

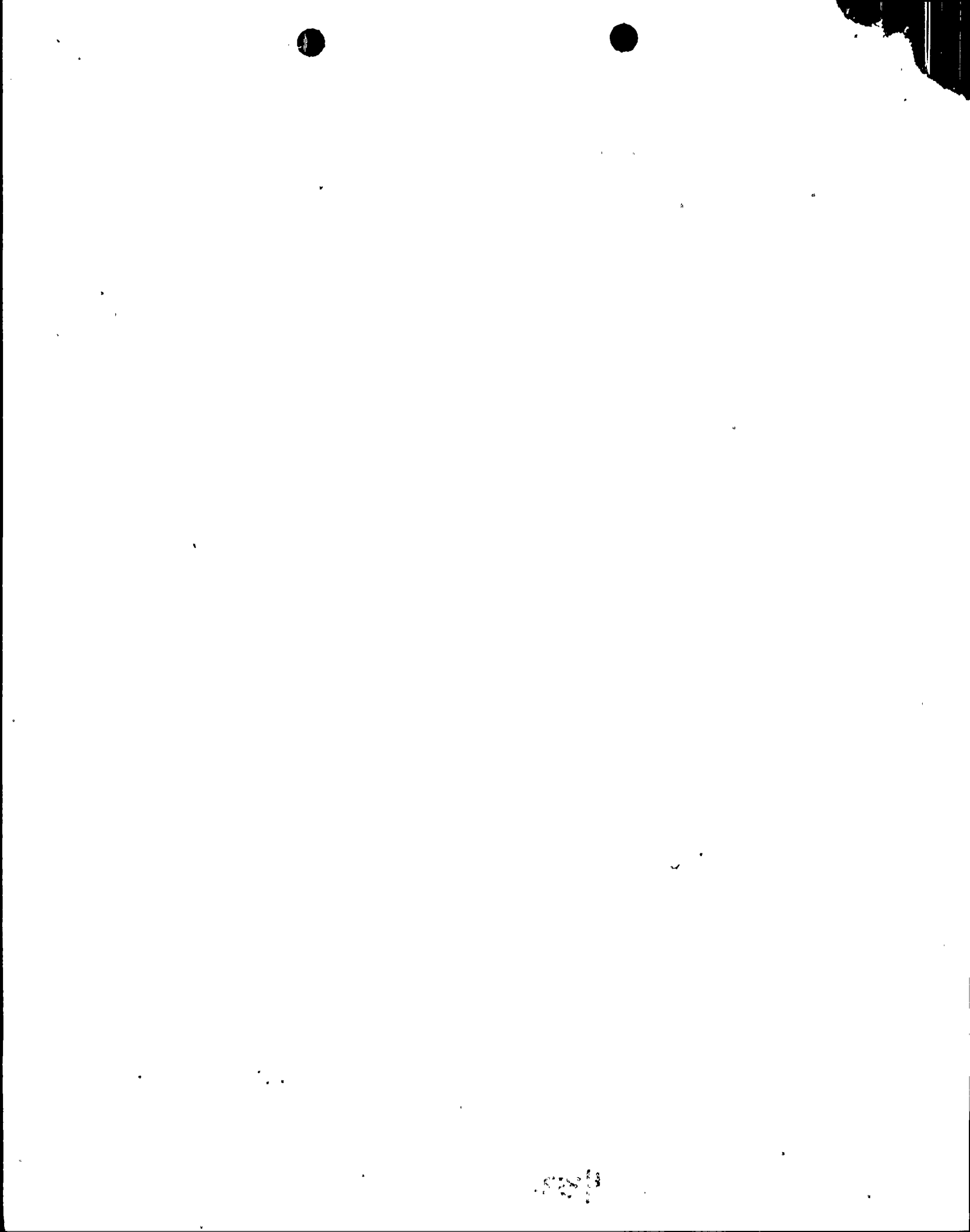
APPENDIX F

COST COMPUTATION FOR COMPRESSED GAS

INSULATED TRANSMISSION LINE

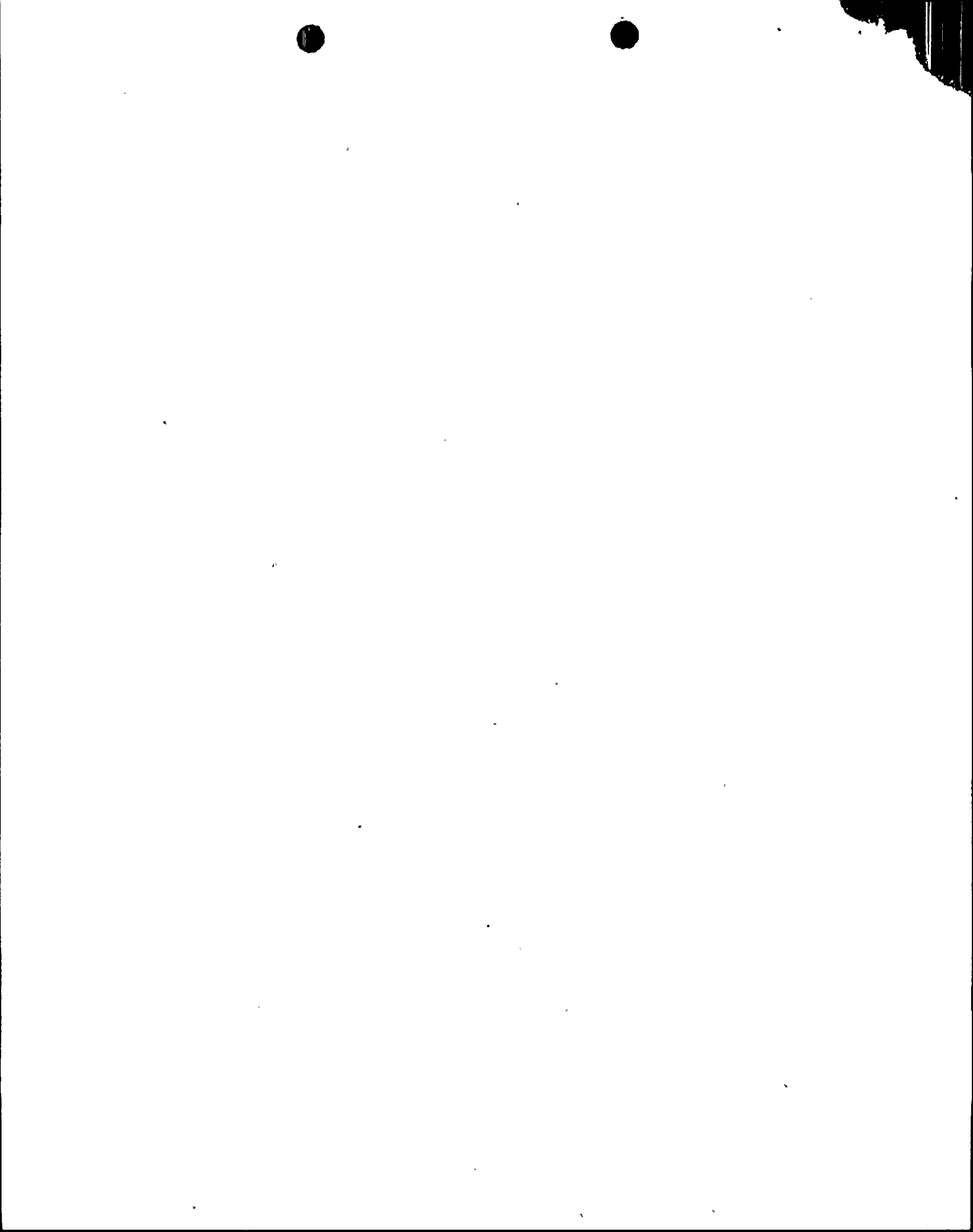
A 500 kV compressed gas insulated ("CGI") transmission line capable of carrying 2720 MVA power load contains a 7" diameter conductor inside a 20" diameter sheath. Both are made of aluminum. The conductor is supported inside the sheath on expoy insulators, the space being filled with SF₆ gas at 50 psig for high voltage insulation. The conductor is installed in the sheath at the factory and shipped in 60' sections. These sections are welded together in the field. Any elbows required are also made in the factory. Only straight welded joints are required for the sheath. During field installation the bus must be kept clean and dry. As each section is installed it is inspected, vacuumed and cleaned. At the end of each working day the assembled sections are pressurized with dry air and nitrogen to 5 psi. After the system is welded together it is pressurized with dry air and nitrogen containing a small quantity of SF₆. The welds and fittings are then given a leak test with an SF₆ sniffer. The system is then evacuated with a vacuum, then filled with clean, dry SF₆ gas to the required density. Moisture content of the gas is measured and must be below 300 ppm. Gas monitoring systems are installed to ensure that the SF₆ gas is within operating limits, with alarms to indicate loss of gas. The CGI SF₆ system is static and sealed with no circulation of gas.

