STATE OF ILLINOIS

ILLINOIS COMMERCE COMMISSION

COMMONWEALTH EDISON COMPANY	:	
	:	
Application of COMMONWEALTH EDISON COMPANY, for authorization under Section 4-101 of the Illinois Public Utilities Act ("Act"), 220 ILCS § 5/4-101, or alternatively, for a Certificate of Public Convenience and Necessity, pursuant to Section 8-406 of the Act, to install, operate and maintain two new 345,000 volt electric transmission lines in Cook County, Illinois.	:	No. 10-

Direct Testimony of

THOMAS W. LEEMING, P.E.

Manger of Transmission Reinforcement
Commonwealth Edison Company

PUBLIC VERSION

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1 **I. Executive Summary and Introduction**

2 **A. Identification of Witness**

3 Q. **Please state your name and business address.**

4 A. My name is Thomas W. Leeming. My business address is Two Lincoln Centre,
5 Oakbrook Terrace, IL 60181

6 Q. **By whom and in what position are you employed?**

7 A. I am employed by Commonwealth Edison Company ("ComEd") as the Manager of
8 Transmission Reinforcement in the Transmission Operations and Planning Department. I
9 am also currently interim Director of ComEd Transmission Operations and Planning.

10 **B. Purpose of Testimony**

11 Q. **What is the purpose of your testimony?**

12 A. My testimony explains the transmission planning associated with Phase II of the West
13 Loop transmission project ("Phase II"). Phase II follows ComEd's 2005 West Loop
14 transmission project, which I will refer to as "West Loop – Phase I." The Illinois
15 Commerce Commission ("Commission") considered and approved West Loop – Phase I
16 in Docket No. 05-0188 (Order entered Feb. 23, 2006). I also identify and discuss the
17 studies ComEd has undertaken to determine how best to meet the need for Phase II in a
18 manner that will ensure adequate, efficient, and reliable electric service provided at the
19 least cost.

20 **C. Summary of Testimony**

21 Q. **Would you please summarize your conclusions in this testimony?**

22 A. Yes. I conclude that:

23 • In order to reliably serve the City of Chicago's ("City") central business
24 district in the event the Fisk and Crawford generating stations become
25 unavailable for service in 2012 or thereafter, ComEd must reinforce its
26 transmission system serving this area. Further, if only the Fisk generating
27 station becomes unavailable in 2013 or thereafter, ComEd must reinforce
28 its transmission system serving the central business district.

29 • The least cost way to meet this need is to install two new 345 kV
30 transmission lines on existing rights-of-way: one line consists of 1.6 miles
31 of overhead line, and one line consisting of 2 miles of underground cable.
32 In addition ComEd proposes to install 2 new autotransformers and related
33 substation equipment. This proposal is reasonable and provides the least-
34 cost means for ComEd to continue to meet its reliability obligations for the
35 central business district.

36 **D. <u>Background and Qualifications</u>**

37 Q. **What are your duties as a Manager of Transmission Reinforcement?**

38 A. As the Manager of the Transmission Reinforcement I am responsible for forecasting and
39 managing Transmission System Reinforcements on the ComEd system. I determine
40 when and where transmission system reinforcements are needed. My duties include
41 coordinating with PJM Interconnection, LLC ("PJM") to identify upgrades required to
42 meet PJM Transmission Planning Criteria.

43 Q. **How long have you held that position?**

44 A. I have been in this position since July 2007.

45 Q. **What other professional experience do you have?**

46 A. I have been continuously employed by ComEd since 1992. My initial position at ComEd
47 was in the Technical Studies Section of the System Planning Department where I was
48 responsible for Generator Stability, Voltage Stability, and other detailed technical studies
49 of the ComEd Transmission System. I then moved to the Transmission Reinforcement
50 Group and was responsible for analyzing and planning the Northern and Western portions

51 of the ComEd Transmission System. In 2001, I was promoted to Transmission
52 Operations Engineer and worked in Transmission System Operations. In this capacity I
53 performed study work related to planning and coordinating transmission maintenance
54 outages as well as performing real-time system reliability studies. In 2005, I became
55 Manager of the Technical Studies Group in Transmission Planning and was responsible
56 for the interconnection of third-parties onto the ComEd Transmission system and
57 oversaw transient stability, voltage stability, and other detailed studies on the ComEd
58 system to ensure the system met the ComEd Transmission Planning Criteria.

59 Q. **What is your educational background?**

60 A. I hold a Bachelor of Science degree in Electrical Engineering (1990) from Iowa State
61 University and a Master of Science degree in Electrical Engineering (1992) from
62 Michigan State University.

63 Q. **Are you a Licensed Professional Engineer?**

64 A. I am a Licensed Professional Engineer in the State of Illinois.

65 Q. **Do you participate in any electric power engineering groups?**

66 A. I participate in the PJM Planning Committee and the Transmission Expansion Advisory
67 Committee ("TEAC").

68 Q. **Please explain the role of PJM as it relates to ComEd's system.**

69 A. PJM is the regional transmission organization that coordinates the movement of
70 wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland,
71 Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West
72 Virginia and the District of Columbia. ComEd was integrated into PJM in 2004. While

ComEd owns its transmission assets, PJM operates the ComEd transmission system and is the Planning Authority for the ComEd zone.

Q. **Earlier you mentioned that you participate in the PJM's TEAC and Planning committees. What is the purpose of your participation in those Committees?**

A. TEAC provides advice and recommendations to aid in the development of PJM's Regional Transmission Expansion Plan. The Planning Committee has the responsibility to review and recommend system planning strategies and policies as well as planning and engineering designs for the PJM bulk power supply system to assure the continued ability of the member companies to operate reliably and economically in a competitive market environment.

