.37
Post Harvest/Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	2	$15.00				
Ammonium sulfate	$7.00	gallon	16	ounce	2	1.75				
Application	$10.00	acre			2	20.00	36.75	62,093	1.425	52.39
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	62,093	1.425	49.89
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	60	pound	1	$39.00				
Topdress N[2]	$800	ton	205	pound	1	82.00				
Topdress App	$9.75	acre			1	9.75	130.75	18,362	0.422	55.12
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	18,362	0.422	19.32
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	62,093	1.425	23.63
Harvesting:										
Combine	$42.00	acre			1	$42.00	42.00	5,597	0.128	5.40
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	40	bushel	20%	$96.00	96.00	62,093	1.425	136.84
Pole Footprint	$12.00	bushel	40	bushel		$480.00	480.00	144	0.003	1.59
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	144	0.003	0.02
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	144	0.003	0.03
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	144	0.003	0.02
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE IN FIELD INTERIOR **$387.13**

Estimated Spring Wheat Yield: 40 bu/ac

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

[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08

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	$12.75	acre			1	$12.75	$12.75	19,022	0.437	$5.57
Post Harvest/Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	2	$15.00				
Ammonium sulfate	$7.00	gallon	16	ounce	2	1.75				
Application	$10.00	acre			2	20.00	36.75	63,356	1.454	53.45
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	63,356	1.454	50.91
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	60	pound	1	$39.00				
Topdress N[2]	$800	ton	205	pound	1	82.00				
Topdress App	$9.75	acre			1	9.75	130.75	19,022	0.437	57.10
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	19,022	0.437	20.01
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	63,356	1.454	24.11
Harvesting:										
Combine	$42.00	acre			1	$42.00	42.00	5,937	0.136	5.72
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	40	bushel	20%	$96.00	96.00	63,356	1.454	139.63
Pole Footprint	$12.00	bushel	40	bushel		$480.00	480.00	214	0.005	2.36
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	214	0.005	0.04
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	214	0.005	0.05
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	214	0.005	0.03
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50
ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE IN FIELD INTERIOR										**$396.48**

Estimated Spring Wheat Yield: 40 bu/ac

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

[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08

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	$12.75	acre			1	$12.75	$12.75	1,136	0.026	$0.33
Post Harvest/Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	2	$15.00				
Ammonium sulfate	$7.00	gallon	16	ounce	2	1.75				
Application	$10.00	acre			2	20.00	36.75	1,136	0.026	0.96
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	1,136	0.026	0.91
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	60	pound	1	$39.00				
Topdress N[2]	$800	ton	205	pound	1	82.00				
Topdress App	$9.75	acre			1	9.75	130.75	1,136	0.026	3.41
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	1,136	0.026	1.20
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	1,136	0.026	0.43
Harvesting:										
Combine	$42.00	acre			1	$42.00	42.00	1,136	0.026	1.10
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	40	bushel	20%	$96.00	96.00	1,136	0.026	2.50
Pole Footprint	$12.00	bushel	40	bushel		$480.00	480.00	1,136	0.026	12.52
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	1,136	0.026	0.20
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	1,136	0.026	0.26
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	1,136	0.026	0.17
Labor & Equipment	$50	hour	0.5	hour	3	$75.00	75.00			75.00

ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE **$98.99**

Estimated Spring Wheat Yield: 40 bu/ac

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

[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08

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	$12.75	acre			1	$12.75	$12.75	420	0.010	$0.12
Post Harvest/Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	2	$15.00				
Ammonium sulfate	$7.00	gallon	16	ounce	2	1.75				
Application	$10.00	acre			2	20.00	36.75	420	0.010	0.35
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	420	0.010	0.34
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	60	pound	1	$39.00				
Topdress N[2]	$800	ton	205	pound	1	82.00				
Topdress App	$9.75	acre			1	9.75	130.75	420	0.010	1.26
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	420	0.010	0.44
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	420	0.010	0.16
Harvesting:										
Combine	$42.00	acre			1	$42.00	42.00	420	0.010	0.40
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	40	bushel	20%	$96.00	96.00	420	0.010	0.93
Pole Footprint	$12.00	bushel	40	bushel		$480.00	480.00	420	0.010	4.63
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	420	0.010	0.07
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	420	0.010	0.10
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	420	0.010	0.06
Labor & Equipment	$50	hour	0.334	hour	3	$50.10	50.10			50.10

ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE & SPLITTING PROPERTY LINE **$58.97**

Estimated Spring Wheat Yield: 40 bu/ac

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

[2] Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08

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	$12.75	acre			1	$12.75	$12.75	233	0.005	$0.07
Post Harvest/Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	2	$15.00				
Ammonium sulfate	$7.00	gallon	16	ounce	2	1.75				
Application	$10.00	acre			2	20.00	36.75	233	0.005	0.20
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	233	0.005	0.19
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	60	pound	1	$39.00				
Topdress N[2]	$800	ton	205	pound	1	82.00				
Topdress App	$9.75	acre			1	9.75	130.75	233	0.005	0.70
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	233	0.005	0.25
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	233	0.005	0.09
Harvesting:										
Combine	$42.00	acre			1	$42.00	42.00	233	0.005	0.22
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	40	bushel	20%	$96.00	96.00	233	0.005	0.51
Pole Footprint	$12.00	bushel	40	bushel		$480.00	480.00	233	0.005	2.57
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	233	0.005	0.04
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	233	0.005	0.05
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	233	0.005	0.04
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50

ANNUAL COST OF FARMING AROUND H-POLES PARALLEL TO FIELD EDGE **$42.42**

Estimated Spring Wheat Yield: 40 bu/ac

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

[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08

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	$12.75	acre			1	$12.75	$12.75	21,511	0.494	$6.30
Post Harvest/Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	2	$15.00				
Ammonium sulfate	$7.00	gallon	16	ounce	2	1.75				
Application	$10.00	acre			2	20.00	36.75	68,086	1.563	57.44
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$6.50	acre			1	6.50				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	35.00	68,086	1.563	54.71
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	60	pound	1	$39.00				
Topdress N[2]	$800	ton	205	pound	1	82.00				
Topdress App	$9.75	acre			1	9.75	130.75	21,511	0.494	64.57
Planting:										
Seed	$20.00	bu	70	pound	1	$23.33				
Seeding	$22.50	acre			1	22.50	45.83	21,511	0.494	22.63
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	68,086	1.563	25.91
Harvesting:										
Combine	$42.00	acre			1	$42.00	42.00	7,237	0.166	6.98
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	40	bushel	20%	$96.00	96.00	68,086	1.563	150.05
Pole Footprint	$12.00	bushel	40	bushel		$480.00	480.00	393	0.009	4.33
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	393	0.009	0.07
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	393	0.009	0.09
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	393	0.009	0.06
Labor & Equipment	$50	hour	0.334	hour	3	$50.10	50.10			50.10
ANNUAL COST OF FARMING AROUND H-POLES IN FIELD INTERIOR										**$443.24**

Estimated Spring Wheat Yield: 40 bu/ac

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

[2]Applying a total of 100 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/13/07. Revised 6/2/08

Appendix B
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	$22.50	acre			2	$45.00	$45.00	123	0.003	$0.13
Toobar	$18.00	acre			2	36.00	36.00	123	0.003	0.10
Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	1	$7.50				
Ammonium sulfate	$7.00	gallon	16	ounce	1	0.88				
Application	$10.00	acre			1	10.00	18.38	123	0.003	0.05
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$10.00	acre			1	10.00				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	38.50	123	0.003	0.11
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	90	pound	1	$58.50				
Topdress N[2]	$800	ton	480	pound	1	192.00				
Topdress App	$11.75	acre			1	11.75	262.25	123	0.003	0.74
Planting:										
Seed	$20.00	bu	100	pound	1	$33.33				
Seeding	$24.00	acre			1	24.00	57.33	123	0.003	0.16
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	123	0.003	0.05
Harvesting:										
Combine	$57.00	acre			1	$57.00	57.00	123	0.003	0.16
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	90	bushel	20%	$216.00	216.00	123	0.003	0.61
Pole Footprint	$12.00	bushel	90	bushel		$1,080.00	1,080.00	123	0.003	3.05
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	123	0.003	0.02
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	123	0.003	0.03
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	123	0.003	0.02
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50

ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE AT FIELD EDGE **$42.73**

Estimated Spring Wheat Yield: 90 bu/ac

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

[2]Applying a total of 230 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07. Revised 6/2/08

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 Ft²	Overlap Acre	Overlap Cost
Post Harvest:										
Disc, Offset	$22.50	acre			2	$45.00	$45.00	240	0.006	$0.25
Toobar	$18.00	acre			2	36.00	36.00	240	0.006	0.20
Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	1	$7.50				
Ammonium sulfate	$7.00	gallon	16	ounce	1	0.88				
Application	$10.00	acre			1	10.00	18.38	240	0.006	0.10
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$10.00	acre			1	10.00				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	38.50	240	0.006	0.21
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	90	pound	1	$58.50				
Topdress N[2]	$800	ton	480	pound	1	192.00				
Topdress App	$11.75	acre			1	11.75	262.25	240	0.006	1.44
Planting:										
Seed	$20.00	bu	100	pound	1	$33.33				
Seeding	$24.00	acre			1	24.00	57.33	240	0.006	0.32
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	240	0.006	0.09
Harvesting:										
Combine	$57.00	acre			1	$57.00	57.00	240	0.006	0.31
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	90	bushel	20%	$216.00	216.00	240	0.006	1.19
Pole Footprint	$12.00	bushel	90	bushel		$1,080.00	1,080.00	240	0.006	5.95
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	240	0.006	0.04
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	240	0.006	0.06
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	240	0.006	0.04
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50

ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE AT FIELD EDGE **$47.70**

Estimated Spring Wheat Yield: 90 bu/ac

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

[2] Applying a total of 230 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07. Revised 6/2/08

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	$22.50	acre			2	$45.00	$45.00	5,597	0.128	$5.78
Toobar	$18.00	acre			2	36.00	36.00	18,362	0.422	15.18
Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	1	$7.50				
Ammonium sulfate	$7.00	gallon	16	ounce	1	0.88				
Application	$10.00	acre			1	10.00	18.38	62,093	1.425	26.19
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$10.00	acre			1	10.00				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	38.50	62,093	1.425	54.88
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	90	pound	1	$58.50				
Topdress N[2]	$800	ton	480	pound	1	192.00				
Topdress App	$11.75	acre			1	11.75	262.25	18,362	0.422	110.55
Planting:										
Seed	$20.00	bu	100	pound	1	$33.33				
Seeding	$24.00	acre			1	24.00	57.33	18,362	0.422	24.17
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	62,093	1.425	23.63
Harvesting:										
Combine	$57.00	acre			1	$57.00	57.00	5,597	0.128	7.32
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	90	bushel	20%	$216.00	216.00	62,093	1.425	307.90
Pole Footprint	$12.00	bushel	90	bushel		$1,080.00	1,080.00	144	0.003	3.57
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	144	0.003	0.02
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	144	0.003	0.03
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	144	0.003	0.02
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50
ANNUAL COST OF FARMING AROUND REGULAR SPAN MONO-POLE IN FIELD INTERIOR										**$616.75**

