Energy Performance Systems, Inc.

Project Title: **Improving the Efficiency of Planting, Tending and Harvesting Farm Grown Trees for Energy**

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Congressional District: 3 (Corporate office: Rogers, MN)
Congressional District: 7 (Project Farm location: Graceville, MN)
Congressional District: 6 (Equipment Building Location: Big Lake, MN)

MILESTONE 15 - SUMMARY REPORT
Annual Land Rent and 3rd year site preparation

Summary

Fifteen acres of land were identified and contracts negotiated for use of the land for establishing a 3rd year hybrid poplar production trial and a poplar clone comparisons trial. Rent for all of the land was paid prior to planting of the sites. Verso Paper Company was identified as the source of the poplar cuttings. The company, Environmental Forestry Consultants, LLC was hired to organize the planting and spraying of the 15 acres, including the establishment of the clone comparisons trial.

Milestone 15a: Rental payment for 2nd and 3rd year planting sites

Rent was paid in April for the 80 acres near Graceville, Minnesota planted with hybrid poplar in 2007.
Rent was paid to a second landowner in May, 2008 for 10 acres near Dumont, Minnesota to be used for establishing a hybrid poplar production trial started in May 2008.
Rent was also paid to a third landowner in May, 2008 for 5 acres near Dumont, Minnesota to be used for establishing a poplar clone comparisons trial in May, 2008.

15b: Identification of land for 3rd yr planting and negotiation of land contracts

Substantial efforts were put into identifying land for the 3rd year of planting, but finding suitable land was made difficult by the recent increase in demand for corn and soybeans resulting in greatly increased market prices. The predicted high prices for those commodities have been realized. Actual corn prices in Omaha, Nebraska during the first week of July 2008 were $7.16 per bushel as compared to $3.16 in July 2007. Actual soybean prices in central Illinois were $15.44 per bushel as compared to $8.08 in July 2007. Energy Performance Systems (EPS) had planned to locate land for the 3rd year planting in south central Minnesota in order to be able to compare hybrid poplar growth under different rainfall regimes and different soil conditions. However, south central Minnesota is within the prime corn and soybean production area of the US, making leasing of land for a perennial crop nearly impossible in that area.

The effort to find land involved the following actions. EPS first contacted landowners in the south central MN region who had responded to project advertisements in fall 2006. Those landowners were either unwilling to convert any cropland to trees or wanted a very high land rental price. EPS then contacted the University of Minnesota to determine the possibility of using university-owned land for the study. While, the university declined to make any land available, individuals contacted were helpful in identifying possible south central MN landowners that might have an interest in allowing trees to be planted on their land. Negotiations were initiated with one south central MN landowner willing to rent low-lying land that received occasional flooding. Negotiations broke down when the farmer requested a guaranteed market for the wood for years 6 through 10 which was unacceptable. EPS then contacted the landowner in western Minnesota who had allowed the planting of poplars on 80 acres of his cropland in 2007 and who had said earlier he was willing to rent more land. But, to increase land type diversity, EPS instead requested that the landowner help identify two other landowners near Dumont, MN who were willing to lease small parcels of land to EPS for the 2008 plantings (Figs. 1, 2, 3 & 4). These leases were negotiated in early May.

The two sites each have unique aspects of interest. The smaller 5 acre parcel is within the east portion of a larger, approximately 12 acre site, (Fig. 2) that includes both well drained and poorly drained soils (Fig. 5). It provides an excellent opportunity for the comparison of the performance of poplars across varied soil conditions and it also offers the opportunity to compare growth of all clones with corn that was planted by the landowner on the western half of the site. The 5 acre planting is bounded on east side by natural vegetation and a small stream. The larger 10 acre parcel is located in a corner of a section and bounded on 2 sides by road and cut off from the rest of the section by a small stream

that separates the land from the rest of the section (Fig. 4). The soils are typical of the cropland in the surrounding area (Fig 6).

