

Environmental Assessment

Akeley Township
Minnesota Power Substation



December, 2004

By: Ayres Associates



Environmental Assessment

1. **Project Title:** Electrical Substation Construction-Minnesota Power

2. Proposer:	Minnesota Power	3. RGU: Akeley Township
<u>Contact Person:</u>	Larry Bubacz	Tom Beck
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4. **Reason for EA Preparation:**

Mandatory EA

If an environmental review is mandatory give EQB rule category subpart number and subpart name.

Minnesota Environmental Quality Board's (MEQB) Power Plant Siting Rules, chapter 4400.5000-Local Review of Proposed Facilities

5. **Project Location:**

County Hubbard **Township** Akeley

6.75 acre parcel in the SE corner of SW-NE, section 29, Township 141N. Range 32 W
Approximately 2 miles west of Akeley Minnesota

Attached are the following:

- County Map showing the general location of the proposed project: (Attachment A)
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries; (Attachment B)
- Site plan showing all significant project and natural features (Attachment C)

6. **Description:**

a. *Provide a project summary of 50 words or less to be published in the EQB Monitor.*

This proposed project consists of the construction of a new 115/34.5kV electrical substation and associated transmission and distribution lines in Akeley Township, Hubbard County.

b. *Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.*

The proposed project will be the construction of a new 115/34.5 kV substation to provide electrical load-serving capability to the cities of Dorset, Nevis, Akeley, Walker, Minnesota and surrounding rural area. An adjacent 115 kV transmission line referred to as 725 Line will be looped into the proposed substation. The location of this loop is approximately midway between Badoura and LaPorte near the intersection of Minnesota State Highway 34 and Hubbard County Road 25.

The proposed substation will employ a low profile design and be situated within a 6.75 acre parcel of land at the intersection of State Highway 34 and County Road 25 to be purchased by Minnesota Power. An access road will be built from County Road 25 to the substation on the northern part of the property. An approximate 20x24-foot control house will be placed inside the fence near the terminus of the access road.

The proposed substation will use outdoor, 34.5 kV-switchgear/circuit breakers and underground/aboveground 34.5 kV exits. The station will be designed to accommodate a future tie breaker position as well as a future transformer. Initially, 725 Line will loop into the station with two circuit breakers, disconnects, line protection, instrument transformers, indoor switchgear, and a 115 kV to 34.5kV step down substation transformer. The 34.5 distribution line will go southwest/south from the substation property to a connection with 520 feeder on the south side of Highway 34.

Total cost for this project is estimated to be \$2,050,000. Construction is expected to begin in the spring of 2005 and be completed that fall.

c. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries

The present 115/kV source to the Minnesota Power (MP) and Great River Energy is (GRE) electric loads in Dorset, Nevis, Akeley, Walker and surrounding rural areas is the MP Badoura 115.34.5kV substation. These loads are normally fed from the Badoura Substation via the MP 34.5 kV 520 feeder, which is approximately 29 miles in length. During planned or unplanned outages of 520 feeder, the Walker and Akeley area loads can be served from Badoura via MP 34.5 kV feeders that normally supply the areas surrounding Onigum, Ten Mile, Hackensack, and Trip Lake. The loads around Dorset and Nevis can alternately be fed from the Badoura substation via MP's 515 feeder, or depending on load levels may also be sourced from GRE's 115/34.5 kV Hubbard Substation, which supplies loads in Park Rapids and the surrounding rural areas. Typical normal peak load supplied by 520 feeder is approximately 15MW. This load has been growing at an annual rate of approximately 5% since 2000. Other area loads served from the Badoura and Hubbard area are growing at a rate of 2.5%-3.5% annually since 2000. Due to this rapid load growth throughout the region, combined with the distance from the 115 kV sources, soon acceptable voltage will not be maintained along 520 feeder during peak load periods. Before long this feeder will not be capable of providing an alternative source to other area loads because of its load

served and length. A new Akeley substation, which will be approximately 10 miles closer to the area's large loads, will increase reliability and greatly improve the ability to maintain voltage support during peak load periods along 520 feeder. This new substation will also improve the ability to make use of 520 feeder as an alternative source to the loads of Onigum, Ten Mile Lake, Hackensack, Trip Lake and Mantrap during planned or unplanned outages of their normal source.

d. Are future stages of this development including development on any out lots planned or likely to happen? Yes No

If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

e. Is this project a subsequent stage of an earlier project? Yes No

If yes, briefly describe past development, timeline and any past environmental review.

7. Project Magnitude Data:

Total project area: 6.75 acres

Indicate areas of specific uses (in square feet):

Office	NA	Manufacturing	NA
Retail	NA	Other Industrial	NA
Warehouse	NA	Institutional	NA
Light Industrial	NA	Agricultural	NA
Other Commercial	NA		

Building Height-The proposed building height for the control building peak is 14 feet

Structure height-The proposed terminal tower in the substation is 30 feet.

The shield wire at the highest point will be 38 feet.

8. Permits and Approvals Required: List all known local, state and federal permits, approvals and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure.

EA Negative Declaration	Akeley Township Board	In-process
Building Permit	Akeley Township Board	In-process
Sanitary Permit	Hubbard County	Prior to construction
Utility Crossing Permit	MN DOT	Prior to construction
State Trail Utility Crossing	MN DNR	Prior to construction
Access Road/Culvert	Hubbard County	Prior to construction
Storm Water Permit	MPCA	Prior to construction

9. **Land Use:** Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or

abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines. The 6.75 acre parcel is currently undeveloped. The property is primarily an abandoned pasture with a small forested portion.

10. Cover Types: *Estimate the acreage of the site with each of the following cover types before and after development:*

Type of Cover	Before (Acres)	After (Acres)
Wetlands	0.15	0.15
Forested/Woodlands	0.60	0.60
Bush/Grassland	6.0	5.0
Impervious surfaces	0.0	1.0
TOTAL	6.75	6.75

11. Fish, Wildlife, and Ecologically Sensitive Resources:

a. *Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts.*

The fish and wildlife that are present on the property or adjacent to it are native to the forested, wetlands, and lake areas of Minnesota. The project is not within a shoreland management of a classified lake. The wildlife that may be present on the site would include species that live and use grassland and forested habitat including but not limited to; deer, small fur bearers, bear, coyotes, birds, amphibians, and reptiles. Due to the nature of the proposed project and its relatively small size the proposed project will not affect the fish and wildlife resources.

b. *Are any state-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources such as native prairie habitat, colonial water bird nesting colonies or regionally rare plant communities on or near the site? Yes No*

If yes, describe the resource and how it would be affected by the project. Indicate if a site survey of the resources has been conducted and describe the results. If the DNR Natural Heritage and Nongame Research program has been contacted give the correspondence reference number: Describe measures to minimize or avoid adverse impacts.

The DNR Natural Heritage and Nongame Research program has been contacted and has reviewed the project. The DNR Natural Heritage and Nongame Research program has indicated that the proposed not have an impact on rare features. (See Attachment D)

12. Physical Impacts on Water Resources: *Will the project involve the physical or*

hydrologic alteration — dredging, filling, stream diversion, outfall structure, diking, and impoundment — of any surface waters such as a lake, pond, wetland, stream or drainage ditch? Yes No

If yes, identify water resource affected and give the DNR Protected Waters Inventory number(s) if the water resources affected are on the PWI. Describe alternatives considered and proposed mitigation measures to minimize impacts.

x The area of the wetland that was delineated at the proposed Akeley Substation site is 3,067 SF. It has been classified as a Type 2 wetland. A Type 2 wetland is an inland fresh meadow whose soil is usually without standing water during most of the growing season, but is waterlogged within at least a few inches of the surface. Vegetation includes grasses, sedges, rushes and various broad-leafed plants. The substation grading pad is within the existing wetland. The wetland will be replaced onsite within the 6.75 acre property.

13. **Water Use:** Will the project involve the installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface or surface water (including dewatering)?

Yes No

If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriations permit numbers, if know. Identify any existing wells on the site map. If there are no wells known on site, explain methodology used to determine.

14. **Water-Related Land Use Management District:** Does any part of the project involves a shore land zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district?

Yes No

If yes, identify the district and discuss project compatibility with district land use restrictions.

15. **Water Surface Use:** Will the project change the number or type of watercraft on any water body?

Yes No

If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

16. **Erosion and Sedimentation:** Give the acreage to be graded or excavated.

The construction area is over one (1) acre. The grass cover will be removed and the ground leveled. The site is nearly level. It is not anticipated to cause erosion or sedimentation. However, a storm water permit will be obtained from the MPCA and the Storm Water Pollution Prevention Plan (SWPPP) will be followed during construction. ✕

Describe any steep slopes or highly erodible soils and identify them on the site map
There are not any steep slopes or highly erodible soils in the proposed project area.

Describe any erosion and sedimentation control measures to be used during and after project construction.

Landscaping and vegetation growth practices will be incorporated in the construction to help minimize erosion.

17. Water Quality: Surface Water Runoff

a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any storm water pollution prevention plans

There are no storm water control structures existing on the site. The proposed development will have increased impervious areas. Likewise, storm water runoff volumes will increase as well. Since the proposed development will disturb more than 1 acre, a general NPDES permit will be obtained from the MPCA. As a part of the NPDES permit requirements, a Storm Water Pollution Prevention Plan (SWPPP) will be developed to minimize the storm water impacts. X

The SWPPP will provide temporary erosion/sediment control measures during construction, timing/staging requirements for quickly re-establishing permanent vegetation and ground cover, and permanent storm water treatment facilities to control runoff and protect water quality. The permanent storm water treatment facilities will include planting recommendations and vegetative buffers. The treatment facilities will be designed in accordance with the requirements of the NPDES permit and the current MPCA guidelines for dealing with storm water runoff.

b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters. No water bodies will receive runoff from the site of this proposed project.

18. Water Quality-Wastewater:

a. Describe sources, composition, and quantities of all sanitary municipal and industrial wastewater produced or treated at the site.

None. All wastewater that will be generated from the proposed project will be domestic in flows and characteristics.

b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving water, including major downstream water bodies and estimate the discharge impact on the quality of receiving water. If the project involves onsite sewage systems, discuss the suitability of site conditions for such systems.

The potential project will include the installation of an outhouse facility. A minimum of waste will be produced. The outhouse will not include running water and will be installed on a holding tank. The holding tank will be pumped out by a MPCA licensed pumper X

when full. All necessary requirements and permits will be followed and obtained from Hubbard County prior to construction. x

c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility's ability to handle the volume and composition of wastes, identifying any improvements necessary.

N/A

d. If the project requires disposal of liquid animal manure, describe disposal technique and location and discuss capacity to handle the volume and composition of manure. Identify any improvements necessary. Describe any required setbacks for land disposal systems.

