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Company: Kansas City Power & Light Company
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MISSOURI PUBLIC SERVICE COMMISSION

UTILITY DIVISION

SCHEDULES 1 THROUGH 7

OF

DIRECT TESTIMONY

OF

MARK L. OLIGSCHLAEGER

Jefferson City, Missouri
February, 1987

OFFICIAL CASE FILE
MISSOURI PUBLIC SERVICE COMMISSION

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KANSAS CITY POWER & LIGHT COMPANY
CASE NO. HO-86-139

INDEX

OLIGSCHLAEGER

KANSAS CITY POWER & LIGHT COMPANY

A STUDY OF KCPL'S STEAM HEAT BUSINESS

December 1981

By

Corporate Planning Department

Corporate Planning & Finance Division

A STUDY OF KCPL'S STEAM HEAT BUSINESS

I. INTRODUCTION

This study of KCPL's Steam Heat operations is in four parts. Following this Introductory Section, Section II addresses the history to add perspective, the physical aspects of the system, the current status of the business, and a discussion relating to allocation of costs, pricing, and financial results. Section II includes a discussion of the financial modeling approach taken and assumptions made to analyze alternative courses of action. A decision tree is developed to illustrate these alternatives.

In Section III an analysis of financial feasibility is performed. This is a graphical analysis consisting of price, rate of return, and cash flow comparisons. Once financial feasibility is evaluated, alternatives to continued operation are addressed in Section IV.

II. REVIEW OF THE BUSINESS

A. History

The distribution of steam for heating purposes was begun by the Kansas City Electric Light Company (a forerunner of KCPL) at its first incandescent light plant at 604 Wall Street. This address is now known as 604 Baltimore. This plant began operation in 1888. The distribution and sale of steam offered an economic outlet for an otherwise waste product by operating engines at an exhaust pressure slightly above atmosphere. The increase in exhaust pressure did not materially increase the cost of electric energy and it made it practical to transmit the steam for heating purposes. Steam heat sales met with such success thet the Kansas City Heating Company was formed in 1905, and the 604 Wall Street Station became Heating Station No. 1.

When the plant was abandoned as a primary source of electrical power due to the advent of condensing type equipment, the original boiler installation was converted to a heating plant so that steam service to customers could continue. Steam service was recognized as an aid in the sale of electric energy to large office buildings, stores, hotels, and others who might have produced their own electricity in an isolated plant, and used the exhaust steam to provide their own heat. The sale of steam made it possible for the Company to offer a complete service to the downtown district.

The increased demand for steam in the downtown area necessitated the construction in 1907 of a more modern heating plant, which was located at 1308-10 Baltimore Avenue. By 1917 the Kansas City Heating Company had ceased to exist and steam heat operations became a department of a predecessor of KCPL. Growing heat and electrical demand necessitated construction of the Wyandotte Station immediately west of the 1308-10 Baltimore location. These plants were connected and operated jointly as Heating Station No. 2.

Prior to 1929 all steam for the heating system was supplied by Heating Station No. 1 and Heating Station No. 2. Station No. 1 was located near the north end of the distribution system and Station No. 2 was near the south end. By 1929 the boilers in Station No. 1 were 40 years old and completely worn out.

In 1927, the Missouri River Power House was purchased from the Kansas City Transit Company. Modernizing the equipment in this plant, later to be called "Grand Avenue Station," offered the opportunity to produce steam heat in a very economical manner. A high pressure (185 lb.) steam main had to be constructed between Grand Avenue and old Heating Station No. 1 at 6th and Baltimore and pressure reducing equipment was installed in Station No. 1 at this time. These additions were completed in 1929. Grand Avenue virtually eliminated the use of the older heating plant at Heating Station No. 1.

It was also recognized that the equipment located near 13th Street would soon become obsolete, so in 1930 another high pressure main was constructed from 6th and Grand to 10th and McGee. Then in 1954 this main was further extended south to 14th Street to a pressure reducing station (Heating Station No. 3) in the basement of the KCPL Parking Garage. This firmed up the south supply of steam and the adjacent Heating Station No. 2 was continued for peaking purposes only.

In 1958 a second high pressure main was built from Grand Avenue to 6th and Baltimore and ultimately it was extended to 13th and Wyandotte which gave both Stations 1 and 3 two firm main line supplies for steam. Both stations 1 and 3 were subsequently converted to automatic control and in 1958 Heating Station No. 2 was demolished and retired from the plant accounts.

B. Physical Characteristics

The heat utility plant can be considered in two parts. The steam distribution system and the portion of the electric plant which is used to generate steam for heating.

The steam distribution system consists of desuperheating stations at 604 Baltimore and 1319 Wyandotte, which are used to reduce the pressure of the incoming steam for customer use and the underground conduit, steam mains, steam services, and meters which are used in distributing steam to our heat utility customers. From 1918 to 1980, the total length of steam mains has increased from 26,292 feet to 61,520 feet. The bulk of this increase occurred in 1930, 1954, and 1958 when mains were added from Grand Avenue to both the north and south ends of the distribution system. Since 1960 only 11,172 feet have been added. This is a 22% increase which means that the mains have been extended by about 1% per year for the past 20 years. There has been very little growth in the number of customers or the addition of steam mains during this period. The downtown service area is outlined in Illustration A. It extends north to 6th Street and south to 14th Street. The east-west boundaries are Oak and Broadway.

As can be seen in Table 1, the steam distribution plant has a dollar weighted average age of about 23 years, the bulk of the investment is in underground conduit and steam mains. The original distribution system, however, was built by the Kansas City Heating Company in 1905 and is, therefore, over 75 years old. The physical age of properties in the Steam Distribution Accounts is apparent from the last column in Table 1, the age of the earliest existing vintages.

The meters which comprise a small part of the plant investment nevertheless have an important role in the heat utility business since they measure the steam sold to customers. Meters are of two types: condensate meters which measure the amount of steam condensate that exits the customer and flow meters which measure the flow of steam by measuring the drop in pressure across a customer location. The condensate meters are basically mechanical and are considered to be fairly accurate, but if the condensate is extracted

ILLUSTRATION A

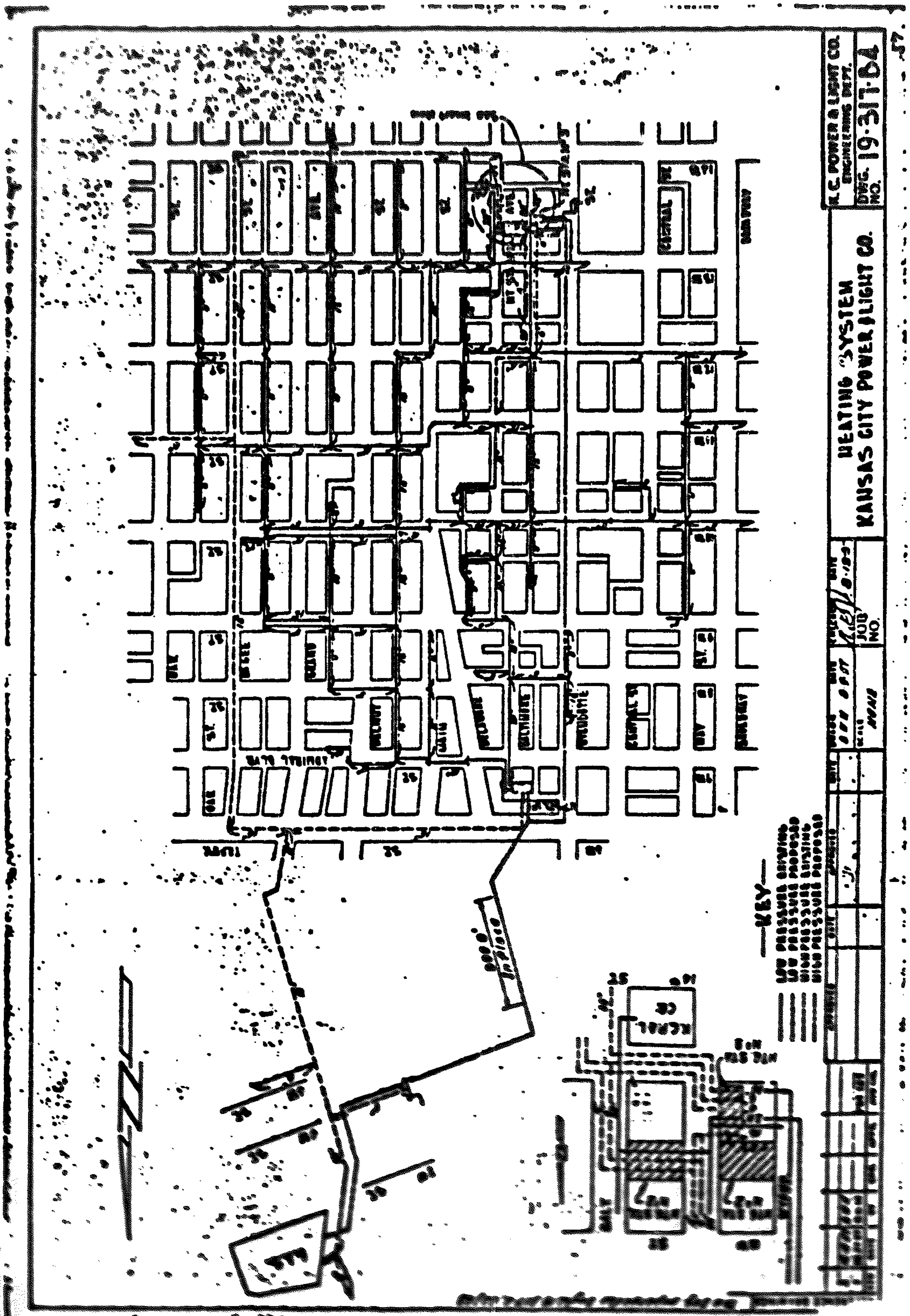


TABLE 1

Steam Distribution Accounts 12/31/80

Account	Plant Balance	Replacement Cost New	Replacement Cost New Less Depre.	Ave. Age	Age of Earliest Vintage
760 Land and Land Rights	$ 60,163	$ 268,419	$ 111,434	21.0 yr.	23.0
761 Structures and Improvements	15,183	—	—	—	—
762 Station Equip.	193,529	523,527	148,179	23.0	52.0
766 UG Conduit Steam Mains	2,994,907	17,999,185	3,422,825	23.0	52.0
769 Services	316,857	1,606,274	423,300	15.0	65.0
770 Meters	81,075	403,937	105,026	31.5	65.0
791 Office Furn. Equipment	1,167	4,413	369	53.0	67.0
794 Tools Shop and Garage Equip.	2,778	15,665	1,440	31.0	60.0
798 Misc. Equip.	153	445	79	24.5	24.5
Total	$3,665,812	$20,821,865	$4,212,652	22.5 yr.	

Steam Distribution Plant Totals

Year	Plant-In-Service	Deprec. Reserve	Net Plant
1960	2,902,311	889,648	2,012,663
1961	2,847,345	847,073	2,000,272
1962	2,881,518	896,150	1,985,368
1963	2,892,252	914,594	1,977,658
1964	2,968,267	962,594	2,005,673
1965	3,068,573	1,024,484	2,044,089
1966	3,257,598	1,051,331	2,206,267
1967	3,307,602	1,093,962	2,213,640
1968	3,381,512	1,168,347	2,213,165
1969	3,437,966	1,230,465	2,207,501
1970	3,500,055	1,294,795	2,205,260
1971	3,536,004	1,370,594	2,165,410
1972	3,586,424	1,433,040	2,153,384
1973	3,465,326	1,498,246	1,967,080
1974	3,473,938	1,573,127	1,900,811
1975	3,513,662	1,695,201	1,818,461
1976	3,578,864	1,786,974	1,791,891
1977	3,582,054	1,911,626	1,670,428
1978	3,618,500	2,040,060	1,578,440
1979	3,618,500	2,175,897	1,442,603
1980	3,665,812	2,304,364	1,361,448

prior to reaching the meters, they can give a low reading indication. The flow meters involve an electro-mechanical conversion to convert a drop in pressure to an electric current which can then be calibrated and measured. This calibration procedure can lead to inaccuracies in measurement. The meter investment is 31.5 years old on a dollar-weighted average basis.

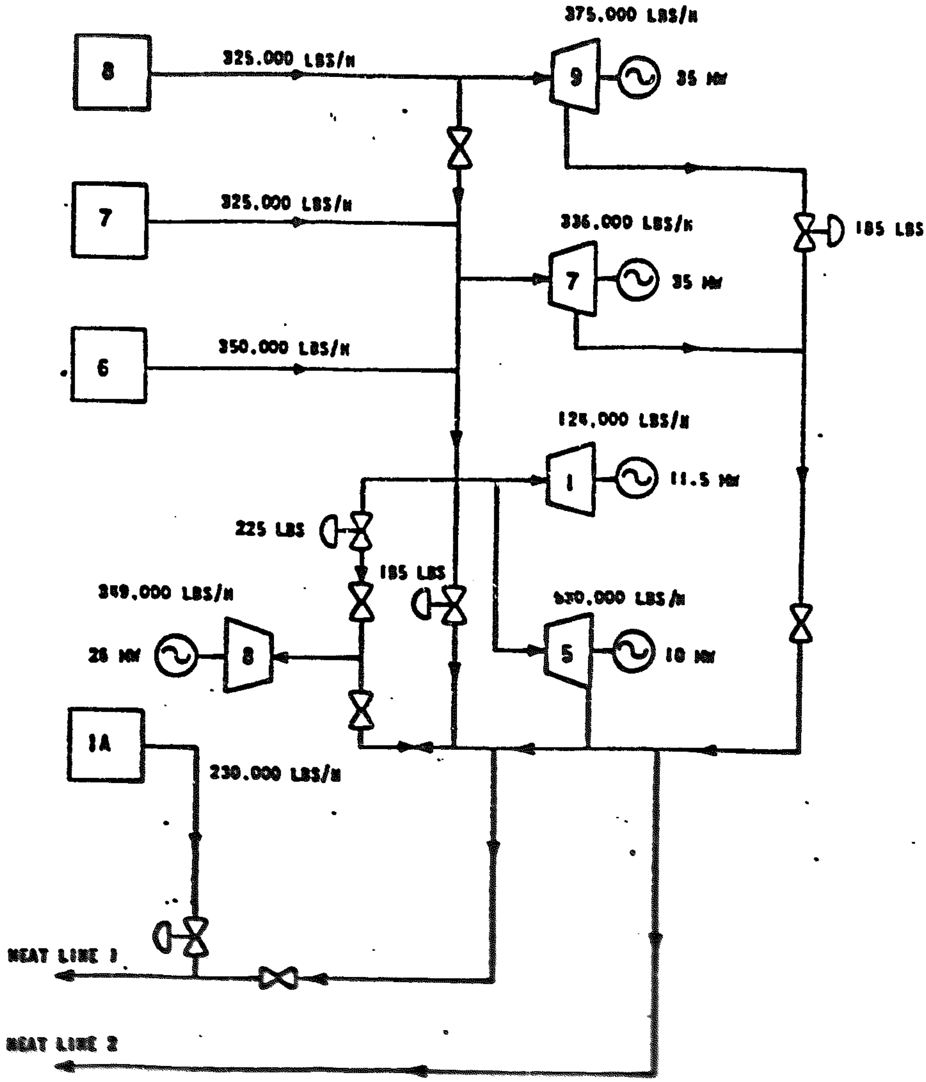
As can be seen in Table 1, the plant balance of the steam distribution system including mains and meters at December 31, 1980, was $3,665,812. Replacement cost new was estimated to be $20,821,865 based on Handy Whitman Indexes and the replacement cost new less depreciation was estimated to be $4,212,652. Plant in service has only increased from $2,902,311 to $3,665,812 over the last 20 years. Net plant has decreased over this period from $2,012,663 to $1,361,448, so very little has been added to Distribution Plant.

The remaining plant used to generate steam for heating is located at Grand Avenue station. Grand Avenue station is located on the Missouri River near the main business district of Kansas City, Missouri. Steam is produced in boilers at a nominal pressure of 650 PSIG for use in electric generation and at 185 PSIG for delivery to the Steam Department after suitable pressure reduction. The Steam Department then distributes steam at 185 PSIG, 100 PSIG, and 10 PSIG to steam customers. Prior to being purchased by KCPL, Grand Avenue Station had seven 25-cycle turbines with a combined generation of 59,000 kW. Realizing that the 25 cycle demand would be reduced as the electric railways were phased out, KCPL began converting the plant to 60 cycle. KCPL eventually installed 107,500 kW of 60 cycle and 10,000 kW of 25 cycle capacity removing five older turbine units having a capacity of 39,000 kW. The remaining 20,000 kW of older 25 cycle capacity was ultimately retired with the elimination of the electric transit system, and the newer 10,000 kW, 25 cycle unit was converted to 60 cycle by the addition of a frequency converter. There are currently three coal or gas fired boilers--#6, #7, and #8--and one boiler, #1A, which is fueled by oil or gas. Boiler #1A is currently in a state of disrepair and its future use is questionable. Electricity is produced in high pressure turbines #1, #7, and #9 and topping turbine #5. The low pressure steam from turbine #5 was previously used to serve low pressure turbine #8 and supply steam to the steam department. In 1977, low pressure turbine #8 was taken out of service. Low pressure steam is now all provided to the steam department either directly from boilers through pressure reducing valves or from topping turbine #5 which exhausts steam at 185 PSIG and, therefore, pressure reduction is not required. A schematic of the Steam Generating System at Grand Avenue is depicted by Illustration B.

Condensed steam from the turbines is returned to boilers, however, condensate for the steam department is not returned to the station and requires complete make-up from the city water supply.

The maximum capacity of Grand Avenue was rated at 99,000 kW peak net generation from 1971 to 1977 although peak net generation of 108,000 kW was achieved as can be seen in Table 2 which gives some operating statistics on the station. From 1977 to present, it has been rated at 70,000 kW. As the related capacity of Grand Avenue has been reduced, so has the annual generation from 156,200 MWh in 1971 to 44,000 MWh in 1980. Future projections, also indicated on Table 2, are even lower reducing to 20,000 MWh and zero generation beyond 1990. The rated capacity at Grand Avenue is scheduled to be derated from 70,000 kW to 40,000 kW in 1982 when turbines #1, #5, and #7 will go on inactive reserve.

ILLUSTRATION B



* STEAM CAPACITIES ARE MAXIMUM CONDITIONS.