After installation, the CGI system is given a high voltage AC test, usually with a transportable resonant transformer set, and is then ready for service.



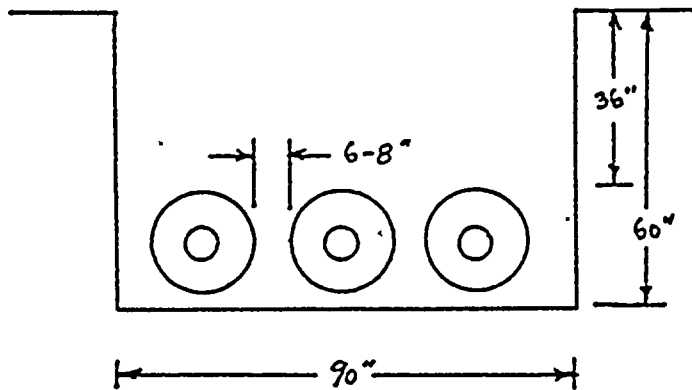
The 500 kV CGI system requires a trench 90" wide and 60" deep. The excavated material is disposed of and then the trench backfilled with thermal sand.

As shown in the computation below, a CGI 500 kV system costs eight times as much as a 500 kV overhead transmission line. The cost to place the 44 mile Susquehanna-Sunbury, the 53.9 mile Susquehanna-Siegfried and the 30.2 mile Susquehanna-Stanton lines underground is estimated at \$544 million. Overhead construction for these lines is \$67 million. The underground costs do not contain such factors as additional circuits required for reliability due to length of time required to locate faults and repair cables.



CGI SYSTEM PER MILE COST

500 kV System, 2720 MVA capability, 7" conductor, 20" sheath, isolated phase construction. All costs are 1978 dollars.



Trench volume 1.39 cu yd / lin foot

Surface area 9.5 sq ft / lin foot

CIVIL ENGINEERING:

Road crossings:

1-30' crossing / mile

Remove asphalt

90' x 30' → 225 sq ft @ 1.25 / sq ft

281

Repave with asphalt

@ 1.65 / sq ft

371

Excavation 1.39 cu yd x 5280 x 30.24 \$ / cu yd

221937

Disposal of earth 1.39 cu yd x 5280 x 8 \$ / cu yd

58714

Backfill with sand 1.39 x 5280 x 18 \$ / cu yd

132106

Re seed RLW $(\frac{90' + 90'}{12} \times 5280')$ / 43560 sq ft / acre x 1700 / acre

3091

=

416500

CGI EQUIPMENT COMPONENT COSTS

CGI Bus (665 \$ / 3φ foot) x 5280

3511200

Sweep elbows (2 / mile @ 13270)