15c: Plan and coordinate 3rd year site preparation

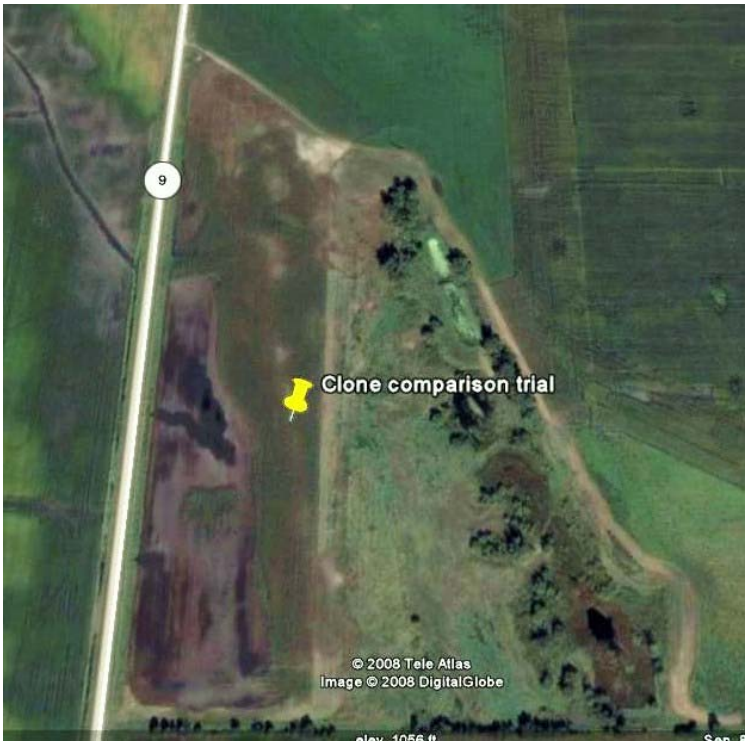
EPS decided to optimize the effort involved in planting a small 3rd year planting by including a clone comparison trial within the area used for evaluating the growth and yield of the standard NM6 clone. The rationale for this additional effort was that the previous two years of planting had shown that the NM6 clone is susceptible to iron chlorosis in areas of the field that are lower lying and contain a higher salt level. Iron chlorosis is an iron deficiency disease that will decrease plant vitality, slow the rate of growth, and for extreme cases cause death. Consultation with other experts in the region had suggested that clones being tested in university research, but not yet commercial, might show superior performance with respect to that issue. Comparison of the standard clone (NM6) with alternative clones, some of which show promise for avoiding iron chlorosis on poorly drained soils, will provide very important field data for supporting future deployment of poplars in Minnesota since most cropland (especially well-drained cropland) has recently increased significantly in price. The inclusion of a clone comparison trial resulted in a different strategy for planning and coordinating the 3rd year of tree planting than might have otherwise been done

The planning and coordination effort for the 3rd year of planting included identifying a source of good quality hybrid poplar cuttings for growth and yield assessment (the production trial), identifying the clones that would be included in the clone comparison trial (and their source), identifying a production trial planting crew and a clone comparison trial planting crew, determining whether the sites would be cultivated and if so, who would do it prior to planting, and making arrangements for spraying with a pre-emergence spray immediately after planting.

The first activity was to identify a better source of the NM6 clone of hybrid poplar material than was used in the 2006 and 2007 plantings. Discussions were initiated with Verso Paper Company which is managing more than 20,000 acres of hybrid poplar plantings in the Todd county, MN area, less than 100 miles from the EPS plantings in Traverse county, MN. The NM6 cuttings produced by Verso Paper Company were highly recommended by University of Minnesota scientists working in collaboration with the company. Verbal commitments were made to purchase enough cuttings to plant 15 acres in December of 2007; the cuttings were held in Verso Paper's freezer until picked up by EPS on May 27, 2008. The cutting size was very uniform and the condition appeared to be excellent.

All of the other planning and coordination activities were addressed by hiring a forestry consultant in the region who offered to oversee all aspects of getting the 15 acres planted, including the clone comparison trial. Agreements were first made in January 2008 to work with the consulting firm, Environmental Forestry Consultants, LLC (EFCLLC). The company was believed to be capable because the lead scientist had worked in the field of hybrid poplar research since the early 1970's with the U.S. Forest Service and since retiring, he had been responsible for several hybrid poplar plantings in the North Central region primarily for the purpose of clean-up of contaminated land. He also had close ties with the Iowa State University Forestry Geneticist who was a source for the poplar clones believed to potentially offer advantages over NM6.

The sites were planted by EFCLLC and it's subcontracted planting crew on May 27-30. A Forestry Genetics Professor and two students from Iowa State University (ISU) assisted EFCLLC in getting the poplar clonal comparison trial planted on the 5 acre site (Figs 7 & 8). A consultant representing EPS was on site during the first 2 days of the planting. Figs 9&10 show the subcontracted planting crew at work on the poplar production trial site. Rain starting early in the morning of Thursday May 29 made completion of the planting difficult, but all 15 acres were planted with either NM6 or with alternative poplar clones. A map is attached providing information on the layout of the clone trial.



Figures 1 shows the location of the 2008 poplar clone comparison trial with respect to Dumont, MN and figure 2 shows a close-up of the planting site. Poplar plantings occupy the right half of the field beginning about 1/3 of the way down from the top of the field. The clone trial includes some of the lower lying (dark) area as well as slightly higher (grey-green) areas.

Figures 3 and 4 show the position of the 2008 poplar production trial in relationship to Dumont, MN and a close-up of the field.

Figure 5. View of 2008 clone planting site from the north end in Mid May prior to planting.

Figure 6. View of the poplar production trial site from the east side in mid-May prior to planting.


Figures 7 & 8 showing Iowa State University students using an auger for digging deep holes for planting rooted cuttings in the poplar clone comparison.


Figures 9 & 10 showing the subcontracted planting crew planting unrooted NM6 poplar cuttings using a one-person planter followed by a person checking the planting depth of each cutting.