** TURBINE CAPACITIES ARE RATED.

TABLE 2

Grand Avenue Operating Statistics

Year	(000's) MWhs Net Genera-tion	Total and Fired MMBtu	Peak kW	Avg. Cents/ MMBtu	Total Fuel
1971	156.2	4,516,998	107,000	30.9	1,395,752
1972	157.6	4,744,884	108,000	33.0	1,565,812
1973	186.9	5,130,633	106,000	36.3	1,862,420
1974	154.5	4,397,835	107,000	42.6	1,873,478
1975	198.2	5,320,909	99,000	69.24	3,684,416
1976	203.1	5,624,476	99,000	84.2	4,735,802
1977	143.1	4,774,660	70,000*	90.17	4,305,439
1978	120.3	4,526,393	70,000	107.3	4,858,543
1979	127.9	4,776,599	70,000	128.89	6,156,558
1980	44.0	2,933,820	70,000	151.18	4,435,346

*Retired Boiler #8

Future Projections

Year	(000's) MWhs Net Genera-tion	MMBtu Excluding Steam	Peak kW	Cents/ MMBtu	Fuel Excluding Steam
1981	20.0	748,677	70,000	190.68	1,431,098
1982	20.0	748,677	40,000	226.0	1,692,010
1983	32.0	588,000	40,000	230.0	1,351.000
1984	28.0	525,000	40,000	285.0	1,498,000
1985	15.0	275,000	40,000	313.0	861,000
1986	35.0	640,000	40,000	334.0	2,138,000
1987	22.0	408,000	40,000	328.0	1,340,000
1988	36.0	655,000	40,000	429.0	2,807,000
1989	37.0	692,000	40,000	453.0	3,135,000
1990	20.0	369,000	40,000	591.0	2,182,000
1991	0.0	—	—	—	—

Table 3 demonstrates that the weighted average age of steam generating plant is approximately 35 years, but the property dates back to the early 1900s. The total plant in service at the end of 1980 was $20,959,272. The replacement cost new was estimated to be $120,408,317 and the depreciated replacement cost new was $18,666,077. This relates to 117.5 MW of name plate capacity that is currently rated at 70 MW. Of the $20,959,272 electric plant in service, $3,092,727 has been allocated to the heat utility business. Electric plant in service at Grand Avenue has only increased from $18,925,608 to $20,959,272 over the last 20 years. Net plant has decreased over this period from $10,863,294 to $6,232,547. Grand Avenue, like the Steam Heat Distribution System, has had very few additions made in the recent past.

Electrically, Grand Avenue serves mainly as a peaking unit and a central distribution point for providing electrical services to the downtown area. If the steam requirement were eliminated, some generation at Grand Avenue would still be required unless some changes are made in the distribution network. An alternative would be to operate Grand Avenue on a standby status as a gas fired unit. This alternative would necessitate a redesign of the electrical network that supplies downtown Kansas City. It has been estimated that this could reduce the O&M expenses at Grand Avenue by 67%.

C. Allocation Factors

The allocation of electric expenses to the heat utility operations was originally based on the philosophy that Grand Avenue station is primarily an electric generating peaking source and the steam demand of the steam department is a secondary by-product of electric generation. This philosophy has been followed even though steam service is not interruptible. This early allocation

TABLE 3

Grand Avenue Production Accounts 12/31/80

Account	Plant Balance	Replacement Cost New	Replacement Cost New Less Depre.	Ave. Age	Age of Earliest Vintage
310 Land	$ 626,252	$ —	$ —	—	—
311 Structures and Improvements	3,821,027	29,027,145	1,146,938	35.0 yr.	65.0
312 Boiler Plant	9,133,956	50,207,338	7,332,643	31.0	65.0
314 Turbo Generators	4,220,990	28,540,623	6,202,387	45.0	65.0
315 Accessory Elec. Equipment	2,911,234	11,794,968	3,764,941	30.0	65.0
316 Miscellaneous	245,813	838,243	219,168	24.0	65.0
Total	$20,959,272	$120,408,317	$18,666,077	34.5 yr.	
Allocation to Steam	$ 3,092,727	—	—		

Grand Avenue Station Totals

Year	Plant-In-Service	Deprec. Reserve	Net Plant
1960	18,925,608	8,062,314	10,863,294
1961	18,927,632	8,541,326	10,386,306
1962	18,958,992	8,995,740	9,963,252
1963	17,887,993	8,420,525	9,467,468
1964	17,925,099	8,647,892	9,277,207
1965	17,714,273	8,300,544	9,413,729
1966	17,723,214	8,734,810	8,988,404
1967	16,944,205	8,294,288	8,649,917
1968	18,120,128	8,728,749	9,391,379
1969	19,547,037	9,186,727	10,360,310
1970	19,165,511	9,310,581	9,854,930
1971	19,184,556	9,775,393	9,409,163
1972	19,207,834	10,262,524	8,945,310
1973	19,471,180	10,869,261	8,601,919
1974	19,516,503	14,428,956	5,087,547
1975	20,480,645	11,571,054	8,909,591
1976	20,477,190	12,194,754	8,282,436
1977	20,696,698	12,749,856	7,946,842
1978	20,735,710	13,431,567	7,304,143
1979	20,908,829	14,075,392	6,833,437
1980	20,959,272	14,726,725	6,232,547

was based on the steam heat demand that was coincident with one-hour peak electrical demand. Since 1953 the electrical peak has occurred in the summer causing a large part of the station's total costs to be borne by the electricity business. A study on steam allocations was performed by Black & Veatch in 1958 in detail on an item-by-item basis which confirmed this "peak allocation". This allocation method has been challenged several times by commission staff members. Only recently has this methodology been changed to give steam customers a larger percentage of costs to be shared with the electric business.

The largest component of cost for heat utility operations is purchased steam. This expense is basically the fuel and water expenses associated with producing steam for heat. These direct variable costs are determined on the basis of actual pounds of steam transferred to heat utility and pounds of make-up water used by the heat department.

Those expense items associated with operating and maintaining the boilers and other structures, O&M expenses, are allocated to the Steam Heat Department on the basis of the average of the monthly steam requirements supplied by the boiler facilities for use by the Steam Department as compared to the annual peak steam requirement of the Electric Department. Other allocations to the utility heat business are interdepartmental rent and Administration and General (A&G) expenses. The former consists of taxes, depreciation, and return on the electric plant allocated to steam. This allocation is made in the same manner as boiler O&M. The latter, Steam Heat A&G expenses, are a portion of the overall company's A&G expenses. This is also allocated in the same manner as boiler O&M. Further detail on steam allocations is provided in Appendix A which includes sample allocations and extracts of filed testimony from the last Missouri retail and steam filing, Case No. ER-81-42.

D. Steam Heat Prices

The growth in the steam business has been relatively slow. In 1918 annual sales were 440 million pounds, the price was 68 cents per thousand pounds, producing revenues of $300,000. The price of steam increased sharply to $1.50 per thousand pounds in 1921 at which time usage was 450 million pounds annually, producing revenues of about $700,000. After 1921, the price of steam declined steadily reaching a low of near 85 cents in the early 1930s. In 1960, 39 years later, the price of steam had risen again to $1.50 per thousand pounds, usage was 878 million pounds, and revenues were $1,324,539. By 1971, the price of steam was still around $1.50 per thousand pounds, usage was 1,141 million pounds yielding revenues of $1,700,000. By 1980, the price had climbed to $5.80 per thousand pounds, the usage was 633 million pounds, and the revenues were $3,660,000.

The price of steam heat has increased dramatically in the last few years. The only rate case prior to 1971 was in 1961 and that resulted in a lower steam heat rate being set at an average of $1.46. Since 1971, we have had six rate increases and the average cost of steam per 1,000 pounds has increased from $1.50 in 1971 to $5.80 at the end of 1980. The average revenue per 1,000 pounds for each year is shown in Table 4.

A comparison of other utilities' prices as compiled by The International District Heating Association reveals that in 1980 the price of steam per 1,000 pounds ranged from $2.50 to $15.00.

E. Customers and Financial Results

There were 210 steam customers at the end of 1980. Since 1971, the number of customers has declined from 272 to 210 billed at the end of 1980.

TABLE 4

Year	Avg. Annual Rate ($/1,000 lbs.)	Month of Rate Increase	Steam Customer Dollars Per Unit Of Heat Content ($/MMBtu)	Gas Customer Dollars Per Unit Of Heat Content ($/MMBtu)	Gas/Steam (Percent)
1971	1.50		1.29		
1972	1.50		1.29		
1973	1.50	June 73	1.29		
1974	2.00	Apr 74	1.72		
1975	2.70		2.32	.75	32%
1976	3.30	May 76	2.84	.95	33%
1977	3.80	Nov 77	3.27	1.50	46%
1978	4.50		3.87	1.75	45%
1979	5.20		4.48	2.00	45%
1980	5.80	Mar, Jul 1980	5.00	2.80	56%

TABLE 5

Year	Bldgs.*	Heat Degree Days	Steam Input Less Co. Use (MMlb.)	Sales (MMlb.)	Losses (MMlb.)	Percent Loss	Lbs. Steam Input/ Bldg/ ° Day	Lbs. Sales/ Bldg/ ° Day	Lbs. Losses/ Bldg/ ° Day
1960	307	--	1004.4	878	126.0	12.5	--	--	--
1961	304	--	977.6	859	119.0	12.2	--	--	--
1962	299	5019	980.7	872	109.0	11.1	653.5	581.1	72.6
1963	293	4782	967.4	841	126.0	13.0	690.4	600.2	89.9
1964	286	4442	954.4	832	122.0	12.9	751.3	654.9	96.0
1965	284	4528	1004.0	861	143.0	14.2	780.7	669.5	111.2
1966	278	4614	1108.7	966	143.0	12.9	864.4	753.1	111.5
1967	279	4623	1100.9	981	120.0	10.9	853.5	760.6	93.0
1968	281	4995	1242.4	1177	60.0	5.3	885.2	838.6	47.0
1969	280	5206	1382.4	1215	167.0	12.1	948.4	833.5	114.6
1970	281	4688	1399.5	1220	179.0	12.8	1062.4	926.1	135.9
1971	284	4529	1346.5	1141	205.5	15.3	1047.0	887.1	159.9
1972	283	5036	1354.5	1169	176.5	13.0	950.4	820.2	130.2
1973	286	4514	1218.8	1139	79.8	6.5	944.1	882.3	61.8
1974	267	4370	1137.6	882	255.6	22.5	975.0	755.9	219.1
1975	208	4636	1120.1	922	198.1	17.7	901.5	742.1	159.4
1976	268	4763	1126.6	868	258.6	23.0	882.6	680.0	202.6
1977	271	4728	1115.0	908	207.0	18.6	870.2	708.7	161.5
1978	252	5570	1243.5	864	379.5	30.5	885.9	615.5	270.4
1979	244	5264	1195.5	764	431.5	36.1	930.8	594.8	336.0
1980	238	4689	1053.0	634	419.0	39.8	943.6	568.1	375.5

*For the time period 1960-1970, total customers were used as a proxy for the number of buildings.

This number is slightly misleading since some of this decline in customers involved several customers being combined. A more indicative number is the number of meters or buildings served. The number of meters has declined from 284 in 1971 to 238 in 1980. Table 5 summarizes some of the key sales figures during the last 20 years.

Since 1960 the actual amount of business measured in terms of buildings served has decreased. This is reflected in steam input to the system. Steam input per building per degree day has not trended downward but has remained fairly constant. The annual sales in pounds of steam has declined significantly apparently due to two factors--fewer buildings served and fewer sales per building per degree day. The decrease in sales/building/degree day as compared to a relatively constant steam input/building/degree day indicates that "additional efforts be made to improve customer inspection and metering" as pointed out in a recent report made by System Power Operations. It is assumed in this analysis that if a rigorous effort is undertaken to improve customers' inspections and metering losses, unaccounted steam can be reduced to 17%. This is based on the average loss per building per degree day prior to 1978 divided by the average steam input/building/degree day over the 1971-1980 period.

Table 6 lists key financial results for the last 20 years. These results are rearranged to separate the variable components of purchased steam, O&M, general taxes, and the relatively fixed income tax and other expenses. For the past three years, steam heat revenues have not covered total costs. In 1980 such revenues did not even match variable costs which are essential to continuing operation.

These results indicate we have never earned a "reasonable return" on the steam investment. As the amount of sales in pounds of steam per customer per

TABLE 6

Year	Revenues	Purchased Steam (Variable)	O&M (Variable)	General Taxes (Variable)	Net Revenue	Income Tax & Other (Fixed)	Operating Income
1960	1,324,539	526,822	78,563	115,377	603,777	376,672	277,105
1961	1,253,243	510,244	90,724	108,104	544,171	380,031	164,140
1962	1,237,428	548,675	78,266	112,369	498,118	354,054	144,064
1963	1,169,674	538,756	85,136	106,516	439,266	318,855	120,411
1964	1,171,119	556,311	104,113	107,365	403,330	305,825	97,505
1965	1,194,047	578,173	131,531	116,662	367,681	287,951	79,730
1966	1,292,850	618,035	185,852	118,840	370,123	310,708	59,415
1967	1,321,137	600,178	113,319	135,230	472,410	374,501	97,909
1968	1,568,595	712,831	115,105	169,864	570,795	422,354	148,441
1969	1,729,432	810,175	162,388	237,743	519,126	372,707	146,419
1970	1,797,983	886,682	174,896	245,947	490,458	345,642	144,816
1971	1,700,064	833,826	265,194	244,296	356,748	256,164	100,584
1972	1,828,730	983,860	193,180	244,472	407,218	338,152	69,066
1973	1,735,586	945,601	202,770	232,853	354,362	335,076	19,286
1974	1,786,694	1,046,916	178,058	208,857	352,863	395,158	(42,295)
1975	2,505,512	1,549,272	234,252	288,272	433,716	423,346	10,370
1976	2,866,684	1,874,548	268,254	314,732	409,150	411,618	(2,468)
1977	3,497,462	2,056,490	299,352	397,568	744,052	638,248	105,804
1978	3,912,840	2,697,831	300,150	426,798	488,061	546,889	(58,828)
1979	3,986,082	3,127,249	327,394	453,602	77,837	359,712	(281,875)
1980	3,660,104	3,356,088	378,649	385,079	(459,712)	94,730	(554,442)
1960–1980 Percent Change	176	537	382	234	(176)	189*	(300)
Avg. Percent Change Per Year	5	10	8	6	(5)	5*	(7)

*Adjusted for $997,000 tax loss in 1980.

degree day has declined, we have had to produce about the same steam due to increased losses. Purchased steam expense which is related to the steam input to the system has increased at a faster pace than any other costs due to higher fuel costs, and a greater allocation of fixed costs to steam as electric generation has been reduced. Expenses excluding Distribution O&M, taxes, and purchased steam have increased moderately over the last 20 years. These expenses increased by 189% (5% per year) excluding the income tax loss in 1980. Such costs are more related to investment which has not increased substantially. These cost increases have not been offset by adequate rate increases and, therefore, a "reasonable return" has not been attained.

Assuming that the unaccounted steam problem is at the customer's end, then a continous effort of checking metering and customer inspection should result in higher sales.

E. Discussion

The objective of this first phase of the steam business study was to recite the history of the business, document its physical characteristics, and review the history of its financial performance. The objective of the next phase is to analyze the future potential profitability of the steam heat business. This will be addressed in Section III.

The financial profitability of the steam business has continued to decline over the last decade. There are several key factors contributing to its decline. These factors include the lack of growth in the area served by the steam business, increased losses, inflation in energy costs, aging plant and distribution facilities, and inadequate revenue increases to meet costs.

With this background, what is the financial potential of the business? To analyze this question an accounting model of the steam business was developed using the Interactive Financial Planning System. This model simulates the cost accounting of the steam heat business and can be used to estimate financial profitability under varying assumptions of key factors. Five factors were determined to be the major considerations in the financial future of the steam business.

1. The Grand Avenue Plant is old and could be retired. How will changes in the level of the electric business at Grand Avenue affect the steam business. As allocation to electric drops to zero, what is the impact on financial results?

2. The number of customers and the steam sold over the past decade has continually declined. What are the possibilities of reversing this trend?

3. The system losses have increased substantially, particularly over the past few years. Can these losses be reduced without a significant increase in operating expenses?

4. Rate relief has not kept pace with the costs of operating the business. What levels of rate relief are possible from the MPSC? How high can prices rise and yet remain competitive?

5. As new investment is required to replace aging equipment, what is the effect on rate levels?

A decision tree was constructed to analyze the financial impact of varying four of these key factors through a reasonable range of expectations (see Illustration C).

Key Factor Definitions:

Hypothesis		Definition
(1) Grand Avenue operation continues?	Yes:	Grand Avenue electric operation continues indefinitely at current operating levels.
	No:	Grand Avenue electric operation retires in 1985 and is used only for steam business thereafter.

(2)	Sales can be increased?	Yes:	Steam sales increase to include a large customer in 1983.
		No:	Continue trend established over the past decade.
(3)	Losses can be reduced?	Yes:	Losses are reduced to 20%.
		No:	Losses remain at 40%.
(4)	What level of rate relief can be obtained?	Alt. 1:	Prices escalate at the Company's expected fuel inflation rate.
		Alt. 2:	Prices escalate at projected gas price escalation rates to remain competitive with gas.
		Alt. 3:	Prices reflect full cost of service by 1985 and thereafter.

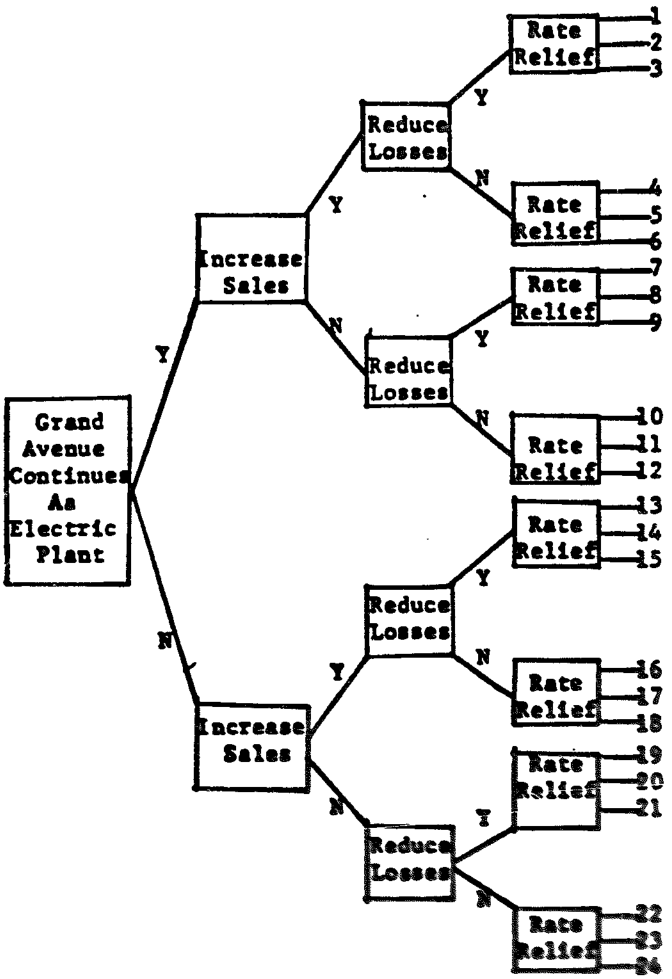
The initial analysis consisted of developing a steam model case to simulate each decision tree path and project the likely financial results over the next ten-year period if that particular combination of events occur. These 24 cases provided the basis for evaluating the future profitability of the steam business. Detailed financial results for these cases are included in Appendix B. From this information, some conclusions are formulated in Section III about the viability of KCPL remaining in the steam heat business.