26540

Gas monitoring system 5280 / 1250 x 3850

16262

Cathodic Protection

Potential source (6 \$ / 3φ foot) x 5280

31680

Grounding & Monitoring

2000

3587682

CGI EQUIPMENT INSTALLATION COSTS

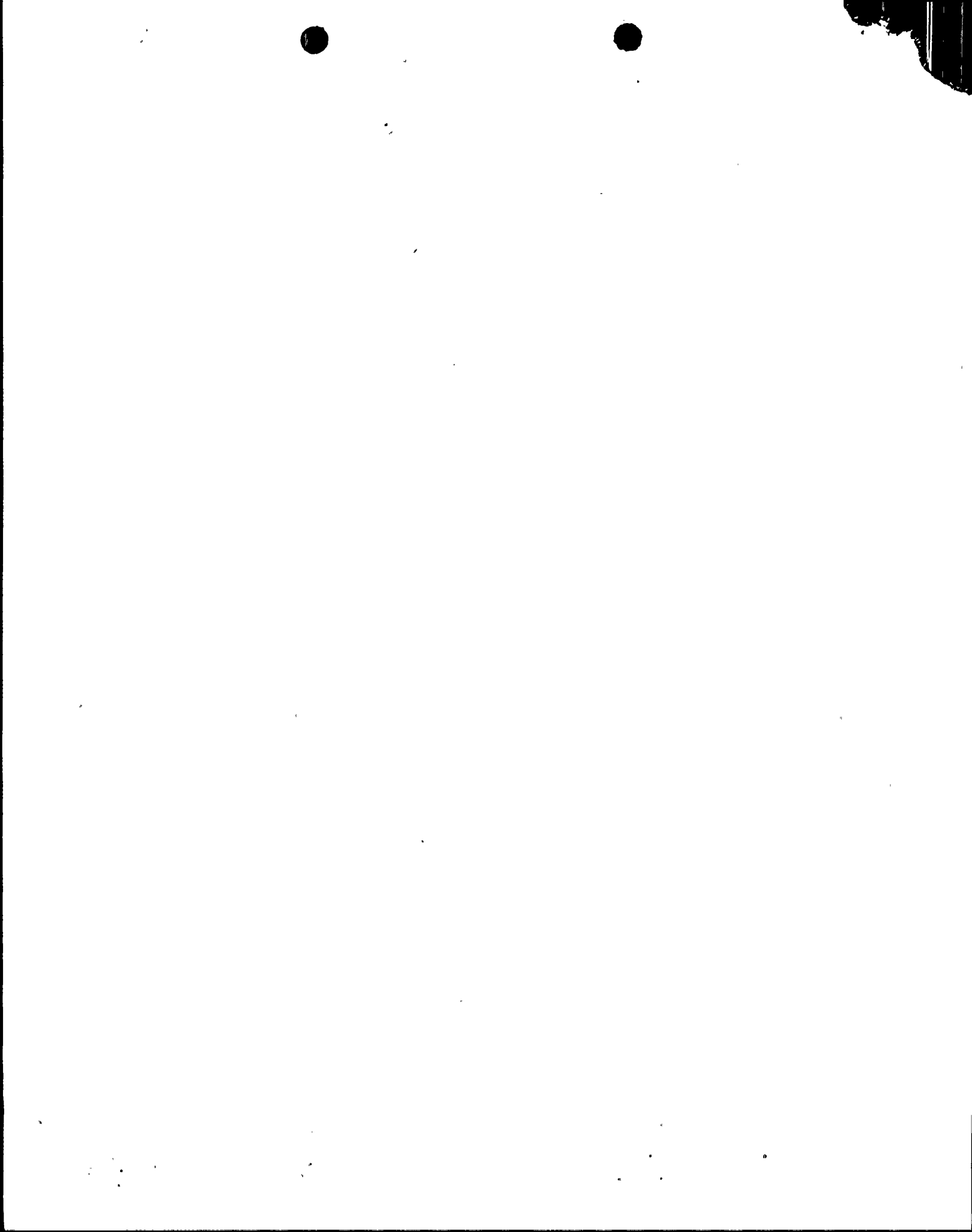
CGI Bus		192 449
Manhole & Piping	5280/1250 x 5200	21 965
Gas Monitor System	5280/1250 x 3400	14 362
Cathodic Protection		<u>4 000</u>
		232 775