E. Itemized Attachments to Testimony

Q. **Are any exhibits attached to your direct testimony?**

A. Yes. Attached Exhibit 2.1 is a one-line diagram which depicts the proposed Phase II project.

II. ComEd's Transmission System

Q. **Please explain the role of ComEd's transmission system in delivering electrical power to customers.**

A. ComEd's wires transmit electric power from a variety of sources, including base load nuclear and fossil fuel generating stations and peaking units. The purpose of the transmission and distribution system is to reliably deliver this power to customers, at the voltage level and quantity required.

A network of 765kV, 345 kV and 138 kV lines form the backbone of ComEd's transmission system. These transmission lines move "bulk" power from the various sources of supply to the areas of ComEd's service territory where customer demand exists. There, the power is converted by transformers to the lower voltages used for distribution to ComEd customers. ComEd's transmission system also provides the principal means for the flow of power required for interstate transactions.

Q. **What factors must be considered in operating and maintaining an adequate, efficient, and reliable transmission system?**

A. A transmission system must have capacity sufficient to meet projected power flows within applicable thermal limits of the equipment while maintaining required voltage levels and system stability, under both normal and contingency conditions.

Q. **How does ComEd Transmission Reinforcement Planning evaluate and decide how and when the ComEd transmission system needs reinforcement?**

A. The engineers in Transmission Reinforcement create computer models of the ComEd transmission system, as well as surrounding transmission systems, in order to determine when the system needs reinforcement. Information about expected system reinforcements, new customer interconnections, generation supply as well as forecasted loads for the time period in question is included in each base case model. The forecasted loads also incorporate the impacts of energy efficiency programs. Once this information is added to the model, literally thousands of predefined contingencies are tested against each base case to determine if any thermal, voltage or stability limits are violated. This data is used to perform a variety of studies to determine if, and when, changes are required to the transmission system.

117 Q. **Your prior answer states that "predefined contingencies are tested." How do you**
118 **define the term "contingency"?**
119 A. In the context of transmission planning, a "contingency" generally refers to a situation
120 where an element becomes unavailable for service. Consequently, when ComEd
121 analyzes segments of its transmission system to determine whether system reinforcement
122 is necessary, we establish our base case – usually assuming all equipment is available.
123 We refer to our base case as "N-0" (N minus zero): meaning zero elements used in the
124 system are unavailable. We then conduct an analysis assuming one element is out of
125 service, otherwise known as an N-1 contingency. Additional contingencies subject to
126 analysis follow the same designation, i.e., N-2, N-3 etc.

127 Q. **Why do you study contingency conditions as well as normal operating conditions?**
128 A. Generating units and major transmission system components cannot be assumed to be in
129 operation 100% of the time. In fact, it is rare that an N-0 situation actually exists. In
130 addition to scheduled maintenance requirements, unscheduled outages occur. Therefore,
131 a level of reliability must be maintained appropriate to the number and nature of
132 customers at risk to possible system failures, balanced by providing service at a
133 reasonable cost. For example, the transmission system must, at a minimum, continue to
134 operate within acceptable thermal limits with any single line or transformer in an area out
135 of service. In addition, where the behavior of the transmission system in an area is
136 heavily dependent on the localized output of a particular generating unit or units, it is
137 critical to consider the ability of the system to continue to operate when that generating
138 unit is unavailable.

139 Q. **Does ComEd maintain a set of standards to indicate when reinforcement is needed?**

140 A. Yes. ComEd has adopted "Transmission Planning Criteria" to guide us in our decision-
141 making. This document represents ComEd's interpretation, specific to our system, of the
142 planning standards of the North American Electric Reliability Corporation ("NERC").
143 The NERC reliability standards define the reliability requirements for planning and
144 operating the North American bulk power system. We file our Transmission Planning
145 Criteria with the Federal Energy Regulatory Commission ("FERC") as part of our annual
146 FERC Form 715 filing.

147 Q. **What actions are taken based on these criteria?**

148 A. When the data shows that an upgrade to the system is required due to a violation of the
149 Transmission Planning Criteria, ComEd, both in the planning and design engineering
150 areas, initially identify feasible means of eliminating the violations that are consistent
151 with sound engineering and system planning practices. Depending on the nature of the
152 violations, there may be several such alternative plans. Consistent with ComEd's
153 obligations to provide reliable service to its customers, we then determine which of the
154 alternatives are technically feasible and potentially cost-effective. Where there is more
155 than one such option, ComEd assesses the advantages and disadvantages of the various
156 alternatives and selects as the proposed plan the option that would provide adequate,
157 efficient and reliable service to customers at least cost.

158 Q. **Are there any other factors which should be considered in evaluating alternative**
159 **plans, once the need for transmission system reinforcement is demonstrated?**

160 A. Yes. Effects on other portions of the existing transmission system must be considered. A
161 plan must also be capable of being constructed and operated within the time required to

162 eliminate the violations. For example, required real estate must be available or
163 obtainable. Finally, a suitably robust plan should also fit in with the long-term
164 development plans for the system as a whole.

165 **III. <u>The Proposed Project: West Loop – Phase II</u>**

166 Q. **Earlier in your testimony you stated that the proposed project, Phase II, follows**
167 **from the Commission's approval of West Loop – Phase I in 2006. Would you please**
168 **explain that statement?**

169 A. Yes. In 2005, ComEd filed a petition seeking approval of a project to reinforce service to
170 the northern portions of the central business district– the West Loop project, which I now
171 refer to as "West Loop – Phase I. The Commission approved Phase I in 2006. Docket
172 No. 05-0188 (Order entered Feb. 23, 2006). In that proceeding, ComEd witness Jennifer
173 Sterling, testified that ComEd's long range plan for the area also included installing a
174 345 kV circuit from the Crawford substation to the Fisk substation. Docket No. 05-0188,
175 Sterling Dir., ComEd Ex. 1.0 amended, 17:373-18:377. Ms. Sterling explained that such
176 a circuit would be needed in the event that the Crawford and Fisk generating stations
177 (which are not owned by ComEd or its affiliates) are no longer available for service. *Id.*
178 Phase II addresses that very issue, which is explained in more detail by ComEd witness
179 Susan O. Ivey. ComEd has analyzed the issue and has identified the need for the
180 reinforcement of transmission in the southern portion of the central business district.