The third phase of the study (Section IV) explores alternatives to current operations such as operating the business as a distinguishable profit center, as a cogeneration project, or a plan to get out of the business by selling to another party—the city, another energy company, or another interested party.

ILLUSTRATION C

STEAM BUSINESS DECISION TREE

1	2	3	4	No.	Potentially Profitable	Unprofitable



III. FINANCIAL ANALYSIS

A. Price of Steam Based on Full Cost of Service

1. Grand Avenue Station Retired Beyond 1990

Chart 1 illustrates the projected price of steam in ¢/MMBtu for Cases 3, 6, 9, and 12 on the decision tree under the assumption that KCPL earns its full required return of 13% on net steam distribution plant by 1984 and that the electric service portion of Grand Avenue Station is retired after 1990. The projected steam prices are compared to the projected price of natural gas (General Service) as delivered and also the equivalent cost of gas converted to steam using a 65% efficiency ratio.

Case 12 is a reference case and represents the status quo:

--Sales from existing customers continue at current levels and are diminished slightly by increased price elasticity effects.

--No large customer is added to the system.

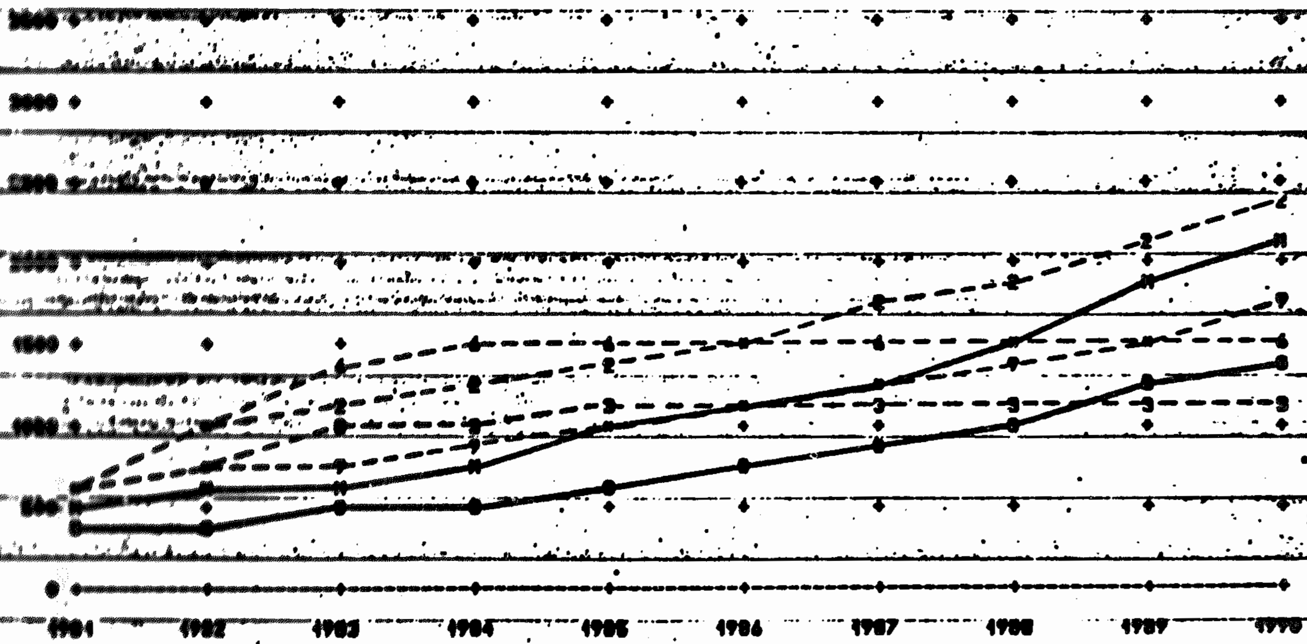
--Losses at the 40% level continue unabated.

This reference case indicates that steam prices would not be competitive with equivalent gas even after the full deregulation of gas prices beyond 1985 start to take effect. All cases show significant rate increases above inflation rates over the next few years if a 13% rate of return is to be achieved by 1984.

The competitive advantage of steam prices improves as adjustments to the reference case are made. Case 9 assumes reduction of losses from 40% to 20% and shows steam prices become competitive by 1986. This assumes that loss reduction is a direct source of revenue. Case 3 contains the additional assumption that a very large steam customer (twice the size of all existing customers combined) could be added in 1983 on an attractive steam rate at the

KANSAS CITY POWER & LIGHT COMPANY
DATE: 12/04/81 TIME: 14:57
STEAM HEAT MODEL

STEAM RATES CENTS/MMBTU 1981-1990
GRAND AVENUE ELECTRIC CONTINUES ELECTRIC OPERATION
CHART 1



G - GAS PRICE ESTIMATE
H - GAS PRICE CONVERTED 86% EFFICIENCY
3 - CASE 3 STEAM PRICE (GA+,S+,RL+,RICB)
6 - CASE 6 STEAM PRICE (GA+,S+,RL-,RICB)
9 - CASE 9 STEAM PRICE (GA+,S-,RL+,RICB)
2 - CASE 12 STEAM PRICE (GA+,S-,RL-,RICB)

equivalent price of delivered natural gas. The short run impact is to raise the overall price of steam above Case 9 in the years prior to 1986, but steam prices remain flat and below Case 9 thereafter. In the long-run, the overall steam price falls below even the delivered price of gas beyond 1989 and becomes very competitive.

2. Grand Avenue Station Retired in 1984

Chart 2 contains the cases of Chart 1 modified to include the retirement of the electric portion of Grand Avenue Station in 1984. This causes more steam boiler plant to be allocated to the remaining steam business in 1985 and beyond, thus raising the overall cost of steam. Case 15 is the only case in this group that becomes competitive with gas, and this doesn't occur until 1988. This case assumes the reduction in losses from 40% to 20% and sales to a very large customer. Retiring the electric business delays the cross-over point where steam prices become competitive by two years over Case 3 in Chart 1. Case 21 shows that reduction in losses alone is not sufficient for steam to become competitive with gas if the electric plant is retired in 1984. To cover cost of service upon retiring Grand Avenue electric rates would practically have to double in all cases.

3. Summary of Full Cost of Service Cases

If the price of steam is permitted to rise to its fully allocated cost of service, which implies significant increases over the next two years, and is to become competitive with deregulated gas within five years (1986), then (a) steam losses must be reduced to 20% or less and (b) large steam sales must be attained and (c) the retirement of the electric business at Grand Avenue Station would have to be delayed beyond 1990.

If the electric service is retired in 1984, then the competitive point between steam and gas is delayed two more years to 1988.

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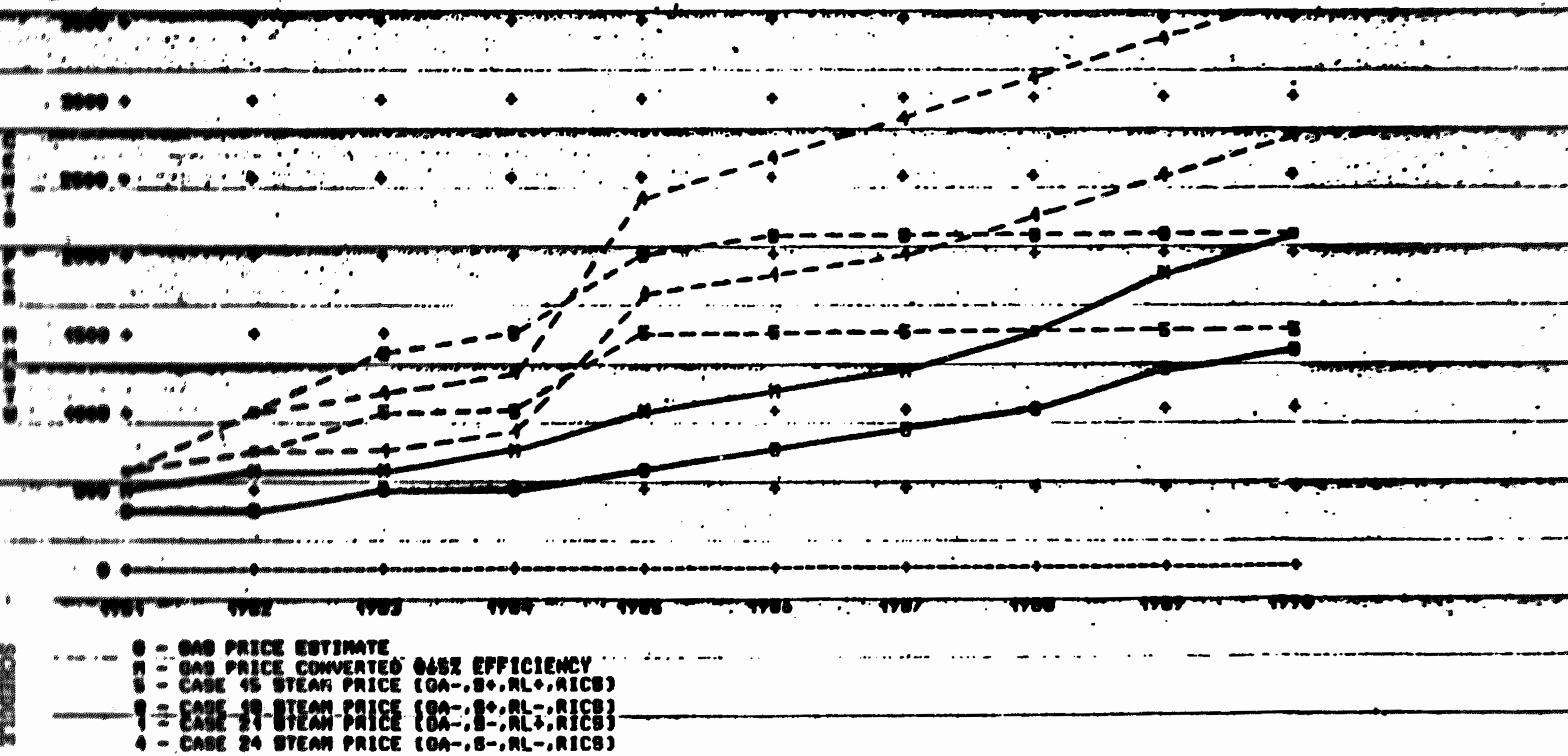
STEAM HEAT MODEL

STEAM RATES CENTS/MMBTU 1981-1990
GRAND AVENUE ELECTRIC RETIRES ELECTRIC OPERATION
CHART 2



B. <u>Price of Steam Increased at the Rate of Inflation of Variable Fuel Costs to Produce Steam</u>

The next series of cases addresses the branches in the decision tree that assume that the price of steam escalates at the rate of variable fuel costs. For this analysis, fuel is assumed to increase at 13% per annum from 1981 to 1990. Chart 3 shows that at this rate of inflation, steam prices would be slightly above gas in 1983 and 1984, and competitive with deregulated gas in 1985 and beyond. (Chart 3 also shows that if steam increases at the rate of inflation projected for gas prices--18% per annum--then steam never becomes competitive with deregulated gas.)

1. Grand Avenue Station Retired Beyond 1990

Given that steam price increases are limited to 13% escalation of fuel costs, then Chart 4 compares the rate of return earned on net steam distribution plant investment for cases reflecting changes in sales and steam losses (Cases 1, 4, 7, 10). Case 7 indicates that at a minimum, steam losses should be reduced to less than 20% just to break even over the three years and then a respectable return could be earned thereafter. Case 1, which also assumes the addition of a large customer, delays profitability to 1986. Both cases indicate rates of return beyond 1986 are considerably higher than the 13% required in the fuel cost of service cases discussed in Section III-A. This suggests that steam price increases could be held well below the rate of inflation of variable fuel costs beyond 1986 if losses are reduced (see Cases 3 and 9 on Chart 1).

2. Grand Avenue Station Retired in 1984

Chart 5 plots the rates of return for Cases 13, 16, 19, 22 of the decision tree which have the same 13% steam price escalation as above but include the

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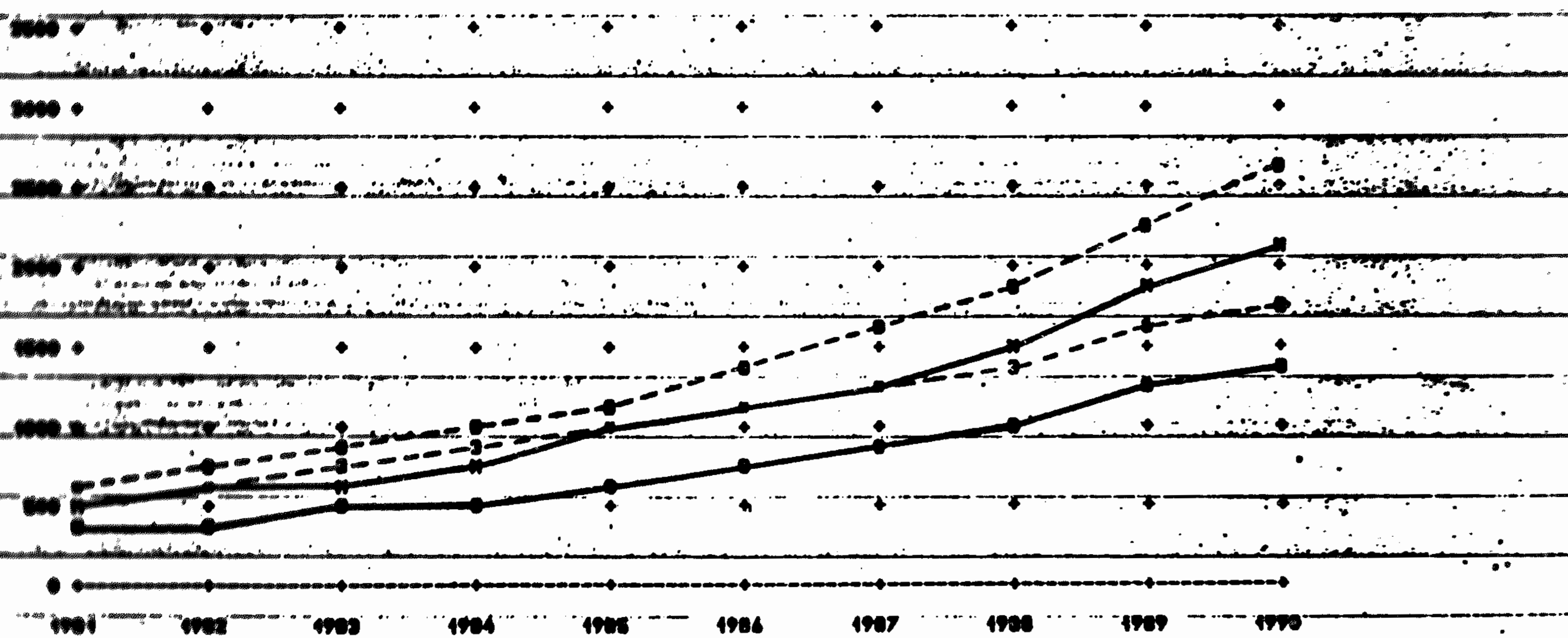
DATE: 12/04/81 TIME: 14:58
STEAM HEAT MODEL

STEAM RATES CENTS/MMBTU 1981-1990
COMPARISION OF STEAM RATES TO GAS RATES
CHART 3



G = GAS PRICE ESTIMATE
M = GAS PRICE CONVERTED @65% EFFICIENCY
3 = STEAM RATES AT 13% ESCALATION
8 = STEAM RATES AT 10% ESCALATION

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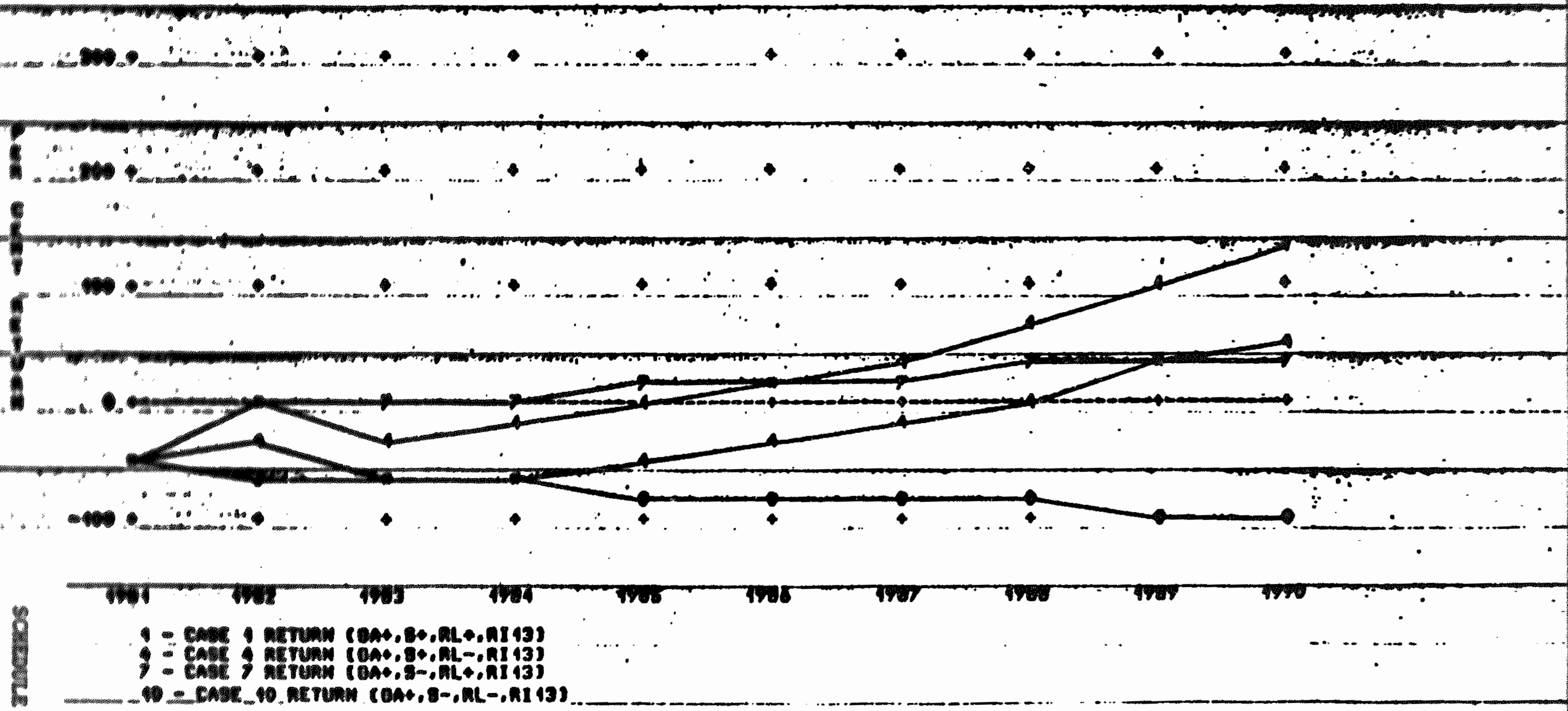
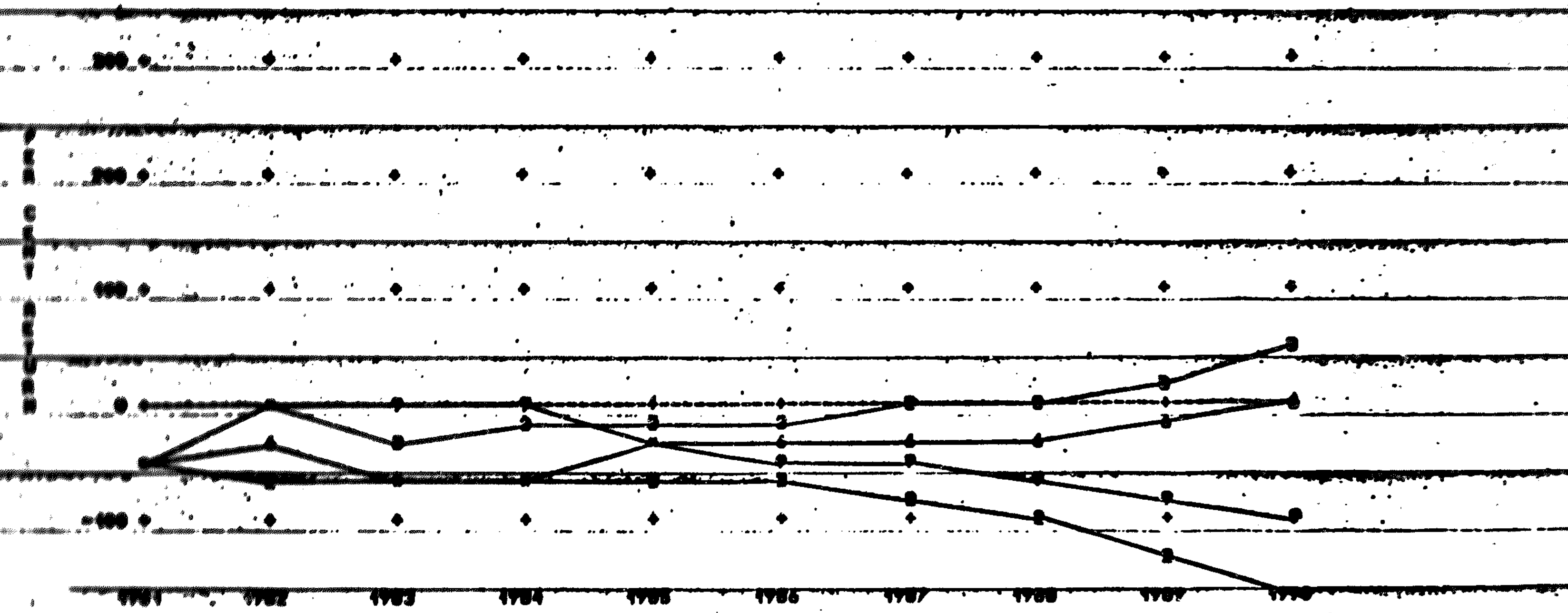
STEAM HEAT MODEL