N/A

19. Geologic Hazards and Soil Conditions:

*a. Approximate depth (in feet) to
Ground water: minimum 6ft average 24-60ft*

*Bedrock: minimum Not Present average Not Present
NA-Bedrock is not located in the development area*

Describe any of the following geologic site hazards to ground water and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

There are not any sinkholes, shallow limestone, or karst conditions on or near the property of the proposed development.

b. Describe the soils on the site, giving NRCS (SCS) classifications, if known. Discuss soil granularity and potential for ground water contamination from wastes or chemical spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

The soils at the site are the Bootlake-Graycalm complex 1127B. These soils are well drained with rapid permeability. The proposed project will use secondary earthen berms containment components to prevent wastes or chemical spills from entering the soils. (See detailed soils component description; Attachment E and soils map; Attachment F)

20. Solid Wastes, Hazardous Wastes, Storage Tanks:

a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating municipal solid waste,

indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

The generation of any solid waste will be minimal. Any solid waste produced during construction will be deposited according to the requirement of Hubbard County and MPCA. The proposed facility will not be staffed; any solid waste that is brought onto the project grounds will be removed during the maintenance visit.

b. Identify any toxic or hazardous materials to be used or present at the site and identify measures to be used to prevent them from contaminating groundwater. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

The proposed project will not produce or use any toxic or hazardous materials.

c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

The proposed project will maintain oil on the site. The one transformer will contain approximately 3,750 gallons of oil. In addition, there will be three instrument transformers on the site, each containing a total of 75 gallons of oil. A capacitor bank will also be installed that will contain 25 gallons of oil.

A berm surrounding the transformer will provide secondary containment.

The proper authorities will be contacted in the unlikely event of a spill to ensure emergency response containment plans are followed.

21. **Traffic:**

Estimated total average daily traffic generated. NA

Estimated maximum peak hour traffic generated (if known) and time of occurrence. NA

During construction the site may see up to 10 vehicles per hour. Under normal operation the site will see 2 vehicles per week to the substation.

If needed, who will pay for any improvements on the road?

Minnesota Power, the owner of the road, would pay for any improvements to the access road. The Minnesota Department of Transportation (MN DOT) and Hubbard County Highway Department requirements and comments will be followed for construction of the access road. (See MN DOT comments Attachment G and Hubbard County Highway Department Attachment H)

Provide an estimate of the impact of traffic congestion on affected roads and describe any traffic improvements necessary.

The proposed project will not have an impact on traffic congestion.

If the project is within the Twin Cities metropolitan area, discuss its impact on the regional transportation system. NA

22. **Vehicle-Related Air Emissions:** Estimate the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts. Note: If the project involves 500 or more parking spaces, consult EAW Guidelines about whether a detailed air quality analysis is needed.

The proposed project will not cause any significant decrease in air quality due to minimal traffic.

23. **Stationary Source Air Emissions:** Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult EAW Guidelines for a listing) and any greenhouse gases (such as carbon dioxide, methane, nitrous oxide) and ozone-depleting chemicals (chloro-fluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

The proposed project will not generate stationary air emissions.

24. **Odors, Noise and Dust:** Will the project generate odors, noise or dust during construction or during operation? x Yes No

If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them. Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

Construction activities will generate odors, noise, and dust. The construction will be temporary and should not result in adverse impacts to the surrounding residents due to distances. Standard dust control measures will be required as part of the road construction.

Substation Audible Noise: The main source of audible noise from an electric substation is generated by its large power transformers. The transformer to be used at the Akeley Substation is a 115/34.5 kV 33.6 MVA transformer that is currently installed at the Minnesota Power Badoura Substation. Since the noise produced by a large power transformer is nearly independent of loading, the noise produced by this or any other AC (alternating current) substation will be nearly constant. (Any increase in noise due to transformer loading is related to noise produced by the transformer's cooling system fans and motors, which, at most, contribute 3 dBA to overall transformer noise levels).

The Minnesota Pollution Control Agency has rules and statutes that limit sound levels based on land use. The most restrictive limits are associated with Noise Classification Area 1, which limits daytime noise levels to 60 dBA at the property line and to 50 dBA during the nighttime hours at locations where people normally spend the night (see Minnesota Rules Chapter 7030.0014 Noise Area Classification 1, and 70300050 Subpart 1 and 3A). Attachment I depicts the Akeley substation's footprint and the approximate location of the 50 dBA and 60 dBA noise level contours. As indicated on this drawing, the noise produced by operation of Akeley Substation as currently proposed (single 115/34.5 kV forced air-cooled transformer including the contribution from the transformer's cooling motors and fans) will be well below the most restrictive state requirements. The Akeley Substation will be designed for the future addition of a second 115/34.5 kV transformer—so the noise produced by the substation could increase in the future. Analysis indicates that with the addition of a second transformer, the Noise Classification Area 1 standards will still be met.

25. **Nearby Resources:** *Are any of the following resources on or in proximity to the site?*

Archaeological, historical or architectural resources? ___ Yes x No

A written request has been submitted to the Minnesota State Historical Preservation Office to determine the potential for archeological resources on the site.

Prime or unique farmlands or land within an agricultural preserve? ___ Yes x No

Designated parks, recreation areas or trails? X Yes ___ No

Scenic views and vistas? ___ Yes x No

Other unique resources? ___ Yes x No

If yes, describe the resource and identify any project-related impacts on the resource. Describe any measures to minimize or avoid adverse impacts.

The proposed project will have a common boundary with the right-of-way of a Minnesota Department of Natural Resources (DNR) Heartland Trail on the property's southern border. All requirements and permits be obtained and followed from the DNR prior to construction of the project to prevent any possible adverse impact to the trail.

26. **Visual Impacts:** *Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks?* x Yes ___ No
If yes, explain.

The proposed project includes transmission towers and power lines that will rise approximately 38 feet. These towers and lines are similar to towers and lines that are currently adjacent to the project.

27. **Compatibility With Plans and Land Use Regulations:** *Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable*

land use, water, or resource management plan of a local, regional, state or federal agency?

Yes **No**. If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

Akeley Township is the regulating authority. The proposed project falls within the local land use plan for the township. A building permit is required for the proposed project. It is anticipated that the Akeley Township Board will act on the permit upon completion of the environmental review and assessment.

28. **Impact on Infrastructure and Public Services:** Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project?

Yes **No**. If yes, describe the new or additional infrastructure or services needed.

29. **Cumulative Impacts:** Describe the nature of the cumulative impacts and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to cumulative impacts (or discuss each cumulative impact under appropriate item(s) elsewhere on this form).

There are no plans in the foreseeable future to add any transformers or transmission lines to the proposed substation.

There are no foreseeable projects that may interact with the proposed project to cause cumulative effects.

30. **Other Potential Environmental Impacts:** If the project may cause any adverse environmental impacts not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.

No additional adverse environmental impacts that were not discussed in items 1 to 28 are anticipated.

A scoping meeting was conducted on 10/7/04 to obtain public comments concerning the proposed project. No environmental concerns were received or expressed. (See Attachment J)

Notices of the proposed project were distributed to the EQB's general notification list and to the regulators review list. (See Attachment K for notices and comments received.) No adverse environmental impacts were expressed.

a) Describe any potential health effects related to the substation that could be experienced by those living or working near the proposed electrical station. EMF

EMF refers to electric and magnetic fields that surround any electrical device, such as a power line, electrical wiring, or an operating appliance. Electric fields are produced by voltage and are easily shielded by objects (e.g., trees, buildings and earth). In contrast, magnetic fields are produced by current and these fields pass through most materials. Both electric and magnetic fields decrease with increasing distance from the source.

Electric Field

For this project, the operating voltage of the areas existing power lines will not be changed, so the electric field associated with operation of these existing lines will not change. However, the project will include construction of several hundred feet of new overhead 115 kV transmission to connect the proposed Akeley Substation to the area's transmission system. See Attachment L for a graph of the expected electric field profile around this new 115 kV line.

The project will also include construction of several hundred feet of 34.5 kV underground feeders to connect the substation to the area's existing electric distribution system. Due to the shielding provided by the earth and cable sheath, combined with the low operating voltage, the electric field above this 34.5 kV underground feeder will be insignificant.

Magnetic Field

As mentioned previously, the strength of magnetic field is dependent on the amount of current flowing on the power line's conductors. Since the proposed Akeley Substation will result in changes to the connectivity of the area's power grid (Line # 725 will be routed into the proposed substation) the current flowing on 725 Line will change. This change in current flow will impact the magnetic field profile around these lines. Since the loads served by the existing 34.5 kV overhead 520 feeder will not change, the magnetic field and expected current flow on 520 Feeder will not be impacted. (The exception to this will be the section of 520 Feeder that will provide an emergency connection to the Badoura Substation. This section of line will not normally serve any load so its current flow and magnetic field will be zero except during emergency conditions.)

The magnetic field profiles around the area's power lines as they will be configured after the proposed Akeley Substation is operational can be viewed as Attachment M. Since the magnetic field strength is dependent on current flow, the expected peak current flows on these lines were estimated from a 2006 model year load flow model. Peak current flows would be expected to occur less than 5% of the time when the system electrical demand is at its maximum.

Several conclusions can be drawn from the magnetic field profile data:

- Magnetic field levels decrease rapidly (inverse square of the distance from source) from the centerline.
- Magnetic field levels of the underground 34.5 kV line exits is lower and decreases significantly faster than the overhead circuits (due to increased field cancellation since the conductors are located closer together and current flow is lower)
- The magnetic fields decrease as current flow decreases.

- Since magnetic fields decrease as current flow decreases, the fields expected during normal operation would usually be less than those represented in the graphs. This is because the graphs depict the fields associated with "Conductor Thermal Limit" and "Normal Peak" current flows. Actual current flow is expected to be less than these values 80% of the time reaching "Normal Peak" levels less than 5% of the time and approaching the thermal limit only for short periods of time after a contingency.

Impacts of the Electric and Magnetic Fields on Public Health

According to conclusions of the Minnesota Department of Health, MDH, "the current body of evidence is insufficient to establish a cause and effect relationship between EMF and adverse health effects (see <http://www.health.state.mn.us/divs/eh/radiation/emf/>). While some epidemiological studies have reported a weak association between leukemia with increasing exposure to magnetic fields, other studies have reported no association. Epidemiological studies alone are considered insufficient for concluding that a cause and effect relationship exists, and must be supplemented by data from laboratory studies. Existing laboratory studies have not substantiated this relationship (even at high exposure levels).

These conclusions are similar to the conclusions of scientific committees convened by the US Congress, and other international and national health agencies.

As with many other environmental health issues, the possibility of a health risk from EMF cannot be entirely dismissed. The MDH considers it prudent public health policy to continue to monitor the EMF research and to support prudent avoidance measures, including providing information to the public regarding EMF sources and exposures.

MDH and other state agencies are also working together to provide guidance for a consistent science-based EMF policy, including the identification of low cost no cost measures to mitigate EMF exposures."