North	May 30,2008	9	9	9	9	9	9	9	5	5	5	5	5	9	9	9	9	9	9	9
		1	1	1	1	1	1	1	5	5	5	5	5	1	1	1	6	6	6	6
		10	10	9	9	9	9	9	5	5	5	5	5	6	6	6	6	6	1	10
		10	10	9	9	9	9	9	5	5	5	5	5	6	6	6	6	6	1	10
		10	10	9	9	9	9	9	5	5	5	5	5	6	6	6	6	6	1	10
Clone		10	10	9	9	9	9	9	5	5	5	5	5	6	6	6	6	6	1	10
ID #	Clone	10	10	9	9	9	9	9	5	5	5	5	5	6	6	6	6	6	1	10
1	D 105	10	10	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	10
2	DN 34 =	10	10	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	10
	Eugenei	10	10	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	10
3	NM 6	10	10	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	10
4	DN 177	10	10	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	10
5	NE 222	10	10	6	6	6	6	6	1	1	1	1	1	8	8	8	8	8	1	10
6	C9425-35 =	10	10	6	6	6	6	6	1	1	1	1	1	8	8	8	8	8	1	10
	ISU 25-35	10	10	6	6	6	6	6	1	1	1	1	1	8	8	8	8	8	1	10
7	91x04-03	10	10	6	6	6	6	6	1	1	1	1	1	8	8	8	8	8	1	10
8	80x01112	10	10	6	6	6	6	6	1	1	1	1	1	8	8	8	8	8	1	10
9	DN 2	10	10	9	9	9	9	9	3	3	3	3	3	9	9	9	9	9	1	10
10	P. deltoides	10	10	9	9	9	9	9	3	3	3	3	3	9	9	9	9	9	1	10
		10	10	9	9	9	9	9	3	3	3	3	3	9	9	9	9	9	1	10
Clone		10	10	9	9	9	9	9	3	3	3	3	3	9	9	9	9	9	1	10
ID #	Parentage	10	10	9	9	9	9	9	3	3	3	3	3	9	9	9	9	9	1	10
1	D	10	10	1	1	1	1	1	9	9	9	9	9	2	2	2	2	2	1	10
2	DN	10	10	1	1	1	1	1	9	9	9	9	9	2	2	2	2	2	1	10
3	NM	10	10	1	1	1	1	1	9	9	9	9	9	2	2	2	2	2	1	10
4	DN	10	10	1	1	1	1	1	9	9	9	9	9	2	2	2	2	2	1	10
5	DN	10	10	1	1	1	1	1	9	9	9	9	9	2	2	2	2	2	1	10
6	DD	10	10	3	3	3	3	3	4	4	4	4	4	1	1	1	1	1	2*	10
7	DD	10	10	3	3	3	3	3	4	4	4	4	4	1	1	1	1	1	2	10
8	DD	10	10	3	3	3	3	3	4	4	4	4	4	1	1	1	1	1	3*	10
9	DN	10	10	3	3	3	3	3	4	4	4	4	4	1	1	1	1	1	3	10
10	D	10	10	3	3	3	3	3	4	4	4	4	4	1	1	1	1	1	2*	10
		10	10	8	8	8	8	8	6	6	6	6	6	3	3	3	3	3	2	10
Clone	Rooting	10	10	8	8	8	8	8	6	6	6	6	6	3	3	3	3	3	3*	10
ID #	Characteristics	10	10	8	8	8	8	8	6	6	6	6	6	3	3	3	3	3	3	10
1	Good w/Soak	10	10	8	8	8	8	8	6	6	6	6	6	3	3	3	3	3	2*	10
2	Good	10	10	8	8	8	8	8	6	6	6	6	6	3	3	3	3	3	2	10
3	Excellent	10	10	9	9	9	9	9	8	8	8	8	8	9	9	9	9	9	3*	10
4	Excellent	10	10	9	9	9	9	9	8	8	8	8	8	9	9	9	9	9	3	10
5	Excellent	10	10	9	9	9	9	9	8	8	8	8	8	9	9	9	9	9	2*	10
6	Good w/Soak	10	10	9	9	9	9	9	8	8	8	8	8	9	9	9	9	9	2	10
7	Not known OK	10	10	9	9	9	9	9	8	8	8	8	8	9	9	9	9	9	3*	10
8	Good w/Soak	10	10	2	2	2	2	2	7	7	7	7	7	5	5	5	5	5	3	10
9	Excellent	10	10	2	2	2	2	2	7	7	7	7	7	5	5	5	5	5	2*	10
10	Variable	10	10	2	2	2	2	2	7	7	7	7	7	5	5	5	5	5	2	10
		10	10	2	2	2	2	2	7	7	7	7	7	5	5	5	5	5	3*	10
		10	10	2	2	2	2	2	7	7	7	7	7	5	5	5	5	5	3	10
		9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

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