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HAND DELIVERED

Members of the City of Milwaukee
Common Council

Dear Council Members:

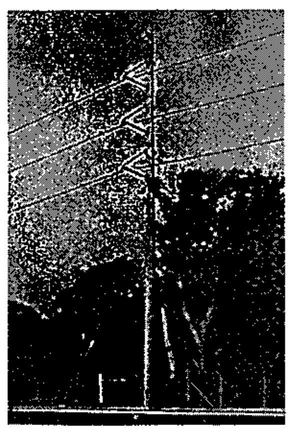
Re: Comments in Support of Alderman Murphy's Substitute Resolution Relating to the City of Milwaukee's Position on the Western Milwaukee County Electric Reliability Project; 2.2 Mile; 138,000 Volt Transmission Line Providing Service to Milwaukee County Grounds

I, Donald P. Gallo, write on behalf of Milwaukee Montessori School ("MMS") to endorse Alderman Murphy's substitute resolution (the "Substitute Resolution") supporting an underground transmission line along 95th Street from the existing 96th Street substation to Wisconsin Avenue (the "Underground 95th Street Line").

MMS is a private co-educational day school for students from toddler age through the eighth grade. Founded in 1961, the school has been located at its present location at 345 North 95th Street since 1998. MMS's 4.80-acre campus houses more than five hundred school children and teachers. MMS students come from urban and suburban communities within a 15-mile radius of Milwaukee in order to experience the challenging, individualized educational experience provided by the Montessori curriculum and to develop into independent thinking students of knowledge, courage, personal integrity and compassion.

MMS is bounded on the west by Interstate 45, on the north by St. Therese Catholic Church and Bluemound Road, on the east by North 95th Street, and on the south by a private apartment complex. MMS makes frequent use of its outdoor facilities, including playground areas, playing fields, backyard patio, front porch and gardens. Students also enjoy adjacent community landmarks such as Cannon Park, St. Therese Church, and the Milwaukee County Zoo.

Consequently, MMS is deeply concerned about the American Transmission Company's ("ATC") Western Milwaukee County Electric Reliability Project (the "Project"), which involves the construction of a new We Energies substation adjacent to the existing Milwaukee County Substation at 93rd Street and Watertown Plank Road and the construction of two separate 138,000-volt transmission lines to connect electrical power supply via the transmission system that serves the West Milwaukee area. Each of these separate transmission supplies consists of three power lines, and each power line is approximately three inches in diameter.



While MMS understands, supports, and respects the need for more electrical power, MMS *opposes new aboveground* transmission lines in the vicinity of 95th Street, St. Therese Church parishioners, the 500+ person MMS community, the 200 residents of a nearby apartment complex, other neighboring residents, and Cannon Park patrons. MMS *strongly urges selection of an underground option.* Because it is technically feasible to construct the underground line along 95th Street, and because the Underground 95th Street Line is more cost-effective and cost-efficient than other buried line routes, MMS supports the Substitute Resolution.

The City of Milwaukee should adopt the Substitute Resolution. The Underground 95th Street Line will:

1. **Pose fewer safety risks** than an aboveground line, because the potential for downed power lines is eliminated;

2. **Pose fewer health risks** than an aboveground line, because electric fields are not an issue with underground transmission lines, and underground transmission lines produce lower magnetic fields than aboveground lines[1];

3. **Provide greater reliability** than an aboveground line, because underground lines are less susceptible to weather-related issues and the severe storms that are becoming more frequent, and underground lines are less likely to result in power outages[2]; and,

4. **Result in lower maintenance costs and less disruption** to the adjacent residential neighborhood during initial construction and while servicing and maintaining the line than an aboveground line, because the underground route is more direct, the underground line is less prone to reliability issues, and a new sensor technology allows quick identification of underground line breaks.

On the other hand, an overhead line will:

1. **Negatively impact the neighborhood character,** because overhead lines are not compatible with the residential character of the neighborhood, which currently consists of area churches, apartments, parks, and the MMS; and,

2. **Adversely impact neighborhood property values,** because aboveground transmission lines convey an industrial and unsafe image that is not consistent with the residential/school/church neighborhood

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[1] *See enclosed* December 12, 2011 FORTUNE article.

[2] *See enclosed* excerpt from Wisconsin Public Service Commission overview.

through which they would travel. The resulting decrease in demand for housing and schools in the area will ultimately cause the neighborhood to decline.

An overhead line will have a long-term and cumulative negative societal impact on the residential character of the MMS neighborhood and on the City of Milwaukee as a whole. This negative societal impact far exceeds any incremental construction cost difference between the aboveground and underground transmission line alternatives. Furthermore, the Underground 95th Street Line will have lower maintenance costs and cause less disruption than an overhead line, will provide greater reliability than an overhead line, and will pose fewer safety and health risks than an overhead line.