Estimated Spring Wheat Yield: 90 bu/ac

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

[2]Applying a total of 230 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07. Revised 6/2/08

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	$22.50	acre			2	$45.00	$45.00	5,937	0.136	$6.13
Toobar	$18.00	acre			2	36.00	36.00	19,022	0.437	15.72
Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	1	$7.50				
Ammonium sulfate	$7.00	gallon	16	ounce	1	0.88				
Application	$10.00	acre			1	10.00	18.38	63,356	1.454	26.73
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$10.00	acre			1	10.00				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	38.50	63,356	1.454	56.00
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	90	pound	1	$58.50				
Topdress N[2]	$800	ton	480	pound	1	192.00				
Topdress App	$11.75	acre			1	11.75	262.25	19,022	0.437	114.52
Planting:										
Seed	$20.00	bu	100	pound	1	$33.33				
Seeding	$24.00	acre			1	24.00	57.33	19,022	0.437	25.04
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	63,356	1.454	24.11
Harvesting:										
Combine	$57.00	acre			1	$57.00	57.00	5,937	0.136	7.77
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	90	bushel	20%	$216.00	216.00	63,356	1.454	314.16
Pole Footprint	$12.00	bushel	90	bushel		$1,080.00	1,080.00	214	0.005	5.31
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	214	0.005	0.04
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	214	0.005	0.05
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	214	0.005	0.03
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50

ANNUAL COST OF FARMING AROUND LONG SPAN MONO-POLE IN FIELD INTERIOR **$633.10**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 230 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07. Revised 6/2/08

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	$22.50	acre			2	$45.00	$45.00	1,136	0.026	$1.17
Toobar	$18.00	acre			2	36.00	36.00	1,136	0.026	0.94
Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	1	$7.50				
Ammonium sulfate	$7.00	gallon	16	ounce	1	0.88				
Application	$10.00	acre			1	10.00	18.38	1,136	0.026	0.48
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$10.00	acre			1	10.00				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	38.50	1,136	0.026	1.00
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	90	pound	1	$58.50				
Topdress N[2]	$800	ton	480	pound	1	192.00				
Topdress App	$11.75	acre			1	11.75	262.25	1,136	0.026	6.84
Planting:										
Seed	$20.00	bu	100	pound	1	$33.33				
Seeding	$24.00	acre			1	24.00	57.33	1,136	0.026	1.50
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	1,136	0.026	0.43
Harvesting:										
Combine	$57.00	acre			1	$57.00	57.00	1,136	0.026	1.49
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	90	bushel	20%	$216.00	216.00	1,136	0.026	5.63
Pole Footprint	$12.00	bushel	90	bushel		$1,080.00	1,080.00	1,136	0.026	28.17
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	1,136	0.026	0.20
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	1,136	0.026	0.26
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	1,136	0.026	0.17
Labor & Equipment	$50	hour	0.5	hour	3	$75.00	75.00			75.00
ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE										**$123.28**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 230 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07. Revised 6/2/08

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	$22.50	acre			2	$45.00	$45.00	420	0.010	$0.43
Toobar	$18.00	acre			2	36.00	36.00	420	0.010	0.35
Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	1	$7.50				
Ammonium sulfate	$7.00	gallon	16	ounce	1	0.88				
Application	$10.00	acre			1	10.00	18.38	420	0.010	0.18
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$10.00	acre			1	10.00				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	38.50	420	0.010	0.37
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	90	pound	1	$58.50				
Topdress N[2]	$800	ton	480	pound	1	192.00				
Topdress App	$11.75	acre			1	11.75	262.25	420	0.010	2.53
Planting:										
Seed	$20.00	bu	100	pound	1	$33.33				
Seeding	$24.00	acre			1	24.00	57.33	420	0.010	0.55
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	420	0.010	0.16
Harvesting:										
Combine	$57.00	acre			1	$57.00	57.00	420	0.010	0.55
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	90	bushel	20%	$216.00	216.00	420	0.010	2.08
Pole Footprint	$12.00	bushel	90	bushel		$1,080.00	1,080.00	420	0.010	10.41
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	420	0.010	0.07
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	420	0.010	0.10
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	420	0.010	0.06
Labor & Equipment	$50	hour	0.334	hour	3	$50.10	50.10			50.10

ANNUAL COST OF FARMING AROUND H-POLES PERPENDICULAR TO FIELD EDGE & SPLITTING PROPERTY LINE **$67.95**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
2Applying a total of 230 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07. Revised 6/2/08

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	$22.50	acre			2	$45.00	$45.00	233	0.005	$0.24
Toobar	$18.00	acre			2	36.00	36.00	233	0.005	0.19
Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	1	$7.50				
Ammonium sulfate	$7.00	gallon	16	ounce	1	0.88				
Application	$10.00	acre			1	10.00	18.38	233	0.005	0.10
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$10.00	acre			1	10.00				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	38.50	233	0.005	0.21
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	90	pound	1	$58.50				
Topdress N[2]	$800	ton	480	pound	1	192.00				
Topdress App	$11.75	acre			1	11.75	262.25	233	0.005	1.40
Planting:										
Seed	$20.00	bu	100	pound	1	$33.33				
Seeding	$24.00	acre			1	24.00	57.33	233	0.005	0.31
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	233	0.005	0.09
Harvesting:										
Combine	$57.00	acre			1	$57.00	57.00	233	0.005	0.30
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	90	bushel	20%	$216.00	216.00	233	0.005	1.16
Pole Footprint	$12.00	bushel	90	bushel		$1,080.00	1,080.00	233	0.005	5.78
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	233	0.005	0.04
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	233	0.005	0.05
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	233	0.005	0.04
Labor & Equipment	$50	hour	0.25	hour	3	$37.50	37.50			37.50
ANNUAL COST OF FARMING AROUND H-POLES PARALLEL TO FIELD EDGE										**$47.40**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 230 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07. Revised 6/2/08

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	$22.50	acre			2	$45.00	$45.00	7,237	0.166	$7.48
Toobar	$18.00	acre			2	36.00	36.00	21,511	0.494	17.78
Preplant Spraying										
Roundup (RT3)	$60.00	gallon	16	ounce	1	$7.50				
Ammonium sulfate	$7.00	gallon	16	ounce	1	0.88				
Application	$10.00	acre			1	10.00	18.38	68,086	1.563	28.72
Wildoat Control:										
Fargo	$1.05	pound	15	pound	1	$15.75				
Application	$10.00	acre			1	10.00				
Incorp w/ Heavy Harrow	$12.75	acre			1	12.75	38.50	68,086	1.563	60.18
Fertilizer:										
Banded w/ Seed[1]	$1,300	ton	90	pound	1	$58.50				
Topdress N[2]	$800	ton	480	pound	1	192.00				
Topdress App	$11.75	acre			1	11.75	262.25	21,511	0.494	129.51
Planting:										
Seed	$20.00	bu	100	pound	1	$33.33				
Seeding	$24.00	acre			1	24.00	57.33	21,511	0.494	28.31
In Crop Spraying:										
Affinity Broad Spectrum	$10.50	ounce	0.5	ounce	1	$5.25				
LV-6 (2,4-D)	$25.00	gallon	6	ounce	1	1.17				
Surfactant	$20.00	gallon	1	ounce	1	0.16				
Application	$10.00	acre			1	10.00	16.58	68,086	1.563	25.91
Harvesting:										
Combine	$57.00	acre			1	$57.00	57.00	7,237	0.166	9.47
Crop Loss:										
Quality/Quanity in Overlap	$12.00	bushel	90	bushel	20%	$216.00	216.00	68,086	1.563	337.62
Pole Footprint	$12.00	bushel	90	bushel		$1,080.00	1,080.00	393	0.009	9.74
Weed Control Around Pole:										
Roundup (RT3)	$60.00	galllon	16	ounce	1	$7.50	7.50	393	0.009	0.07
Maverick	$16.00	ounce	0.667	pound	1	$10.67	10.10	393	0.009	0.09
In Crop Herbicide Mix (application figured below)					1	$6.58	6.58	393	0.009	0.06
Labor & Equipment	$50	hour	0.334	hour	3	$50.10	50.10			50.10
ANNUAL COST OF FARMING AROUND H-POLES IN FIELD INTERIOR										**$705.03**

Estimated Spring Wheat Yield: 90 bu/ac

[1]Banding 11-52-0 or 18-46-0 with seed.
[2]Applying a total of 230 actual units of nitrogen per acre.

Compiled by Neal E. Fehringer, Certified Professional Agronomist, C.C.A. on 6/15/07. Revised 6/2/08

APPENDIX O: POTENTIAL WIND FARM MITIGATION MEASURES ADAPTED FROM PROGRAMMATIC EIS - BLM WIND ENERGY DEVELOPMENT ON BLM LANDS IN THE WESTERN U.S.

Potential Wind Farm Mitigation Measures
Adapted from the BLM Programmatic EIS for
BLM Wind Energy Development on BLM Lands in the Western U.S.

The previous evaluations identified a number of potential impacts that could occur during the construction, operation, and decommissioning of a wind energy facility. A variety of mitigation measures could be implemented at wind energy projects to reduce potential impacts, and these are described in the following sections. In addition, monitoring during the various phases of wind energy development could be utilized to identify potential concerns and actions to address those concerns. Monitoring data could be used to track the condition of resources, to identify the onset of impacts, and to direct responses to address those impacts. The following sections identify measures that may be appropriate for mitigating potential impacts associated with new wind energy projects.

The discussion of potential measures to reduce impacts is heavily adapted from the final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-administered lands in the Western United States located at http://windeis.anl.gov/documents/fpeis/. Potential measures have been refined to address conditions found in the vicinity of the MATL line. Because this discussion is general in nature due to the lack of detailed plans on the wind farms, site-specific and species-specific issues associated with individual wind energy development projects are not assessed in detail. Rather, the range of possible impacts on resources present in the study area is identified. This section considers only indirect cumulative impacts of the transmission line that could be associated with wind farm development.