STEAM HEAT RETURN ON NET PLANT 1981-1990
GRAND AVENUE ELECTRIC CONTINUES ELECTRIC OPERATION
CHART 4



KANSAS CITY POWER & LIGHT COMPANY
DATE: 12/04/81 TIME: 14:50
STEAM HEAT MODEL

STEAM HEAT RETURN ON NET PLANT 1981-1990
GRAND AVENUE ELECTRIC RETIRED ELECTRIC OPERATION
CHART 5



3 - CASE 13 RETURN (GA-,S+,RL+,RI 13)
6 - CASE 16 RETURN (GA-,S+,RL-,RI 13)
9 - CASE 19 RETURN (GA-,S-,RL+,RI 13)
2 - CASE 22 RETURN (GA-,S-,RL-,RI 13)

effect of retiring the electric service out of Grand Avenue Station. Only Case 13 (reduce losses, increase sales with a large customer) eventually becomes profitable beyond 1988. This indicates that 13% increases in the price of steam alone are not sufficient to maintain profitability while absorbing the impact of retiring the electric side of Grand Avenue Station.

3. Summary of 13% Price Increase Cases

These cases indicate that steam price increases at the rate of inflation (13%) of variable fuel costs are not sufficient to achieve profitability once the electric side of Grand Avenue is retired in 1984 even if losses are reduced to 20% and a large steam sale is consummated. Even if Grand Avenue continues to operate, losses must be reduced or sales increased substantially for the steam business to become profitable.

C. <u>Price of Steam Increased to Match Equivalent Price of Natural Gas</u>

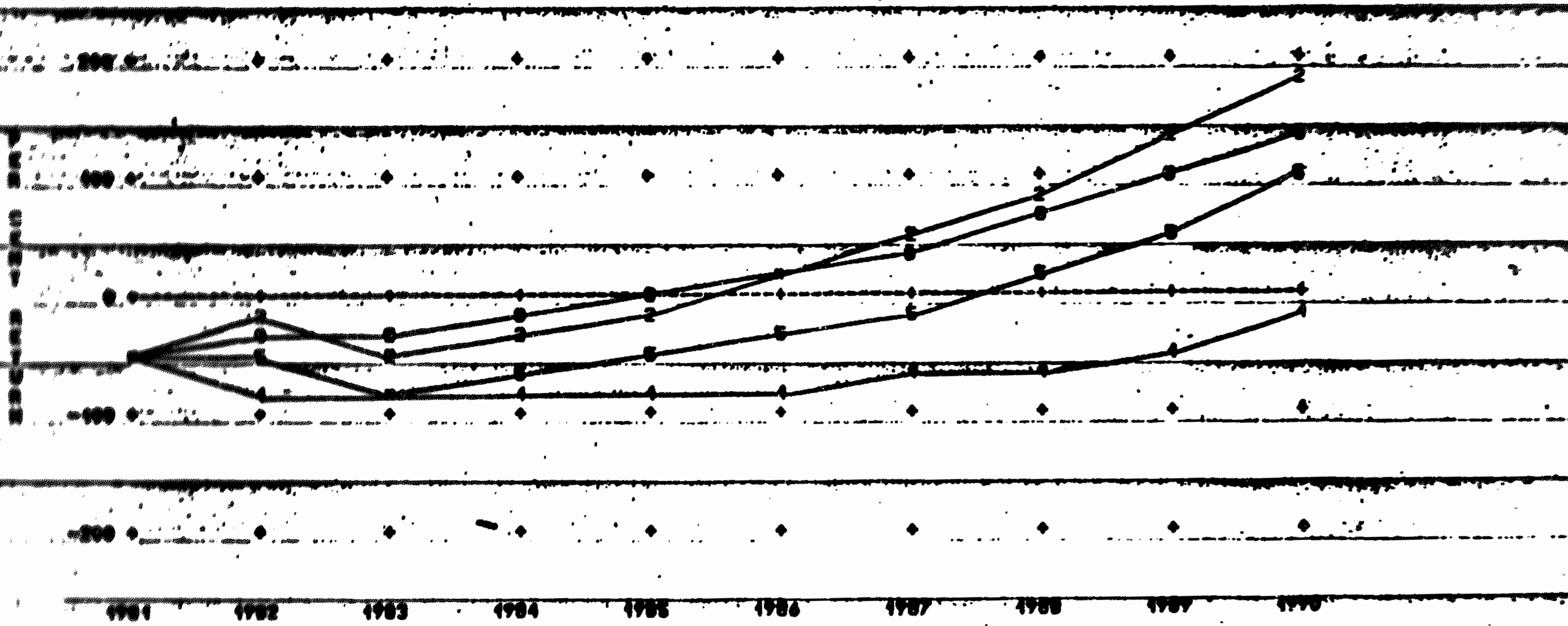
This series of cases from the decision tree assumes that steam prices are increased annually to match the price of gas on a cents-per-Btu basis adjusted for a 65% efficiency factor as shown on Chart 3. This section will discuss the impact of this limitation on expected rate of return for the same assumptions on steam losses, sales increases, and the retirement of Grand Avenue Station.

1. Grand Avenue Station Retired Beyond 1990

Chart 6 indicates that if steam prices are constrained to increase no faster than equivalent gas prices, then no positive return can be earned until after 1985 even if losses are reduced (Case 8). Case 2 where both sales are increased and losses reduced does not improve profitability before 1985. Once gas is deregulated beyond 1985, then both Cases 2 and 8 become profitable. If sales are increased and losses are not reduced, profitability does not improve until 1988 as is illustrated by Case 5.

KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT MODEL

STEAM HEAT RETURN ON NET PLANT 1981-1990
GRAND AVENUE ELECTRIC CONTINUES ELECTRIC OPERATION
CHART 6



2 - CASE 2 RETURN (OA+,S+,RL+,RIO/.65)
5 - CASE 5 RETURN (OA+,S+,RL-,RIO/.65)
8 - CASE 8 RETURN (OA+,S-,RL+,RIO/.65)
1 - CASE 11 RETURN (OA+,S-,RL-,RIO/.65)

2. Grand Avenue Station Retired in 1984

Chart 7 shows again that retirement of Grand Avenue Station is an impediment to profitability even after gas prices are deregulated in 1985. Case 14 shows that even with reduced losses and increased sales a positive return would not be earned until 1988.

3. Summary of Competitive Gas Price Cases

Restricting steam prices to competitive gas price increases would require stable prices through 1982 and then increases at an 18% per year rate thereafter. This delays a positive return until after 1985 even with reduced losses and increased sales. The retirement of Grand Avenue Station in 1984 further retards profitability until 1988. If steam prices continue to escalate at projected gas price escalation rates, however, and no major new investment is required, high rates of return may result after profitability is established.

D. Comparison of Cumulative Net Cash Flow

1. Grand Avenue Retired Beyond 1990.

Chart 8 demonstrates the cumulative net cash flow expected in cases 2, 5, 8, and 11. These cases assume that steam prices can match projected gas prices on a cents-per-Btu basis adjusted for a 65% efficiency factor. This chart shows the impact reducing losses has on cash flow. Cases 2 and 8, the cases in which losses are reduced, experience a positive cumulative cash flow in 1988. The other cases remain negative throughout the decade.

2. Grand Avenue Retired in 1984.

Chart 9 demonstrates the cumulative net cash flows for Cases 14, 17, 20, and 23. This chart shows that if Grand Avenue retires and rates match an equivalent gas price, it would take both loss reduction and a large increase in sales to experience positive cash flow by the end of the decade.

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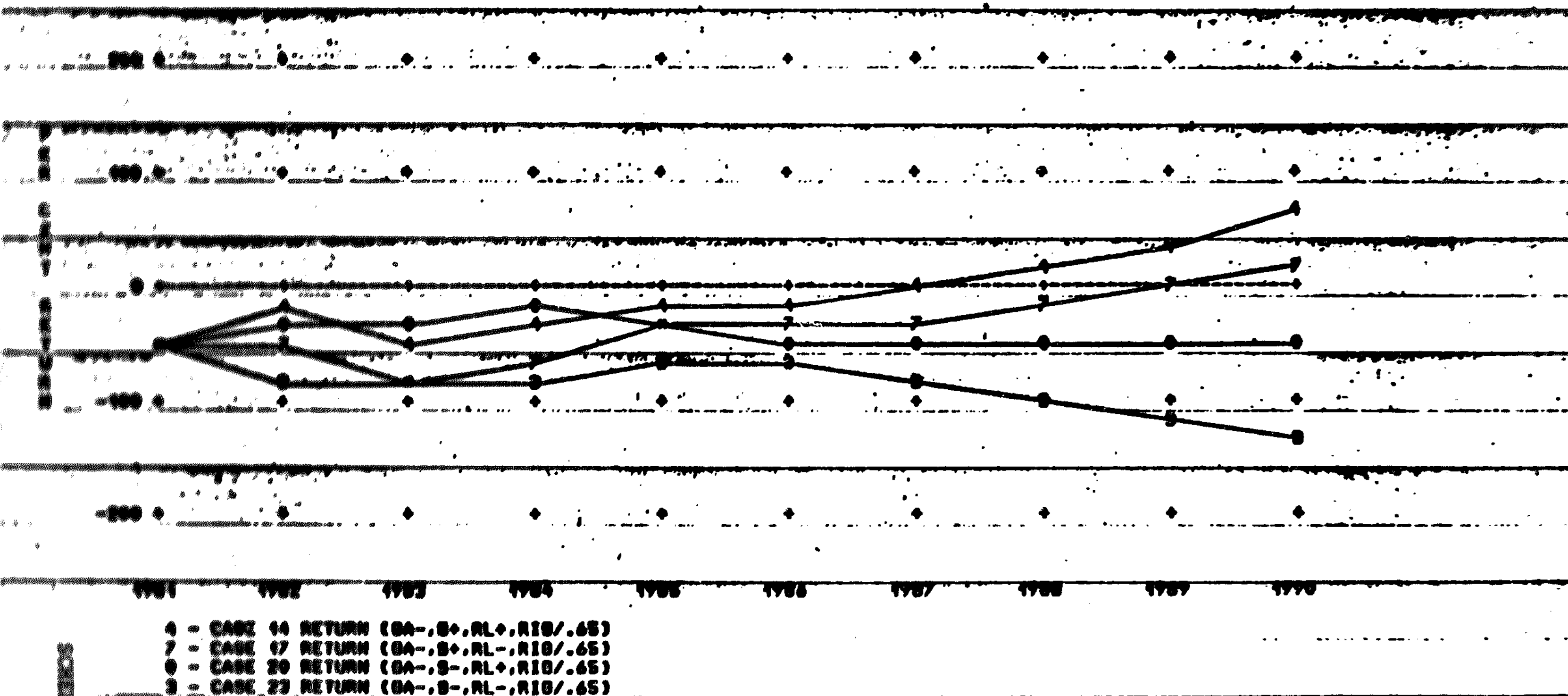
DATE: 12/04/81 TIME: 14:50
STEAM HEAT MODEL

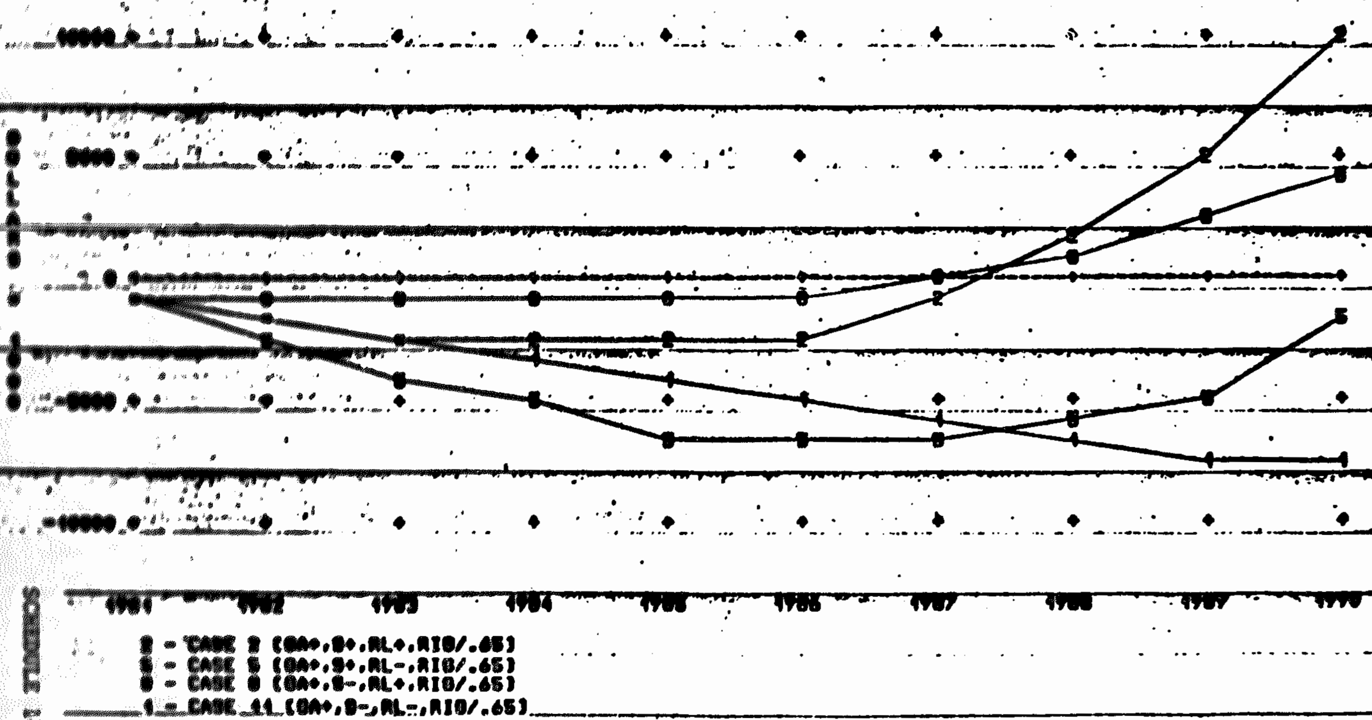
STEAM HEAT RETURN ON NET PLANT 1981-1990
GRAND AVENUE ELECTRIC RETIRED ELECTRIC OPERATION
CHART 7