TOTAL PER MILE COST WITHOUT LOSSES

Civil work	416 500	
CGI equipment	3 587 682	
CGI installation	<u>232 775</u>	
	4 236 957	→ \$4,240,000
Plus 2 terminations @ 65000		130,000

REFERENCE

R.L. Schmid, et al, "Economic Study of the Application of Compressed Gas Insulated Transmission Lines," 7th IEEE/PES Transmission and Distribution Conference and Exposition, April 1-6, 1979



SUSQUEHANNA 500 kV LINES

UNDERGROUND COST ESTIMATE

Sunbury Line: 44 mi x \$424000/mi + 130000 = \$187 million
Siegfried Line: 53.9 mi x \$424000/mi + 130000 = \$229 million
Stanton Line: 30.2 mi x \$424000/mi + 130000 = \$128 million

Total: \$544 million

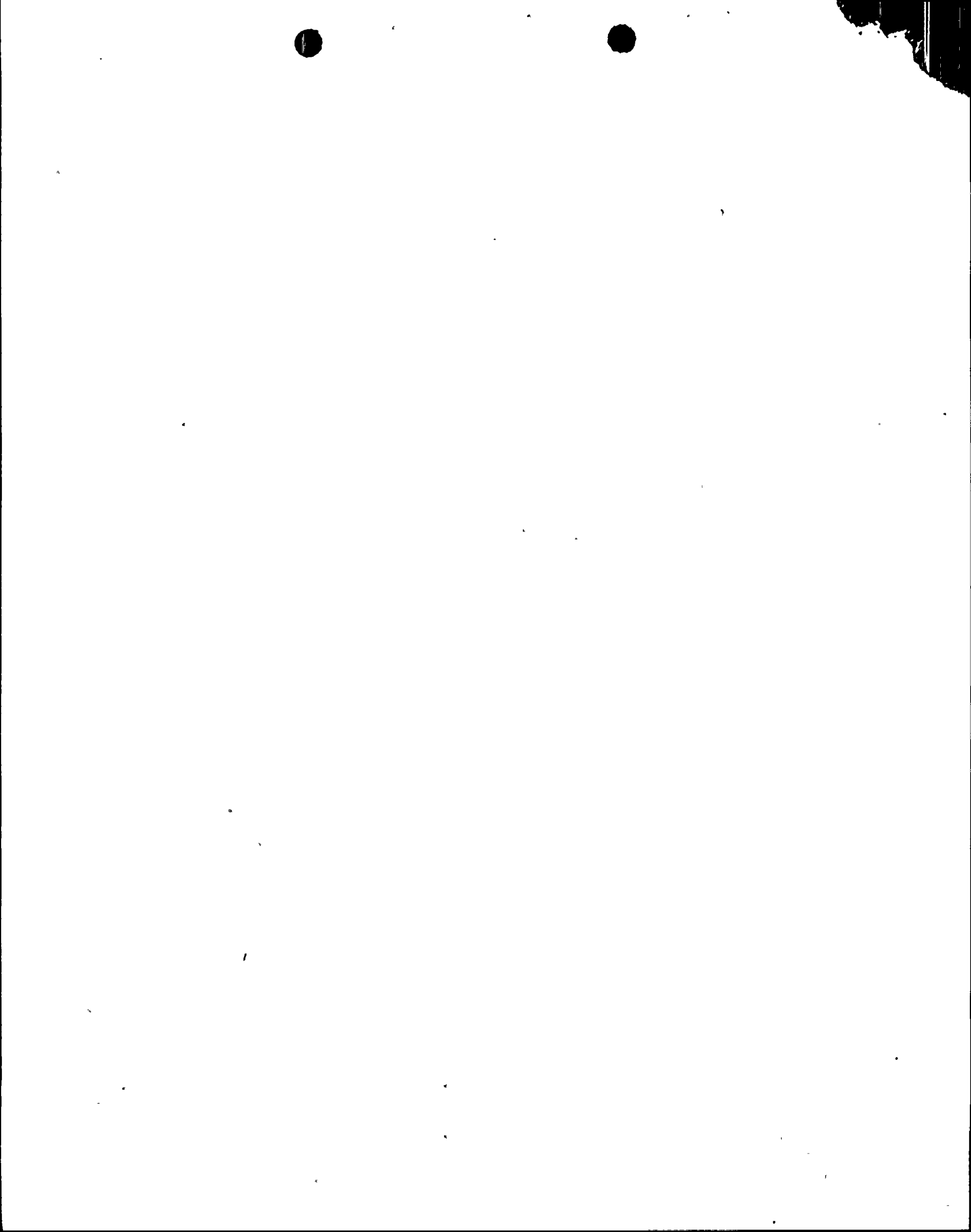