1.0 Land Use and Infrastructure

A variety of mitigation measures could be implemented to reduce potential land use impacts. These measures include:

- Wind energy projects could be planned to mitigate or minimize impacts to other land uses.
- Federal and state agencies, properties owners, and other stakeholders could be contacted as early as possible in the planning process to identify potentially sensitive land uses and issues;
- The U.S. Department of Defense would be consulted regarding the potential impact of a proposed wind energy project on military operations in order to identify and address any concerns;
- The FAA required notice of proposed construction would be made as early as possible to identify any air safety measures that would be required;

- To plan for efficient land use, necessary infrastructure requirements could be consolidated whenever possible, and current transmission and market access could be evaluated;

- Restoration plans could be developed to ensure that all temporary use areas are restored.

- Wind farm developers could work with affected landowners to reduce interference with existing land uses.

1.1 Land Use and Infrastructure - Transportation

Potential impacts from transportation activities related to site monitoring and testing, construction, operation, and decommissioning of typical wind energy development projects are expected to be low, provided appropriate planning and implementation actions are taken. The following measures to mitigate transportation impacts address the expected major activities associated with future wind energy development projects and general safety standards.

- Generally, roads could be required to follow natural contours and be reclaimed. Roads could be designed to an appropriate standard no higher than necessary to accommodate their intended functions.

- Existing roads could be used to the maximum extent possible, but only if in safe and environmentally sound locations. If new access roads are necessary, they could be designed and constructed to the appropriate standard no higher than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Abandoned roads and roads that are no longer needed could be recontoured and revegetated.

- A transportation plan could be developed by project sponsors, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan could consider specific object sizes, weights, origin, destination, and unique handling requirements and could evaluate alternative transportation approaches (e.g., barge or rail). In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits could be clearly identified.

- A traffic management plan could be prepared by the project sponsors for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan could incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration. Signs could be placed along roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration could be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time.

- Project personnel and contractors could be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions, to ensure safe and efficient traffic flow.

- During construction and operation, traffic could be restricted to the roads developed for the project. Use of other unimproved roads could be restricted to emergency situations.

2.0 Geology and Soils

The potential for impacts to geologic resources and soils would occur primarily during construction and decommissioning. The following mitigation measures could reduce impacts:

- The size of disturbed land could be minimized as much as possible. Existing roads and borrow pits could be used as much as possible.

- Topsoil removed during construction could be salvaged and reapplied during reclamation. Disturbed soils could be reclaimed as quickly as possible or protective covers could be applied.

- Erosion controls that comply with state standards could be applied. Practices such as jute netting, silt fences, and check dams could be applied near disturbed areas.

- On-site surface runoff control features could be designed to minimize the potential for increased localized soil erosion. Drainage ditches could be constructed where necessary but held to a minimum. Potential soil erosion could be controlled at culvert outlets with appropriate structures. Catch basins, drainage ditches, and culverts could be cleaned and maintained regularly.

- Operators could identify unstable slopes and local factors that can induce slope instability (such as groundwater conditions, precipitation, earthquake activities, slope angles, and dip angles of geologic strata). Operators also could avoid creating excessive slopes during excavation and blasting operations. Special construction techniques could be used where applicable in areas of steep slopes, erodible soil, and stream channel/wash crossings.

- Borrow material could be obtained only from authorized and permitted sites.

- Access roads could be located to follow natural contours of the topography and minimize side hill cuts.

- Foundations and trenches could be backfilled with originally excavated materials as much as possible. Excavation material could be disposed of only in approved areas to control soil erosion and to minimize leaching of hazardous constituents. If suitable, excess excavation materials may be stockpiled for use in reclamation activities.

3.0 Engineering and Hazardous Materials (Safety also)

The following mitigation measures could be used to deal with hazardous materials during all activities associated with a wind energy project:

- The project sponsor could keep a comprehensive listing of the hazardous materials that would be used, stored, transported, or disposed of during activities associated with site monitoring and testing, construction, operation, and decommissioning of a wind energy project.

- Project sponsors could develop a hazardous materials management plan addressing storage, use, transportation, and disposal of each hazardous material anticipated to be used at the site. The plan could identify all hazardous materials that would be used, stored, or transported at the site. It could establish inspection procedures, storage requirements, storage quantity limits, inventory control, nonhazardous product substitutes, and disposition of excess materials. The plan could also identify requirements for notices to federal and local emergency response authorities and include emergency response plans.

- Project sponsors could develop a waste management plan identifying the waste streams that are expected to be generated at the site and addressing hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. This plan could address all solid and liquid waste that may be generated at the site.

- Project sponsors could develop a spill prevention and response plan identifying where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are adequately stocked at all times, and procedures for making timely notifications to authorities.

- Project sponsors must develop a storm water management plan under Montana DEQ regulation for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion.

- If pesticides are to be used on the site, an integrated pest management plan could be developed to ensure that applications will be conducted in accordance with state and federal regulations. Pesticide use could be limited to nonpersistent, immobile pesticides and could only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

- Secondary containment could be provided for all on-site hazardous materials and waste storage, including fuel. In particular, fuel storage (for construction vehicles and equipment) could be a temporary activity occurring only for as long as is needed to support construction and decommissioning activities. Fuel storage facilities could be removed from the site after these activities are completed.

- Wastes could be properly containerized and removed periodically for disposal at appropriate off-site permitted disposal facilities.

- In the event of an accidental release to the environment, the operator could document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event could be provided to DEQ as required.

- Any wastewater generated in association with temporary, portable sanitary facilities could be periodically removed by a licensed hauler and introduced into an existing municipal sewage treatment facility. Temporary, portable sanitary facilities provided for construction crews could be adequate to support expected on-site personnel and could be removed at the completion of construction activities.

The following mitigation measures dealing with health and safety could be implemented where appropriate during all phases associated with a wind energy project:

- All construction, operation, and decommissioning activities could be conducted in compliance with applicable federal and state occupational safety and health standards (e.g., OSHA's Occupational Health and Safety Standards, 29 CFR Parts 1910 and 1926, respectively (DOL 2001, 2003).

- A safety assessment could be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access, construction, safe work practices, security, heavy equipment transportation, traffic management, emergency procedures, and fire control.

- A health and safety program could be developed to protect workers during construction, operation, and decommissioning of a wind energy project. The program could identify all applicable federal and state occupational safety standards, establish safe work practices for each task (e.g., requirements for personal protective equipment and safety harnesses; OSHA standard practices for safe use of explosives and blasting agents; and measures for reducing occupational EMF exposures), establish fire safety evacuation procedures, and define safety performance standards (e.g., electrical system standards and lighting protection standards). The program could include a training program to identify hazard training requirements for workers for each task and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies could be established.

- Electrical systems could be designed to meet all applicable safety standards (e.g., National Electrical Code [NEC] and IEC and National Electric Safety Code).

- For the mitigation of explosive hazards, workers could be required to comply with the OSHA standard (1910.109) for the safe use of explosives and blasting agents (DOL 1998).

- Measures could be considered to reduce occupational EMF exposures, such as backing the generator with iron to block the electric field, shutting down the generator when working in the vicinity, and/or limiting exposure time while the generator is running (Robichaud 2004).

- The project health and safety program could also address protection of public health and safety during construction, operation, and decommissioning of a wind energy project. The program could establish a safety zone or setback for wind turbine generators from residences and occupied buildings, roads, ROWs, and other public access areas that is sufficient to prevent accidents resulting from hazards such as blade failure and ice throw during the operation of wind turbine generators. It could identify requirements for temporary fencing around staging areas, storage yards, and excavations during construction or decommissioning activities. It could also identify measures to be taken during the operations phase to limit public access to facilities (e.g., permanent fencing could be installed around electrical substations, and turbine tower access doors could be locked to limit public access).

- Operators could consult with local authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) could be identified and addressed in the traffic management plan.

- If operation of the wind turbines is expected to cause significant adverse impacts to nearby residences and occupied buildings from shadow flicker, low-frequency sound, or EMF, site-specific recommendations for addressing these concerns could be incorporated into the project design (e.g., establishing a sufficient setback from turbines).

- The project could be planned to minimize EMI (e.g., impacts to radar, microwave, television, and radio transmissions) and comply with FCC regulations. Signal strength studies could be conducted when proposed locations have the potential to impact transmissions. Potential interference with public safety communication systems (e.g., radio traffic related to emergency activities) could be avoided.

- In the event an installed wind energy development project results in EMI, the operator could work with the owner of the impacted communications system to resolve the problem. Potential mitigation may include realigning the existing antenna or installing relays to transmit the signal around the wind energy project. Additional warning information may also need to be conveyed to aircraft with onboard radar systems so that echoes from wind turbines can be quickly recognized.

- The project could be planned to comply with FAA regulations, including lighting requirements, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.

- Operators could develop a fire management strategy to implement measures to minimize the potential for a human-caused fire.

4.0 Electric and Magnetic Fields – no measures.

5.0 Water Resources

Potential water resource impacts would mostly occur during the site construction and decommissioning phases. Mitigation measures that could reduce such impacts include:

- The amount of cleared and disturbed lands could be minimized as much as possible. Existing roads and borrow pits could be used as much as possible.

Topsoil removed during construction could be salvaged and reapplied during reclamation. Disturbed soils could be reclaimed as quickly as possible or protective covers could be applied.

- Operators could identify unstable slopes and local factors that can induce slope instability (such as groundwater conditions, precipitation, earthquakes, slope angles, and dip angles of geologic strata). Operators also could avoid creating excessive slopes during excavation and blasting operations. Special construction techniques could be used where applicable in areas of steep slopes, erodible soil, and stream channel/wash crossings.

- Erosion controls that comply with state standards could be applied. Controls such as jute netting, silt fences, and check dams could be applied near disturbed areas.

- Operators could gain a clear understanding of the local hydrogeology. Areas of groundwater discharge and recharge and their potential relationships with surface water bodies could be identified.

- Operators could avoid creating hydrologic conduits between two aquifers during foundation excavation and other activities.

- Proposed construction near aquifer recharge areas could be closely monitored to reduce the potential for contamination of the aquifer. This may require a study to determine localized aquifer recharge areas.

- Foundations and trenches could be backfilled with originally excavated material as much as possible. Excess excavated material could be disposed of only in approved areas.

- Existing drainage systems could not be altered, especially in sensitive areas such as erodible soils or steep slopes. When constructing stream or wash crossings, culverts or water conveyances for temporary and permanent roads could be designed to comply with county standards, or if there are no county standards, to accommodate the runoff of a 10-year storm. Potential soil erosion could be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts could be cleaned and maintained regularly.

- On-site surface runoff control features could be designed to minimize the potential for increased localized soil erosion. Drainage ditches could be constructed where necessary but held to a minimum. Potential soil erosion could be controlled at culvert outlets with appropriate structures. Catch basins, drainage ditches, and culverts could be cleaned and maintained regularly.

- Pesticide use could be limited to nonpersistent, immobile pesticides and could only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

6.0 Wetlands and Floodplains

Wind energy development typically occurs on ridges and other elevated land where wetlands and surface bodies are not likely to occur; however, access roads and transmission lines may cross lands where these features may be more common. As a result, wetland and aquatic biota could be affected during construction of the wind energy project and its associated facilities.