SCHEDULE 1-35

KANSAS CITY POWER & LIGHT COMPANY
DATE: 12/04/84 TIME: 15:30
STEAM HEAT MODEL

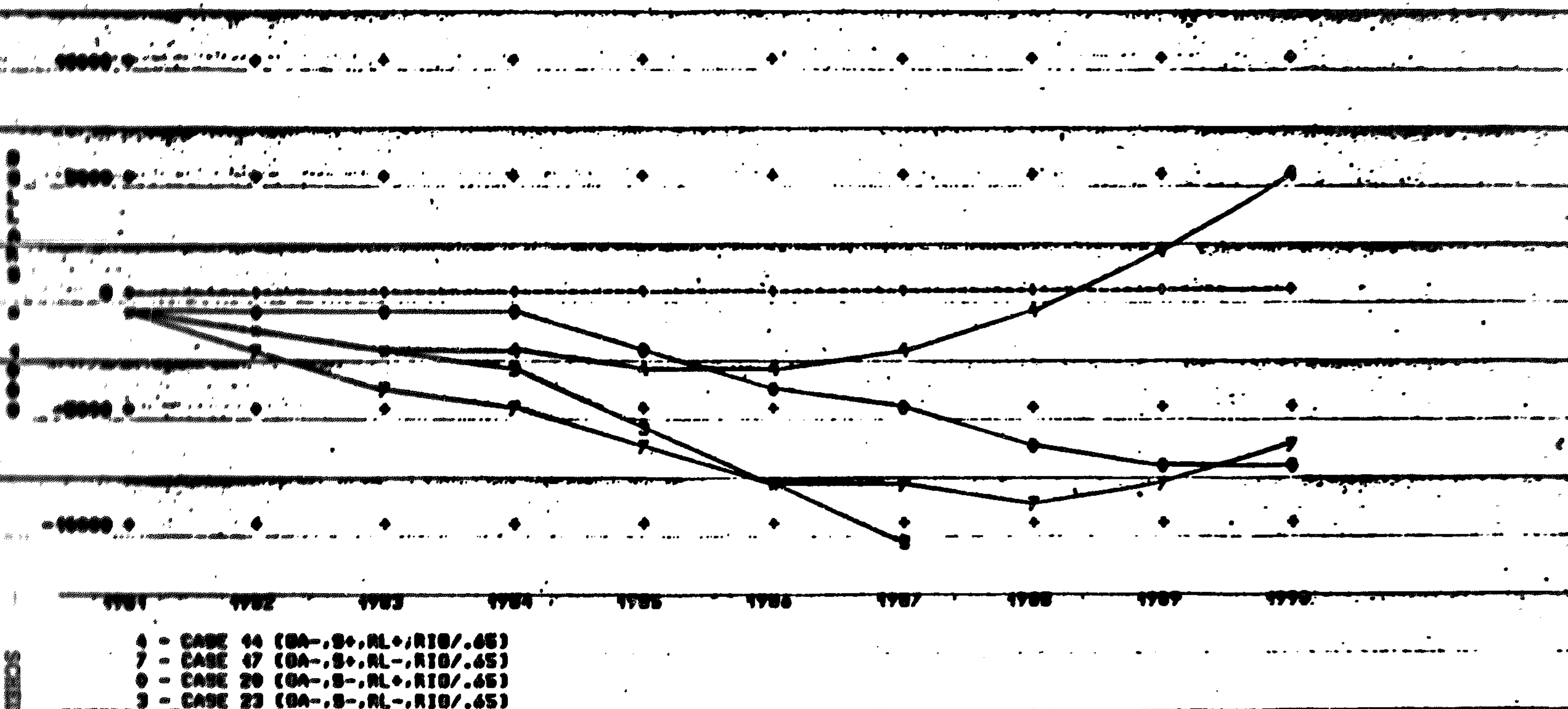
STEAM HEAT FINANCIAL STUDY 1981-1990
COMPARISION OF CUMULATIVE NET CASH FLOW
CHART 8



SCHEDULE 1-36

CITY POWER & LIGHT COMPANY
DATE: 12/04/81 TIME: 15:37
STEAM HEAT MODEL

STEAM HEAT FINANCIAL STUDY 1981-1990
COMPARISION OF CUMULATIVE NET CASH FLOW
CHART 9



SCHEDULE 1-37

3. Summary of Cash Flow Comparison

If the equivalent price of gas on a cents-per-Btu basis is an approximation for the maximum price that could be charged for steam, then reducing losses and increasing sales are the major factors leading to a positive cash flow by the end of the next ten years. It should be noted that the financial model assumes that losses are all at the customers end consequently an improvement in losses results in a revenue increase with no additional expenses. If the losses are a result of some other problem, the positive impact on cash flow may not be achievable in this decade.

Charts 8 and 9 illustrate the fact that cumulative cash requirements will most likely exceed cash inflows for the next six years or so. If steam rates escalate at a rate that is less than expected for natural gas rates (such as the projected fuel price escalation rate of 13%), then this negative cash position could persist even longer. To attain the high level of returns depicted by Cases 2 and 8 on Chart 6 will cause a cash drain in the near term. Less optimistic conditions may cause such a cash drain to continue much longer.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusion

The financial impact model analysis suggests that the steam business could be made less unprofitable in the short run by reducing steam losses below 20% and aggressively applying for rate relief to bring the earned rate of return on the steam business closer to the required return of 13%. Such action would place steam prices above the competitive price of natural gas before it is deregulated in 1985. If steam price increases are restricted to the competitive price of gas, then profitability and net positive cash inflows are unattainable prior to gas deregulation in 1985.

The addition of a very large steam customer (twice total existing steam sales) at an assumed price, which is the equivalent price of delivered natural gas, has an immediate dampening effect on profitability because of the major shift in the allocation of costs to the steam side of the business. The assumed price of steam to the large customer should be examined to further evaluate its short run impact on earned return on steam plant investment. In the long run as the delivered price of gas is deregulated, these additional large sales provide revenue to more than cover variable costs, contribute to fixed charges and improve profitability.

The retirement of the electric side of Grand Avenue Station in 1984 has a considerable negative impact on profitability, cash flow, and the long-run price of steam relative to natural gas. This analysis indicates that retirement more than triples the allocation of boiler plant from the electric business to the steam business. The effect is to not earn the required return on the steam business without exceeding the competitive price of natural gas until the late 1980s when the full effect of gas price deregulation takes place.

B. Recommendations

In the short run, KCPL should immediately establish the steam business as a specific profit center or KCPL subsidiary under the direction of a Director or Manager of Steam Operations reporting to a Vice President who is made responsible for developing a plan for the long-run profitability of the steam business or its eventual divestment.

We should consider the following actions:

1. Seek to minimize steam business earnings losses in the short run and improve profitability in the long run for KCPL by:
   (a) Immediate resolution of the steam loss problem.
   (b) Pursuit of steam price increases commensurate with profitability goals and competitive energy sources.
   (c) Investigate further the desirability of large customer additions and pricing to absorb existing or future steam capacity.
   (d) Investigate further the impact of retiring Grand Avenue Station in its entirety and look at the feasibility and economics of providing steam supply from electric boilers supplied by electric power purchased from the KCPL system. The study should consider the possibility of competition because of the availability of smaller electric boiler installations to steam customers who would purchase electricity on a large commercial/industrial rate. How many existing customers could convert to this type of system? How would these systems compete with natural gas options?
   (e) Analyze the accounting allocation procedures to ascertain if the allocation system accurately defines the true costs of the steam business.
2. With the help of KCPL personnel (ESCC, etc.) and/or engaging a qualified consultant, investigate the possibility of KCPL divesting itself of the steam business by:
   (a) Selling the steam business "as is" upon the retirement of Grand Avenue Station. Who are the potential buyers and on what terms? What are the regulatory considerations? What changes could be made to the business to make total or partial devestment possible?

(b) Selling the steam business, following potential refurbishments and retirement of Grand Avenue Station as suggested under 1.(d) above. What conditions would make the sale attractive to a prospective purchaser? What are the political and regulatory considerations in the sale?

(c) Considering an alternative to retiring Grand Avenue Station-- refurbishing and structuring the operation of Grand Avenue Station as a co-generation project over the next 10 years. Establish a separate company which sells by-product electricity to the KCPL system. What would be the required price of steam and revenue from electric output sold to KCPL to make this alternative an attractive venture to a potential buyer?

TABLE OF CONTENTS

I - EXECUTIVE SUMMARY

Introduction and Purpose

After supplying low-pressure steam service in downtown Kansas City for nearly 100 years, a series of recent events focused KCPL's attention on the urgent need for a long-range study of the downtown steam system. On March 9, 1982, the Electric Supply Coordinating Committee (ESCC) issued a Statement of Scope for the Long-Range Steam Heat Planning Study. The purpose of this study is to develop a recommendation for a long-range plan for KCPL's downtown steam system, with primary emphasis on a plan that is technically and economically feasible, and will contribute to maintaining steam as a competitive and reliable heat source through the year 2000.

Concentrating on the period 1984-2003, the study consists of engineering and economic evaluations of alternative plans for meeting future steam requirements. The criteria for evaluating an effective plan rests on the two basic strategies of (i) providing downtown steam service which is both reliable and competitive in price with natural gas and (ii) maintaining steam rates such that KCPL can recover the costs of steam heat operation.

The Downtown Steam System

The downtown steam system can be separated into two components - the steam distribution system and the steam generating facility at Grand Avenue Station.

The steam distribution system consists of nearly twelve miles of underground pipe buried beneath the streets of downtown Kansas City. Two high pressure steam mains originate at Grand Avenue Station and transport steam to two desuperheating and pressure reduction stations, prior to final distribution to customers in the downtown area. Most of the steam distribution pipe is quite old, with less than 20% of the total footage installed since 1960 and with some sections now over 75 years old.

Steam usage is measured on the customer's premises primarily with condensate meters. Although the meter itself is an accurate device, leaks in the condensate line, intentional diversion of condensate, non-condensing uses for steam, and other factors can result in less condensate being returned to the meter than that which corresponds to actual steam usage.

Steam losses have increased substantially over the past four years, and now are reported to be between 30 and 40%. The aging steam distribution system, combined with metering problems, have contributed to this increase. Programs are currently underway to correct this problem.

Steam for the downtown heating system is generated at Grand Avenue Station, a dual-use electric and steam facility which has been in operation since the early 1920's. There are currently three dual-fueled (coal or natural gas) boilers that provide the bulk of the steam requirements. Due to the fact that these boilers were designed primarily to serve turbine-generator needs, steam for the downtown system is generated at a higher temperature and pressure than would otherwise be required, introducing an inherent thermal inefficiency in the overall steam heat cycle.

Grand Avenue is now the oldest active generating station in the KCPL system, a factor contributing significantly to several operating constraints that impact the cost of steam. Designed in an era prior to plant automation, operations are highly labor intensive. Further, with no electric generation, the boiler design itself limits the burning of coal to high steam loading periods, requiring that more expensive natural gas fuel be burned during lower load periods.

The customer uses steam primarily for space heating with minimal non-winter loads and summer use limited mainly to domestic hot water heating and use in kitchen facilities. This results in an extremely low system load factor - approximately 28%.

The customer base served by the steam system has been declining over the past few years, and at the end of 1981 consisted of 204 customers. Annual steam sales have experienced a corresponding decline. During 1981, steam operations resulted in book revenue of about $3,894,000, and a year-end net operating loss of $595,366. Presently the average price of downtown steam is about $8.50 per Mlb.

A forecast of future steam heat load was prepared for the year 1984 and held constant for the remaining 20 years in the study period. This forecast consisted of the existing customer base, adjusted for known future changes. The forecasted steam load is well within the steaming capacity of the existing Grand Avenue equipment throughout the study period.

Because of its dual function of electric generation and steam heat production, Grand Avenue is subject to a complex allocation of property and expenses for rate case purposes. When the electric generating facilities are retired, the remaining plant and expenses will be borne entirely by the downtown ratepayer.

Steam System Scenarios

A series of related long-range planning scenarios were studied by utilizing computer programs which simulate the production and cost accounting aspects of the steam system. These scenarios concentrated upon the steam generation segment of the system, addressing the primary issues of fuel costs, electric facility retirement, boiler age and efficiency, and system load factor. Unique cases were developed to simulate the following steam system scenarios:

1. A base case representing a continuation of the current steam system serving the existing customer base;
2. A variation on the base case which limits downtown steam service to the six-month winter heating season only;
3. The use of electrode boilers for minimum load and/or standby service;
4. Modifications to Grand Avenue equipment that will allow coal burning for minimum load conditions;
5. Substitution of either electrode boilers, coal-fired package boilers, or fluidized bed boilers for existing Grand Avenue steam generating equipment;
6. The addition of a new large, high load-factor customer to the existing customer base;

Conclusions

For each of the major scenarios outlined above, the resulting cost of steam service to the customer is compared to the forecast cost of natural gas. Based upon this comparison, and a detailed analysis of the results of the simulated steam operation, the following conclusions result:

1. A continuation of the present operating system of serving the existing customer base with existing facilities results in a downtown steam system which cannot be both profitable and competitive with natural gas. Contributing factors include:

   - low system load factor together with minimum load constraints on the boilers results in high use of natural gas in the six-month non-winter season;
   - inherent thermal inefficiencies of producing superheated steam for delivery to the customer at low pressure and temperature;
   - the need to provide "quick start" backup capability results in a large volume of natural gas burn to keep a boiler on hot standby; and
   - Grand Avenue Station age and design result in a very labor intensive operation with high operations and maintenance expense.

2. With the electric facilities retired in 1990 as planned, the downtown steam system becomes even less competitive with natural gas due to the following:

- although total station O&M is reduced by 32% with electric retirement, the loss of allocation to electric more than offsets this effect resulting in an increased cost of steam;
- the cost of steam to the customer is 1.7 times the cost of natural gas in 1990, and the cost of steam increases by a factor of 4 during the period 1982-1990.

3. Of the possible new technologies for generating steam, electrode boilers results in the lowest cost steam; however, steam is still not competitive with natural gas in the near-term;

4. Shutdown of the steam system during the six-month off-peak period, use of electrode boilers for standby, and the burning of coal at minimum load all result in a reduced steam cost but the system is still not competitive with natural gas until late in the study period;

5. Addition of new winter peaking, low load-factor steam loads does nothing to improve the viability of the steam system;

6. Fuel and O&M expenses represent 81% of the cost of providing downtown steam in 1990. To make the existing steam system competitive with natural gas after Grand Avenue electric facilities are retired, projected fuel and O&M expenses have to be reduced by about 50%. It is unlikely that such a reduction could be achieved while retaining an acceptable level of service;

7. Investigations currently underway may identify method which could reduce operating costs in the short-term. These would include:

   - coal mill and burner modifications to permit coal burning at low steam conditions thereby reducing fuel costs;
   - reduced pressure boiler operation to mitigate thermal cycle inefficiency; and
   - transfer of major maintenance projects to Central Maintenance to reduce maintenance labor at Grand Avenue.

8. The addition of a new large, high load-factor customer has the effect of lowering the cost of downtown steam such that the system is competitive with natural gas. This results from the following:

   - increased system load factor permits coal to be burned year round, reducing fuel cost per Mlb by about 40% in 1990;
   - O&M expense is spread over more units of output reducing O&M cost per Mlb by over 60%;
   - even with electric retirement, the price of downtown steam in 1990 is reduced from $38 to $23/Mlb and the cost to the customer is competitive with the cost of natural gas.
   - downtown steam remains competitive as long as the new customer is on the system and provided that no large capital expenditures are needed.

Recommendations

Based upon the results of this study, the following long-range plan is recommended for the steam system:

1. Add a new large, high load-factor steam customer as soon as possible but definitely prior to the retirement of electric facilities at Grand Avenue;

2. In the interim period until the new large customer has been added, continue to operate Grand Avenue as a joint electric and steam plant and improve steam's competitive position with natural gas by implementing cost saving measures which include:
   - greatly reducing natural gas usage for boiler hot standby and under minimum load conditions;
   - reducing labor expense by shifting major maintenance projects to Central Maintenance;
   - investigating the possibility of reducing coal costs by purchasing Grand Avenue coal from small suppliers on the spot market during periods of soft market conditions.

3. Continue to run the existing coal-fired Grand Avenue boilers for the foreseeable future to avoid large capital expenditures required for a techology changeover;

4. If there is no prospect for the addition of a new large, high load factor customer, the following course of action should be considered:

- by year end 1985, "freeze" the availability of the steam rate to prevent new customer entry onto the system;
- upon retirement of electric facilities at Grand Avenue, consider the possibility of seasonal steam service only during the six-month heating season to reduce fuel and O&M expense;
- as the customer base is reduced through attrition, continue to aggressively pursue plant and expense cutbacks at Grand Avenue Station;
- at the point that electric heat becomes competitive with steam heat, promote customer conversion with an incentive such as leased electrode boilers and/or an incentive electric heat rate.

5. Update the study of downtown steam at intervals no greater than every two years. In the interim, continue to investigate and where appropriate, implement, cost reduction measures particularly as they relate to fuel and O&M expenses.

II - INTRODUCTION

Low-pressure steam service has been supplied to downtown Kansas City for nearly 100 years. Although provided since 1929 as a convenient by-product of electric generation at Grand Avenue Station, downtown steam has now grown to be depended upon as a primary heat source for most of the downtown business district.

As electric operations at Grand Avenue have declined in magnitude and importance, steam costs have risen and steam service has become more of a primary product of Grand Avenue operations. For the past several years there has been growing awareness that Grand Avenue overall equipment age and condition could eventually limit future steam heat business. This general perception was crystallized with the November 1981 approval of KCPLAN which projected the retirement of Grand Avenue electric facilities by about 1990. Although KCPLAN identified the refurbishment of older coal-fired generation as an alternative to retirement at some stations, a subsequent study by Black & Veatch confirmed earlier indications that Grand Avenue electric equipment was beyond the point of economic revitalization.

At this same time, four other separate but related events helped focus attention on the urgent need for a new long-range study of the downtown steam system. First, the conversion of a major downtown retail store to natural gas heating raised concern for both the immediate and long-term competitiveness of steam heat. Next, the request by a major industry for process steam that could eventually more than triple annual steam output and increase peak-hour demand by 70% focused attention on the aging Grand Avenue steam facilities. Third, questions were raised as to the long-term availability and cost of steam heat as Kansas

City enters a period of downtown revitalization. And, finally, an internal report presented several questions concerning the long-term financial viability of the present steam heat system.

In response to these challenges, the internal management of the steam heat system received renewed attention in early 1982. Subsequently, on March 19, 1982, the Electric Supply Coordinating Committee (ESCC) issued a Statement of Scope for the Long-Range Steam Heat Planning Study.

III - PURPOSE

The purpose of this study is to develop a recommendation for a long-range plan for KCPL's downtown steam system. The primary emphasis of the study is to develop a plan that is technically and economically feasible, and will contribute to maintaining steam as a competitive and reliable heat source for the downtown area through the year 2000.

Concentrating on the twenty-year period beginning in 1984, the study consists of engineering and economic evaluations of alternative plans for meeting future steam requirements. Development of the plans examined in the study was guided by the following presuppositions:

1. KCPL will continue to provide steam heat service in the future;
2. Alternatives such as discontinuing service, divestiture, or establishment as a nonregulated subsidiary are beyond the scope of this study; and
3. Solutions to immediate problems, such as large steam losses, are assumed to be successfully implemented as planned in the period prior to 1984.

The criteria for an effective long-range plan rests on two basic strategies:

(i) providing downtown steam service which is competitive with natural gas as an economic and reliable heat source for the long term; and

(ii) maintaining steam rates such that KCPL can recover the fixed and variable costs of steam heat operation, while earning an adequate rate-of-return on steam heat investment.

Both of these strategies must be effectively satisfied to keep the steam system viable.

IV - EXISTING STEAM SYSTEM

The distribution of steam for heating purposes in downtown Kansas City was begun in 1888 by the Kansas City Electric Light Company from its electric generating station at 604 Wall Street. The system was expanded to a larger customer base in the following years and a second source of steam supply was added at 1308 Baltimore. In 1929, Grand Avenue Station began supplying high pressure (185 psig) steam to the downtown area. Over the years, the two older stations at Wall Street and Baltimore were phased out as Grand Avenue Station assumed more of the steam load.

The downtown steam system can be separated into two components. The first is the steam distribution system - nearly twelve miles of underground pipe beneath the streets of Kansas City. The second is the steam generating facility at Grand Avenue Station.