181 Q. **What are the current transmission facilities serving the central business district?**

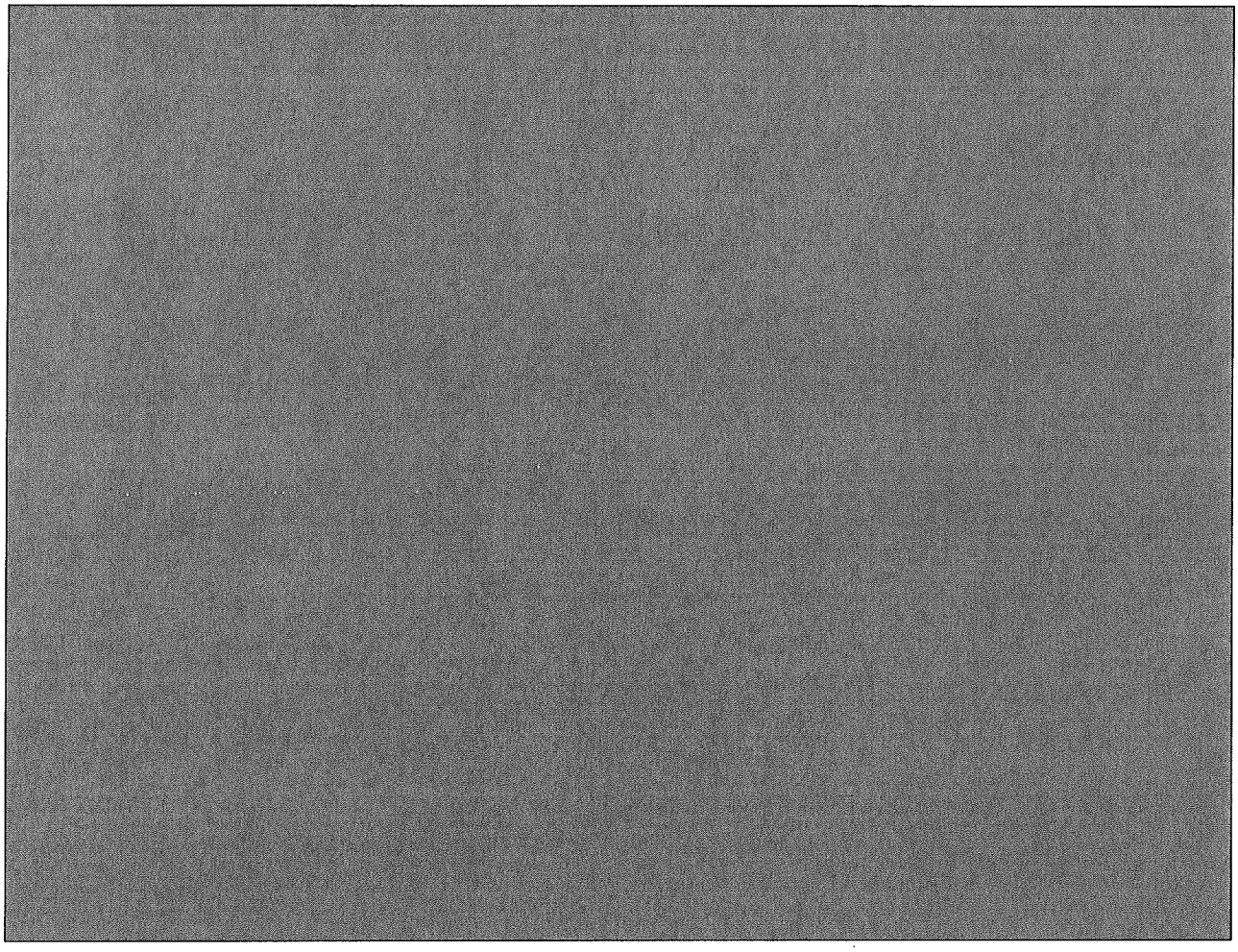
182 A. ComEd's current transmission facilities in the area are designed, in part, to recognize the
183 how the Crawford and Fisk generating stations contribute to serving the central business

184 district's load requirements. Accordingly, ComEd has installed various 345 kV and
185 138 kV lines, as well as related transformers, circuit breakers, busses, capacitor banks
186 and other equipment to deliver power and energy to the central business district. Most
187 recently, ComEd completed its West Loop – Phase I project, which reinforced the
188 transmission system in the area just north of the central business district.

189 Q. **How do the Crawford and Fisk generating stations contribute to serving the central**
190 **business district's load?**

191 A. The central business district's load is approximately 3,500 MW during peak periods.
192 Together, the Crawford and Fisk generating stations, including peaking units at Fisk, can
193 generate approximately 1,036 MW of electricity, or almost 30% of the electricity needed
194 for the central business district. Generating stations generally contribute to local system
195 reliability, in part, by reducing the flow of electricity from other sources necessary to
196 serve the local load. With respect to the Crawford and Fisk generating stations, their
197 proximity to the central business district supports system reliability by serving that area's
198 load. The following illustration depicts, generally, how these generating stations, along
199 with ComEd's West Loop, Crawford, Fisk and Taylor substations, support ComEd's
200 transmission system serving the central business district.