High intensity electric fields can have adverse impacts on the operation pacemakers and implantable cardioverter/defibrillator (ICD). Interference to implanted cardiac devices can occur if the electric field intensity is high enough to induce sufficient body currents to cause interaction. Modern bipolar devices are much less susceptible to interactions with a power line electric field.

Medtronic, a manufacturer of pacemakers and ICD, has indicated that electric fields below 6 kV/meter are unlikely to cause interactions affecting operation of most of their devices. Older unipolar designs are more susceptible to interference from electric fields. Research completed by Toivoen et. al. has indicated that the earliest evidence of interference for these older unipolar designs was in electric fields ranging from 1.2 to 1.7 kV/meter. The maximum electric field produced from the power lines associated with this project will not change and will be less than 1.29 kV/meter, so interaction with implantable cardiac devices is not likely. In the unlikely event a pacemaker is impacted,

the effect is typically temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker would return to its normal operation when the person moves away from the source of the interference.

General Safety

The Akeley Substation and associated power lines would be designed to meet or exceed all relevant State and National Electric Safety Codes.

The power lines associated with this project would be equipped with protective devices to safeguard the public from the power line if an accident occurs and a structure or conductor falls to the ground. The protective equipment would shut down the line and make it inoperative.

b) List any impact on radio or telephone communications in the area.

Corona discharges from the conductors of an overhead transmission line occur when the electric field intensity on the surface of the conductor exceeds the breakdown strength of air. These discharges, if strong enough, can produce an audible noise and result in radio/TV interference. Audible noise and radio/TV interference is typically not a concern for power lines with operating voltages below 161 kV, since the electric field intensity is low.)

Minnesota Power is unaware of any complaints related to audible noise or radio TV interference resulting from the power lines in and around the project area. Since no changes to the operating voltage of these power lines are planned with this project, no changes in conductor audible noise and radio TV interference would be expected. Therefore, audible noise and radio TV interference should not be an issue.

c) Will there be any interruptions expected when switching from the current substation to the new substation? This proposed project is a new substation and not the replacement of an existing substation. Therefore switching from an existing substation to the new substation will not occur and therefore will be no impacts associated with this event.

31. Summary of Issues: *Do not complete this section if the EAW is being done for EIS scoping; instead, address relevant issues in the draft Scoping Decision document, which must accompany the EAW. List any impacts and issues identified above that may require further investigation before the project is begun. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.*

As detailed in this EA, the proposed project will require permit approval from a variety of authorities before the project can commence. Specific details may change to meet the requirements of the permits. However, the completed EA represents the intentions of the proposed project.

RGU CERTIFICATION: I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The Environmental Assessment describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions.
- Copies of this Environmental Assessment are being sent to the entire EQB distribution list.

Signature:

Date: 11/29/04

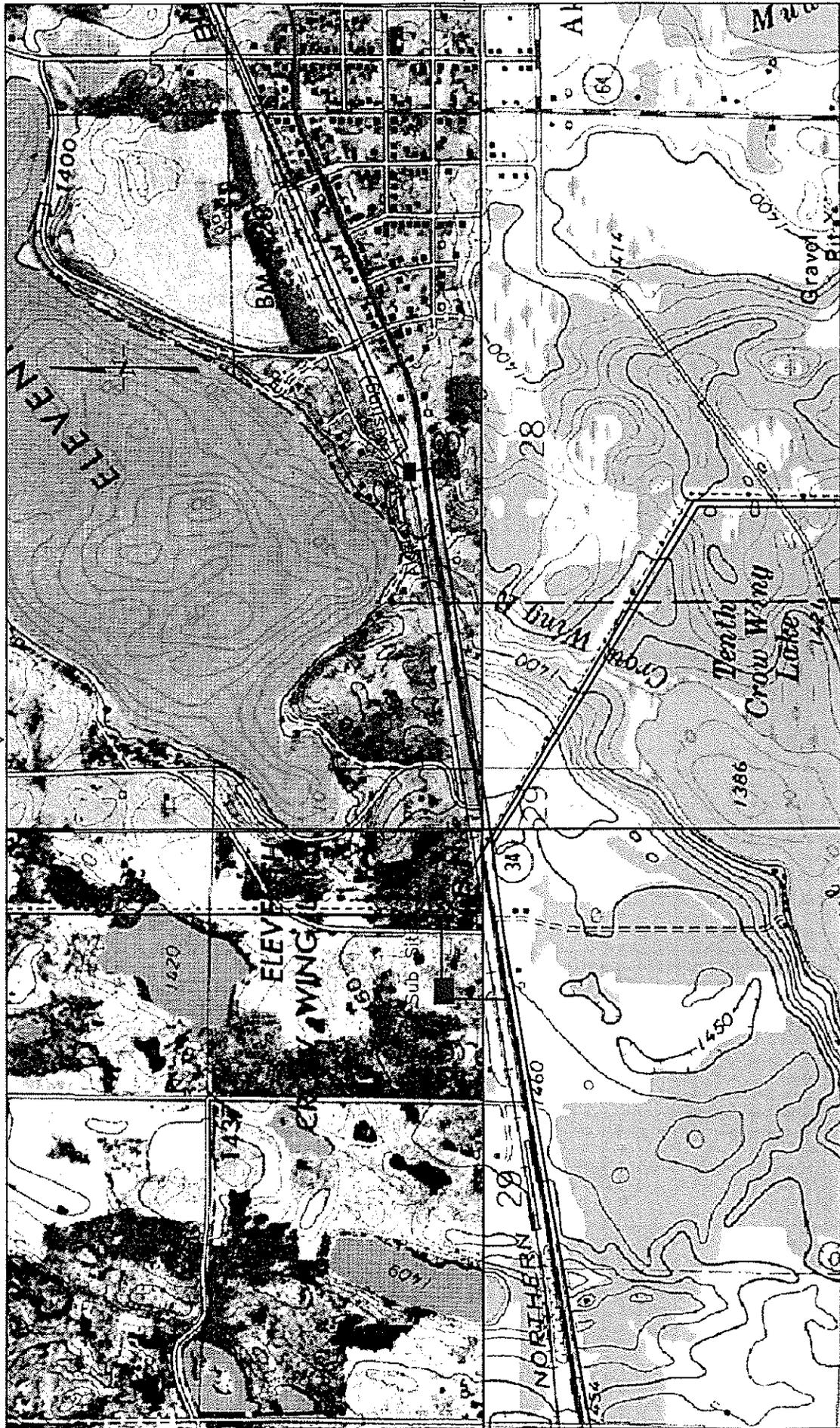
Tom Beck
Title: Akeley Township Clerk

Attachments

- A Hubbard County Map Project general location
- B U.S. Geological Survey Map
- C Site Plan Maps
- D DNR Natural Heritage and Nongame Research Program comments
- E Soils
- F Soils Map
- G MNDOT comments
- H Hubbard County Highway Department comments
- I Sound Contours Map
- J Scoping meeting notice and meeting minutes
- K General Notification, Agency Notification, and comments
- L Electric Field Graphs and information
- M Magnetic Field Graphs and information

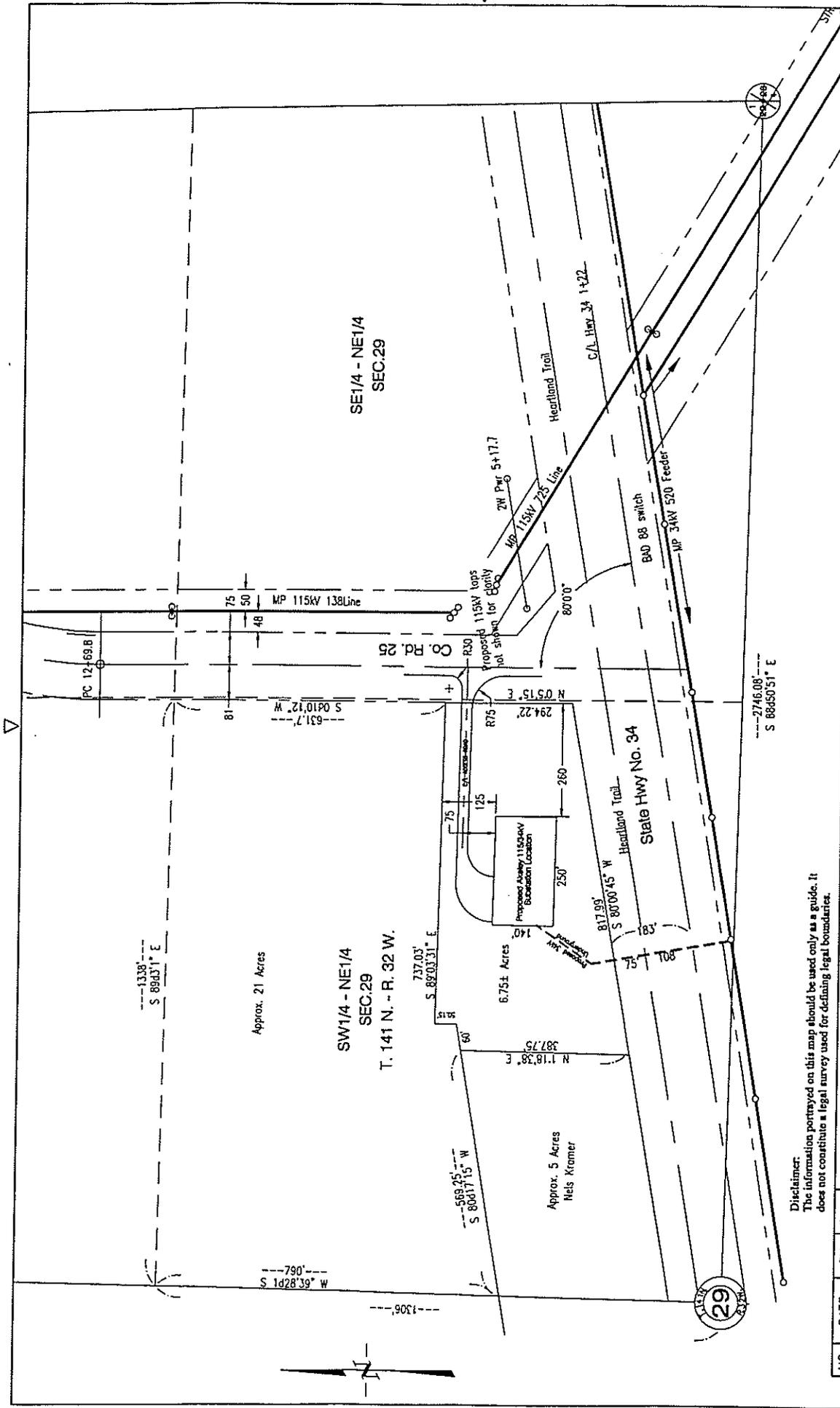
ATTACHMENT A

ATTACHMENT B



NO. DATE		BY	ENG.	REVISION DESCRIPTION		DR. ZAC	CHK. ZAC	AKLEY 115/34KV SUBSTATION PROPOSED STATION LAYOUT		SH.	REV. A
A	11-4-04	ZAC	ROM	ISSUED FOR PERMITTING		APPROVED					MB-AYRES
						DATE	11-4-2004				
 minnesotapower CADD DRAWING FOR REPRODUCTION ONLY											
ImageSite: .											