Distribution System

The downtown steam system covers about 100 square blocks in the downtown business district, extending approximately from 6th Street on the north to 14th Street on the south. The west boundary is Broadway and a high pressure steam line runs as far east as Holmes.

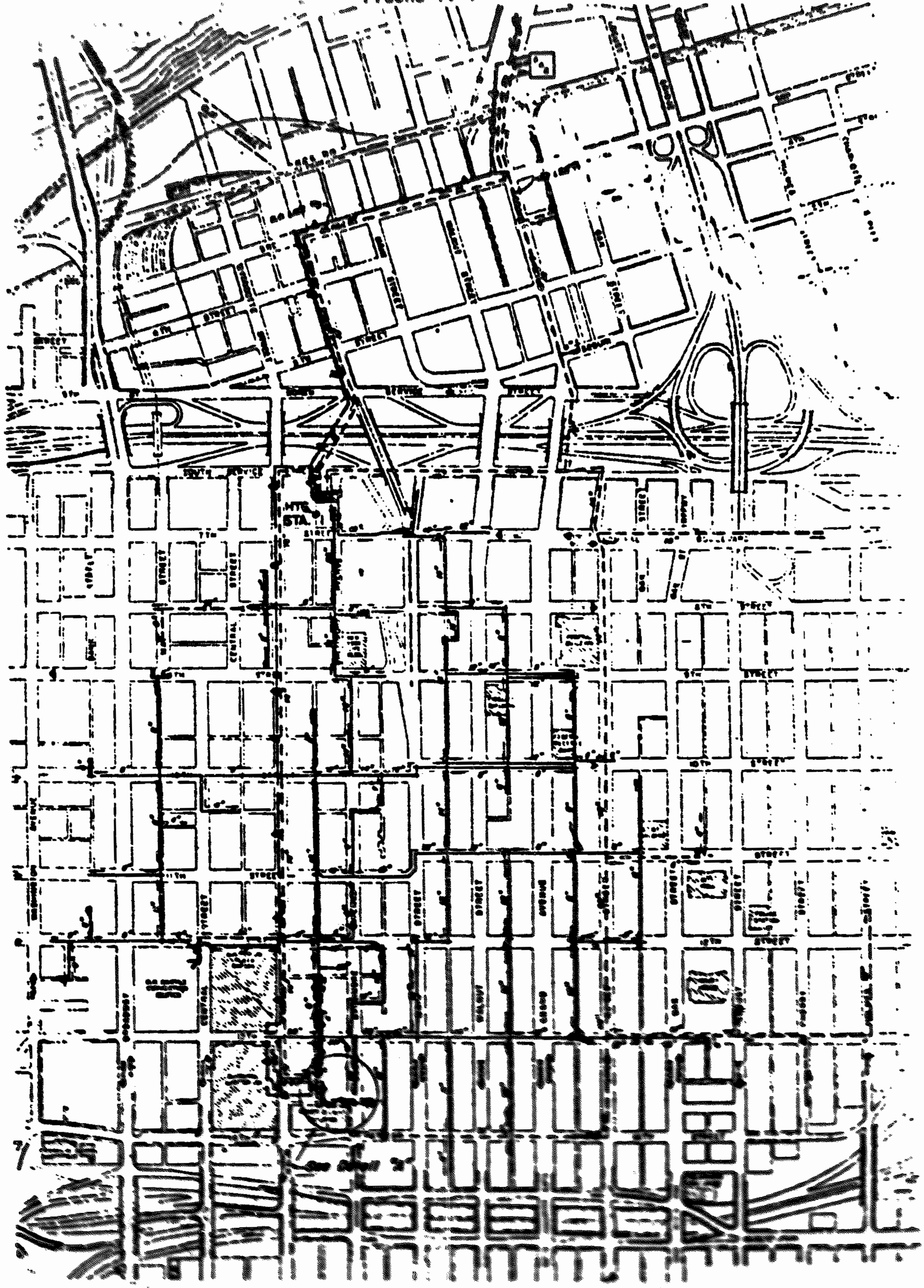
Two high pressure (185 psig) steam mains originate at Grand Avenue Station, each capable of carrying the entire downtown steam load. The high pressure steam is transported to two desuperheating stations located at 1319 Wyandotte and 604 Baltimore (the old Wall Street steam plant site). At the desuperheating stations, the steam pressure is reduced to 105 psig and 15 psig for distribution to the majority of customers. After the steam is used, the condensate is discharged to the sewer system requiring total make-up from city water at Grand Avenue Station. A diagram of the downtown steam system is shown on Figure IV-1.

The last major steam main extension took place in 1958 when the second high pressure line from Grand Avenue was installed. Less than 20% of the total 62,000 feet of steam distribution mains has been installed since 1960. Some sections of the downtown distribution network date back to the Kansas City Heating Company and are over 75 years old.

An important element of the distribution system is the metering. Steam is measured and billed in units of thousands of pounds (Mlb.) through either a flow meter or a condensate meter. Flow meters are an electro-mechanical device that directly measure the volume of steam. This type of meter is not commonly used on KCPL's system for two reasons. First, a flow meter is more costly than a condensate meter and, secondly, it requires a relatively long length of straight steam flow at the entrance to the customer's property. For the latter reason, its applicability is severely limited.

Condensate meters are commonly used on the downtown steam system. A mechanical device, the condensate meter measures steam input into a building by measuring the condensate flow out of the building. After the usable heat has been extracted from the steam, the steam condenses - returns to water - and is piped through the meter before discharge to the sewer system. Although the condensate meter itself is an accurate device, the potential for inaccurate measurement of steam input to a building is great because all the condensate may not be returned through the meter. Leaks in the condensate line, intentional diversion of condensate, and non-condensing uses for steam such

FIGURE IV-1



as humidification can result in less condensate being returned through the meter than steam input to the building.

System steam losses have increased substantially over the past four years. Until 1978, losses (measured as the difference between steam sendout at Grand Avenue and steam metered on the customer premises for billing) generally were between 10% and 20%. In the last four years, losses have steadily increased to between 30% and 40%. The decline in load levels, aging steam distribution system, and metering problems have contributed to this increase.

A number of measures have been implemented in the last several months to correct the high loss problem. Formal schedules have been established for steam maintenance, meter reading, inspections and other operating activities. The Steam Department is utilizing infrared scanning to detect leaks in the system and customer inspections to identify condensate leaks, diversions, and faulty meters. The number of people assigned to steam maintenance has increased from five to ten, including a maintenance supervisor and two labor crews.

Because of the corrective action currently underway, for this study losses were assumed to be 20% - a significant improvement over recent history. The reduction in losses to 20% seems reasonable in light of the fact that losses averaged only 13% for the period 1960 to 1978.

Grand Avenue Station

In 1927, KCPL purchased the facility that later would be known as Grand Avenue Station. The station began providing steam service in 1929 and through the years was modernized until by 1950 it assumed essentially the equipment configuration that exists today.

There are currently three dual-fueled (coal or natural gas) boilers designated #6, #7, and #8 that provide the bulk of the steam requirement. Full-load steaming capability of the boilers totals 910,000 pounds per hour and is distributed as follows:

Boiler #6	340,000 lbs./hour	Boiler #8	285,000 lbs.hour
Boiler #7	285,000 lbs./hour		

In 1969, 1A boiler, an oil and natural gas fueled package boiler with a 200,000 lb./hour capability, was added to supplement the station steam supply.

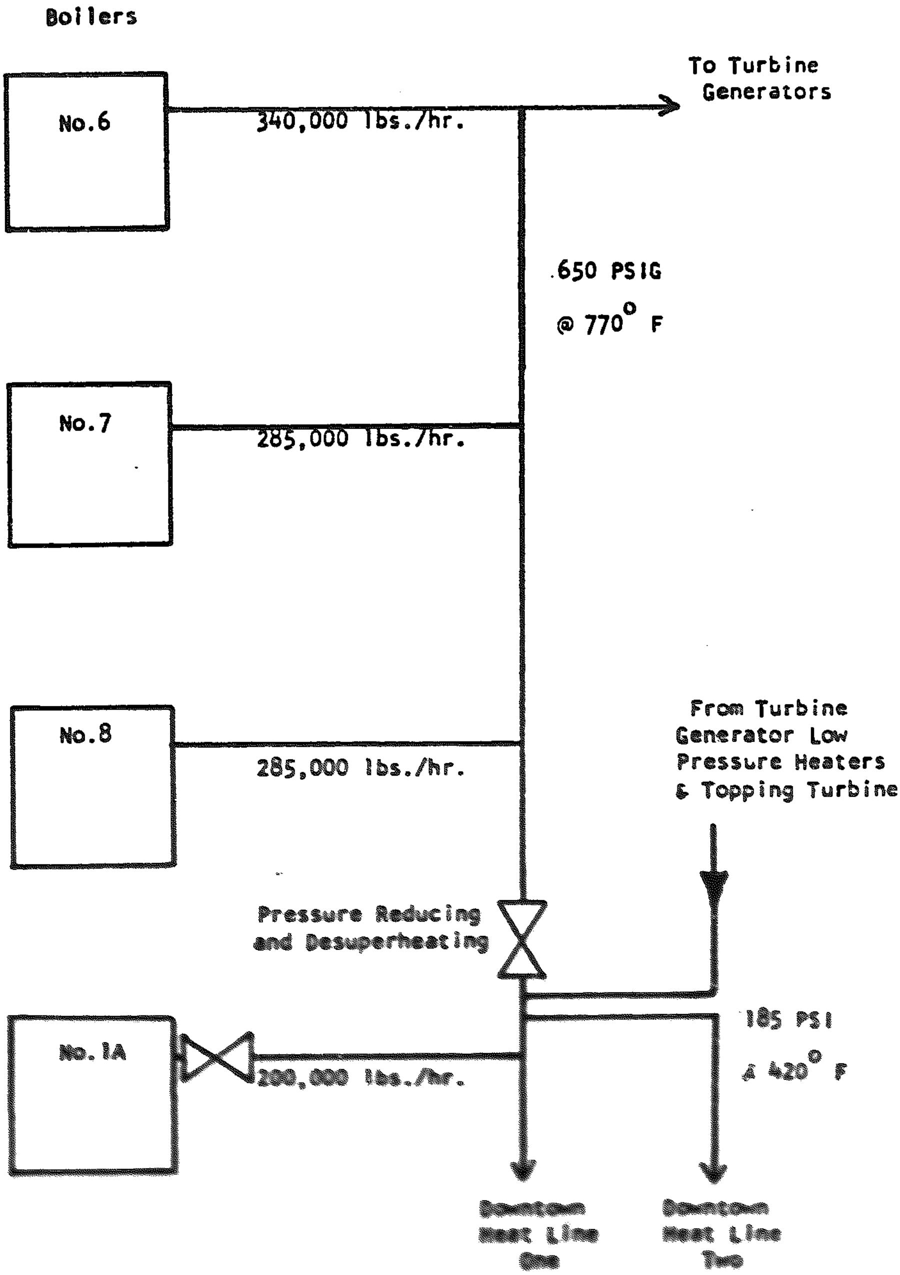
As shown in Figure IV-2 the three large coal-fired boilers are connected through a common header. Steam at the header can be extracted for sendout to the downtown steam system or passed through a turbine for electrical generation. Boiler 1A, which is currently in need of major repair, produces lower pressure steam for use directly in the downtown steam system or for boiler feedwater heaters. Because of the turbine requirement, superheated steam is produced at about 650 psig by the three coal-fired boilers. The steam is then cooled (desuperheated) and the pressure is reduced to 185 psig for sendout to the high pressure steam system.

In the winter, at times of high steam heat load, a portion of the steam heat sendout is first passed through #5 turbine generator. This turbine (a so-called "topping" turbine) acts as a pressure reducing valve which utilizes high pressure, superheated steam to produce electricity and then exhausts 185 psig steam to the downtown steam system. This is a very efficient cycle but it can only be used in winter when the downtown steam load is high.

In the 1970's, electric generating capability at Grand Avenue was as high as 108 MW. Over the past few years turbine generators have been retired or put on inactive reserve status so that current accredited capacity is 40 MW. Retirement

FIGURE IV-2

STEAM GENERATOR FLOW DIAGRAM



SCHEDULE 2-20

of the remaining electric generation at Grand Avenue is projected for 1990.

Although the amount of capacity at Grand is relatively minor, the importance of that capacity is not. The downtown area is served electrically through a low voltage underground network system. In the event of multiple system contingencies that would interrupt electric service to the downtown network, Grand currently provides the electrical backup for the Kansas City business district.

Because of its dual function of electric generation and steam heat production, Grand Avenue is subjected to a complex allocation of property and expenses for rate case purposes. Historically, the allocation had been based on the premise that Grand Avenue was primarily an electric generating station with steam a secondary product. In recent years, as Grand has assumed primarily an electrical peaking function and as generation has been retired or deactivated, the steam heat segment of the business has assumed an increasing share of the Grand Avenue costs. If the remaining electric generating facilities are retired in 1990, the remaining plant and expenses will be borne entirely by the downtown steam ratepayer.

It is important to understand some of the inherent operating constraints at Grand Avenue that contribute to the cost of steam. These include (i) the relatively high O&M expenses associated with the station, and (ii) design and operating constraints that adversely impact fuel costs.

(i) O&M expenses

Grand Avenue is now the oldest active generating station in the KCPL system. Purchased in 1927, the station was originally designed and operated to provide 25 hertz electric power for the streetcar system.

Although reconstructed after its purchase with new coal-burning facilities added in the late-1940's, Grand Avenue remains an essentially non-automated power plant characteristic of the late 1940's. This basically labor intensive operation is further increased by the station's age which requires that a great deal of maintenance be performed to keep equipment operating properly.

(ii) Fuel Costs

The largest component in the cost of steam is fuel expense. Here, as in the case of O&M expenses, Grand Avenue's physical characteristics present some significant problems.

Located on the Missouri River adjacent to the main business district of Kansas City, Grand Avenue has limited space for coal handling and storage facilities. As a result, coal for Grand Avenue is delivered via unit trains to Hawthorn Station, with a few coal cars subsequently diverted to Grand Avenue as needed. Coal unloading is a time consuming manual process, using a gantry crane and conveyor system. Both of these factors add to the transporation and unloading costs of Grand Avenue fuel, and directly impact the coal cost reflected in the steam rate.

Steam can be produced at a moderate fuel cost on coal, but because of minimum load constraints, high cost natural gas must be used to produce steam during most of the six-month non-winter season. When downtown steam load falls below 100,000 pounds per hour and there is no need for electric generation, the boilers must be fired with natural gas because of inherent boiler instability and coal pulverizer limitations.

Contributing to the high fuel cost is the natural gas burned to keep a boiler on "hot-standby". Boilers take several hours to be brought up to operating pressure and temperature. Consequently, in order to provide reliable service in the event of forced outage of the primary boiler supplying steam service, a second boiler must be kept hot by the use of natural gas pilots. At present, the estimated cost of natural gas for hot standby is approximately $650,000 per year.

Another factor that affects fuel efficiency for downtown steam production is the boiler design itself. The boilers are designed to produce the superheated steam under conditions necessary for the electric turbines. The steam for downtown heat is then desuperheated and the pressure reduced for sendout. This requires fuel input to the boiler of approximately 1700 BTU to produce a pound of steam for sendout that has a heat content at the customer's premises of about 1200 BTU. A boiler designed solely to produce the lower pressure and temperature steam necessary for the heat system would require significantly less fuel input.

V - FUTURE STEAM LOAD

Forecasting future steam load is essentially an empirical process, subject to a considerably less rigorous process than that followed in electric load forecasting. It essentially consists of evaluating the existing customer base and their possible changes in the future, adding in the effects of new customer additions, and finally adjusting for perceived future economic and competitive conditions. This was the process followed in developing the steam forecast for this study.

Existing Customers

At the end of 1981, KCPL had 204 customers receiving downtown steam service. This represented a 3% decline from 1980, and a decline of 68 customers since 1971 when the system served a total of 272 customers.

Annual steam sales in 1981 were about 500,000 Mlbs., with a peak steam demand of about 364 Mlbs. per hour experienced during the winter season. Due to an unusually mild winter during 1981, steam sales were especially low. A more representative year would be 1980, at which time annual steam sales were about 634,000 Mlbs., with a peak winter demand of about 383 Mlbs. per hour. Annual steam sales have also declined over the past 10 years from a 1971 level of 1,141,000 Mlbs.

The price of steam has increased significantly over the past few years. Presently, the average price of steam is about $8.50 per Mlb. This compares to a 1971 average rate level of about $1.50 per Mlb., which had been held essentially constant since the early 1960's. During 1981, steam operations generated book revenue of $3,894,125, resulting in a year-end net operating loss of $595,366.

As previously discussed, steam sendout or input into the system is metered at Grand Avenue Station. Steam sales are metered on the customer premises. However, because the metering is primarily of the condensate type, the meter registers sales volume after it has passed through the customer's internal piping system. The difference between sendout and sales are the system losses.

Table V-1 illustrates the declining trend in steam sales over the last decade. Steam input has also declined, but at a lesser rate so that losses have increased substantially.

Forecast

A 1984 projection of the peak hour steam sendout of 359,000 pounds per hour was used as the starting point forecast for the study. The peak load and annual steam sendout were then adjusted for known changes, such as the addition of the Vista Hotel and two other major downtown office projects. In addition, steam sendout was reduced by 5% in order to recognize that less steam will be required as system losses are reduced from the current 40% to 20%. The assumption is that of the projected 20% reduction in losses resulting from corrective action currently underway, one-fourth (5%) is due to correctable problems with the steam distribution system. The remaining three-quarters (15%) of correctable losses were added to the projected steam sales because it occurs beyond the point of delivery to the customer, either through unmetered condensate or malfunctioning meters.

The adjusted forecast is a 1984 peak steam load of 364,000 pounds per hour, with annual steam sendout of 887,000 Mlbs. Losses are 20% resulting in annual

TABLE V-1

HISTORICAL GRAND AVENUE STEAM HEAT STATISTICS

	Customers Connected	Input to System (MMLB) (Less Company Use)	Sales (MMLB)	% Loss
1971	272	1346.5	1141	15.3
1972	259	1354.5	1169	13.0
1973	258	1218.8	1139	6.5
1974	251	1137.6	882	22.5
1975	252	1120.1	922	17.7
1976	253	1126.6	868	23.0
1977	248	1115.0	908	18.6
1978	222	1243.5	864	30.5
1979	218	1195.5	764	36.1
1980	215	1053.0	634	39.8
1981	204	920.0	503	44.8

steam sales of 709,600 Mlbs. The forecast was considered a constant over the study period.

Load Factor

Steam is used primarily for space heating with only minimal non-winter load. The resulting system load factor is very low - approximately 28%. The forecasted winter peak load of 364,000 pounds per hour contrasts sharply with the forecasted summer minimum load of about 15,000 pounds per hour. Figure V-1 is a plot of the forecasted monthly peaks illustrating the seasonal load shape. Summer use is limited primarily to domestic hot water heating and use in kitchen facilities. The Federal Office Building, the largest summer steam consumer, is in the process of converting from steam turbine driven air conditioning to an electric drive system.