201 **Confidential CEII Slide 1:**



202

203 Q. **How do the Crawford and Fisk generating stations contribute to the design of the**
204 **transmission system serving the central business district?**

205 A. As I indicated earlier, ComEd designed its transmission system serving the central
206 business district in recognition that the Crawford and Fisk generating stations were
207 available sources of electricity.

208 Q. **Given that ComEd has planned its transmission system serving Chicago's central**
209 **business district with consideration of the contributions of the Fisk and Crawford**

210 **generating stations, has ComEd studied the impact of serving that area without**
211 **these generating stations being available?**
212 A. Yes. Over time, ComEd has conducted various load flow studies evaluating the impact
213 of having the Crawford and Fisk generating stations become unavailable. ComEd
214 witness Jennifer Sterling, in her testimony in the Phase I proceeding, noted that beginning
215 in the late 1990's ComEd had evaluated this issue. Docket No. 05-0188, Sterling Dir.,
216 ComEd Ex. 1.0 amended, 17: 373-18:377. More recently, ComEd has conducted load
217 flow studies evaluating the impact on ComEd's transmission system of having neither
218 generating station available in 2012 and 2015, as well as a separate scenario where the
219 Fisk generating station would become unavailable in 2013.

220 Both the 2012 and 2015 studies undertook an evaluation of the impact to
221 ComEd's current transmission system should the Crawford and Fisk units become
222 unavailable, as well as evaluating the impact to ComEd's system if the Phase II project
223 facilities were installed and operational at the time those units were unavailable. We then
224 tested these assumptions against the transmission planning criteria described above. For
225 purposes of this analysis, our base case assumed that neither the Fisk nor Crawford
226 generating stations were available for service. As described earlier in this testimony, that
227 is our N-0 study. We also conducted studies assuming one contingency and two
228 contingencies, or N-1 and N-2, respectively, under peak load conditions.

229 Similarly, we conducted an analysis of the impact should just the Fisk generating
230 station become unavailable in 2013, using various contingencies. Like the 2012 and
231 2015 studies, we also evaluated the impact to ComEd's system if the Phase II projects

232 facilities were installed and operational in 2013. We also conducted studies assuming
233 one and two contingencies under peak load conditions.

234 Q. **Please describe the load forecasting performed by ComEd relevant to this project.**
235 A. ComEd's Transmission Planning Criteria defines two load levels at which peak load
236 conditions are modeled. The first is described as the 50/50 load forecast, a system load
237 level that is expected to occur once every other year. Said another way, the 50/50
238 forecast can be thought of as 'normal' summer weather conditions. The second load
239 level that is modeled is a 90/10 forecast that represents extreme weather conditions for
240 each system model base case. The Transmission Planning engineers utilize data provided
241 by the ComEd Distribution Capacity Planning Department that details projected growth
242 at each distribution substation in order to determine local loading conditions in sub-zones
243 of the ComEd territory. This 'bottom-up' look is then matched to PJM's load forecasts
244 for ComEd to ensure that the total system loads in each case consider the system-wide
245 view.

246 Q. **What do your 2012 and 2015 studies show?**
247 A. Should the Crawford and Fisk generating stations become unavailable for service, it will
248 be necessary to import more electricity from other generation sources to serve the central
249 business district's load. In order to bring additional power and energy into Chicago, our
250 2012 studies show that, after considering contingencies in our criteria, existing
251 transmission facilities serving the central business district will overload.

Q. **Why?**

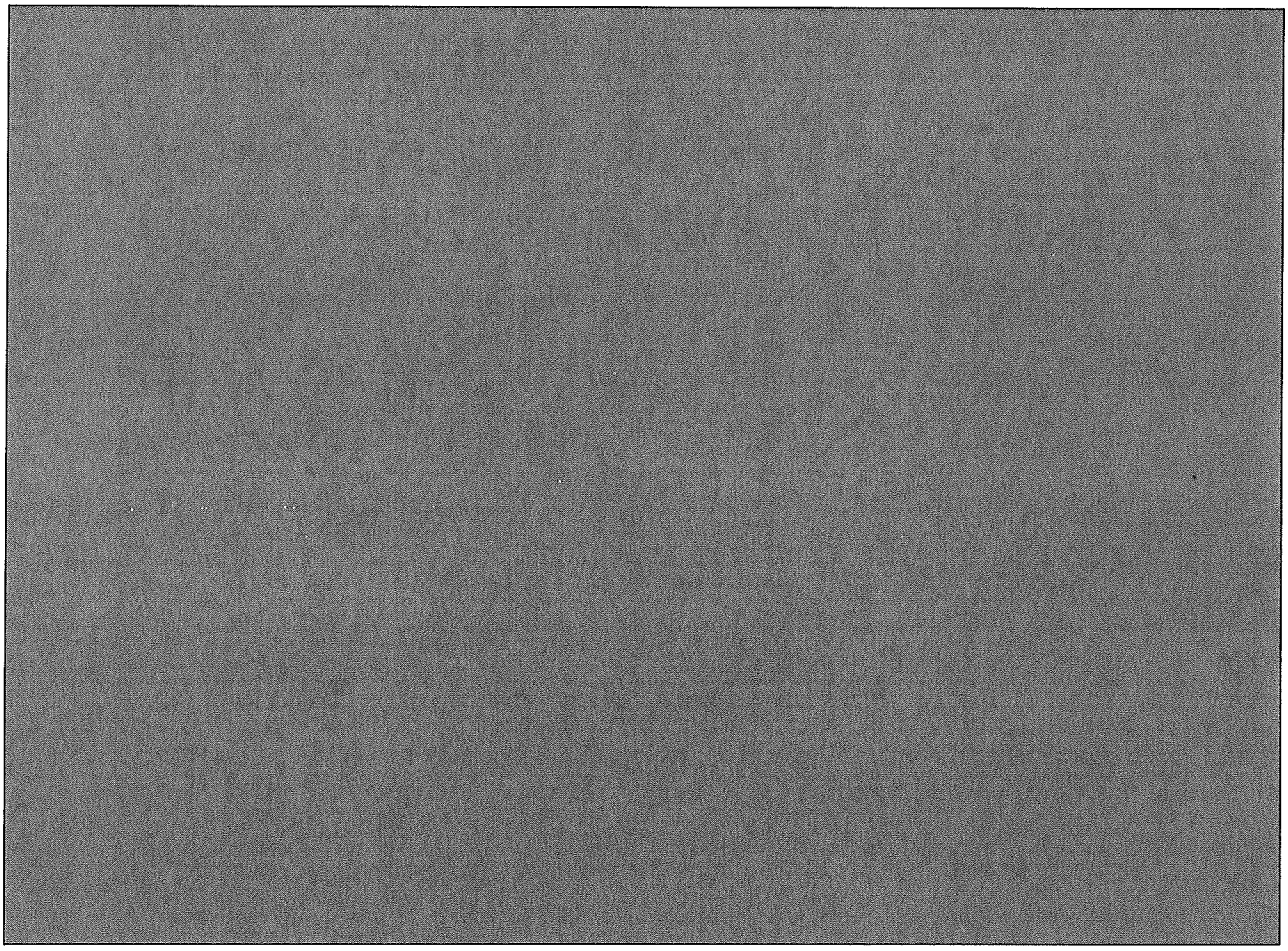
A. ComEd's transmission system is not sized to transmit the additional electricity that will need to be imported to meet the central business district's projected load in 2012 and thereafter, assuming that the Crawford and Fisk stations are unavailable.