For all of these reasons, MMS endorses the Substitute Resolution supporting the Underground 95th Street Line.

Yours very truly,

Donald P. Gallo

Donald P. Gallo

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Enc.

cc Monica Van Aiken (with enclosure)

Underground Electric Transmission Lines

PUBLIC SERVICE COMMISSION OF WISCONSIN

Introduction

This overview contains information about electric transmission lines which are installed underground, rather than overhead on poles or towers. Underground cables have different technical requirements than overhead lines and have different environmental impacts. Due to their different physical, environmental, and construction needs, underground transmission generally costs more and may be more complicated to construct than overhead lines. Issues discussed in this pamphlet include:

- Types of Underground Electric Transmission Cables
- Ancillary Facilities
- Construction and Operation Considerations
- Costs
- Repairs

The design and construction of underground transmission lines differ from overhead lines because of two significant technical challenges that need to be overcome. These are: 1) providing sufficient insulation so that cables can be within inches of grounded material; and 2) dissipating the heat produced during the operation of the electrical cables. Overhead lines are separated from each other and surrounded by air. Open air circulating between and around the conductors cools the wires and dissipates heat very effectively. Air also provides insulation that can recover if there is a flashover.

In contrast, a number of different systems, materials, and construction methods have been used during the last century in order to achieve the necessary insulation and heat dissipation required for undergrounding transmission lines. The first underground transmission line was a 132 kV line constructed in 1927. The cable was fluid-filled and paper insulated. The fluid was necessary to dissipate the heat. For decades, reliability problems continued to be associated with constructing longer cables at higher voltages. The most significant issue was maintenance difficulties. Not until the mid-1960s did the technology advance sufficiently so that a high-voltage 345 kV line could be constructed underground. The lines though were still fluid filled. This caused significant maintenance, contamination, and infrastructure issues. In the 1990s the first solid cable transmission line was constructed more than one mile in length and greater than 230 kV.

A fault in a directionally drilled section of the line could require replacement of the entire section. For example, the cost for directional drilling an HPGF cables is $25 per foot per cable. The cables in the directional drilled section twist around each other in the pipe so they all would have to be pulled out for examination.

The newer XLPE cables tend to have a life that is one half of an overhead conductor which may require replacing the underground every 35 years or so.

Easement agreements may require the utility to compensate property owners for disruption in their property use and for property damage that is caused by repairing underground transmission lines on private property. However, the cost to compensate the landowner is small compared to the total repair costs. Underground transmission lines have higher life cycle costs than overhead transmission lines when combining construction repair and maintenance costs over the life of the line.

Potential Fluid Leaks

Although pipe-type underground transmission lines require little maintenance, transmission owners must establish and follow an appropriate maintenance program, otherwise pipe corrosion can lead to fluid leaks.

Both HPFF and SCFF lines must have a spill control plan. The estimate for potential line leakage is about one leak every 25 years. Soil contaminated with leaking dielectric oil is classified as a hazardous waste. This means that contaminated soils and water would have to be remediated. The types of dielectric fluid used in underground transmission lines include alkylbenzene (which is used in making detergents) and polybutene (which is chemically related to Styrofoam). These are not toxic, but are slow to degrade. The release and degradation of alkylbenzene could cause benzene compounds, a known carcinogen, to show up in plants or wildlife.

A nitrogen leak from a HPGF line would not affect the environment, but workers would need to check oxygen levels in the vaults before entering. Fluid leaks are not a problem for solid dielectric cables.

Electric and Magnetic Fields

Electric fields are created by voltage. Higher voltage produces stronger electric fields. Electric fields are blocked by most objects such as walls, trees, and soil and are not an issue with underground transmission lines. Magnetic fields are created by current and produced by all household appliances that use electricity. Magnetic field strength increases as current increases so there is a stronger magnetic field generated when an appliance is set on "high" than when it is set on "low". Milligauss (mG) is the common measurement of magnetic field strength. Typically, a hair dryer produces a magnetic field of 70 mG when measured one foot from the appliance. A television produces approximately 20 mG measured at a distance of one foot.

The strength of the magnetic field produced by a particular transmission line is determined by current, distance from the line, arrangement of the three conductors, and the presence or absence of magnetic shielding. Underground transmission lines produce lower magnetic fields than aboveground lines because the underground conductors are placed closer together which causes the magnetic fields created by each of the three conductors to cancel out some of the other's fields. This results in reduced magnetic fields. Magnetic fields are also strongest close to their source and drop off rapidly with distance (Table 1). Pipe-type underground lines can have significantly lower magnetic fields than overhead lines or other kinds of underground lines because the steel pipe has magnetic shielding properties that further reduce the field produced by the conductors.