- Construction activities may adversely affect wetlands and aquatic biota through (1) habitat disturbance, (2) mortality or injury of biota, (3) erosion and runoff, (4) exposure to contaminants, and (5) interference with migratory movements. Except for the construction of stream crossings for access routes or the unavoidable location of a transmission line support tower in a wetland, construction within wetlands or other aquatic habitats would be largely prohibited.

- The overall impact of construction activities on wetlands and aquatic resources would depend on the type and amount of aquatic habitat that would be disturbed, the nature of the disturbance (e.g., grading and filling, or erosion in construction support areas), and the aquatic biota that occupy the project site and surrounding areas.

- Avoid construction of stream crossings could directly impact aquatic habitat and biota within the crossing footprint.

7.0 Vegetation

The following measures could be implemented through weed control plans required by county weed boards to minimize the potential establishment of invasive vegetation at a wind energy development site and its associated facilities:

- Operators would develop a plan for control of noxious weeds and invasive plants acceptable to the county weed board, which could occur as a result of new surface disturbance activities at the site. The plan could address monitoring, weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulching could be required.

- If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area could be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.

- Access roads and newly established power lines could be monitored regularly for invasive species establishment, and weed control measures could be initiated immediately upon evidence of invasive species introduction.

- Fill materials that originate from areas with known invasive vegetation problems could not be used.

- Certified weed-free mulch could be used when stabilizing areas of disturbed soil.

- Habitat restoration activities and invasive vegetation monitoring and control activities could be initiated as soon as possible after construction activities are completed.

- All areas of disturbed soil could be reclaimed using weed-free native shrubs, grasses, and forbs.

- Pesticide use could be limited to nonpersistent, immobile pesticides and could only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

- Access roads, utility and transmission line corridors, and tower site areas could be monitored regularly for invasive species establishment, and weed control measures could be initiated immediately upon evidence of invasive species introduction.

8.0 Wildlife

Mitigation measures that could minimize raptor fatalities at wind energy development projects include:

- Raptor use of the project area could be evaluated, and the project could be designed to minimize or mitigate the potential for raptor strikes. Scientifically rigorous raptor surveys could be conducted; the amount and extent of baseline data required could be determined on a project-specific basis.

- Areas with a high incidence of fog, mist, low cloud ceilings, and low visibility could be avoided.

- Turbine locations could be configured in order to avoid landscape features (including prairie dog colonies and other high-prey potential sites) known to attract raptors.

- Turbine arrays could be configured to minimize avian mortality (e.g., orient rows of turbines parallel to known bird movements).

- Underground or raptor-safe transmission lines could be used to reduce collision and electrocution potential.

- A habitat restoration plan could be developed that avoids or minimizes negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species (e.g., avoid the establishment of habitat that attracts high densities of prey animals used by raptors).

- Road cuts, which are favored by pocket gophers and ground squirrels, could be minimized.

- Either no vegetation or native plant species that do not attract small mammals could be maintained around the turbines.

- Tubular supports rather than lattice supports could be used, with no external ladders and platforms.

- The minimum amount of pilot warning and obstruction avoidance lighting specified by the FAA could be used, and the FAA could be consulted.

- Operators could determine if active raptor nests (i.e., raptor nests used during the breeding season) are present. Buffers could be provided to avoid disturbance of nesting raptors.

- Areas with high bird use could be avoided through micro-siting alternatives (e.g., at the Foote Creek Rim project, turbines were located slightly away from the rim edge of a flat top mesa [Strickland et al. 2001a]).

Measures that have been suggested for management of sage grouse and their habitats may apply to sharp-tailed grouse (e.g., Paige and Ritter 1999; Connelly et al. 2000; Montana Sage-Grouse Work Group 2003). The measures that have pertinence to wind energy development projects include:

- Identify and avoid both local (daily) and seasonal migration routes.

- Consider grouse and sage habitat when designing, constructing, and utilizing project access roads and trails.

- Avoid, when possible, siting energy developments in breeding habitats.

- Adjust the timing of activities to minimize disturbance to grouse during critical periods.

- When possible, locate energy-related facilities away from active leks or near grouse habitat.

- When possible, restrict noise levels to 10 dB above background noise levels at the lek sites.

- Minimize nearby human activities when birds are near or on leks.

- As practicable, do not conduct surface-use activities within crucial sage-grouse wintering areas from December 1 through March 15.

- Maintain sagebrush communities on a landscape scale.

- Provide compensatory habitat restoration for impacted sagebrush habitat.

- Avoid the use of pesticides at grouse breeding habitat during the brood-rearing season.

- Develop and implement appropriate measures to prevent the introduction or dispersal of noxious weeds.

- Avoid creating attractions for raptors and mammalian predators in grouse habitat.

- Consider measures to mitigate impacts at off-site locations to offset unavoidable grouse habitat alteration and reduction at the project site.

9.0 Fish – no measures.

10.0 Threatened, Endangered, and Candidate for Listing Species

If federally listed species are present in the project vicinity, the project sponsor is encouraged to contact the USFWS.

A variety of site-specific and species-specific measures may be appropriate to mitigate potential impacts to special status species if present in the project area. Such measures may include:

- Field surveys could be conducted to verify the absence or presence of the species in the project area and especially within individual project footprints.

- Project facilities or lay-down areas could not be placed in areas documented to contain or provide important habitat for those species.

11.0 Air Quality

The potential for adverse air quality impacts during the site monitoring and testing and operation phases would be limited. The greatest potential impacts would occur during the construction and decommissioning phases. Generation of fugitive particulates from vehicle traffic and earthmoving activities would need to be controlled. Typical measures (ABC Wind Company, LLC undated; PBS&J 2002) that could be implemented to control particulates and other pollutants include these:

- Mitigation measures for areas subject to vehicular travel

Access roads and on-site roads could be surfaced with aggregate materials, wherever appropriate.

Dust abatement techniques could be used on unpaved, unvegetated surfaces to minimize airborne dust.

Speed limits could be posted (e.g., 25 mph) and enforced to reduce airborne fugitive dust.

- Mitigation measures for soil and material storage and handling

Workers could be trained to handle construction material to reduce fugitive emissions.

Construction materials and stockpiled soils could be covered if they are a source of fugitive dust.

Storage piles at concrete batch plants could be covered if they are a source of fugitive dust.

- Mitigation measures for clearing and disturbing land

Disturbed areas could be minimized.

Dust abatement techniques could be used as earthmoving activities proceed and prior to clearing.

- Mitigation measures for earthmoving

Dust abatement techniques could be used before excavating, backfilling, compacting, or grading.

Disturbed areas could be revegetated as soon as possible after disturbance.

- Mitigation measures for soil loading and transport

If practicable, soil could be moist while being loaded into dump trucks.

Soil loads could be kept below the freeboard of the truck.

Drop heights could be minimized when loaders dump soil into trucks.

Gate seals could be tight on dump trucks.

Dump trucks could be covered before traveling on public roads.

- Mitigation measure for blasting

Dust abatement techniques could be used during blasting.

12.0 Audible Noise

The following mitigation measures could reduce potential noise impacts:

- Proponents of a wind energy development project could take measurements to assess the existing background noise levels at a given site and compare them with the anticipated noise levels associated with the proposed project.

- Noisy construction activities (including blasting) could be limited to the least noise-sensitive times of day (daytime only between 7 a.m. and 10 p.m.) and weekdays.

- Whenever feasible, different noisy activities (e.g., blasting and earthmoving) could be scheduled to occur at the same time since additional sources of noise generally do not add a significant amount of noise. That is, less-frequent noisy activities would be less annoying than frequent less-noisy activities.

- All equipment could have sound-control devices no less effective than those provided on the original equipment. All construction equipment used could be adequately muffled and maintained.

- All stationary construction equipment (i.e., compressors and generators) could be located as far as practicable from nearby residences.

- If blasting or other noisy activities are required during the construction period, nearby residents could be notified in advance.

13.0 Socioeconomics – no measures.

14.0 Paleontological and Cultural Resources

To mitigate or minimize potential paleontological resource impacts, the following mitigation measures could be adopted:

- Operators could determine whether paleontological resources exist in a project area on the basis of the sedimentary context of the area, a records search for past paleontological finds in the area, and/or a paleontological survey.

- A paleontological resources management plan could be developed for areas where there is a high potential for paleontological material to be present. Management options may include avoidance, removal of the fossils, or monitoring. If the fossils are to be removed, a mitigation plan could be drafted identifying the strategy for collection of the fossils in the project area. Often it is unrealistic to remove all of the fossils, in which case a sampling strategy can be developed. If an area exhibits a high potential but no fossils were observed during surveying, monitoring could be required. A qualified paleontologist could monitor all excavation and earthmoving in the sensitive area. Whether the strategy chosen is excavation or monitoring, a report detailing the results of the efforts could be produced.

- If an area has a strong potential for containing fossil remains and those remains are exposed on the surface for potential collection, steps could be taken to educate workers and the public on how to report these resources to the landowner.

- To mitigate or minimize potential impacts to cultural resources, the following mitigation measures could be adopted. On state or federal lands, some measures could be required.

- Where a wind farm would be located on state or federal lands, agencies with permitting authority could consult with Native American governments early in the planning process to identify issues and areas of concern regarding the proposed wind energy development. Aside from the fact that consultation is required under the National Historic Preservation Act (NHPA), consultation is necessary to establish whether the project is likely to disturb traditional cultural properties, affect access rights to particular locations, disrupt traditional cultural practices, and/or visually impact areas important to the Tribe(s).

- The presence of archaeological sites and historic properties in the area of potential effect could be determined on the basis of a records search of recorded sites and properties in the area and/or an archaeological survey. The State Historic Preservation Officer (SHPO) is the primary repository for cultural resource information, and the State DNRC offices and most BLM Field Offices also maintain this information for lands under their jurisdiction.

- Archaeological sites and historic properties present in the area of potential effect could be reviewed by an agency and/or a project sponsor to determine whether they meet the criteria of eligibility for listing on the NRHP. Cultural resources listed on or eligible for listing on the NRHP are considered “significant” resources.

- When any ROW application includes remnants of a National Historic Trail, is located within the viewshed of a National Historic Trail’s designed centerline, or includes or is within the viewshed of a trail eligible for listing on the National Register of Historic Places (NRHP), the operator could evaluate the potential visual impacts to the trail associated with the proposed project and identify appropriate mitigation measures.

- If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan could be developed by a regulatory agency and/or a project sponsor. This plan could address mitigation activities to be implemented for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation (as warranted) and monitoring. If an area exhibits a high potential, but no artifacts are observed during an archaeological survey, monitoring by a qualified archaeologist could be required during all excavation and earthmoving in the high-potential area. A report could be prepared documenting these activities. The CRMP also could (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public land.