Q. **How is the transmission system affected under this scenario?**

A. ComEd's planning criteria do not allow for its transmission cables, transformers and related equipment to become overloaded. The electrical grid is networked. When equipment is taken out of service, loading on other equipment typically increases. If cable line loading cannot be brought down below the emergency rating, that would lead to some loss of cable life and, eventually, cable damage and/or failure. Loading above applicable ratings or exceeding the time limits associated with those ratings may cause cable failure, and it is impossible to predict when this failure may occur.

For example, based on our analysis if Crawford and Fisk were unavailable, and two contingencies occurred – ***begin confidential CEII*** XXXX

Confidential CEII Slide 2:



The results of the 2015 study find that the overload situation is exacerbated, as projected load for the central business district continues to increase over time. The results of the 2012 and 2015 studies are summarized in Table TWL-1 and TWL-2 respectively.

276 **Table TWL-1 (2012 Study)[1]:**

Load	First Contingency	Second Contingency	Confidential CEII Overloaded Element	Loading W/O West Loop II (% SE Rating Before Operating Steps)	Load W/O West Loop II (% SE Rating After Operating Steps)	Load With West Loop II (% SE Rating Before Operating Steps)	Load With West Loop II (% SE Rating After Operating Steps)
90/10	138-L0705_GR-C	345-L17723_B-C	XX	124.55%	103.53%	124.99%	Mitigated
			XX	114.83%	Mitigated	107.08%	Mitigated
90/10	138-L11418_R-C	138-L8223__R-C	XX	105.29%	105.29%	87.30%	NA
90/10	138-L13701GR-C	345-L15323_B-C	XX	112.50%	100.88%	76.60%	NA
90/10	138-L15317_R-C	345-L15323_B-C	XX	142.39%	107.64%	80.40%	NA
90/10	138-L17008_B-C	345-L17723_B-C	XX	124.86%	104.65%	127.10%	Mitigated
			XX	118.28%	Mitigated	105.90%	Mitigated
90/10	138-L17008_B-C	345-L17724_R-C	XX	122.39%	101.21%	111.30%	Mitigated
			XX	113.07%	Mitigated	116.30%	Mitigated
90/10	345-L1309__R-C	345-L17723_B-C	XX	118.47%	109.13%	103.80%	Mitigated
			XX	109.62%	Mitigated	109.10%	Mitigated
			XX	103.02%	Mitigated	92.00%	NA

277

278

[1] The "% SE Rating" referenced in certain column headings refers to the Summer Emergency Ratings for facilities under contingency scenarios.

279 **Table TWL-2 (2015 Study)[2]:**

Load	First Contingency	Second Contingency	Confidential CEII Overloaded Element	Loading W/O West Loop II (% SE Rating Before Operating Steps	Load W/O West Loop II (% SE Rating After operating steps)	Load With West Loop II (% SE Rating Before operating Steps	Load With West Loop II (% SE Rating After operating Steps
90/10	138-L0705_GR-C	345-L17723_B-C	XX	126.30%	110.40%	110.20%	Mitigated
			XX	108.10%	Mitigated	95.00%	NA
			XX	104.80%	Mitigated	96.30%	NA
90/10	138-L11418_R-C	138-L8223__R-C	XX	105.60%	105.60%	82.40%	NA
90/10	138-L13701GR-C	345-L15323_B-C	XX	126.20%	123.30%	79.10%	Mitigated
			XX	104.90%	103.60%	70.70%	Mitigated
90/10	138-L15317_R-C	345-L15323_B-C	XX	141.20%	130.80%	66.50%	NA
			XX	109.70%	107.90%	76.70%	NA
			XX	101.80%	Mitigated	61.30%	NA
			XX	103.80%	101.60%	68.20%	NA
90/10	138-L17008_B-C	345-L17723_B-C	XX	128.00%	108.10%	126.10%	Mitigated
			XX	103.10%	Mitigated	88.30%	NA
90/10	138-L17008_B-C	345-L17724_R-C	XX	119.50%	116.40%	114.80%	Mitigated
			XX	115.90%	114.60%	93.50%	NA
90/10	345-L1309__R-C	345-L17723_B-C	XX	111.00%	106.40%	90.50%	NA
			XX	111.90%	107.00%	100.90%	Mitigated
			XX	115.20%	111.00%	102.70%	Mitigated
			XX	100.20%	Mitigated	83.90%	NA
90/10	138-L17008_B-C	138-L15317_R-C	XX	109.10%	106.30%	53.30%	NA
			XX	103.30%	103.10%	85.80%	NA
				101.10%	Mitigated	99.60%	NA

[2] This table does not identify all facilities that become overloaded in this study.