Table 1 shows sample magnetic field measurements at different distances from underground and overhead lines. Maximum magnetic field strengths of underground transmission lines typically do not exceed a few mG at a distance of 25 feet.

Table 1 Sample Magnetic Field Strength of Various Transmission Lines

Voltage	Construction	Amperes	Distance	mG
69 kV	Underground - XLPE	252	Centerline at surface	34.20
			50 feet from Centerline	0.90
69 kV	Underground - Pipe-type	204	Centerline at surface	0.80
			50 feet from Centerline	0.10
69 kV	Overhead	167	Centerline	23.00
			40 feet from Centerline	7.00
138 kV	Underground - Pipe-type	467	Centerline at surface	0.21
			50 feet from Centerline	0.05
138 kV	Overhead	710	Centerline at surface	190.00
			50 feet from Centerline	46.00

Heat

Heat produced by the operation of an underground transmission cable raises the temperature at the above the line, a few degrees. This is not enough to harm growing plants, but it could cause premature seed germination in the spring. Heat could also build up in enclosed buildings near the line.

Transmission routes that include other heat sources, such as steam mains, should be avoided. Electric cables should be kept at least 12 feet from other heat sources, otherwise the cable's ability to carry current decreases.

Reliability of Service

In general, lower voltage underground transmission lines are very reliable. However, their repair times are much longer than those for overhead lines.

Repair Rates – Pipe-Type Transmission Cables

For pipe-type lines, the trouble rates historically, for about 2,536 miles of line correspond to about:

- One cable repair needed per year for every 833 miles of cable.
- One splice repair needed per year for every 2,439 miles of cable.
- One termination repair needed per year for every 359 miles of cable.

These trouble rates indicate that there would be, at most, a 1:300 chance for the most common type of repair to be needed in any one mile of pipe-type underground line over any one year.

The Public Service Commission of Wisconsin is an independent state agency that oversees more than 1,100 Wisconsin public utilities that provide natural gas, electricity, heat, steam, water and telecommunication services.

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Electric 11 (05/11)

TIME TO BURY OUR POWER LINES?

A SERIES OF SEVERE STORMS THIS YEAR HAS LEFT MILLIONS WITHOUT ELECTRICITY. AN AFFORDABLE SOLUTION MAY EXIST. *By Brian Dumaine*

A late-October blizzard damaged power lines in Glastonbury, Conn.

THE FREAK SNOWSTORM THAT HIT the Northeast on Halloween weekend felled branches and trees at a dizzying rate—New York City's Central Park alone lost 1,000 trees—and downed hundreds of power lines. The blizzard left some 2 million without electricity—many for more than a week. The even weirder thing is that this didn't really need to happen. As severe storms become more frequent and the losses from closed businesses and absentee workers add up, one is tempted to ask a very simple question: Why don't we bury our power lines?

Well, it turns out the answer isn't so simple. Numerous studies conducted by utilities over the years conclude that it is not economically feasible to bury lines. The most common estimate is that it costs 10 times more to bury them than to string them on poles. The North Carolina Utilities Commission said that burying wires statewide would cost $41 billion, take 25 years, and would more than double monthly electric bills. The news gets more discouraging. Some experts say that underground cables are more reliable than those above ground but only by about 50%, and that advantage is somewhat counteracted when you consider that it takes much longer to find, dig up, and repair a faulty wire. Why do underground cables fail at all? Floods and earthquakes can short lines. There's more: The roots of a tree toppled in a storm could destroy a buried wire.

Is it that hopeless? Maybe not, argues Gerry Sheerin, an engineer and consultant in Ontario, who thinks the studies on cost and reliability are out of date and too high, perhaps by a factor of two. "Putting wires underground is absolutely a last resort with utilities, so they don't have much experience doing it and tend to overestimate the difficulties involved." That said, most new housing developments today bury their cables, helping the industry to gain experience. A nationwide program to bury wires could create economies of scale that would drive down costs. Also, new sensor technology could help spot breaks in underground lines, speeding repairs.

Who would pay for all of this? Public utilities commissions are unlikely to grant huge rate increases to utilities to bury lines. In this economy, not many homeowners would cough up cash for underground lines, even though doing so could boost curb appeal and thus house values.

That leaves the federal government. The DOE has programs for improving the nation's grid, yet no one in Washington is seriously talking about allocating funds to bury power cables. The issue at least should be studied more. Will the cost of burying lines be offset by the billions that could be saved from not having to repair overhead lines and avoiding economic disruptions? No one knows. Maybe we should find out. In the meantime, get your flashlights and bottled water ready. F

REPORTER ASSOCIATE *Caitlin Keating*