- Periodic monitoring of significant cultural resources in the vicinity of development projects may help curtail potential looting/vandalism and erosion impacts. If impacts are recognized early, additional actions can be taken before the resource is destroyed.

- Unexpected discovery of cultural resources during construction could be brought to the attention of the responsible authorized officer or landowner immediately. Work could be halted in the vicinity of the find to avoid further disturbance to the resources while they are being evaluated and appropriate mitigation measures are being developed.

- Wind farm developers could inform construction workers and site operators of appropriate measures to avoid damage to or destruction of cultural resources.

15.0 Visuals

The potential for impacts to visual resources soils could occur during all phases of wind energy development. The following mitigation measures could reduce impacts (NWCC 2002; AusWEA 2002; Gipe 1998, 2002; NYSDEC 2000):

- Turbine arrays and the turbine design could be integrated with the surrounding landscape. To accomplish this integration, several elements of design need to be incorporated.

- The operator could provide visual order and unity among clusters of turbines (visual units) to avoid visual disruptions and perceived “disorder, disarray, or clutter” (Gipe 2002).

- To the extent possible given the terrain of a site, the operator could create clusters or groupings of wind turbines when placed in large numbers; avoid a cluttering effect by separating otherwise overly long lines of turbines, or large arrays; and insert breaks or open zones to create distinct visual units or groups of turbines.

- The operator could create visual uniformity in the shape, color, and size of rotor blades, nacelles, and towers (Gipe 1998).

- The use of tubular towers is recommended for visual unity. Truss or lattice-style wind turbine towers with lacework, pyramidal, or prism shapes could be avoided. Tubular towers present a simpler profile and less complex surface characteristics and reflective/shading properties.

- Components could be in proper proportion to one another. Nacelles and towers could be planned to form an aesthetic unit and could be combined with particular sizes and shapes in mind to achieve an aesthetic balance between the rotor, nacelle, and tower (Gipe 1998).
- Color selections for turbines could be made to reduce visual impact (Gipe 2002) and could be applied uniformly to tower, nacelle, and rotor, unless gradient or other patterned color schemes are used.

- The operator could use nonreflective paints and coatings to reduce reflection and glare. Turbines, visible ancillary structures, and other equipment could be painted before or immediately after installation. Uncoated galvanized metallic surfaces could be avoided because they would create a stronger visual contrast, particularly as they oxidize and darken.

- Commercial messages on turbines and towers could be avoided (Gipe 2002).

- The site design could be integrated with the surrounding landscape.

- To the extent practicable, the operator could avoid placing substations or large operations buildings on high land features and along "skylines" that are visible from nearby sensitive view points. The presence of these structures could be concealed or made less conspicuous. Conspicuous structures could be designed and constructed to harmonize with desirable or acceptable characteristics of the surrounding environment (Gipe 2002).

- The operator could bury power collection cables or lines on the site in a manner that minimizes additional surface disturbance.

- Commercial symbols (such as logos), trademarks, and messages could be avoided on sites or ancillary structures of wind energy projects. Similarly, billboards and advertising messages could be avoided (Gipe 1998, 2002).

- Site design could be accomplished to make security lights nonessential. Such lights increase the contrast between a wind energy project and the night sky, especially in rural/remote environments, where turbines would typically be installed. Where they are necessary, security lights could be extinguished except when activated by motion detectors (e.g., only around the substation) (Gipe 1998).

- Operators could minimize disturbance and control erosion by avoiding steep slopes (Gipe 1998) and by minimizing the amount of construction and ground clearing needed for roads, staging areas, and crane pads. Dust suppression techniques could be employed in arid environments to minimize impacts of vehicular and pedestrian traffic, construction, and wind on exposed surface soils.

- Disturbed surfaces could be restored as closely as possible to their original contour and revegetated immediately after, or contemporaneously with construction. Action could be prompt to limit erosion and to accelerate restoring the preconstruction color and texture of the landscape.

- The wind development site could be maintained during operation. Inoperative or incomplete turbines cause the misperception in viewers that “wind power does not work” or that it is unreliable.

- Inoperative turbines could be completely repaired, replaced, or removed. Nacelle covers and rotor nose cones could always be in place and undamaged (Gipe 1998).

- Wind energy projects could evidence environmental care, which would also reinforce the expectation and impression of good management for benign or clean power. Nacelles and towers could also be cleaned regularly (yearly, at minimum) to remove spilled or leaking fluids and the dirt and dust that would accumulate, especially in seeping lubricants.

- Facilities and off-site surrounding areas could be kept clean of debris, “fugitive” trash or waste, and graffiti. Scrap heaps and materials dumps could be prohibited and prevented. Materials storage yards, even if thought to be orderly, could be kept to an absolute minimum. Surplus, broken, disused materials and equipment of any size could not be allowed to accumulate (Gipe 2002).

- A decommissioning plan could be developed, and it could include the removal of all turbines and ancillary structures and restoration/reclamation of the site.

16.0 Mitigation during Site Monitoring and Testing

Site monitoring and testing would generally result in only minimal impacts to ecological resources. The following mitigation measures may ensure that ecological impacts during this stage of the project would be minimal:

- Existing roads could be used to the maximum extent feasible to access a proposed project area.

- If new access roads are necessary, they could be designed and constructed to the appropriate standard.

- Existing or new roads could be maintained to the condition needed for facility use.

- The area disturbed during the installation of meteorological towers (i.e., the tower footprint and its associated lay-down area) could be kept to a minimum.

- Individual meteorological towers could not be located in or near sensitive habitats or in areas where ecological resources known to be sensitive to human activities are present.

- Installation of meteorological towers could be scheduled to avoid disruption of wildlife reproductive activities or other important behaviors (e.g., during periods of grouse nesting).

17.0 Mitigation during Plan of Development Preparation and Project Design

Mitigation measures may be considered during preparation of the project design to ensure that the siting of the overall wind energy development project and of individual facility structures, as well as various aspects of the design of individual facility structures, do not result in unacceptable impacts to ecological resources. The following measures could be incorporated into the siting of the wind development project:

- Operators could identify important, sensitive, or unique habitat and biota in the project vicinity and site, and design the project to avoid (if possible), minimize, or mitigate potential impacts to these resources. The design and siting of the facility could follow appropriate guidance and requirements from other resource agencies, as available and applicable.

- The operators could contact appropriate agencies early in the planning process to identify potentially sensitive ecological resources that may be present in the area of the wind energy development.

- The operators could conduct surveys for federal- and state-protected species and other species of concern within the project area.

- Operators could evaluate avian and bat use (including the locations of active nest sites, colonies, roosts, and migration corridors) of the project area by using scientifically rigorous survey methods (e.g., see NWCC 1999).

- The project could be planned to avoid (if possible), minimize, or mitigate impacts to wildlife and habitat.

- Discussion could be held with the appropriate agency biologists regarding the occurrence of sensitive species or other valued ecological resources in the proposed project area.

- Existing information on species and habitats in the project area could be reviewed.

The amount and extent of necessary preproject data would be determined on a project-by-project basis, based in part on the environmental setting of the proposed project location. Methods for collecting such data may be found in NWCC (1999) and California Energy Commission (2007).

17.1 Mitigating Habitat Impacts. The following measures could be considered during project siting to minimize potential habitat disturbance:

- If survey results indicate the presence of important, sensitive, or unique habitats (such as wetlands and sagebrush habitat) in the project vicinity, facility design could locate turbines, roads, and support facilities in areas least likely to impact those habitats.

- Habitat disturbance could be minimized by locating facilities (such as utility corridors and access roads) in previously disturbed areas (i.e., locate transmission lines within or adjacent to existing power line corridors).

- Existing roads and utility corridors could be utilized to the maximum extent feasible.

- New access roads and utility corridors could be configured to avoid high quality habitats and minimize habitat fragmentation.

- Site access roads and utility corridors could minimize stream crossings.

- A habitat restoration management plan could be developed that identifies vegetation, soil stabilization, and erosion reduction measures and requires that restoration activities be implemented as soon as possible following facility construction activities.

- Individual project facilities could be located to maintain existing stands of quality habitat and continuity between stands.

- The creation of, or increase in, the amount of edge habitat between natural habitats and disturbed lands could be minimized.

- To minimize impacts to aquatic habitats from increased erosion, the use of bridges or fill ramps rather than stream bank cutting could be designated for all stream crossings by access roads.

- Stream crossings could be designed to provide in-stream conditions that allow for and maintain uninterrupted movement and safe passage of fish.

17.2 Mitigating Site/Wildlife Interactions. To reduce the potential use of site facilities by perching birds, to reduce the potential for collisions with project facilities, and to reduce the potential for electrocution, the following measures could be considered during the design of individual facility structures:

- Locations that are heavily utilized by migratory birds and bats could be avoided.

- Permanent meteorological towers, transmission towers, and other facility structures could be designed to discourage their use by birds for perching or nesting.

- The use of guy wires on permanent meteorological towers could be avoided or minimized.

- Electrical supply lines could be buried in a manner that minimizes additional surface disturbance. Overhead lines could be used in cases where the burial of lines would result in further habitat disturbance.

- Power lines could be configured to minimize the potential for electrocution of birds, by following established guidelines (e.g., APLIC [2006], APLIC and USFWS ~2O05]).

- Operators could consider incorporating measures to reduce raptor use of the project site into the design of the facility layout (e.g., minimize road cuts and maintain nonattractive vegetation around turbines).

- Turbines and other project facilities could avoid locations in areas with known high bird usage; in known bird and/or bat migration corridors or known flight paths; near raptor nest sites; and in areas used by bats as colonial hibernation, breeding, and maternity/nursery colonies, if site studies show that they would pose a high risk to species of concern.

- Wind energy projects could avoid locations in areas with a high incidence of fog and mist.

- To reduce attraction of migratory birds to turbines and towers, the need for or use of sodium vapor lights at site facilities could be minimized or avoided.

- Turbines could be configured to avoid landscape features known to attract raptors, if site studies show that placing turbines there would pose a significant risk to raptors.

17.3 Mitigating Habitat Disturbance. To mitigate habitat reduction or alternation during construction, the following measures may be implemented:

- The size of all disturbed areas could be minimized.

- Where applicable, the extent of habitat disturbance could be reduced by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas.

- Habitat restoration activities could be initiated as soon as possible after construction activities are completed.

17.4 Mitigating Disturbance and Injury of Vegetation and Wildlife. These measures may be applicable to mitigate the disturbance or injury of biota during construction:

- In consultation with staff from natural resource management agencies, construction activities could be scheduled to avoid important periods of wildlife courtship, breeding, nesting, lambing, or calving.