In 1972, system load factor was severely degraded with the closing of the Schlitz Brewery. The brewery was not only a large steam user, but it was a high load factor consumer using large volumes of steam in all months of the year.

The importance of load factor improvement cannot be overemphasized. A substantial increase in off-peak sales during the non-heating season could greatly reduce overall cost of steam production by negating the minimum load constraints at Grand Avenue Station. If off-peak steam sendout can be increased to over 100,000 pounds per hour, coal can be burned instead of high cost natural gas. The reduced fuel cost coupled with the largely fixed operations and maintenance expenses being distributed over more pounds of steam output would greatly reduce the cost per pound to the customer. The steam load duration curve in Figure V-2 illustrates the extent of the problem. Over 60% of the hours in the year, load is less than 100,000 pounds.

FIGURE V-1

PROJECTED MONTHLY STEAM PEAKS

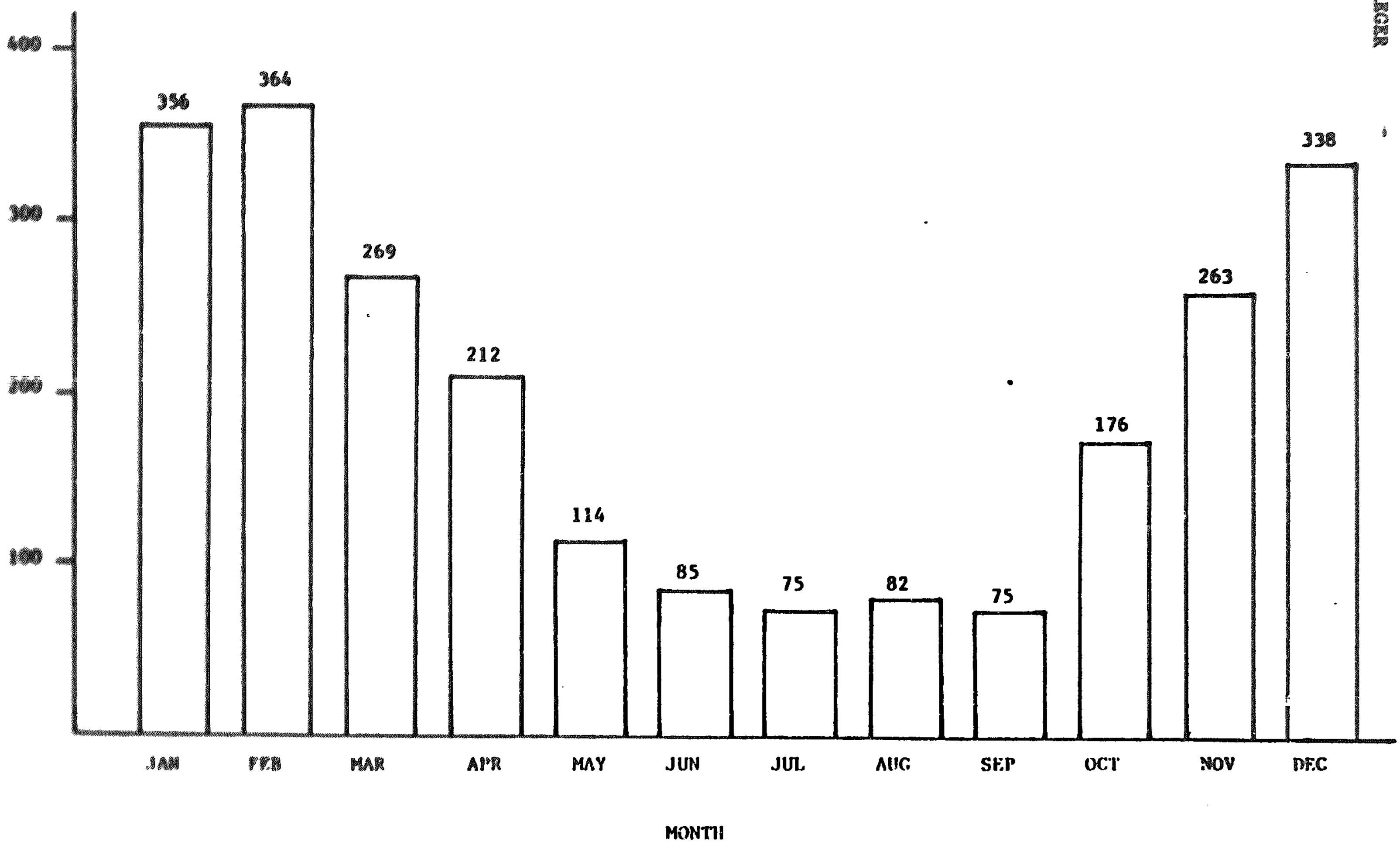
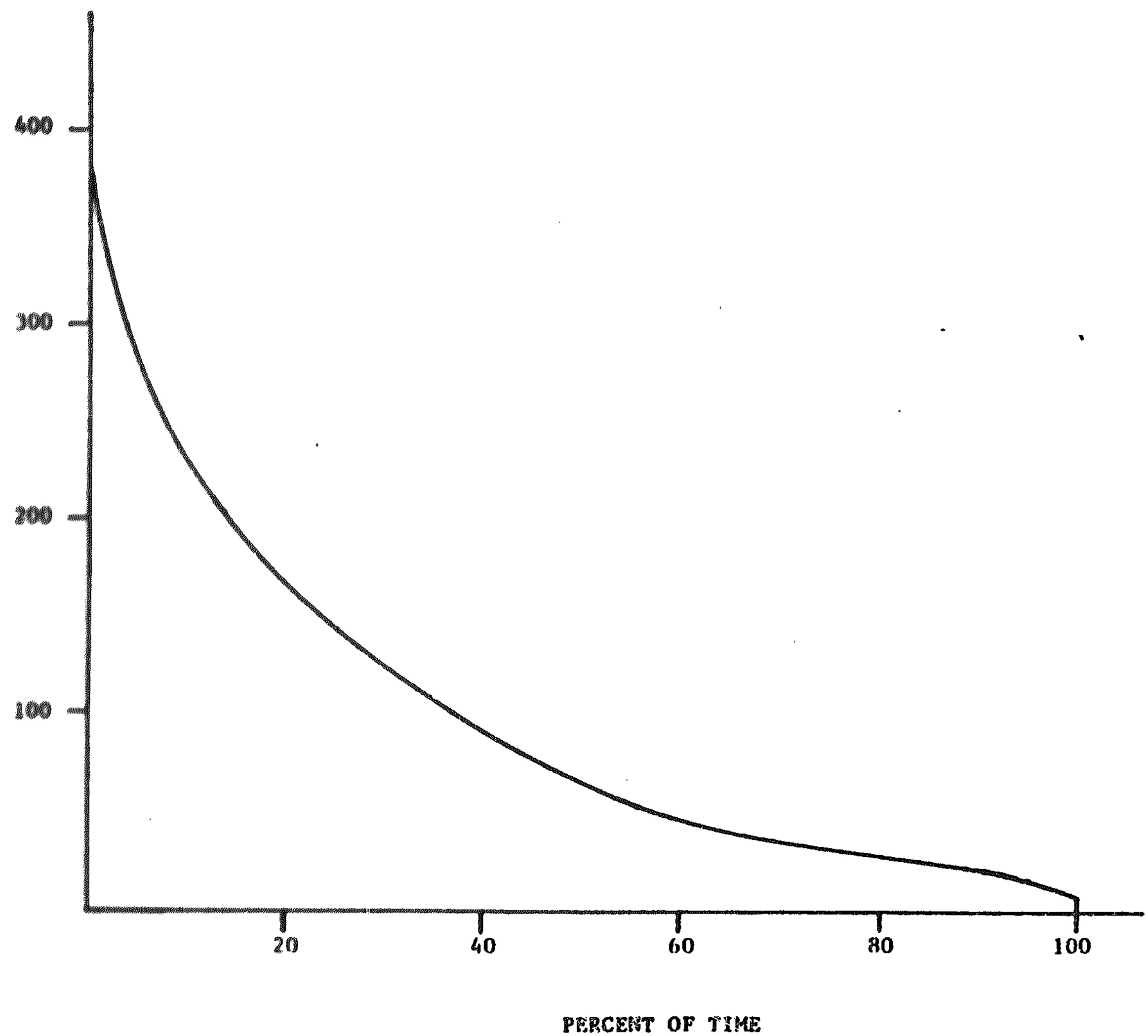


FIGURE V-2

STEAM LOAD DURATION CURVE



VI - KEY STUDY ISSUES

The scope of this study covers the 20 year period from 1984 through 2003. 1984 was selected as the starting point for the study in order to avoid modeling short-term operational changes currently being implemented in the steam system and to "filter out" the effects of the current general business slowdown. A horizon year of 2003 was chosen so that the period of study is sufficiently long to test both the implementation and impact of various alternatives. Primary analysis, however, will concentrate on the early years of the study period.

Overview

The critical year in the study is 1990, when the electric generation facilities at Grand Avenue Station are projected for retirement. At that point in time, the remaining boiler facility will have been in service for over 40 years. As a result, in all cases studied, electric generation was retired in 1990.

The study effort concentrates on the steam generation segment of the system. The present level of distribution system O&M expense was increased by 50% and escalated into the future. The increased distribution system expenditures are projected to reduce distribution system losses from 40% to 20% by 1984 and maintain a reliable distribution system in future years. To put the increased distribution system expenditures in perspective, the amount of increase could cover the installation of over 400 feet of new steam main annually in addition to the present level of activity.

The steam generating system at Grand Avenue presents a number of existing operating constraints that have a major impact on the cost of downtown steam. In addition, the future retirement of electric facilities, the addition of a large industrial customer, or the eventual replacement of the existing boilers each have an impact on the downtown steam customers. Scenarios examined in the study addressed each of these subjects. In all cases, a 13% rate of return on net plant was held constant.

Herein follows a brief description of the primary issue addressed in the study by means of computer simulation of the steam system.

<u>Fuel Mix</u>

The present fuel mix at Grand Avenue is approximately 40% natural gas and 60% coal. Of the $4.5 million fuel cost experienced during 1981, over half was for natural gas. As discussed in Section IV the large gas burn is the result of two operating constraints - minimum load and hot standby.

In an attempt to overcome these fuel cost obstacles, cases were constructed to reduce the natural gas burn by substitution of electrode boilers for hot standby and to carry the steam load during low load periods. Electrode boilers have the capability to reach operating temperature and pressure in a matter of minutes rather than hours, without the pilot fuel requirements. The tradeoff is the capital cost for new electrode boilers. Electrode boilers used in this operating mode can be thought of as "peaking" units much the same as combustion turbines on the electrical system.

Another possibility that was studied to reduce the natural gas burned during minimum load conditions was to convert to a seasonal form of service. Steam heat could be provided only during the six-month winter space heating season. Not only is there an obvious fuel savings, but O&M expense could be reduced significantly. This mode of operation is possible only if the electric generation is retired.

Electric Retirement

In all cases, electric is projected to retire in 1990 resulting in an increase in cost of steam charged to the downtown customers. Under the present allocation method for this dual function generating station, approximately 80% of the plant and over 75% of non-fuel operations and maintenance are allocated to electric. Of the total 1981 Grand Avenue fuel burn of $4.5 million, $2 million was charged to electric generation. The net electrical generation for 1981 was 21,600 megawatt hours.

The retirement of Grand Avenue electric facilities results in a reduction in total property and a significant reduction in O&M expense (estimated at about one-third of the present total). However, the remaining plant and expenses, part of which were previously allocated to electric, are then directly assigned to downtown steam. The overall impact is that elimination of the dual function and the allocation of plant and expenses overshadows the reduced expense benefit of electric retirement resulting in increased cost of steam to the customer.

Boiler Age and Efficiency

By 1990, the boilers at Grand will be 40 years old or older. As discussed in Section IV, these boilers are designed to produce turbine quality steam (650 PSIG and 770° F) which requires more fuel input than would be necessary to produce the quality of steam necessary for downtown heat customers (185 PSIG and 420° F). To overcome this thermal inefficiency, alternate technologies were studied with the objective of completing a steam equipment change-over by 1990.

New boilers could greatly increase fuel efficiency, reduce operations and maintenance expense and extend the life of the system. The trade-off is the high capital cost required for essentially a new plant. A description of the new technology options studied follows:

1. Electrode Boilers. Commercial electrode boilers are readily available in sizes up to 135,000 pound per hour steaming capacity. The boiler is a single steel pressure vessel with water pumped through during the heating process. An electrical current is passed through the water using the resistance of the water as a heat generator. KCPL has electrode auxiliary boilers in service at Iatan Generating Station.

   The advantages of electrode boilers include significantly lower O&M costs and capital costs compared to similar sized coal fired boilers. In addition, an electrode boiler requires minimal space, it is efficient, and it can be designed to supply steam at the pressure and temperature necessary for direct sendout to the system.

   The preliminary concept for this alternative was to install electrode boilers on the Grand Avenue Station turbine deck when electric generation is retired to take advantage of the existing electrical system to the generators. This would also permit installation of electrode boilers independent of the final disposition of the existing coal-fired boilers.

   Preliminary cost estimates in 1982 dollars is $1 million for a 135,000 pound per hour electrode boiler. In addition, one 40 MVA transformer would be required to support the operation of four electrode boilers. Additional boilers would require additional transformation capability. Cost of electrical energy input was assumed to be KCPL's then current system average cost of fuel and O&M.

2. Package Boiler. Coal-fired package boilers are commercially available, however, they require all of the current clean air equipment (scrubbers and precipitators) usually associated with large electrical generating stations. Because of the space requirement for this type of system, the addition of package boilers would be difficult without dismantling the existing boilers.

Estimated 1982 cost of a 135,000 pound per hour package boiler is $14 million, including installation of coal, lime and ash handling systems.

3. Fluidized Bed Boilers. In a conventional coal-fired boiler, pulverized fuel is fed into the boiler flame where combustion takes place in the air stream. A fluidized bed boiler is different in that a bed of coal and limestone is combusted in the lower portion of the boiler. Fluidized bed technology is capable of coal-fired operation without complex air quality control equipment and still meets flue gas limitations imposed by current air quality regulations.

One commercial size boiler is currently marketed in the United States based on developmental work done in Finland where nine such boilers are in operation burning various fuels, including trash, peat, and coal. The cost estimate in 1982 dollars for a 135,000 pound per hour fluidized bed boiler is $9 million. Although this is significantly less than a conventional package boiler, the operating costs for fluidized bed are estimated to be significantly higher.

Load Factor

As previously discussed, load factor improvement could have a significant favorable impact on the cost of downtown steam and was therefore studied in detail. The addition of a large industrial process load with a very high load factor could eliminate the natural gas burn during low load periods. In addition, the largely fixed O&M expenses and return on net plant could be spread over more units of output. The impact of these two effects can result in a greatly reduced cost per unit of steam output.

VII - PLANNING SCENARIOS

The series of related long-range planning scenarios were studied by utilizing the Power System Simulation (PSS) program for production costing and a simplified accounting model for approximate steam cost to the customer. These planning scenarios first involved the development of a base case, which represented a continuation in the future of the present steam system serving the existing customer base. Subsequently, variations from this base case were developed which were directed toward exploring the key issues reviewed in Section VI. For each scenario, the cost of steam service to the customer, expressed in cents per million BTU and in dollars per Mlb., is compared to the cost of natural gas to the customer in the years 1990 and 2003.

The PSS program was modified to simulate the operation of the downtown steam system, with the Grand Avenue boilers dispatched to meet bi-hourly steam loads. A load model for downtown steam was constructed from actual load shape date for periods that closely matched the 40 year average heating degree days. The PSS program calculated annual fuel and O&M expense for Grand Avenue steam service.

The fuel and O&M expense was used as input to a simple model that simulates the cost accounting for the steam heat business in order to estimate the price of steam to the customer. The calculation is not intended to be a precise determination of steam price, but rather an estimate. For example, the model uses net plant-in-service as a surrogate for rate base and it does not include working capital nor is it offset by deferred income tax reserves. However, these are relatively minor components of the overall revenue requirement with fuel and production O&M representing over 80% of the cost of service.

A complete list of the engineering and economic parameters used in this study are contained in Appendix A. In addition, copies of the detailed computer output summaries for each major scenario are contained in Appendix B.

The following summarizes the results obtained for each major scenario developed:

Case 1 (Base). The Base Case represents a continuation of the current steam system serving the existing customer base, and essentially represents a "business as usual" approach. Grand Avenue continues as a dual function station until 1990, at which time the electric generation is retired and overall O&M expenses are reduced to reflect the related labor and materials savings. Labor is reduced by approximately one-third as the authorized manpower dropped from over 140 to 94 people. Materials for turbine generator related maintenance are eliminated resulting in about a 15% reduction. All remaining expenses are directly charged to downtown steam, and as previously noted, results in an overall increase in steam system O&M.

Natural gas continues to be burned for hot standby at the rate of 20 MCF per hour throughout the year. Gas also continues to be burned in the primary boiler whenever steam load is under 100,000 pounds per hour. Boilers #6, #7, and #8 are dispatched to meet load and boiler 1A is not considered operational for this case.

Table VII-1 compares the cost of steam to natural gas for the years 1990 and 2003. Steam is not competitive with gas in the 1980's and the price spread increases with the retirement of electric in 1990. The price of steam from 1989 to 1990 increases from $26/Mlb. to $38/Mlb. - almost double the price of gas.

The next series of cases were developed to simulate methods of reducing the cost of steam primarily through fuel and O&M savings.

Case 2 (Seasonal Service). Given the results of the Base Case, Case 2 eliminates the non-heating season natural gas burn by shifting in 1990 to six-month (winter) seasonal service. In 1990 this results in significant savings of about $8 million (40%) in fuel and O&M as compared to the Base Case. As shown in Table VII-1, the price of steam is reduced about $6/Mlb. to $32/Mlb., but natural gas is still the cheaper heat source.

The O&M reduction with seasonal service reflects the reduction in labor expense during the summer. The personnel removed during the summer could conceivably be shifted to Hawthorn 1-4, provided that Hawthorn is at that time still operating as a seasonal peaking unit. The two stations could complement each other in regard to manpower.

Case 3 (Electrode Boilers for Standby). Case 3 utilizes two 135,000 pound per hour electrode boilers for standby service to eliminate the natural gas burn for hot standby. A coal-fired boiler is retired coincident with the installation of the electrode boilers. The price of steam in 1990 is $33.50/Mlb. but steam still cannot compete with natural gas.

Case 4 (Electrode Boilers for Minimum Load). This case is an extension of Case 3. With the electrode boilers already in place for standby service, they could be operated during minimum load conditions to reduce natural gas burn and O&M expense. Operation of electrode boilers in non-heating months would permit a significant further reduction in manpower at Grand Avenue. The 1990 cost of steam is reduced by about $11/Mlb., however, the price of steam is still not competitive with natural gas until late in the study period.