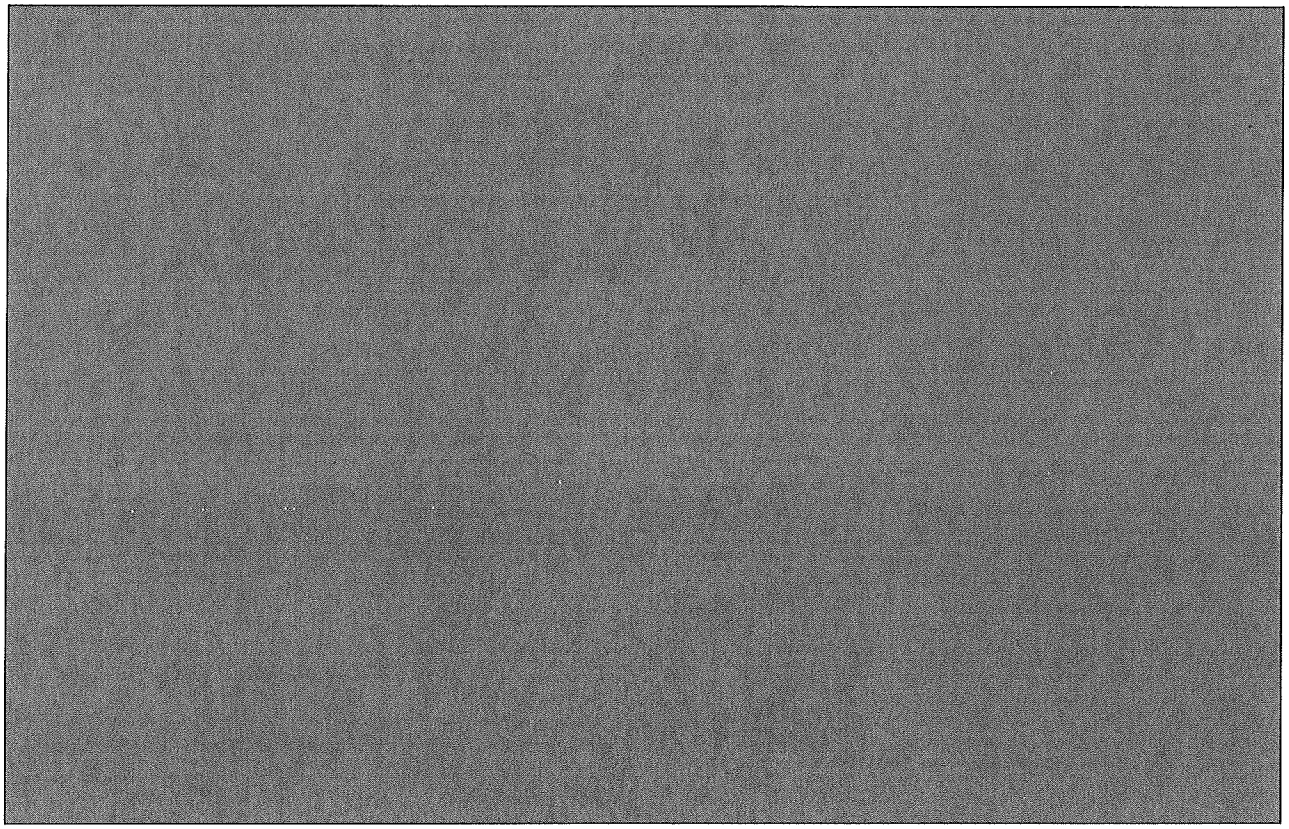
280 Q. **You also mentioned that ComEd evaluated a scenario where the Fisk generating**
281 **station was unavailable starting in 2013. What did that study find?**
282 A. This study also found overloading problems on certain facilities if contingencies were
283 experienced with Fisk out of service. Given that our transmission planning criteria do not
284 allow for such overloaded facilities, ComEd must plan to remedy this overload situation.
285 The results of the 2013 study are summarized in confidential CEII Table TWL-3.

Load	First Contingency	Second Contingency	Overloaded Element	Loading W/O West Loop II (% SE Rating Before Operating Steps)	Load W/O West Loop II (% SE Rating After Operating Steps)	Load With West Loop II (% SE Rating Before Operating Steps)	Load With West Loop II (% SE Rating After Operating Steps)
XX	XX	XX	XX	XX	XX	XX	XX

286

287 Q. **Describe what you propose to build to remedy this situation.**
288 A. ComEd proposes to construct the new transmission lines and install new autotransformers
289 as part of a project to relieve those facilities that will be subject to an overloaded
290 condition. This proposal is depicted in Slide 3 below.

291 **Confidential CEII Slide 3:**



292

293 Fortunately, the need for these facilities was contemplated as part of ComEd's long range
294 planning and identified during the Commission's consideration of West Loop – Phase I.
295 As a result, ComEd's proposed new line will not require the acquisition of new rights-of-
296 way (see testimony of ComEd witness Robert Jones, ComEd Ex. 4.0), nor will it require
297 the installation of new towers along the right-of-way (see testimony of ComEd witness
298 Mr. Robert Fournie, ComEd Ex. 3.0).