ATTACHMENT C



SE1/4 - NE1/4
SEC.29

SW1/4 - NE1/4
SEC.29
T. 141 N. - R. 32 W.

Approx. 21 Acres

Approx. 5 Acres
Mels Kromer

Disclaimer:
The information portrayed on this map should be used only as a guide. It does not constitute a legal survey used for defining legal boundaries.

NO.	DATE	BY	ENG.	REVISION DESCRIPTION
A	11-16-04	ZAC	COK	CREATED FOR SITE DESIGN

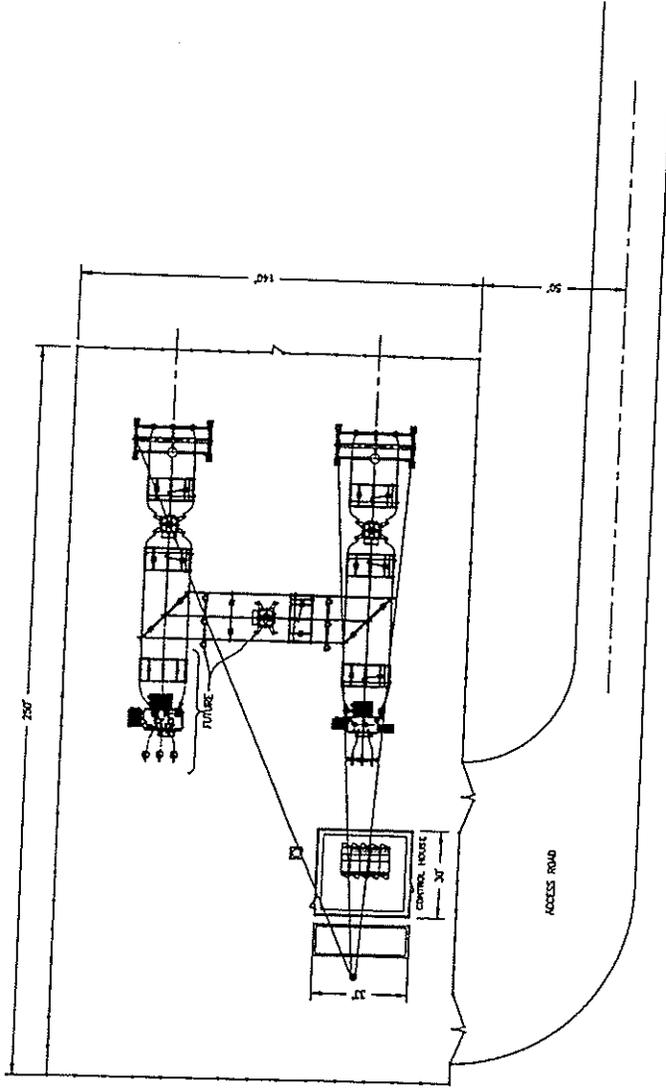
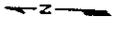
DR. ZAC	CHK.	APPROVED
DATE	11-16-04	

SH. 1	REV. A
AKELEY 115/34.5kV SUBSTATION SITE DESIGN EXHIBIT SUBSTATION SITE LAYOUT	
MB-ENGR	



CADD DRAWING
FOR REPRODUCTION ONLY

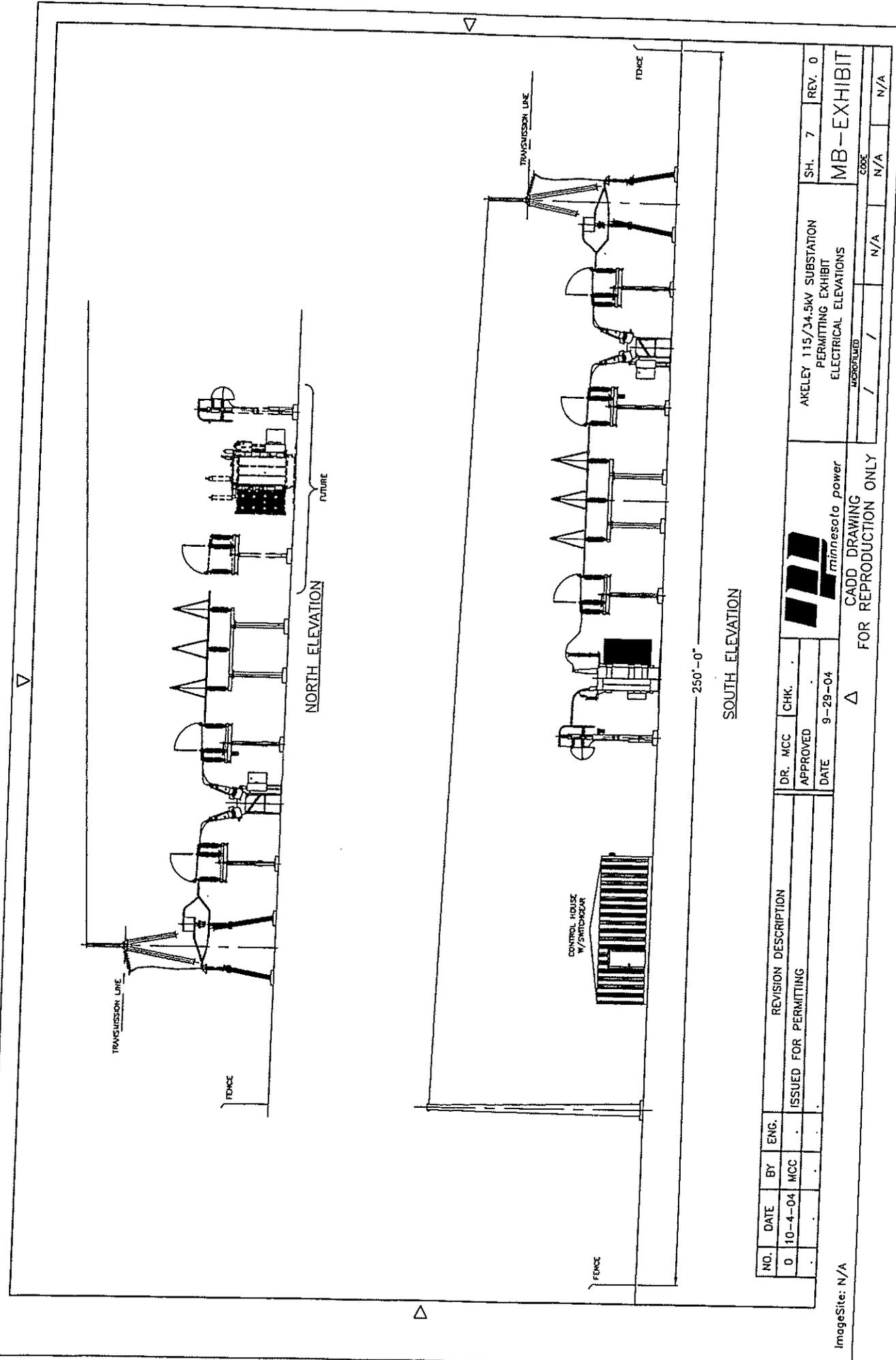
ImageSite: .



SCALE: 1"=40'

NO.		DATE	BY	ENG.	REVISION DESCRIPTION	DR. MCC	CHK.	AKELEY 115/34.5KV SUBSTATION PERMITTING EXHIBIT GENERAL ARRANGEMENT		SH. 6	REV. 0
0		10-4-04	MCC		ISSUED FOR PERMITTING	APPROVED		MCC/PROVIDED /		N/A	N/A
						DATE	9-29-04	minnesota power		N/A	N/A
								CADD DRAWING		MB--EXHIBIT	
								FOR REPRODUCTION ONLY		CODE	
										N/A	

ImageSite: N/A



NO.	DATE	BY	ENG.	REVISION DESCRIPTION	DR. MCC	CHK.	APPROVED	DATE	9-29-04	minnesota power	AKELEY 115/34.5KV SUBSTATION PERMITTING EXHIBIT ELECTRICAL ELEVATIONS	SH. 7	REV. 0
0	10-4-04	MCC		ISSUED FOR PERMITTING							MB-EXHIBIT		
ImageSite: N/A											CODE	N/A	
FOR REPRODUCTION ONLY											Δ	N/A	

1127B-Bootlake-Graycalm complex, 2 to 8 percent slopes

Composition

Bootlake soil and similar soils: About 60 percent
Graycalm soil and similar soils: About 30 percent
Inclusions: About 10 percent

Setting

Landform: Outwash plains

Position on the landform:

Bootlake - summits and foot slopes

Graycalm - back slopes and shoulders

Component Description

Bootlake

Surface layer texture: Sandy loam

Drainage class: Well drained

Dominant parent material: Loamy mantle over sandy outwash sediments

Water table depth: Greater than 6 feet

Available water capacity to 60 inches or root-limiting layer: About 3.7 inches

Organic matter content of the surface layer: About 1 to 2 percent
(Moderately low)

Graycalm

Surface layer texture: Loamy sand

Drainage class: Somewhat excessively drained

Dominant parent material: Sandy glacial drift

Water table depth: Greater than 6 feet

Available water capacity to 60 inches or root-limiting layer: About 3.8 inches

Organic matter content of the surface layer: About 0.5 to 2 percent
(Low or moderately low)

A typical soil series description with range in characteristics for each named component of this map unit is included, in alphabetical order, in this section.

Inclusions

- The moderately well drained Wurtsmith soils are on foot slopes
- The poorly drained Roscommon soils are in swales
- Soils that have more than 15 percent gravel

Interpretive Groups

Land capability classification:

Bootlake - 3s

Graycalm - 4s

Woodland ordination symbol:

Bootlake - 6A

Graycalm - 7A

Windbreak suitability group:

Bootlake - 6G

Graycalm - 7

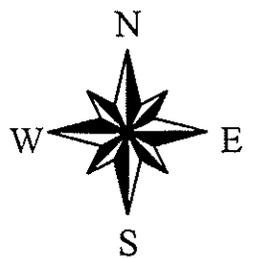
ATTACHMENT F

Map



Natural Resources Conservation Service

Portions of NE 1/4 Sec. 29 AKELEY TWP.



- SOILS
- Boundary_a_mn057.shp
- Section lines

500

0

500 Feet



ATTACHMENT G

Gilbertson, Craig

From: Larry Bubacz (ALLETE) [lbubacz@allete.com]
Sent: Wednesday, November 10, 2004 10:18 AM
To: Craig Gilbertson (gilbertsonc@AyresAssociates.com)
Subject: FW: Proposed Substation Project in Akeley Township

Not sure if I sent this to you already. MNDOT's comments are included.