- All construction employees could be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship, nesting) seasons. In addition, any pets could not be permitted on site during construction.

- Buffer zones could be established around raptor nests, bat roosts, and biota and habitats of concern, if site studies show that proposed facilities would pose a significant risk to avian or bat species of concern.

- Noise-reduction devices (e.g., mufflers) could be maintained in good working order on vehicles and construction equipment.

- Explosives could be used only within specified times and at specified distances from sensitive wildlife or surface waters as established by local, state and federal management agencies.

- The use of guy wires on permanent meteorological towers could be avoided.

17.5 Mitigating Erosion and Fugitive Dust Generation. Measures to minimize disturbance of ecological resources from erosion and fugitive dust may include:

- Erosion controls that comply with county, state, and federal standards could be applied. Controls such as jute netting, silt fences, and check dams could be applied near disturbed areas.

- All areas of disturbed soil could be reclaimed using weed-free native grasses, forbs, and shrubs. Reclamation activities could be undertaken as early as possible on disturbed areas.

- Dust abatement techniques could be used on unpaved, unvegetated surfaces to minimize airborne dust.

- Construction materials and stockpiled soil could be covered if they are a source of fugitive dust.

- Erosion and fugitive dust control measures could be inspected and maintained regularly.

17.6 Mitigating Fuel Spills. To minimize potential impacts to ecological resources from accidental fuel spills, the following mitigation measures may be implemented:

- All refueling could occur in a designated fueling area that includes a temporary berm to limit the spread of any spill.

- Drip pans could be used during refueling to contain accidental releases.

- Drip pans could be used under fuel pump and valve mechanisms of any bulk fueling vehicles parked at the construction site.

- Spills could be immediately addressed per the appropriate spill management plan, and soil cleanup and soil removal initiated if needed.

18.0 Mitigation during Operation

18.1 Mitigating Fuel Spills and Exposure to Site-Related Chemicals. The following measures may be implemented to minimize the potential for exposure of biota to accidental spills:

- Drip pans could be used during refueling to contain accidental releases.

- Pesticide use could be limited to nonpersistent, immobile pesticides and herbicides and could only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

- Spills could be immediately addressed per the appropriate spill management plan, and soil cleanup and removal initiated, if needed.

18.2 Mitigating Site/Wildlife Interactions. Measures to mitigate these interactions were identified for inclusion in wind farm location and design. The following measures may further reduce the potential for bird collisions, primarily through reducing the attractiveness of the facility to birds:

- Taller vegetation (i.e., shrub species) could be encouraged along powerline transmission corridors to minimize foraging in these areas by raptors to the extent local conditions will support this vegetation.

- Areas around turbines, meteorological towers, and other facility structures could be maintained in an unvegetated state (e.g., crushed gravel), or only vegetation that does not support wildlife use could be planted.

- All unnecessary lighting could be turned off at night to limit attracting migratory birds.

- Employees, contractors, and site visitors could be instructed to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship and nesting) seasons. In addition, pets could be controlled to avoid harassment and disturbance of wildlife.

- Observations of potential wildlife problems, including wildlife mortality, could be reported to wildlife management agencies.

19.0 Mitigation during Decommissioning

The measures identified to mitigate construction impacts are applicable to decommissioning activities and may include:

- All turbines and ancillary structures could be removed from the site.
- Topsoil from all decommissioning activities could be salvaged and reapplied during final reclamation.
- All areas of disturbed soil could be reclaimed using weed-free native shrubs, grasses, and forbs.
- The vegetation cover, composition, and diversity could be restored to values commensurate with the ecological setting.

Following removal of the project facilities, implementation of appropriate habitat restoration activities could restore disturbed areas to pre-project conditions.

APPENDIX P: ENDANGERED SPECIES ACT SECTION 7, STATE HISTORIC PRESERVATION OFFICER, AND TRIBAL CONSULTATION

Department of Energy
Washington, DC 20585

July 9, 2007

CSKT Tribal Historic Preservation Office
ATTN: Marcia Pablo
Confederated Salish and Kootenai Tribes
P.O. Box 278
Pablo, MT 59855

Dear Ms. Pablo:

Montana Alberta Tie Line, Ltd. (MATL) has applied to the Department of Energy (DOE) for a Presidential permit to construct a single-circuit, 230,000-volt electric transmission line that would originate northeast of Lethbridge, Alberta, Canada, cross the U.S.-Canada border north of Cut Bank, Montana, and extend approximately 130 miles into the United States on State and private lands, terminating at an existing substation located north of Great Falls, Montana.

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), and 36 CFR Part 800, DOE has determined that the proposed Federal action is an undertaking that has the potential to cause effects on historic properties, and seeks to initiate consultation with the Confederated Salish and Kootenai Tribes (CSKT). Section 106 addresses undertakings occurring on or affecting historic properties, including those of traditional religious and cultural importance to the CSKT.

DOE would like to obtain information from the CSKT about historic properties in or near the project area and to provide you an opportunity to identify your concerns about such properties, including potential mitigation measures. Your assistance in the identification and evaluation of historic properties, including those of traditional religious and cultural importance, will provide us the opportunity to resolve any adverse effects this undertaking may have on these properties. If available, we would welcome any information on the location and importance of archaeological sites, historic structures, and any other localities of interest to you that are known to occur in the proposed project area.

To help in your review, enclosed is a CD containing a report titled, *A Class III Cultural Resources Inventory of the Montana Alberta Tie Ltd., Proposed Transmission Line: Preferred route, Glacier, Pondera, Teton, Chouteau and Cascade Counties, Montana* (GCM Services Report), dated 02-01-2007, and prepared by David Ferguson of AMEC Earth and Environmental for MATL.

In addition to the CSKT, we are also requesting consultation with the Blackfeet Nation. If you know of other tribes that may have historic properties potentially impacted by this project, please let us know about them so we may offer to consult with them as well.

Furthermore, consistent with its obligations under the NHPA, DOE has also initiated consultation with the Montana State Historic Preservation Office (SHPO). In a May 9, 2007 letter, the SHPO determined that DOE's Federal undertaking, with appropriate avoidance and monitoring, should not have any direct effect to the sites located and documented in the GCM Services Report along the preferred route and designated reroutes for the MATL transmission line. For your information, a copy of the SHPO letter is enclosed.

Project Description- The total length of the proposed transmission line would be 203 miles, with approximately 130 miles constructed inside the United States. Laminated wood or wood pole H-frames would be the primary support structures used, with steel structures used for special applications such as monopole dead-end structures. MATL would use different types of H-Frame structures to address the various angles that would be necessary to accommodate changes in terrain and land use. Spacing between the two poles of a proposed H-frame structure would be about 23 feet. Typical span length between support structures would be about 800 feet, but could range from 500 feet to 1,600 feet. Approximately eight support structures per mile would be required. Depending on terrain, total disturbance at each support structure location during construction would be about 10,000 square feet.

Area of Potential Effect- The project's area of potential effect in the United States would be located in an area approximately 20 miles wide and 130 miles long within Glacier, Pondera, Teton, Chouteau, and Cascade Counties, Montana, from near the international border crossing west of the town of Sweetgrass, to the line terminus east of the town of Great Falls. The right-of-way would be approximately 100 feet wide, with the length ranging between 121.6 miles and 139.9 miles depending upon the alternative route.

More Information- DOE has worked closely with the Montana Department of Environmental Quality (MDEQ) on the preparation of a single environmental document that serves as both a Montana State Environmental Impact Statement (EIS) under the Montana Environmental Policy Act (MEPA), and a DOE environmental assessment (EA) under the National Environmental Policy Act (NEPA). This single environmental document (draft document) can be viewed and downloaded in its entirety from the MDEQ web site at http://www.deq.state.mt.us/. For your convenience, enclosed is a hard copy of the draft document.

The draft document was distributed for public comment in March 2007, and three public hearings were conducted to receive comments on the document during a 55-day public comment period. Based on comments received on the draft document indicating strong concern about land use and potential effects on farming, DOE has now determined an EIS, rather than an EA, to be the appropriate NEPA compliance document. Accordingly, on June 7, 2007, DOE published in the *Federal Register*, the enclosed Notice of Intent to prepare an EIS.

DOE will continue working with the MDEQ to address the comments received on the draft document and prepare responses to comments. If the previously published draft document does not require significant modifications to address the comments, we will issue corrections and updated information as errata along with the responses and the March 2007 draft document as the DOE draft EIS. If extensive modifications are required to adequately address comments, we will issue a new document, along with the responses, as our draft EIS.

Please feel free to contact me directly by e-mail at Anthony.Como@hq.doe.gov, or by phone at 202-586-5935, with regard to any concerns or questions you may have with this proposed project.

Sincerely,

Anthony J. Como

Anthony J. Como
Director, Permitting and Siting
Office of Electricity Delivery and
Energy Reliability

Enclosures

cc: Stan Wilmoth, State Archaeologist, Deputy SHPO
Tom Ring, MDEQ
J. Surbrugg, Tetra Tech

Department of Energy
Washington, DC 20585

July 9, 2007

Blackfeet Nation
ATTN: John Murray
Blackfeet Tribal Historic Preservation Office
P.O. Box 2809
Browning, MT 59417

Dear Mr. Murray:

Montana Alberta Tie Line, Ltd. (MATL) has applied to the Department of Energy (DOE) for a Presidential permit to construct a single-circuit, 230,000-volt electric transmission line that would originate northeast of Lethbridge, Alberta, Canada, cross the U.S.-Canada border north of Cut Bank, Montana, and extend approximately 130 miles into the United States on State and private lands, terminating at an existing substation located north of Great Falls, Montana.

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), and 36 CFR Part 800, DOE has determined that the proposed Federal action is an undertaking that has the potential to cause effects on historic properties, and seeks to initiate consultation with the Blackfeet Nation. Section 106 addresses undertakings occurring on or affecting historic properties, including those of traditional religious and cultural importance to the Blackfeet Nation.

DOE would like to obtain information from the Blackfeet Nation about historic properties in or near the project area and to provide you an opportunity to identify your concerns about such properties, including potential mitigation measures. Your assistance in the identification and evaluation of historic properties, including those of traditional religious and cultural importance, will provide us the opportunity to resolve any adverse effects this undertaking may have on these properties. If available, we would welcome any information on the location and importance of archaeological sites, historic structures, and any other localities of interest to you that are known to occur in the proposed project area.

To help in your review, enclosed is a CD containing a report titled, *A Class III Cultural Resources Inventory of the Montana Alberta Tie Ltd., Proposed Transmission Line: Preferred route, Glacier, Pondera, Teton, Chouteau and Cascade Counties, Montana* (GCM Services Report), dated 02-01-2007, and prepared by David Ferguson of AMEC Earth and Environmental for MATL.