299 Specifically, ComEd will have to construct two new 345 kV lines: the first line
300 runs from the Crawford substation to the Fisk substation, and the second line runs from

301 the Fisk substation to the Taylor substation.[3] Work necessary to complete Phase II
302 includes:

303 • Modify existing substation facilities at the Crawford substation.

304 • Install an overhead 345 kV circuit running from Crawford substation 13 to
305 Fisk substation 11, which includes 1.6 miles of new overhead conductor.
306 Existing towers have capacity to add the new 345 kV overhead circuit.

307 • Install at Fisk: 1) a new 345 kV gas insulated switchgear ("GIS") switch
308 bus at Fisk; 2) two 345 kV to 138 kV autotransformers: 3) two new
309 138 kV shunt capacitor banks; and 4) other bulk equipment necessary to
310 accommodate these facilities.

311 • Construct an underground 345 kV circuit consisting of 2 miles of new
312 cable installed within an existing duct package, which will terminate at the
313 Taylor substation.

314 • Modify existing substation facilities at Taylor to accommodate the new
315 line.

316 Q. **Does Phase II contemplate work for the 138 kV system as well?**

317 A. Yes. Phase II includes reconfiguring a 138 kV line (#1324), which currently runs from
318 the Bedford Park substation to the Crawford substation, and then to the Fisk substation.
319 The reconfigured 138 kV line will run from Bedford Park to Crawford, while the
320 Crawford to Fisk portion, which was built to 345 kV standards, will be used as the new
321 Crawford to Fisk circuit. This work will not entail the construction of new facilities,
322 except for new poles that must be installed on ComEd's substation properties. This
323 configuration was contemplated for and discussed in the West Loop – Phase I docket.
324 There also will be 138 kV substation work at the Fisk substation to accommodate the new
325 autotransformers and capacitors.

[3] While ComEd does not own or operate the Crawford and Fisk generating stations, ComEd owns and operates a substation at the site of each generating station, which ComEd identifies as the Crawford and Fisk substations.

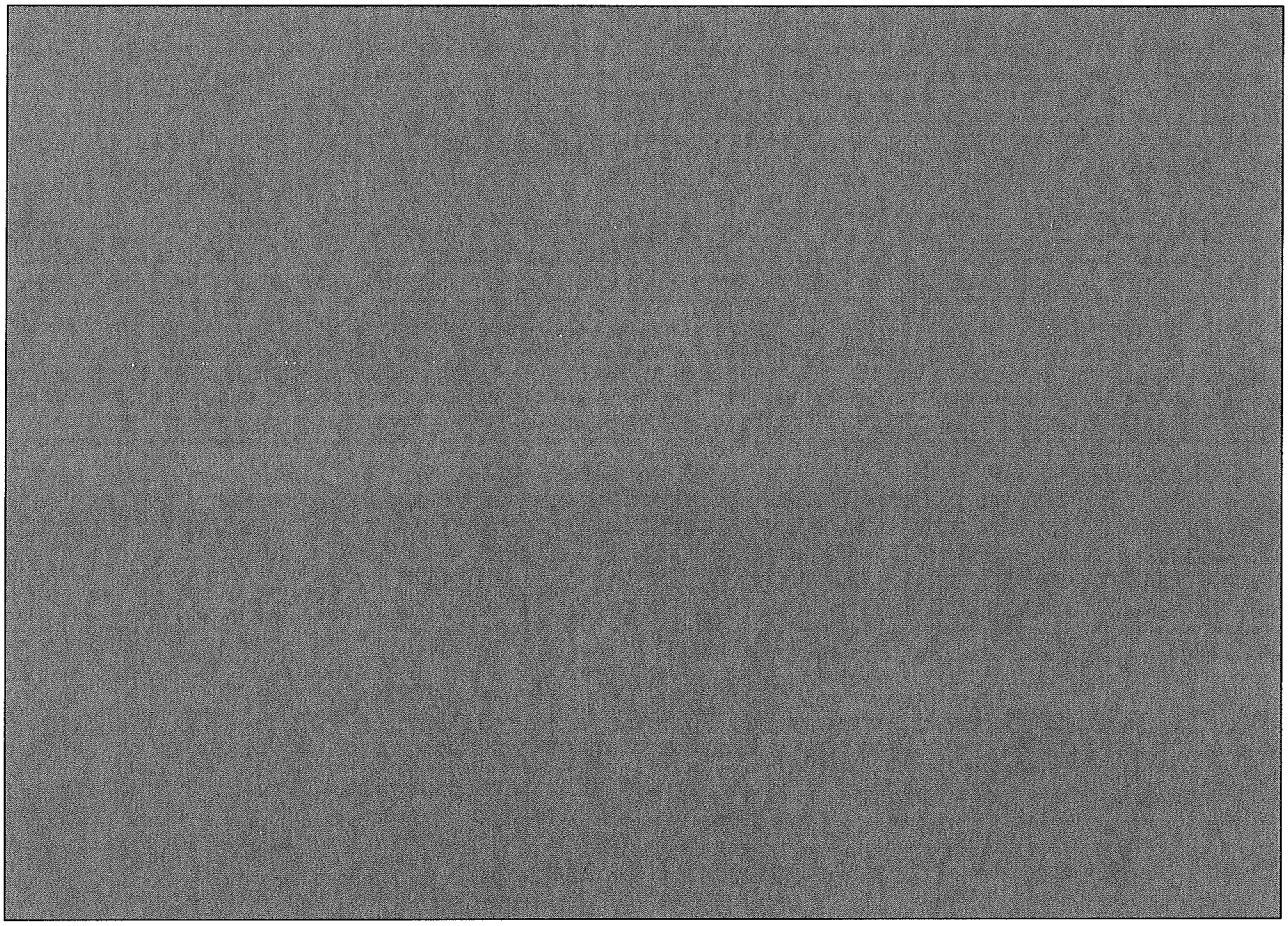
Q. **Why is this 138 kV work necessary?**