-----Original Message-----

From: Michael Kamnikar [mailto:Michael.Kamnikar@dot.state.mn.us]
Sent: Monday, November 08, 2004 3:42 PM
To: lbubacz@mnpower.com
Cc: Jean Bahr; Lynn Eaton
Subject: Proposed Substation Project in Akeley Township

Mr. Larry Bubacz,

MnDOT Northwest District in Bemidji has comments pertaining to your proposed substation site to be constructed in Akeley Township per our telephone conversation earlier today.

1. Site 1A: Road access to be located on local roadway.
2. Overhead lines crossing highway 34 to have poles located back from the edge of the roadway to accommodate roadway widening for future turn lane(s).

Should you require any additional information, please do not hesitate to contact me.

Sincerely,

Mike Kamnikar
MnDOT District 2
3920 TH 2 West
Box 490
Bemidji, MN 56619
Planning Engineer
work (218)755-4521
fax (218)755-2028
E-mail: michael.kamnikar@dot.state.mn.us

ATTACHMENT H

Hubbard County Highway Department



101 Crocus Hill Street
Park Rapids, MN 56470

Phone: 218-732-3302
Fax: 218-732-7640

David A. Olsonawski, P.E.
Engineer, Public Works Coordinator

Jeffrey Adolphson, Assistant Engineer
Edward Smith, Maintenance Superintendent

November 1, 2004

Larry Bubacz
Minnesota Power
30 West Superior Street
Duluth, MN 55802

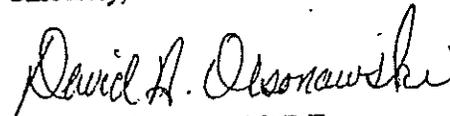
Dear Larry Bubacz,

Hubbard County's concern for sites 1A & 1B along CSAH 25 would be that we have a spring road restriction of 7 tons posted during the spring. Site 2 looks like it is off a Township road that connects to CSAH 49, this is a gravel surface road and would be restricted to 5 tons in the spring.

If your sites will require an entrance on to a county road then you will need to apply for an entrance permit. (one is enclosed).

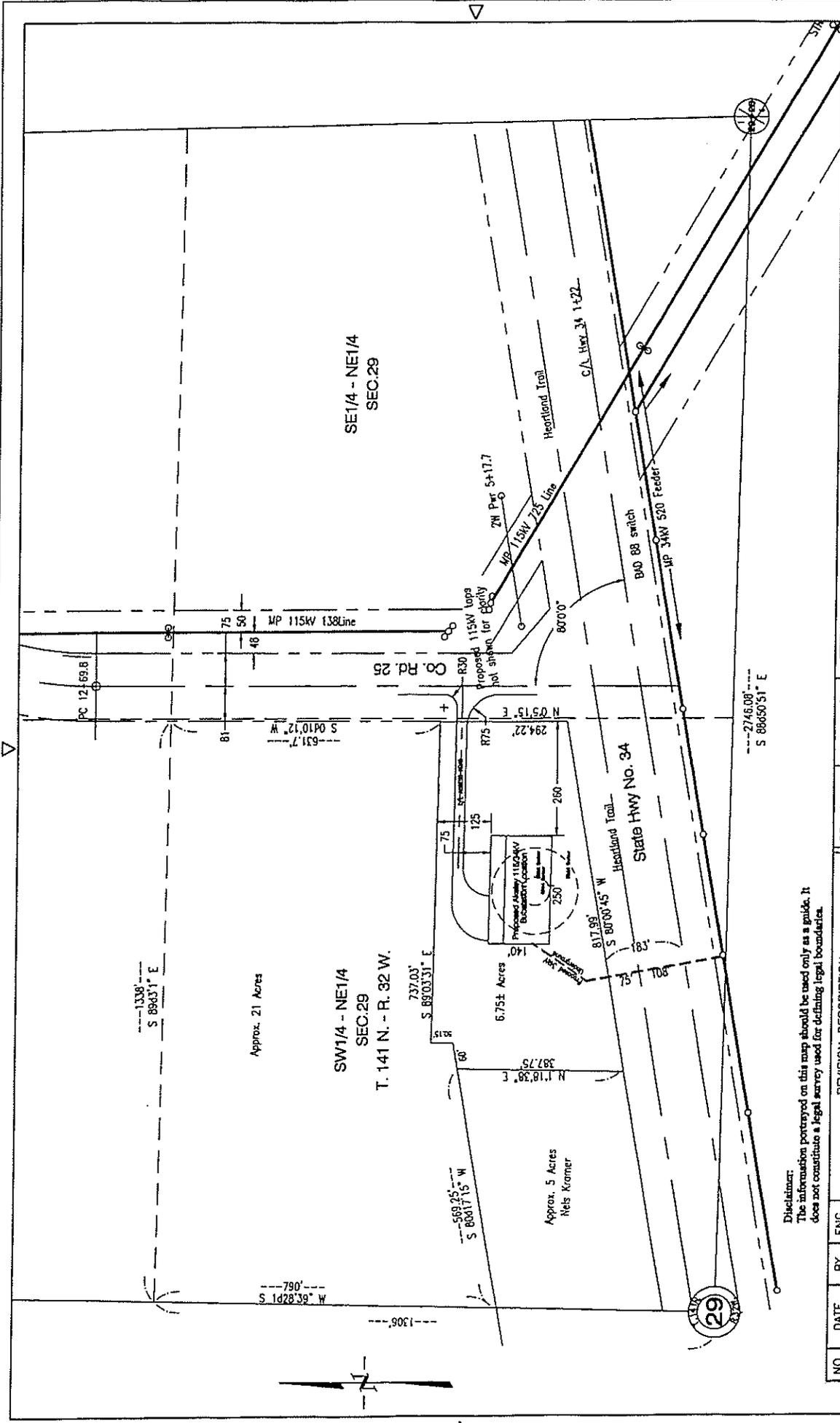
Hopefully this will help you in your planning process, if you have questions on this matter please give us a call.

Sincerely,


David A. Olsonawski, P.E.
Engineer, Public Works Coordinator

cc: file
attachments

ATTACHMENT I



SE1/4 - NE1/4
SEC.29

SW1/4 - NE1/4
SEC.29
T. 141 N. - R. 32 W.

Approx. 21 Acres

Approx. 5 Acres
Nels Kramer

Disclaimers:
The information portrayed on this map should be used only as a guide. It does not constitute a legal survey used for defining legal boundaries.

NO.	DATE	BY	ENG.	REVISION DESCRIPTION
A	11-16-04	ZAC	COK	CREATED FOR SITE DESIGN
B	11-23-04	ZAC	DLY	ADDED SOUND CONTOURS

DR. ZAC	CHK. COK/DLY	APPROVED
DATE	11-16-04	

AKLEY 115/34.5KV SUBSTATION	SH. 1	REV. B
SITE DESIGN EXHIBIT		
SUBSTATION SITE LAYOUT		
MB-ENGRNG		



MINNESOTA power
CADD DRAWING
FOR REPRODUCTION ONLY

ImageSite:

ATTACHMENT J

Posted 9/14/04

AKELEY TOWNSHIP
SPECIAL MEETING

Akeley Township will conduct a special meeting during its regularly scheduled monthly meeting on October 7, 2004, at 8:00 p.m. at the Akeley Township Hall. The subject of the meeting will be the proposed Minnesota Power substation to be constructed in Akeley Township. Representatives from both Minnesota Power and Ayers Associates (Environmental Assessment Evaluation) will be present to discuss and answer questions concerning the proposed substation construction.

Tom Beck,
Clerk

Meeting Location: Akeley Township Hall, Akeley
Minnesota

Project No.: 00-0000.00

Date/Time: 10/7/04

Re: EAW Scoping Meeting Akeley Substation Minnesota
Power

Notes By: CG

Attendees: See Attached list

Akeley Township conducted a special EAW Scoping meeting for the construction and installation of an 115/34.5 kV substation in Akeley Township. The meeting was conducted at the Akeley Township all located in Akeley Minnesota. The meeting was conducted during the regularly scheduled township meeting on 10/7/04 at 8:00 P.M. The meeting was advertised in the township official paper, Northwoods Press, and a meeting notice was posted at the township hall.

C. Gilbertson gave an introduction of Ayres Associates role as consultant to the township for the EAW process. C. Gilbertson gave a brief description of the EAW process that needs to be completed by the township and the township role as the local reviewing authority or RGU. C. Gilbertson introduced L. Bubacz, Sr. Environmental Compliance Specialist, with Minnesota Power. L. Bubacz gave an overview of the project, the need for the substation, and explained two poster boards with photos of similar project that had been recently constructed.

C. Gilbertson opening the meeting for comments, concerns, and questions from the audience present and the township board. (The township board had received no written comments.)

The first question asked L. Bubacz about a photo on the poster board that indicated alternative construction sites for the proposed substation. L. Bubacz explained Minnesota Power's procedure and process when the company locates a potential site for construction of a new substation. He also explained why the current proposed site was selected.

The next question asked about how large of an area was going to be fences. L. Bubacz explained that the entire land area was not going to be fenced, that only the area of the substation would be fenced. L. Bubacz explained the fence was for safety and security reasons.

The next question was a comment that a substation will make noise and about how much noise is produced and how far will it travel. The individual also comment about that the noise was a humming sound. L. Bubacz indicated that the substation would produce a humming noise and discuss that part of the reason why a substation was located on excess land related to the noise produced by a substation. L. Bubacz explained that a noise study will be conducted as part of the EAW process.

The next question asked about how the proposed substation would compare to another substation located in the area. L. Bubacz explained that this substation would be smaller and be low profile. L. Bubacz explained the low profile construction of the proposed substation.

The next question asked about what company the power would be coming from. L. Bubacz explained that the power would come from Minnesota Power. L. Bubacz explained how utility companies assist each other during outages etc.

The next comment and question stated that Itasca-Mantrap was also considering adding a new substation in the region and what if they selected one of the alternative sites that Minnesota Power had located. L. Bubacz stated that no other power utility could do that. L. Bubacz explained the role of the Utilities Commission and that they would not allow two substations in such close proximity.

The next question asked was, who was going to pay for the proposed substation. L. Bubacz stated that Minnesota Power would be paying for it.

C. Gilbertson asked the audience and board if there were any further questions. C. Gilbertson explained a proposed timeline for the EAW and that another public meeting would be held upon completion and publication in Environmental Quality Board (EQB) Monitor of the EAW.

No future questions were asked. There were general comments that the proposed substation was good for the area and would help with all the development that was being done in the region.

L. Bubacz presented the board with the building permit application and the board accepted that application.

No further action was taken and the board moved on to additional township business.