In addition to the Blackfeet Nation, we are also requesting consultation with the Confederated Salish and Kootenai Tribes. If you know of other tribes that may have historic properties potentially impacted by this project, please let us know about them so we may offer to consult with them as well.

Furthermore, consistent with its obligations under the NHPA, DOE has also initiated consultation with the Montana State Historic Preservation Office (SHPO). In a May 9, 2007 letter, the SHPO determined that DOE's Federal undertaking, with appropriate avoidance and monitoring, should not have any direct effect to the sites located and documented in the GCM Services Report along the preferred route and designated reroutes for the MATL transmission line. For your information, a copy of the SHPO letter is enclosed.

Project Description- The total length of the proposed transmission line would be 203 miles, with approximately 130 miles constructed inside the United States. Laminated wood or wood pole H-frames would be the primary support structures used, with steel structures used for special applications such as monopole dead-end structures. MATL would use different types of H-Frame structures to address the various angles that would be necessary to accommodate changes in terrain and land use. Spacing between the two poles of a proposed H-frame structure would be about 23 feet. Typical span length between support structures would be about 800 feet, but could range from 500 feet to 1,600 feet. Approximately eight support structures per mile would be required. Depending on terrain, total disturbance at each support structure location during construction would be about 10,000 square feet.

Area of Potential Effect- The project's area of potential effect in the United States would be located in an area approximately 20 miles wide and 130 miles long within Glacier, Pondera, Teton, Chouteau, and Cascade Counties, Montana, from near the international border crossing west of the town of Sweetgrass, to the line terminus east of the town of Great Falls. The right-of-way would be approximately 100 feet wide, with the length ranging between 121.6 miles and 139.9 miles depending upon the alternative route.

More Information- DOE has worked closely with the Montana Department of Environmental Quality (MDEQ) on the preparation of a single environmental document that serves as both a Montana State Environmental Impact Statement (EIS) under the Montana Environmental Policy Act (MEPA), and a DOE environmental assessment (EA) under the National Environmental Policy Act (NEPA). This single environmental document (draft document) can be viewed and downloaded in its entirety from the MDEQ web site at http://www.deq.state.mt.us/. For your convenience, enclosed is a hard copy of the draft document.

The draft document was distributed for public comment in March 2007, and three public hearings were conducted to receive comments on the document during a 55-day public comment period. Based on comments received on the draft document indicating strong concern about land use and potential effects on farming, DOE has now determined an

EIS, rather than an EA, to be the appropriate NEPA compliance document. Accordingly, on June 7, 2007, DOE published in the *Federal Register*, the enclosed Notice of Intent to prepare an EIS.

DOE will continue working with the MDEQ to address the comments received on the draft document and prepare responses to comments. If the previously published draft document does not require significant modifications to address the comments, we will issue corrections and updated information as errata along with the responses and the March 2007 draft document as the DOE draft EIS. If extensive modifications are required to adequately address comments, we will issue a new document, along with the responses, as our draft EIS.

Please feel free to contact me directly by e-mail at Anthony.Como@hq.doe.gov, or by phone at 202-586-5935, with regard to any concerns or questions the Blackfeet Nation may have with this proposed project.

Sincerely,

Anthony J. Como

Anthony J. Como
Director, Permitting and Siting
Office of Electricity Delivery and
Energy Reliability

Enclosures

cc: Stan Wilmoth, State Archaeologist, Deputy SHPO
Tom Ring, MDEQ
J. Surbrugg, Tetra Tech

Department of Energy
Washington, DC 20585

May 2, 2007

Dr. Mark Baumler
State Historic Preservation Officer
Montana Historical Society
P.O. Box 201202
1410 8th Avenue
Helena, MT 59620-1202

SUBJECT: Consultation Pursuant to Section 106 of the National Historic Preservation Act Regarding the Montana-Alberta Tie Line, Ltd. Proposed Presidential Permit.

Dear Dr. Baumler:

Montana Alberta Tie Line, Ltd. (MATL) applied to the Department of Energy (DOE) for a Presidential Permit to construct a single-circuit, 230,000-volt transmission line that would originate at a new substation to be constructed northeast of Lethbridge, Alberta, Canada, cross the U.S.-Canada international border north of Cut Bank, Montana, and extend approximately 125 miles into the United States, terminating at an existing substation north of Great Falls, Montana.

DOE has worked closely with the Montana Department of Environmental Quality (MDEQ) on the preparation of a single environmental document that serves as both a Montana State Environmental Impact Statement (EIS) under the Montana Environmental Policy Act (MEPA), and a DOE environmental assessment (EA) under the National Environmental Policy Act (NEPA). This single environmental document can be viewed and downloaded in its entirety from the MDEQ web site at http://www.deq.state.mt.us/ .

I am writing to initiate consultation with the Montana State Historic Preservation Officer (SHPO) under section 106 of the National Historic Preservation Act.

DOE has evaluated: (1) the potential impacts of the proposed project; (2) the planned mitigation measures as presented in the environmental document (Appendix F, DEQ Environmental Specifications); (3) MDEQ's Finding of No Effect/No Adverse Effect by avoiding disturbance to each individual cultural resource located within the area of potential project effect (MDEQ letter of February 22, 2007, attached); and (4) the Department of Natural Resources and Conservation's (DNRC) request for SHPO concurrence on their finding that there should be No Effect to Heritage Properties on state lands (DNRC letter of February 6, 2007, attached).

Based on this evaluation, DOE has determined that this undertaking will have no effect upon historic properties as defined in 36 CFR 800.16(i). Pursuant to 36 C.F.R. §800.3, I request your review of DOE's determination.

Thank you for your attention to this matter. At any time, please feel free to contact me directly by e-mail at anthony.como@hq.doe.gov, by phone at 202-586-5935, or contact Brian Mills of my Office at brian.mills@hq.doe.gov, phone at 202-586-8267, with regard to any concerns that you may have with this proposed project.

.

Sincerely,

Anthony J. Como
Director, Permitting and Siting
Office of Electricity Delivery and
Energy Reliability

Attachments: MDEQ February 22, 2007
DNRC February 6, 2007

cc: MDEQ, Tom Ring
DNRC, Patrick Rennie

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

DIVISION OF TRUST LAND MANAGEMENT

BRIAN SCHWEITZER, GOVERNOR

1625 ELEVENTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE (406) 444-2074
TELEFAX NUMBER (406) 444-2684

PO BOX 201601
HELENA, MONTANA 59620-1601

February 6, 2007

Montana State Historic Preservation Office
Attn: Dr. Mark Baumler
P.O. Box 201202
Helena, MT 59620-1202

RE: A Class III Cultural Resource Inventory of the Montana-Alberta Tie Ltd., Proposed Transmission Line: Preferred route, Glacier, Pondera, Teton, Chouteau and Cascade Counties, Montana. Consultant's report (GCM Services, Inc., Butte) prepared by David Ferguson for the AMEC Earth and Environmental (Helena, MT). Report dated 02-01-2007.

Dear Mark:

The above referenced report details the results of a cultural resources inventory within selected segments of the preferred route of a proposed overhead powerline in north-central Montana. With this letter the DNRC is initiating consultation with the Montana State Historic Preservation Officer as required by the State Antiquities Act mandates and the DNRC's administrative rules that implement those mandates.

As reported by the consulting archaeologist, during the course of inventory six partially, or wholly, state owned cultural properties were determined to be within, or near, the proposed area of potential effect (APE). Five of these resources (24GL1121, 24GL1126, 24GL1127, 24PN150 and 24TT578) have not been evaluated to determine whether they are eligible for listing in the National Register of Historic Places (i.e., if they are Heritage Properties). In contrast, site 24PN24 has been previously determined to be a Heritage Property. All six cultural resources consist of surface stone features presumably related to prehistoric Native American occupation of the region.

The arbitrarily defined boundaries for sites 24GL1121, 24GL1126, 24GL1127, 24PN150 and 24TT578 are situated outside the APE and will not be physically impacted by construction of the proposed overhead powerline. Site 24PN24 is partially within the APE and although the site will be crossed by the proposed overhead powerline, construction activities have been designed to avoid physical impacts to identified cultural remains. Although visual impacts to all five properties will occur, their potential significance lies in the information that they could contain. This information would primarily occur in the form of associated sourceable/typeable artifacts, faunal and floral remains, and dateable organics (if any such remains exist in these sites).

The DNRC supports the consultant's recommendations concerning sites 24GL1121, 24GL1126, 24GL1127, 24PN24, 24PN150 and 24TT578. As such, the DNRC is seeking concurrence of the SHPO that there should be **No Effect** to Heritage Properties on state lands with the proposed undertaking.

Thank you in advance for your time, and if you have any questions or concerns regarding the above referenced report or project please contact either Dale Herbort (DEQ) or me.

Sincerely,

Patrick

Patrick J. Rennie
DNRC Archaeologist

cc. Tom Ring, DEQ
Dale Herbort, DEQ

February 22, 2007

Dr. Mark Baumler, SHPO
State Historic Preservation Office
Montana Historical Society
P.O. Box 201202
1410 8th Avenue
Helena, MT 59620-1202

RE: Review of Cultural Resource Inventory of MATL Proposed 230 kV Transmission Line

Dear Mark:

The Montana-Alberta Tie Ltd. (MATL) has proposed to construct a 230 kV transmission line between Alberta, Canada through Glacier, Pondera, Teton, Chouteau and Cascade Counties in Montana, and Great Falls, Montana. The review and licensing of this project falls under the authorization of the Montana Major Facility Siting Act, the Montana Environmental Policy Act, for school trust land, and the Montana Antiquities Act. Administrative jurisdiction may be claimed at a later date by the Department of Energy who will issue a Presidential Permit on the proposed transmission line due to its border crossing. Such jurisdiction may include National Environmental Policy Act and National Historic Preservation Act considerations.

MATL contracted GCM Services, Inc. of Butte, Montana to conduct cultural resource investigations south of the United States/Canadian border. The investigation was concluded with the report "A Class III Cultural Resource Inventory of the Montana-Alberta Tie Ltd., Proposed Transmission Line: Preferred Route, Glacier, Pondera, Teton, Chouteau and Cascade Counties, Montana." prepared by David Ferguson of GCM Services, Inc. In consultation with David Ferguson of GCM Services, Inc., Patrick Rennie of the Montana Department of Natural Resources, Jerry Clark of the Bureau of Land Management and Dale Herbort of the Montana Department of Environmental Quality, a memorandum of understanding was developed to guide most field work methodology. We agree with the application of those methodologies by GCM Services, Inc. in the execution of fieldwork.