A. This work will allow us to utilize the existing overhead towers for the new 345 kV circuit.

Q. **Will Phase II alleviate the overloads you described above?**

A. Yes. As shown on Tables TWL-1, TWL-2 and TWL-3, each of the overloads we identified would be alleviated by Phase II. Slide 4 depicts the projected status of ComEd's transmission system assuming that the Crawford and Fisk generating stations are unavailable, that the two contingencies identified above remain in effect, and Phase II is constructed.

335 **Confidential CEII Slide 4:**



336

337 Q. **Will the implementation of Phase II complete ComEd's efforts to serve load in the**
338 **central business district?**

339 A. No. As noted in the testimony of ComEd witness Jennifer Sterling in the Phase I
340 proceeding, ComEd's plans also include the installation of additional 345 kV lines
341 between the Burnham and Taylor substations, or Phase III. Docket No. 05-0188, Sterling
342 Dir., ComEd Ex. 1.0, 17:367-70. Phase III, however, will be addressed in a future
343 proceeding.

Q. **If the Crawford and Fisk generating stations continue to be in service past 2012, is ComEd's investment in Phase II wasted?**

A. No. In fact, Phase II will provide immediate benefits to the transmission system serving the central business district. In particular, Phase II will reinforce existing 345 kV facilities and provide redundancy for the transmission facilities that serve the central business district. Also, installation of 2 new autotransformers at the Fisk substation decrease reliance on the ***begin confidential CEII*** XXXX

366 • Construct 4 new 138 kV lines: 2 from the Taylor substation to the
367 Dekoven substation (approximately ½ mile), and 2 from the LaSalle
368 substation to the Quarry substation (approximately 3 miles). ComEd does
369 not have rights-of-way for these new lines.

370 The cost of Alternative 1 is approximately $213 million. Meanwhile, Alternative 2
371 would require:

372 • Install 2 new 345 kV lines from Skokie TSS 88 to Northwest TSS 114,
373 approximately 8.2 miles in length: approximately 3.6 miles of overhead
374 line and 5.2 miles of underground line. Install 2 autotransformers at the
375 Northwest substation, plus a new 345 kV bus.

376 • Install 2 new phase-shifting transformers and 2 new 138 kV cables from
377 the Northwest substation to the West Loop substation – the lines would be
378 approximately 4.5 miles long and would require the acquisition of new
379 rights-of-way.

380 The cost to complete Alternative 2 is approximately $533 million.

381 Q. **Do you consider these alternatives to be a reasonable substitute for ComEd's**
382 **proposed Phase II?**

383 A. No. While, each alternative would relieve the overload problems that would arise under
384 our load flow studies, ComEd did not find these alternatives to be reasonable. First,
385 unlike Phase II, both alternative proposals would require ComEd to acquire new rights-
386 of-way. Not only is the acquisition of such rights expensive, it likely would delay the
387 completion of the project. Second, each of these alternatives is more costly than Phase II.
388 Further, with regard to Alternative 1, the Taylor substation would become even more
389 critical to serving the Chicago central business district because it would concentrate more
390 risk to the City's load at that substation. In my opinion, such a result is contrary to our
391 efforts to reduce risks to the City's load.

392 Q. **Did you consider any other types of system reinforcement that did not involve AC**
393 **transmission lines?**
394 A. Yes. As noted above, ComEd considered a generation-based alternative. In particular,
395 ComEd evaluated the possibility of installing a 500 MW of gas-fired generating unit at
396 Fisk. Admittedly, our evaluation was not in-depth. This was due to estimated cost to
397 install such a facility, which is approximately $1000 per kW installed, or $711 million.

398 Q. **Do you consider this type of reinforcement an alternative?**
399 A. No. This alternative is far more costly than ComEd's Phase II proposal.

400 Q. **Did ComEd evaluate whether energy efficiency or demand-side management efforts**
401 **could solve the overload problem identified in studies discussed above?**
402 A. Yes. ComEd used PJM load data for the 2012, 2013 and 2015 studies. For 2012 and
403 2013, this data incorporates the impact of energy efficiency efforts. However, the 2015
404 study was initiated prior to obtaining energy efficiency information for that period.
405 Nonetheless, energy efficiency efforts would not relieve the overloads in 2015. At best,
406 the impact of energy efficiency efforts in 2015 would be negligible. Meanwhile,
407 demand-side management ("DSM") efforts cannot reasonably offset the 1,036 MW of
408 generation that the Crawford and Fisk generating stations contribute to meeting the
409 central business district's peak load of approximately 3,500 MW.

410 **IV. <u>Funding the Proposed Construction</u>**

411 Q. **What is the estimated cost of the proposed project?**
412 A. $178 million.

413 Q. **Where will the funds come from to pay for the construction?**

414 A. Construction funds will come from ComEd's construction budget. ComEd is capable of
415 financing the construction of the line and substation without adverse consequences for
416 ComEd or its customers.

417 Q. **Does ComEd's plant construction budget provide for construction of these lines?**

418 A. Yes. Amounts budgeted for the construction of these lines represent less than six percent
419 of ComEd's total plant expenditures (including indirect costs) for 2010 through 2012.

420 Q. **Does this complete your direct testimony?**

421 A. Yes.