Proposed Akeley 115/34.5 kV Substation Scoping Meeting
Akeley Township, Hubbard County

SIGN IN ROSTER

DATE -10/07/04

TIME-8:00 PM

Akeley Township Hall

NAME

ADDRESS

Emeline Cook	20042-291 st Ave Akeley
Doug Cook	PO BOX 85 Akeley
Leroy W. Miller	24967 Idelbloom Dr. Akeley
Ann Kowalke	29721 Hackberry Dr Akeley
Lenni Halverson	5764 CO. RD. 83 ^{NW} AKELEY
George Lueck	31510 CTY 23 Akeley
Ann W. Winters	23295- Springwood Dr. Akeley
Tom Rask	74707 Republic Rd Akeley
Dolly Poncelet	26314 State 64 Akeley
Evane Splittwasser	21608 Cty 12 Akeley
Cr. G. Whitson	Ayres Associates PO Box 215 Walker

ATTACHMENT K



minnesota power / 30 west superior street / duluth, minnesota 55802-2093 / 218-722-2625 / www.mnpower.com

[161 COPIES WERE DISTRIBUTED FROM THE MEQB'S GENERAL NOTIFICATION LIST]

October 11, 2004

Re: Proposed 115/34.5 kV Akeley Substation Project

Dear _____:

Minnesota Power proposes to construct a new 115/34.5 kV electric substation to meet the growth needs of customers served by our system and that of Great River Energy's in the Akeley-Walker and surrounding area. We have elected to seek local project approval pursuant to MR 4400.5000 (Local Review of Proposed Facilities) by submitting a Building Permit Application for this project to Akeley Township.

The proposed substation site is located in Section 29, Township 131 North and Range 32 West in Akeley Township (Hubbard County) about 400 feet north of Minnesota Highway 34 and one mile west of the City of Akeley, Minnesota. It is near an existing Minnesota Power 115 kV transmission line (725 Line) and a Minnesota Power 34.5 kV distribution line (520 Feeder). The new Akeley Substation will be electrically connected to 725 Line and 520 Feeder. The overhead tie into 725 Line, which is located east of new substation, will span a distance of about 450 feet. The connection to 520 Feeder will be an underground extension from the new substation south for a distance of about 400 feet.

Construction of the proposed substation provides a solution to the present and future electric service requirements in Minnesota Power's western area. The proposed Akeley Substation will reliably meet the increased electric demand currently being experienced. Load growth in this area has averaged approximately four percent over the past several years.

A Building Permit Application was submitted on October 7, 2004 to Tom Beck, Clerk of Akeley Township. He can be contacted by telephone at 218-652-4027.

If you require more information about this project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

bc: Craig Gilbertson
Ayres Associates
201 5 Street North
Suite 3, P.O. Box 215
Walker, MN 56484

Akeley Sub Project Review Addresses

<p>Becky Balk Minnesota Department of Agriculture 90 West Plato Blvd. St. Paul, MN 55107</p>	<p>Beth Lockwood, Supervisor Minnesota Pollution Control Agency Environmental Review Unit/Majors/Remediation Division 520 Lafayette Road St. Paul, MN 55155</p>
<p>Ms. Denise Blackwell-Kraft U.S. Army Corps of Engineers St. Paul District, Attn. CO-R 190 5th Street East St. Paul, MN 55101-1638</p>	<p>David A. Olsonawski Hubbard County Engineer Public Works Building 101 Crocus Hill Street Park Rapids, MN 56470</p>
<p>Britta L. Bloomberg Deputy State Historic Preservation Officer Minnesota Historical Society 845 Kellogg Boulevard W. St. Paul, MN 55102-1906</p>	<p>Russell Peterson Field Office Supervisor U.S. Fish and Wildlife Service Twin Cities Field Office - Ecological Services 4101 East 80th Street Bloomington, MN 55425-1665</p>
<p>Karen L. Cieminski Data Manager/Ecologist Minnesota Department of Natural Resources Natural Heritage & Nongame Research Program 500 Lafayette Road St. Paul, MN 55155</p>	<p>William Alden, District Manager Hubbard County Soil and Water Conservation District 212 1/2 Second Street West Park Rapids, MN 56470 <i>contacted</i></p>
<p>Lynn C. Eaton, District Engineer Minnesota Department of Transportation 8920 Highway 2 West Bemidji, MN 56601</p>	
<p>Jim Haertel Board of Water and Soil Resources One West Water Street Suite 200 St. Paul, MN 55107</p>	<p>Harris Baker Minnesota Department of Transportation Office of Aeronautics 222 East Plato Boulevard St. Paul, MN 55107-1618</p>
<p>Cliff Tweedale, Executive Director Headwaters Regional Development Commission 403 Fourth Street NW Suite 310 P.O. Box 906 Bemidji, MN 56619</p>	<p>Thomas W. Balcom, Supervisor Minnesota Department of Natural Resources Natural Resources Planning and Review Services 500 Lafayette Road St. Paul, MN 55155</p>
<p>Garry Johnson, Administrator Environmental Services Department 301 Court Avenue Hubbard County Courthouse Park Rapids, MN 56470</p>	

②



minnesota power / 30 west superior street / duluth, minnesota 55802-2093 / 218-722-2625 / www.mnpower.com

October 11, 2004

Mr. Allan Mitchell
Manager-Power Plant Siting
Minnesota Environmental Quality Board
300 Centennial Office Building
658 Cedar Street
St. Paul, MN 55155

Re: Proposed 115/34.5 kV Akeley Substation Project

Dear Mr. Mitchell:

Minnesota Power proposes to construct a new 115/34.5 kV electric substation to meet the growth needs of customers served by our system and that of Great River Energy's in the Akeley-Walker and surrounding area. We have elected to seek local project approval pursuant to MR 4400.5000 (Local Review of Proposed Facilities) by submitting a Building Permit Application for this project to Akeley Township.

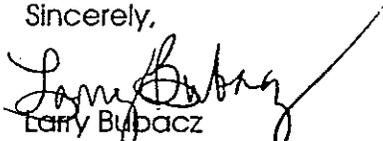
The proposed substation site is located in Section 29, Township 131 North and Range 32 West in Akeley Township (Hubbard County) about 400 feet north of Minnesota Highway 34 and one mile west of the City of Akeley, Minnesota. It is near an existing Minnesota Power 115 kV transmission line (725 Line) and a Minnesota Power 34.5 kV distribution line (520 Feeder). The new Akeley Substation will be electrically connected to 725 Line and 520 Feeder. The overhead tie into 725 Line, which is located east of new substation, will span a distance of about 450 feet. The connection to 520 Feeder will be an underground extension from the new substation south for a distance of about 400 feet.

Construction of the proposed substation provides a solution to the present and future electric service requirements in Minnesota Power's western area. The proposed Akeley Substation will reliably meet the increased electric demand currently being experienced. Load growth in this area has averaged approximately four percent over the past several years.

A Building Permit Application was submitted on October 7, 2004 to Tom Beck, Clerk for Akeley Township. He can be contacted by telephone at (218) 652-4027.

If you require more information about this project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,



Larry Bubacz

Sr. Environmental Compliance Specialist



minnesota power / 30 west superior street / duluth, minnesota 55802-2093 / 218-722-2625 / www.mnpower.com

October 14, 2004

Cliff Tweedale, Executive Director
Headwaters Regional Development Commission
403 Fourth Street NW Suite 310
P.O. Box 906
Bemidji, MN 56619

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Mr. Tweedale:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any proposed or private projects within the project area that could be affected by the construction, operation and maintenance of the planned substation and associated lines. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



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October 14, 2004

Denise Blackwell-Kraft
U.S. Army Corps of Engineers
St. Paul District, Attn. CO-R
190 5th Street East
St. Paul, MN 55101-1638

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Ms. Blackwell-Kraft:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any floodplains or wetlands within the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. The MDNR's Natural Resources Planning and Review Services Division (Tom Balcom), the Minnesota Pollution Control Agency (Beth Lockwood), the Board of Water and Soil Resources (Jim Haertel) and the Hubbard County Soil and Water Conservation District (William Alden) have also been notified about the project. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



minnesota power / 30 west superior street / duluth, minnesota 55802-2093 / 218-722-2625 / www.mnpower.com

October 14, 2004

David A. Olsonawski
Hubbard County Engineer
Public Works Building
101 Crocus Hill Street
Park Rapids, MN 56470

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Mr. Olsonawski:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any highway projects or transportation matters within the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



minnesota power / 30 west superior street / duluth, minnesota 55802-2093 / 218-722-2625 / www.mnpower.com

October 14, 2004

Thomas W. Balcom, Supervisor
Minnesota Department of Natural Resources
Natural Resources Planning and Review Services
500 Lafayette Road
St. Paul, MN 55155

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Mr. Balcom:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any specific issues related to wetlands, threatened/endangered species or other important natural resources within the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

A handwritten signature in black ink, appearing to read "Larry Bubacz".

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



minnesota power / 30 west superior street / duluth, minnesota 55802-2093 / 218-722-2625 / www.mnpower.com

October 14, 2004

Harris Baker
Minnesota Department of Transportation
Office of Aeronautics
222 East Plato Boulevard
St. Paul, MN 55107-1618

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Mr. Baker:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any airports or airstrips near the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



minnesota power / 30 west superior street / duluth, minnesota 55802-2093 / 218-722-2625 / www.mnpower.com

October 14, 2004

Jim Haertel
Board of Water and Soil Resources
One West Water Street Suite 200
St. Paul, MN 55107

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Mr. Haertel:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any floodplains or wetlands within the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. The MDNR's Natural Resources Planning and Review Services Division (Tom Balcom), the Minnesota Pollution Control Agency (Beth Lockwood), the U.S. Army Corps of Engineers (Denise Blackwell-Kraft) and the Hubbard County Soil and Water Conservation District (William Alden) have also been notified about the project. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



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October 14, 2004

Karen L. Cieminski, Data Manager/Ecologist
Minnesota Department of Natural Resources
Natural Heritage and Nongame Research Program
500 Lafayette Road
St. Paul, MN 55155

Re: Notification/Request for Natural Heritage Information for Proposed 115/34,5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Ms. Cieminski:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder exiting the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any rare plants or animal species or other significant natural features known to occur within the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment scoping meeting and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



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October 14, 2004

Russell Peterson, Field Office Supervisor
U.S. Fish and Wildlife Service
Twin Cities Field Office - Ecological Services
4101 East 80th Street
Bloomington, MN 55425-1665

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Mr. Peterson:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any threatened or endangered species or species of special concern or critical habitats within the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. The Minnesota Department of Natural Resources (Natural Resources Planning and Review Services) has also been notified. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



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October 14, 2004

William Alden, Manager
Hubbard County Soil and Water Conservation District
212 1/2 Second Street West
Park Rapids, MN 56470

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Mr. Alden:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any floodplains, wetlands or sensitive soils within the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. The MDNR's Natural Resources Planning and Review Services Division (Tom Balcom), the Board of Water and Soil Resources (Jim Haertel), the U.S. Army Corps of Engineers (Denise Blackwell-Kraft), and the Minnesota Pollution Control Agency (Beth Lockwood) have also been notified about the project. Your comments will be used in developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



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October 14, 2004

Wesley Gjovik, District 2 Engineer
Minnesota Department of Transportation
3920 Highway 2 West
P.O. Box 490
Bemidji, MN 55619

Re: Notification/Request for Project Review of Proposed 115/34.5kV Substation Project in Akeley Township, Hubbard County, MN (T 141N, R 32W)

Dear Mr. Gjovik:

Minnesota Power (MP) is planning to construct a 115/34.5 kV electric substation and associated transmission and distribution lines in Akeley Township, Hubbard County. Construction is scheduled for 2005. Minnesota Power will purchase a 7-acre parcel for the substation and ancillary uses (e.g., an access road, parking area and control house). The substation equipment will be located within a 170 feet by 220 feet fenced area. A single circuit 115 kV transmission line and single circuit distribution feeder will connect to equipment within the fenced area. The transmission connection will be an overhead tap of an existing 115 kV transmission line; the new feeder leaving the substation will be an underground extension to an existing distribution line.