Ten previously recorded historic and prehistoric sites were identified within the area of potential effect. An additional thirty-one historic and prehistoric sites were identified by pedestrian survey. Of these sites, 24GL1121, 24GL1126, 24GL1127, 24PN24, 24PN150, and 24TT578, are located on State Trust Lands. One, 24GL587, is located on BLM land.

All other sites are located on private properties. For the purposes of this undertaking, all identified sites are presumed to be potentially eligible to the National Register of Historic Places and/or the Montana Register of Heritage Sites unless having been determined ineligible by previous consultation with the State Historic Preservation Office.

In all cases, a finding of no effect or no adverse effect can be achieved as MATL has designed the transmission lines to either bypass around or span over the site, or has guided the construction of access roads and erection of power poles to avoid all identified features on the site. In particular, feature avoidance has been designed for the Thirty Knot site (24PN24), the Banka site (24PPN148), and the Sam George Hill site (24PN150) where pole locations and accesses were designated by the appropriate agency archeologists and MATL engineers on-site. At all other sites, access/service roads and the power lines will be aligned outside cultural site areas to avoid any disturbances to cultural sites. The attached two tables summarize the sites identified and the plans for avoidance. A consultation letter from Patrick Rennie of the DNRC concerning cultural sites on State Trust Lands is also attached.

Due to landowner constraints, there are approximately four miles of private right of way which have yet to be surveyed and inventoried. These areas will be examined prior to construction of the transmission line and appropriate consultations conducted. Should alternative alignments be selected by DEQ, surveys of high priority areas would be required prior to construction.

MATL has gone to great effort to achieve a Findings of No Effect/No Adverse Effect by avoiding disturbance to each individual cultural resource located within their area of potential effect. We agree with their consultants that the construction of the MATL Transmission Line has been designed in a manner to achieve a No Effect or No Adverse Effect for each cultural site. With the caveat that an archeologist be present to monitor construction through sites 24PN24, 24PN148, and 24PN150, we request the concurrence of the SHPO on our Findings of No Effect/No Adverse Effect on potential Historic and/or Heritage Properties for the MATL proposed Transmission Line.

Thank you very much for your consideration. Please contact Tom Ring (444-6785) or Dale Herbort (841-5028) if you have further questions.

Sincerely,

Warren D. McCullough

Warren D. McCullough
Chief, Environmental Management Bureau

cc: Bob Williams

Table 7-1. Summary of the Status of Sites encountered during the Class III Inventory.

Site Name	Site Number	Surface Owner	Site Type Type	NRHP Status	Effect to Site	Management Status	Map Figure
	24GL1125	Private	tipi rings	unevaluated	no adverse effect	avoid by design	Fig. 5-2
	24GL1119	Private	historic site	unevaluated	no adverse effect	avoid by design	Fig. 5-3
	24GL1120	Private	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-3
	24GL1121	State	tipi rings	unevaluated	no adverse effect	avoid by design	Fig. 5-4
	24GL1127	State	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-4
	24GL1126	State	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-4
O'Brien H.S.	24GL1133	Private	homestead	not eligible	no effect	avoid by design	Fig. 5-5
Miller H.S.	24GL1134	Private	homestead	not eligible	no effect	avoid by design	Fig. 5-7
Jarrett HS	24GL1136	Private	homestead	not eligible	no effect	avoid by design	Fig. 5-7
Camp 9	24GL1135	Private	historic oil field	not eligible	no effect	unknown	Fig. 5-7
	24GL1132	Private	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-9
30 Knot Site	24PN24	State and Private	cairns, tipi rings & alignments	eligible - D (consensus)	no adverse effect	avoidance of surface features	Fig. 5-10
Fortification	24PN147	Private	prehistoric structure	eligible - D (consultant)	no adverse effect	avoid by design	Fig. 5-14
	24PN152	Private	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-14
	24PN153	Private	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-14
	24PN151	Private	historic dump	not eligible	no effect	avoid by design	Fig. 5-14
	24PN154	Private	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-14
Neyehuis H.S.	24PN149	Private	homestead	eligible - A, C (consultant)	no adverse effect	avoidance of surface features	Fig. 5-14
	24PN155	Private	historic graffiti	not eligible	no effect	avoid by design	Fig. 5-14
Belgian Hill	24PN156	Private	tipi rings	unevaluated	no adverse effect	avoid by design	Fig. 5-15
	24PN157	Private	historic structure	not eligible	no effect	avoid by design	Fig. 5-15
Sam George Hill	24PN150	State and Private	tipi rings	unevaluated	no adverse effect	avoidance of surface features	Fig. 5-17
Banka Site	24PN148	Private	tipi rings	unevaluated	no adverse effect	avoidance of surface features	Fig. 5-18
	24PN158	Private	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-18
	24PN159	Private	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-18
	24TT574	Private	tipi rings	unevaluated	no adverse effect	avoid by design	Fig. 5-20
	24TT575	Private	tipi rings	unevaluated	no adverse effect	avoid by design	Fig. 5-20
	24TT576	Private	tipi ring	unevaluated	no adverse effect	avoid by design	Fig. 5-20
	24TT577	Private	tipi rings	unevaluated	no adverse effect	avoid by design	Fig. 5-20
	24TT578	State	tipi rings	unevaluated	no adverse effect	avoid by design	Fig. 5-21
Black Horse	24CA1053	Private	tipi rings	unevaluated	no adverse effect	avoid by design	Fig. 5-27

Table 7-2. Summary of Previously Recorded Sites in the APE

Site Name	Site Number	Surface Owner	Site Type Type	NRHP Status	Effect to Site	Management Status	Map Figure
GN railroad	24GL191	private	historic railroad	eligible - A	no adverse effect	avoidance of surface features	Fig. 5-6
	24GL587	BLM and private	bison kill	unresolved / unevaluated	no adverse effect	avoid by design	Fig. 5-10
30 Knot Site	24PN24	State and private	cairns, tipi rings & alignments	eligible - D (consensus)	no adverse effect	avoidance of surface features	Fig. 5-10
	24PN34	multiple	historic travel rte	unresolved / unevaluated	no adverse effect	avoidance of surface features	Fig. 4-15
Fortification (aka)	24PN147 24PN5	private	prehistoric structure	eligible - D (consultant)	no adverse effect	avoid by design	Fig. 5-14
L Canal	24PN83	private	irrigation canal	eligible - A (consensus)	no adverse effect	avoidance of surface features	Figs. 4-13, 5-15
L2 Canal	24PN88	private	irrigation canal	eligible - A (consensus)	no adverse effect	avoidance of surface features	Figs. 4-13
AN Canal	24PN109	private	irrigation canal	eligible - A (consensus)	no adverse effect	avoidance of surface features	Figs. 4-12, 5-15
P Canal	24PN111	private	irrigation canal	eligible - A (consensus)	no adverse effect	avoidance of surface features	Figs. 4-14. 5-12
Sleeping Site	24PN112	private	tipi rings campsite	unknown	N/A site was destroyed	no action required	Figs. 4-12, 5-13

United States Department of the Interior

FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
MONTANA FIELD OFFICE
585 Shepard Way
HELENA, MONTANA 59601
PHONE (406) 449-5225, FAX (406) 449-5339

M.09 DOE – Informal
Presidential Permit Docket No. PP-305

September 16, 2008

Anthony J. Como
Director, Permitting and Siting
U.S. Department of Energy, OE-20
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Mr. Como:

This responds to your October 17, 2008 letter, Biological Assessment (BA) and request for concurrence on your determination of effects on listed species from the construction of an international transmission line. This response is provided by the U.S. Fish and Wildlife Service (USFWS) under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4327), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543.

Montana Alberta Tie Line, Ltd. (MATL) applied to the Department of Energy (DOE) for a Presidential Permit to construct a single-circuit, 230,000-volt (230-kV) transmission line that would originate at a new substation to be constructed northeast of Lethbridge, Alberta, Canada, cross the United States (U.S.)-Canada international border north of Cut Bank, Montana, and extend approximately 125 miles into the United States, terminating at an existing substation north of Great Falls, Montana. The DOE has the responsibility for implementing Executive Order (E.O.) 10485 (September 9, 1953), as amended by E.O. 12038 (February 7, 1978), which requires the issuance of a Presidential Permit for the construction, operation, maintenance, and connection of electric transmission facilities at the United States international border.

The USFWS concurs with your determination that your project may affect, but will not adversely affect, the threatened bald eagle (*Haliaeetus leucocephalus*) and will have no affect on the endangered black-footed ferret (*Mustela nigripes*). This concurrence is based upon the mitigation and conservation measures in the BA.

This concludes informal consultation pursuant to regulations in 50 CFR 402.13 implementing the Endangered Species Act of 1973, as amended. This project should be re-analyzed if new information reveals effects of the action that may affect threatened, endangered or proposed species, if the project is modified in a manner that causes an effect not considered in this consultation, or if the monitoring requirements will not be implemented.

For future inquiries on consultation, please call Lou Hanebury at our Billings Sub Office at 406-247-7367.

Sincerely,

R. Mark Wilson
Field Supervisor

cc:
FWS, Billings Sub Office, Billings, MT (Attn: Lou Hanebury)
MTDEQ, Helena, MT (Attn: Tom Ring)

LRH/kae/08-28-08/2008 08_27 LTR wilson_como_MATL__concurrence.doc

** SURNAME SLIP **
FOR CORRESPONDENCE REQUIRING
FIELD SUPERVISOR SIGNATURE

AUTHOR: Lou Hanebury

FILE #: _______

Montana Alberta Tie Line
Presidential Permit Docket No. PP-305
61130-2007-FA-0085
61130-2007-SL-0171

REVIEWER(S): ___________________ ____________________

ASST. FIELD SUPERVISOR: ___________

SPECIAL INSTRUCTIONS:

Tom Ring
Montana Department of Environmental Quality
P.O. Box 200901
Helena, MT.59620
tring@mt.gov

APPENDIX Q:
CONTRACTOR DISCLOSURE STATEMENT

NEPA DISCLOSURE STATEMENT FOR PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT FOR THE MONTANA ALBERTA TIE LTD. (MATL) 230-kV TRANSMISSION LINE

CEQ Regulations at 40 CFR 1506.5(c), which have been adopted by the DOE (10 CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for purposes of this disclosure is defined in the March 23, 1981 guidance "Forty Most Asked Questions Concerning CEQ's National Environment Policy Act Regulations," 46 FR 8026-18038 at Question 17a and b.

"Financial or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)." 46 FR 18026-18038 at 18031.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: (check either (s) or (b)),

(a) X Offeror and any subcontractor have no financial or other interest in the outcome of the project.

(b) ______ Offeror and any subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest.

Financial or Other Interests

1.

2.

3.

Certified by:

J. Edward Surbrugg

Signature

J. Edward Surbrugg
Helena Office Manager
Printed Name and Title

Tetra Tech EM Inc.
Company

September 9, 2008
Date