COST OF OVERHEAD LINES

Overhead construction is \$524000/mile

$(44 + 53.9 + 30.2) \times \$524000 = \$67 \text{ million}$

COST COMPARISON

Underground/Overhead = \$544 million/\$67 million = 8.1



BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
 PENNSYLVANIA POWER & LIGHT COMPANY)
)
 and)
)
 ALLEGHENY ELECTRIC COOPERATIVE, INC.)
)
 (Susquehanna Steam Electric Station,)
 Units 1 and 2))

Docket Nos. 50-387
 50-388

SERVICE LIST

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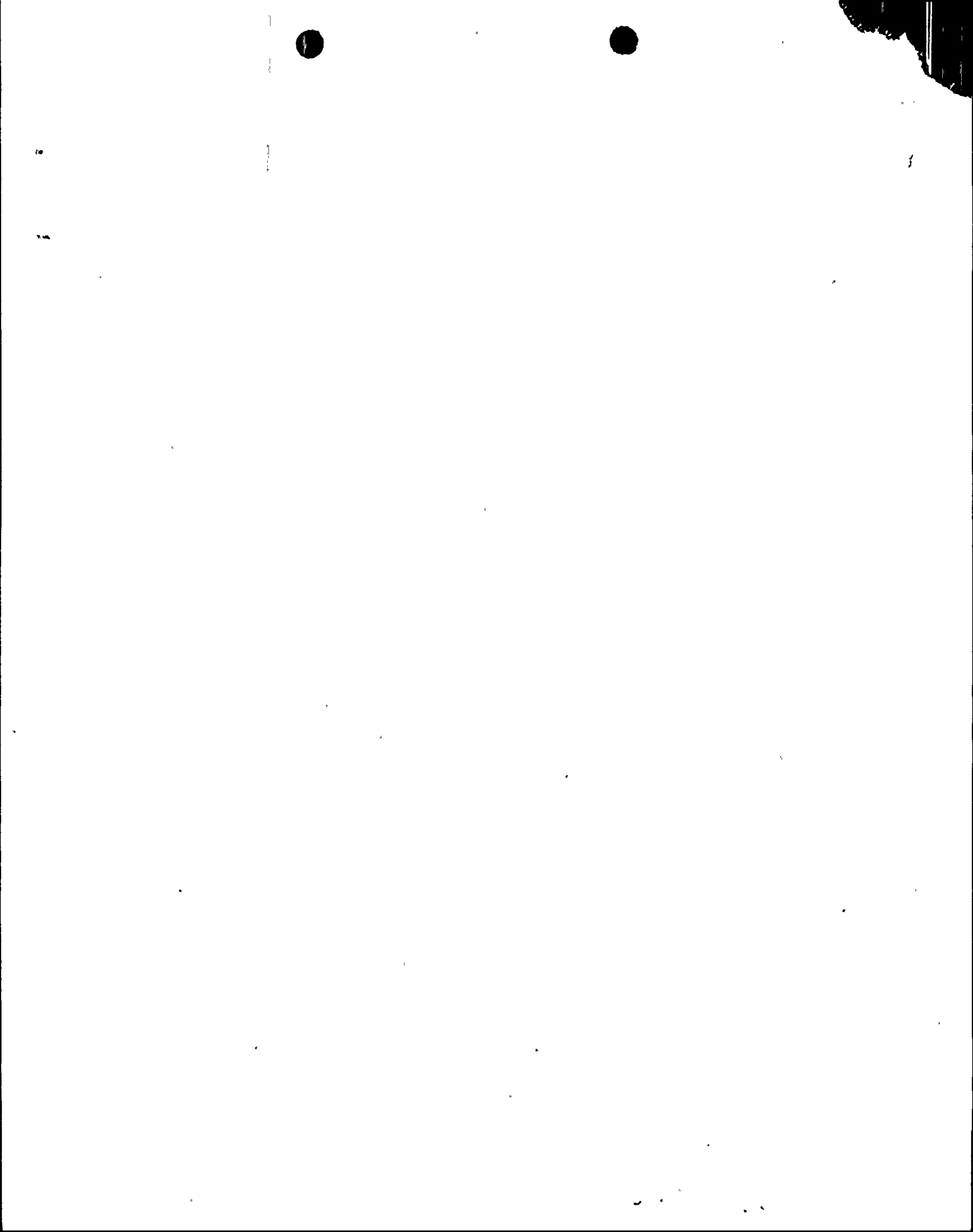
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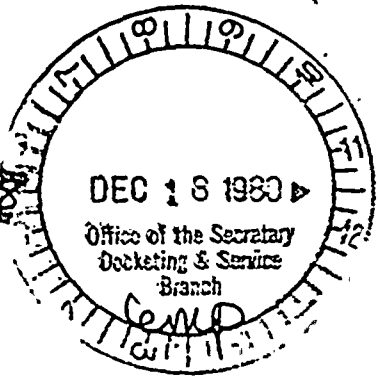
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DOCKET NUMBER