Several sites have been identified and evaluated for the proposed substation. They are located principally in Akeley Township. Site 1A has surfaced as the most viable based on engineering and environmental criteria MP uses for building a new substation. The enclosed map shows the sites evaluated in relationship to various physical and manmade features.

Minnesota Power is requesting your review of the sites shown on the map to determine if there are any highway projects or transportation matters within the project area that could be affected by the construction, operation and maintenance of the proposed substation and associated lines. Your comments will be used developing the environmental assessment.

A Building Permit Application was submitted to Akeley Township for the proposed substation in early October. Following this submittal, a scoping meeting for preparation of an environmental assessment by the township will be conducted. This event took place on October 7, 2004. Receipt of your comments will provide meaningful input to the environmental assessment and decision making process for our application to build the proposed substation.

If you require more information about the project or our application to Akeley Township, please contact me at 218-720-2509 or email me at lbubacz@mnpower.com.

Sincerely,

Larry Bubacz
Sr. Environmental Compliance Specialist

Enclosure



Minnesota Department of Transportation

Office of Aeronautics
Mail Stop 410
222 East Plato Boulevard
St. Paul, MN 55107-1618

Phone: 651/296-8202
Phone: 651/297-1600
Fax: 651/297-5643
Fax: 651/296-1828

October 28, 2004

Larry Bubacz
Sr. Environmental Compliance Specialist
Minnesota Power
30 West Superior Street
Duluth, Minnesota 55802-2093

Dear Mr. Bubacz:

I have reviewed your letter dated October 14, 2004 notifying this office of the planned substation and transmission line construction. There are two airports in the vicinity of the proposed project: Park Rapids Municipal Airport, and Walker Municipal Airport. Both are more than five miles from the proposed project sight, which is beyond the Airport Zoning restrictions of either airport. Given the information you have provided, this office does not anticipate that the project will interfere with the function of either airport.

However, since the structure heights were not given, I am unable to determine whether notification must be sent to the Federal Aviation Administration. You may need to submit a Notice of Proposed Construction or Alteration (FAA Form 7460-1) to the Federal Aviation Administration for a determination on the impact to the airport. I have enclosed a copy of the form and instructions for your use. Please read the instructions to determine if this notice must be filed. Additional copies may be obtained at <http://www.agl.faa.gov/airports/resources.htm>.

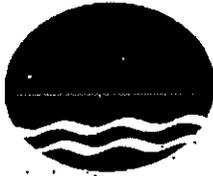
If you have any questions, please contact me,

Sincerely,

A handwritten signature in cursive script that reads "Tracy Schmidt".

Tracy Schmidt
Assistant Regional Airport Development Engineer

Enclosure



Minnesota Pollution Control Agency

November 9, 2004

Mr. Larry Bubacz
Minnesota Power
30 West Superior Street
Duluth, MN 55802-2093

RE: 115/34.5kV Substation Project in Akeley Township, Hubbard County

Dear Mr. Bubacz:

The Minnesota Pollution Control Agency (MPCA) has received copies of the above project, prepared by Minnesota Power. The MPCA has not reviewed this project. Therefore, the MPCA has no specific comments. This decision not to review the project does not constitute waiver by the MPCA of any pending permits required by the MPCA. Ultimately, it is the responsibility of the project proposer to secure any required permits and to comply with any requisite permit conditions. The enclosed checklist identifies permits that the project may require, together with the most recent contacts at the MPCA.

Sincerely,

A handwritten signature in cursive script that reads "James E. Sullivan".

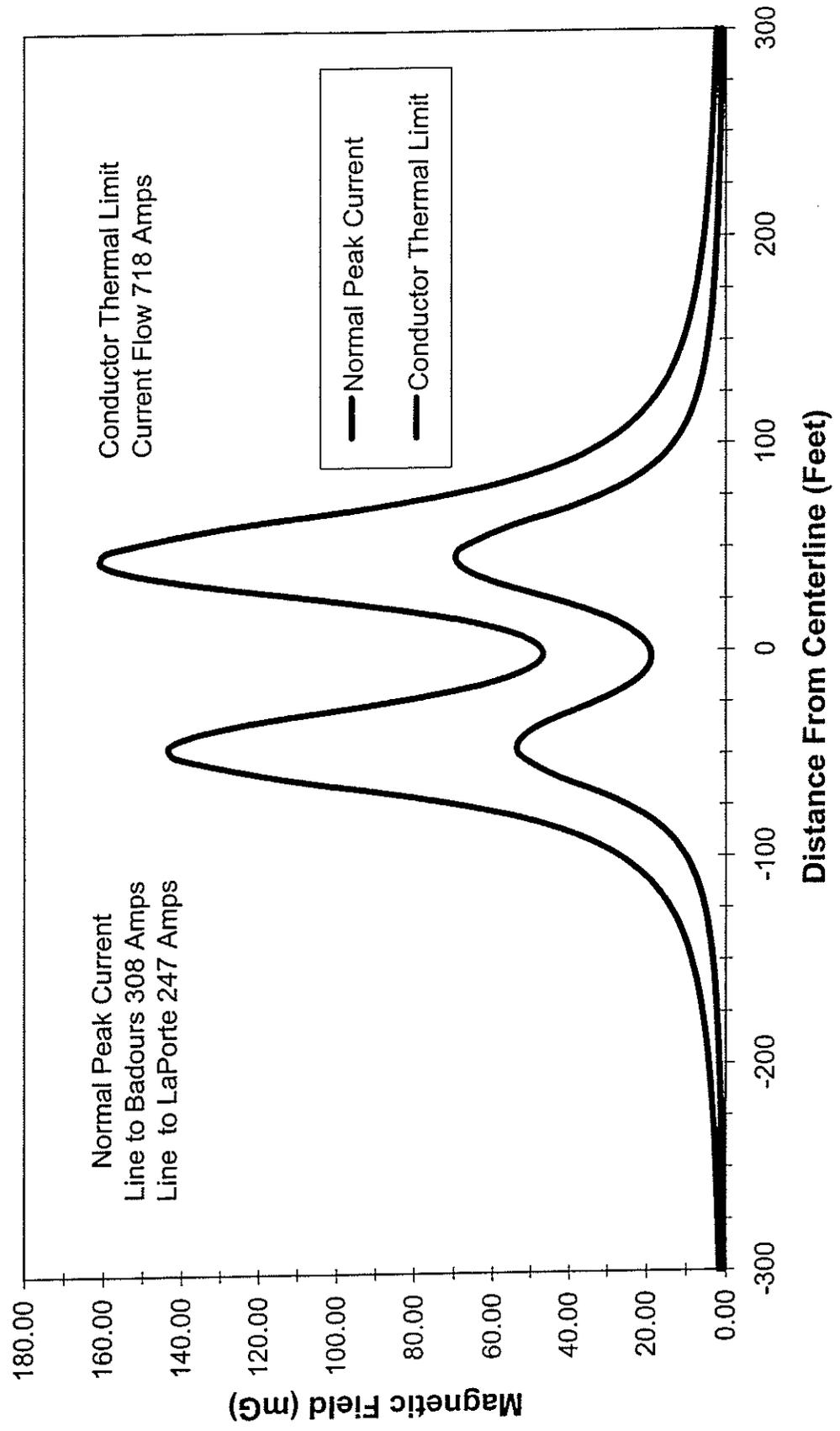
James E. Sullivan
Project Manager
Environmental Review and Operations Section
Regional Division

JS:gs

Enclosure

ATTACHMENT L

Magnetic Field Akeley Substation 115 kV Line Exits



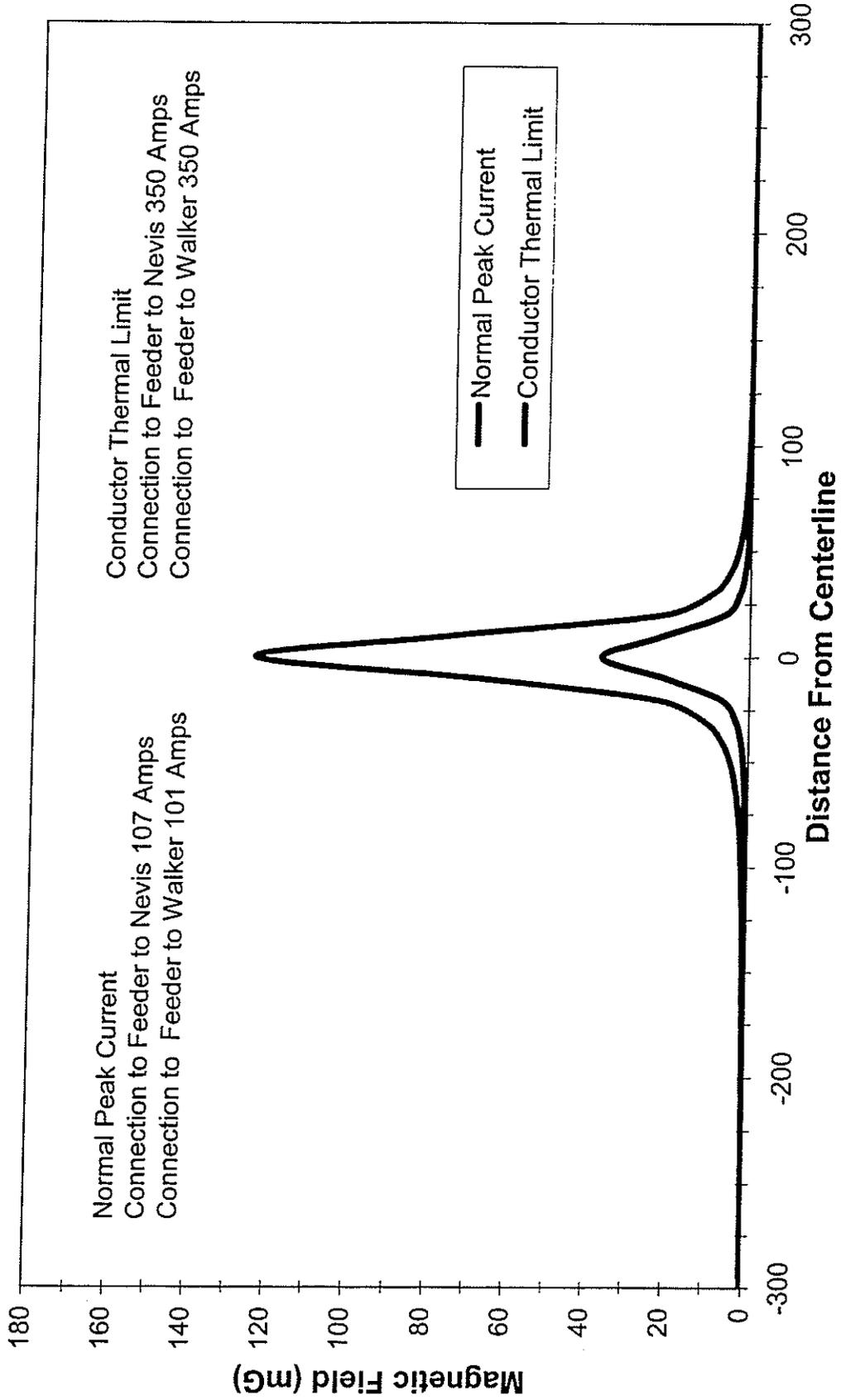
Akeley Substation 115 kV Line Exits

units-feet	units mG	units mG
Distance from Centerline	Normal Peak Current	Conductor Thermal Limit
-300	0.64	1.65
-290	0.69	1.78
-280	0.75	1.92
-270	0.81	2.09
-260	0.88	2.28
-250	0.97	2.49
-240	1.06	2.74
-230	1.17	3.02
-220	1.30	3.35
-210	1.45	3.74
-200	1.63	4.2
-190	1.84	4.75
-180	2.10	5.42
-170	2.41	6.23
-160	2.80	7.25
-150	3.29	8.54
-140	3.94	10.22
-130	4.79	12.46
-120	5.95	15.52
-110	7.61	19.88
-100	10.06	26.37
-90	13.88	36.5
-80	20.10	53.02
-70	30.14	79.84
-60	43.52	115.79
-50	52.82	141.18
-45	53.51	143.3
-40	51.38	137.86
-35	46.72	125.53
-30	40.31	108.37
-25	33.52	89.99
-20	27.58	73.69
-15	23.11	61.11
-10	20.23	52.56
-5	18.89	47.84
0	18.99	46.75
5	20.53	49.25
10	23.56	55.46
15	28.22	65.68
20	34.67	80.23
25	42.83	98.87
30	51.95	119.9
35	60.47	139.67
40	66.65	154.12
45	69.45	160.83
50	68.53	158.98
60	56.37	131.29
70	39.06	91.35
80	26.12	61.31

90	18.12	42.68
100	13.20	31.17
110	10.03	23.76
120	7.90	18.75
130	6.39	15.21
140	5.30	12.62
150	4.47	10.67
160	3.83	9.15
170	3.32	7.95
180	2.91	6.99
190	2.58	6.19
200	2.31	5.54
210	2.07	4.99
220	1.88	4.52
230	1.71	4.11
240	1.56	3.77
250	1.44	3.47
260	1.33	3.2
270	1.23	2.97
280	1.14	2.76
290	1.07	2.57
300	1.00	2.41

Magnetic Field

Akeley Substation 34.5 kV Underground Feeder Exits

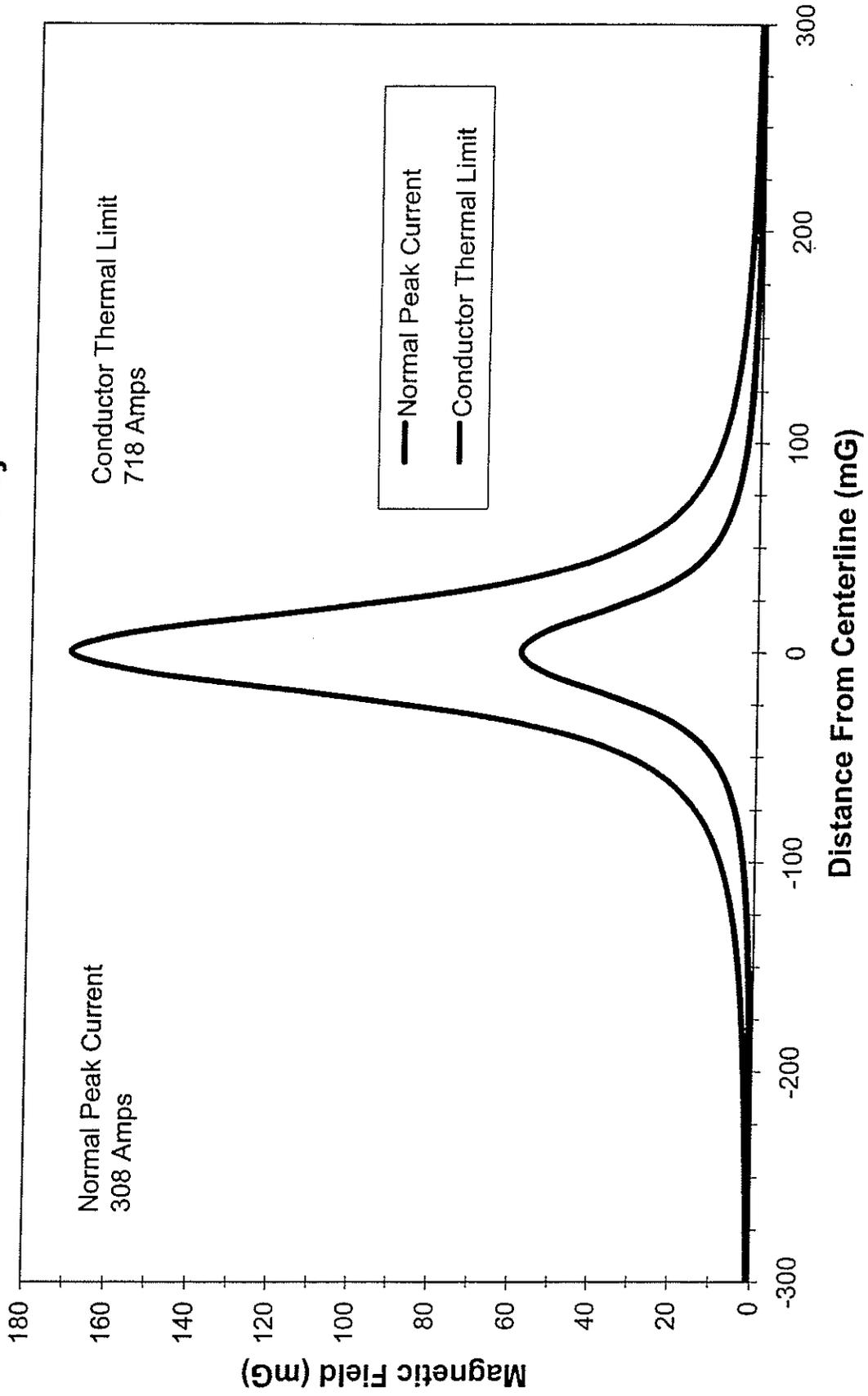


Akeley Substation 34.5 kV Underground Feeder Exits

units-feet Distance from Centerline	units mG Normal Peak Current	units mG Conductor Thermal Limit
-300	0.09	0.29
-290	0.1	0.31
-280	0.1	0.32
-270	0.11	0.34
-260	0.11	0.35
-250	0.12	0.37
-240	0.12	0.39
-230	0.13	0.42
-220	0.14	0.44
-210	0.15	0.47
-200	0.16	0.51
-190	0.17	0.54
-180	0.18	0.59
-170	0.2	0.64
-160	0.22	0.69
-150	0.24	0.76
-140	0.26	0.85
-130	0.3	0.95
-120	0.33	1.07
-110	0.38	1.23
-100	0.44	1.42
-90	0.52	1.69
-80	0.63	2.05
-70	0.79	2.55
-60	1.02	3.32
-50	1.39	4.54
-40	2.05	6.71
-30	3.4	11.2
-20	6.95	22.99
-10	20.56	68.05
0	36.86	124.01
10	21.92	74.99
20	6.33	21.72
30	2.69	9.3
40	1.44	4.99
50	0.88	3.06
60	0.58	2.05
70	0.41	1.46
80	0.31	1.09
90	0.24	0.85
100	0.19	0.69
110	0.16	0.57
120	0.14	0.48
130	0.12	0.42
140	0.11	0.37
150	0.1	0.34
160	0.09	0.31
170	0.09	0.29
180	0.08	0.27

190	0.08	0.25
200	0.07	0.24
210	0.07	0.23
220	0.07	0.22
230	0.07	0.21
240	0.06	0.2
250	0.06	0.19
260	0.06	0.19
270	0.06	0.18
280	0.06	0.18
290	0.05	0.17
300	0.05	0.17

Magnetic Field 725 Line Badoura to Akeley



725 Line Badoura to Akeley

units-feet Distance from Centerline	units mG Normal Peak Current	units mG Conductor Thermal Limit
-300	0.29	0.86
-290	0.32	0.92
-280	0.34	0.99
-270	0.37	1.07
-260	0.4	1.16
-250	0.43	1.26
-240	0.47	1.38
-230	0.52	1.51
-220	0.57	1.65
-210	0.63	1.82
-200	0.69	2.02
-190	0.77	2.25
-180	0.86	2.51
-170	0.97	2.83
-160	1.1	3.2
-150	1.26	3.66
-140	1.45	4.21
-130	1.69	4.9
-120	1.98	5.76
-110	2.36	6.86
-100	2.86	8.3
-90	3.52	10.23
-80	4.43	12.88
-70	5.73	16.66
-60	7.66	22.27
-50	10.67	31.01
-40	15.59	45.33
-30	23.92	69.54
-20	37.17	108.04
-10	52.03	151.25
0	58.57	170.24
10	52.48	152.56
20	37.83	109.96
30	24.58	71.45
40	16.18	47.02
50	11.18	32.49
60	8.1	23.56
70	6.12	17.79
80	4.78	13.89
90	3.83	11.14
100	3.14	9.13
110	2.62	7.62
120	2.22	6.45
130	1.91	5.54
140	1.66	4.81
150	1.45	4.22
160	1.28	3.73
170	1.14	3.32
180	1.03	2.98

190	0.93	2.69
200	0.84	2.44
210	0.77	2.22
220	0.7	2.04
230	0.64	1.87
240	0.59	1.73
250	0.55	1.6
260	0.51	1.49
270	0.48	1.38
280	0.44	1.29
290	0.42	1.21
300	0.39	1.14

Magnetic Field 725 Line Akeley to Laporte