PROD. & UTIL. FAC.

50-387/388



Samuel Chilk, Secretary
Docketing & Service Branch
U. S. Nuclear Regulatory Commission
Washington DC 20555

December 14, 1980
Mt. Bethel, PA

Dear Mr. Chilk:

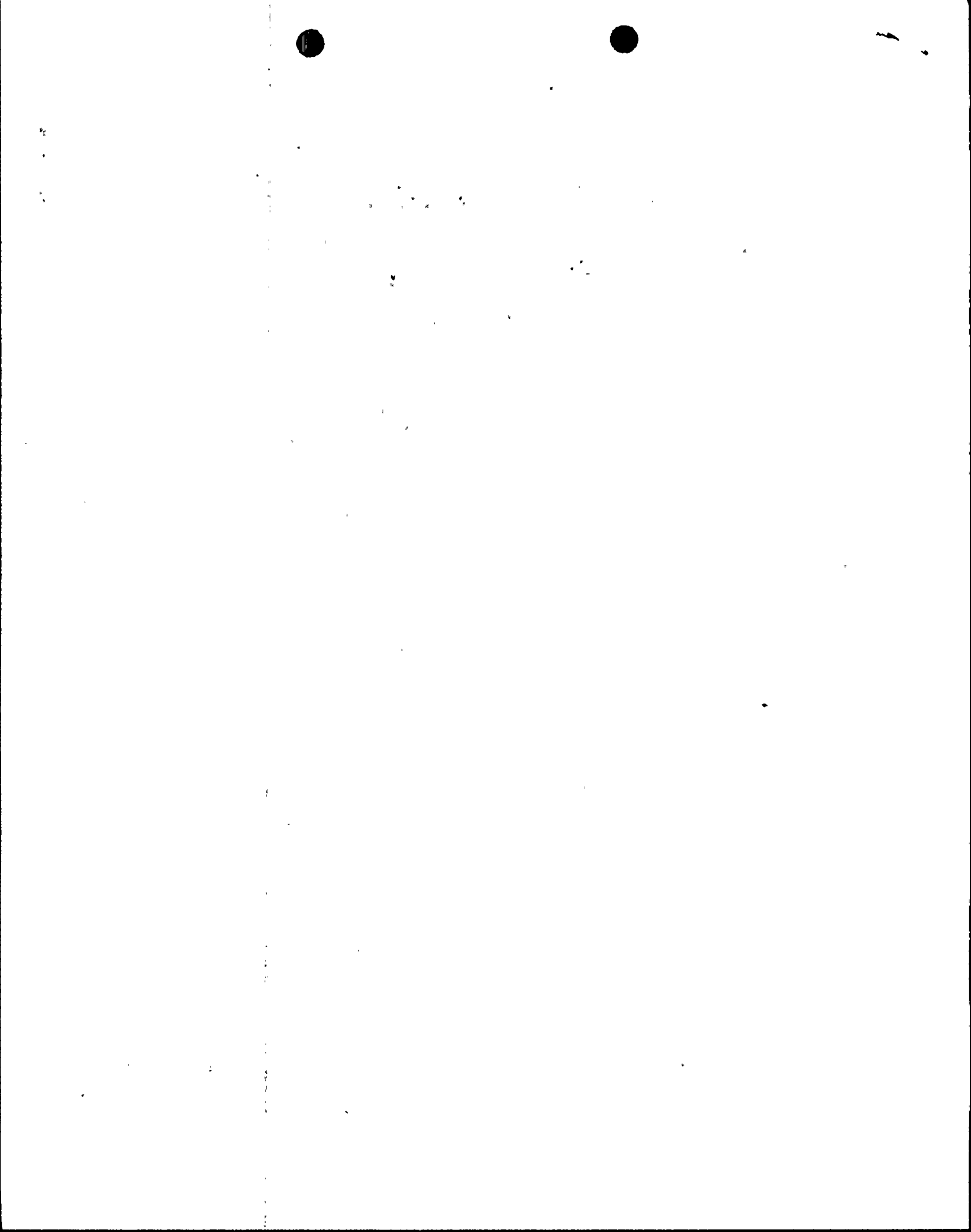
I am writing to request time to make a Limited Appearance Statement at the licensing hearings for Pennsylvania Power and Light's Susquehanna Steam Electric Stations 1 and 2 now under construction in Berwick, Pennsylvania (Docket numbers: 50-387 and 50-388).

Please inform me when and where these hearings will take place and when I will be able to speak. I also would like to request that time be made available in the evenings and/or on weekends for these statements to insure greater public input.

Thank you. I look forward to hearing from you soon.

Sincerely yours,

Robert L. Dorough
R.D.#1 - Box 798
Mt. Bethel, PA 18343



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)

PENNSYLVANIA POWER AND LIGHT)
COMPANY)

(Susquehanna Steam Electric)
Station, Units 1 and 2))
)
)
)

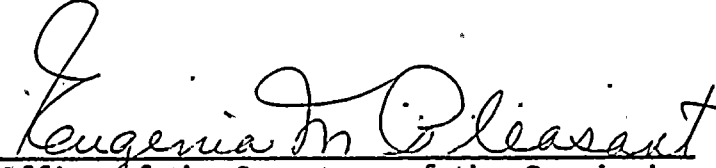
Docket No. (s) 50-387
50-388

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document(s) upon each person designated on the official service list compiled by the Office of the Secretary of the Commission in this proceeding in accordance with the requirements of Section 2.712 of 10 CFR Part 2 - Rules of Practice, of the Nuclear Regulatory Commission's Rules and Regulations.

Dated at Washington, D.C. this

18th day of December 1980.


Eugenia M. Pleasant
Office of the Secretary of the Commission

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)

PENNSYLVANIA POWER AND LIGHT)
COMPANY, ET AL.)

(Susquehanna Steam Electric)
Station, Units 1 and 2))

Docket No.(s) 50-387
50-388

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