Case 5 (Coal for Minimum Load). Case 5 analyzes the cost effect of burning coal under all load conditions. Although not possible at this time, investigations are underway to determine the feasibility of coal mill and boiler modifications that could reduce or eliminate the minimum load constraint on coal burning.

The effect of achieving these modifications is that the 1990 fuel cost was reduced by $5 million from the $12.3 million in the Base Case. Steam at $30.20/Mlb., however, is still 40% higher in cost than natural gas. In addition, the actual savings achieved would be less than that shown in Table VII-1 if some as yet undetermined capital cost is included for the conversion.

TABLE VII-1

STEAM PRICE TO DOWNTOWN CUSTOMERS

CASE	1990	2003
Natural Gas	1950¢/MMBTU	7223¢/MMBTU
Base	3282¢/MMBTU $38.2/M#	10342¢/MMBTU $120.3/M#
Seasonal Service	2752¢/MMBTU $32.0/M#	8317¢/MMBTU $96.7/M#
Electrode Boiler for Standby	2884¢/MMBTU $33.5/M#	8729¢/MMBTU $101.5/M#
Electrode Boiler for Minimum Load	2314¢/MMBTU $26.9/M#	6532¢/MMBTU $76.0/M#
Coal for Minimum Load	2600¢/MMBTU $30.2/M#	7756¢/MMBTU $90.2/M#

The next series of cases simulate complete changeover to a new steam generating technology by 1990. The new technologies offer substantial fuel and O&M savings, but all require large capital expenditures.

<u>Cases 6, 7, and 8 (Electrode Boilers, Coal-Fired Package Boilers, and Fluidized Bed Boilers</u>.

In these cases, new technologies are phased in prior to 1990 to replace the existing steam generators at Grand Avenue. Electrode boilers represent a high fuel cost option with low capital and O&M cost while coal-fired options have high capital cost and low fuel and O&M cost. Table VII-2 shows the cost of steam in 1990 and 2003. In all cases, the installation of these new technologies result in a steam price well in excess of natural gas in 1990. The electrode boiler case did result in significant savings from the Base Case, and in the long term appears competitive with natural gas.

The next series of cases simulate the addition of a new, high load factor customer:

<u>Case 9 (Large Customer)</u>. A large customer was added in 1984 and electric facilities were retired in 1990. The customer was assumed to have a peak load of 250,000 pounds per hour at 100% load factor. The steam sendout at Grand Avenue increased from 887,000 Mlbs. per year to 3,055,000 Mlbs. The price of steam to the large industrial customer was well below the cost of natural gas. Because of the additional steam load, reliability of service was maintained by rehabilitating 1A boiler for standby service.

TABLE VII-2

STEAM PRICE TO DOWNTOWN CUSTOMERS
WITH NEW TECHNOLOGY

CASE	1990	2003
Natural Gas	1950¢/MMBTU	7223¢/MMBTU
Base	3282¢/MMBTU $38.2/M#	10,342¢/MMBTU $120.3/M#
Electrode Boilers	2859¢/MMBTU $33.6/M#	7256¢/MMBTU $84.4/M#
Coal Fired Package Boilers	5594¢/MMBTU $65.1/M#	7709¢/MMBTU $89.7/M#
Fluidized Bed Boilers	5511¢/MMBTU $64.1/M#	10,034¢/MMBTU $116.7/M#

Table VII-3 shows the cost of steam with the addition of the new customer. In 1990 the cost of downtown steam is competitive with natural gas. The large customer reduces 1990 fuel cost from the $8.52/MMBTU in the Base Case to $4.97/MMBTU due to the fact that coal can be burned all year. The fixed O&M expenses are also distributed over increased output resulting in a reduction in O&M expense per Mlb. The addition of a large customer is the only case that results in competitive downtown steam.

A number of variations of Case 9 were studied. The first variation simulated a technology changeover to electrode boilers by 1990 to serve the new high load factor steam system. In order to maintain downtown steam price competitive with natural gas, the industrial customer would have to absorb most of the new equipment capital cost. As a result, the cost of steam to the industrial customer would almost double in 1990. Therefore, it was concluded that new steam generating equipment cannot be effectively integrated into the steam system without either jeopardizing the continued service to the large industrial customer or losing the competitive pricing of downtown steam.

A case was also studied to examine the alternative of electrode boilers for standby rather than the rehabilitation of 1A boiler. The results were inconclusive. Natural gas fuel savings were almost totally offset by the increased capital cost of the electrode boilers. Because there was not any clear advantage to electrode boilers, case runs with the large customer were assumed to include 1A boiler for standby.

TABLE VII-3

STEAM PRICES WITH THE ADDITION OF A NEW HIGH LOAD FACTOR CUSTOMER

CASE	1990	2003
Natural Gas	1950¢/MMBTU	7223¢/MMBTU
Base	3282¢/MMBTU $38.2/M#	10,342¢/MMBTU $120.3/M#
With New Customer:		
Downtown Steam	1986¢/MMBTU $23.1/M#	5790¢/MMBTU $67.3/M#
Large New Customer	1039¢/MMBTU $12.7/M#	3475¢/MMBTU $42.4/M#

The addition of the large, high load factor customer does make downtown steam competitive in price with natural gas. The addition of any high load factor industrial customer can benefit the existing steam customer. A smaller volume customer, however, would have to be charged a higher price to achieve the same effect and to maintain downtown steam's competitive posture as with the large customer.

Finally, other scenarios were investigated by reviewing the results of previously developed cases. They are summarized as follows:

Unit Rehabilitation. Rehabilitation of steam generating facilities at Grand Avenue Station was not studied in detail due to a lack of definitive engineering data on the feasibility of such a program.

In all cases without the addition of the large customer, however, the cost of rehabilitation would only add to an already uncompetitive situation. In the case with the large customer, downtown steam is just competitive with gas in 1990 so that the cost of rehabilitation would have to be borne by the large customer.

In 1990 the large industrial customer's cost for steam is $10.39/MMBTU as compared to gas cost at $19.50/MMBTU and downtown steam at $19.86/MMBTU. If $3/Mlb. were added to the industrial price, the cost would still be well below the cost of natural gas. The additional $3/Mlb. would permit some $30 million in capital improvements for rehabilitation.

Additional Winter Heating Load. The addition of new, low load factor winter heating load does not improve the competitive position of steam heat as compared to natural gas. Addition of this type of new customer merely adds to the winter peak while doing nothing to relieve the minimum load conditions that contribute so significantly to increased steam costs.

VIII - CONCLUSIONS AND RECOMMENDATIONS

Conclusions

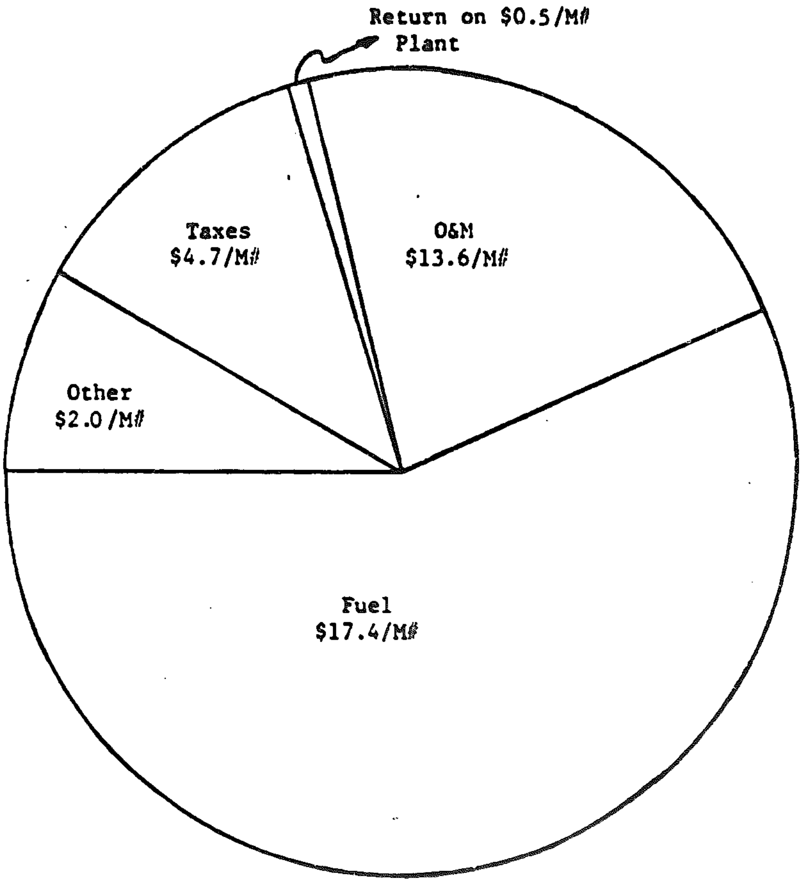
Based upon the investigation documented in this report, a long-range plan for KCPL's downtown steam system can be developed which will contribute to maintaining steam as a competitive and reliable heat source through the year 2000. The development of this plan is based upon the following conclusions:

The Base Case demonstrates that the present steam system cannot be both profitable and competitive with natural gas. A number of factors contribute to the uncompetitive cost of steam. The greatest impact is due to the high proportion of expensive natural gas burned for steam production. The natural gas burn is caused by equipment limitations that prohibit coal burn under minimum load conditions caused by low system load factor. The need to keep a backup boiler on hot standby further increases the natural gas burn.

Another factor that contributes to the high fuel cost is the design of the existing boilers. Greater fuel input to the boilers is required to produce the superheated steam required for turbine operation. The superheated steam is then cooled and the pressure is reduced for steam sendout. A boiler designed or modified to directly produce steam at the 185 psig sendout pressure would reduce fuel costs.

Operations and maintenance expense at Grand Avenue is also relatively high because of the age and design of the facility. Figure VIII-1 illustrates the importance of fuel and O&M to the cost of downtown steam. In 1990, those two components represent 81% of the cost per Mlb.

1990 STEAM COSTS
WITH ELECTRIC GENERATION RETIRED



TOTAL $38.2/M#

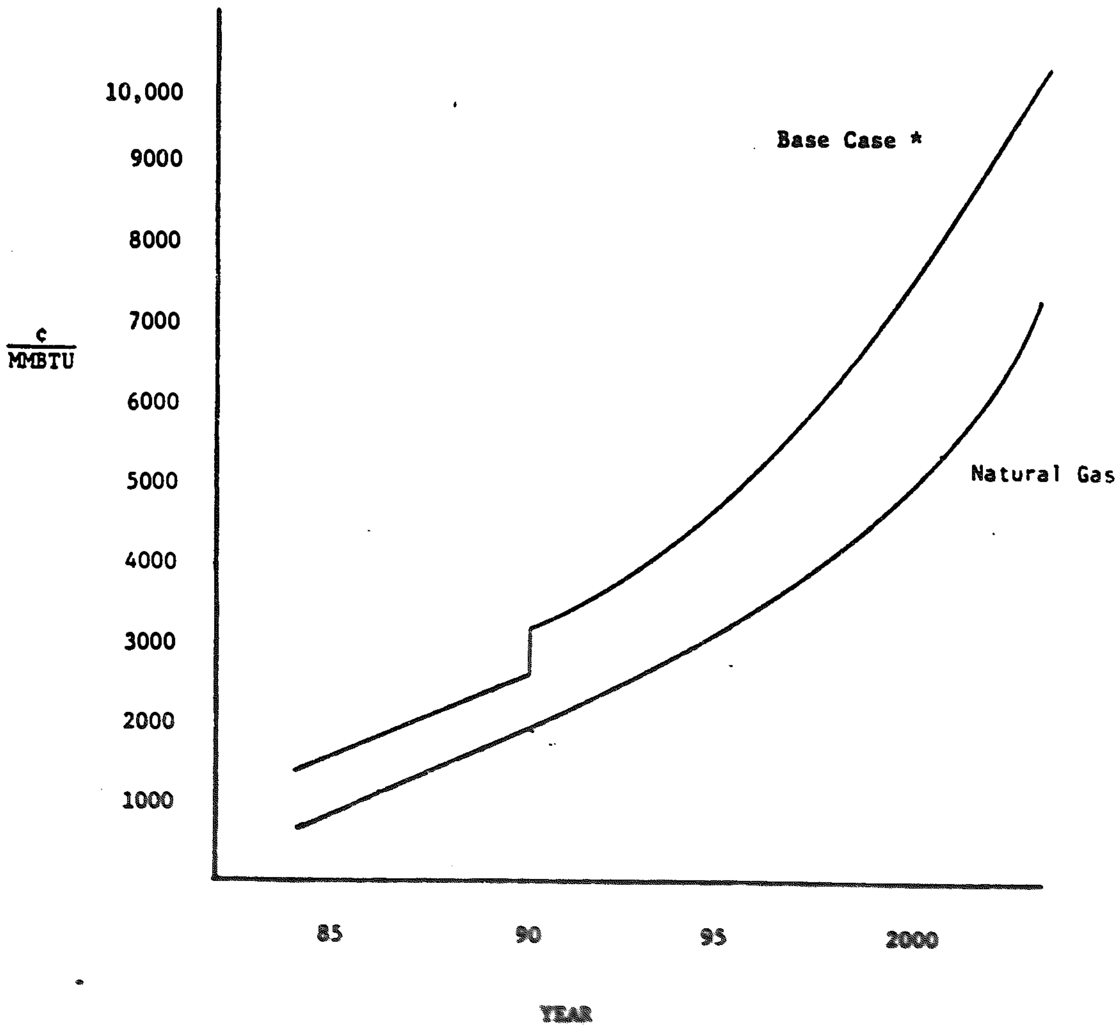
Retirement of the electric generation in 1990 further increases the cost advantage of natural gas over steam. Although total O&M expense is reduced by several million dollars with retirement, the loss of allocation to electric results in a net increase in the cost of steam. Figure VIII-2 graphically illustrates the cost of steam and natural gas over the study period. Steam is not competitive with gas in the 1980's and the situation is aggravated with the retirement of electric generation in 1990.

The results of examination of new steam generating technologies indicates that a new, more efficient supply will not result in a near-term competitive position for downtown steam. Coal-fired options had the effect of greatly reducing fuel and O&M expense, but the capital costs more than offset the savings. Electrode boilers, which are relatively low capital cost, was the best option of new technologies, however even this did not result in a competitive steam price until late in the study period. As a result, steam generator changeover is not a prudent course of action.

A number of scenarios were studied in an attempt to reduce fuel and O&M expense. Specific cases included seasonal service, electrode boilers to serve minimum load and for standby, and plant modifications that permit coal-fired operation under all load conditions. In all cases, some savings were realized, but natural gas is still the less costly source of heat for the downtown customer until late in the study period. Figure VIII-3 shows the cost of steam for the various cases.

Investigations currently underway could result in significant short-term fuel and O&M savings. These include examining the feasibility of coal mill and boiler modifications to permit coal to be fired under minimum

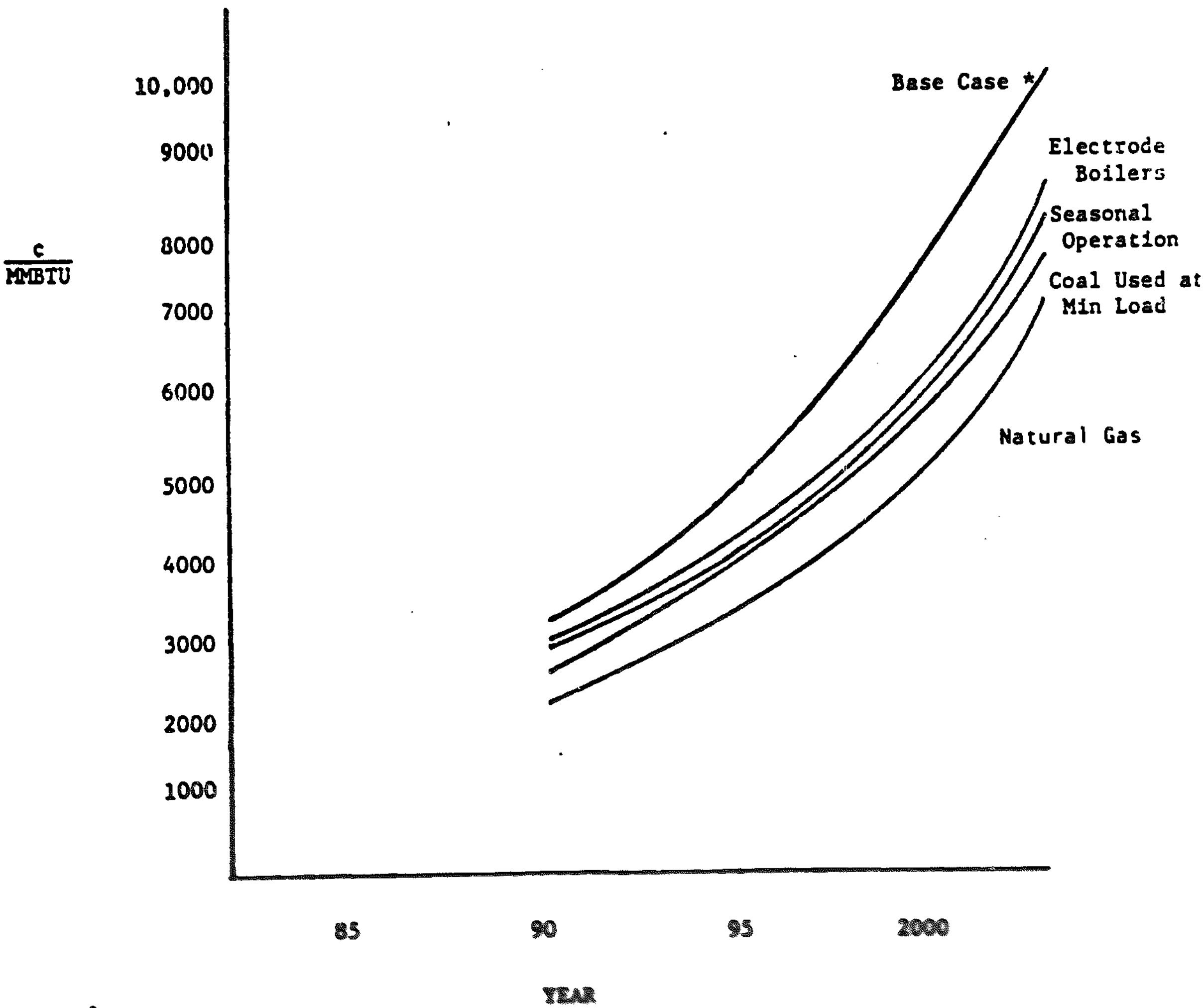
DOWNTOWN STEAM PRICE COMPARED TO NATURAL GAS PRICE



*Base Case = Downtown customer steam price with electrical generation retired in 1990.

FIGURE VIII-3

OPTIONS TO REDUCE COST WITHOUT
LARGE BASE LOAD CUSTOMER



* Base Case = Downtown customer steam price with electric
generation retired in 1990

load conditions. Another efficiency modification being investigated is boiler conversion to low pressure operation to reduce fuel cost upon retirement of the electric generation.

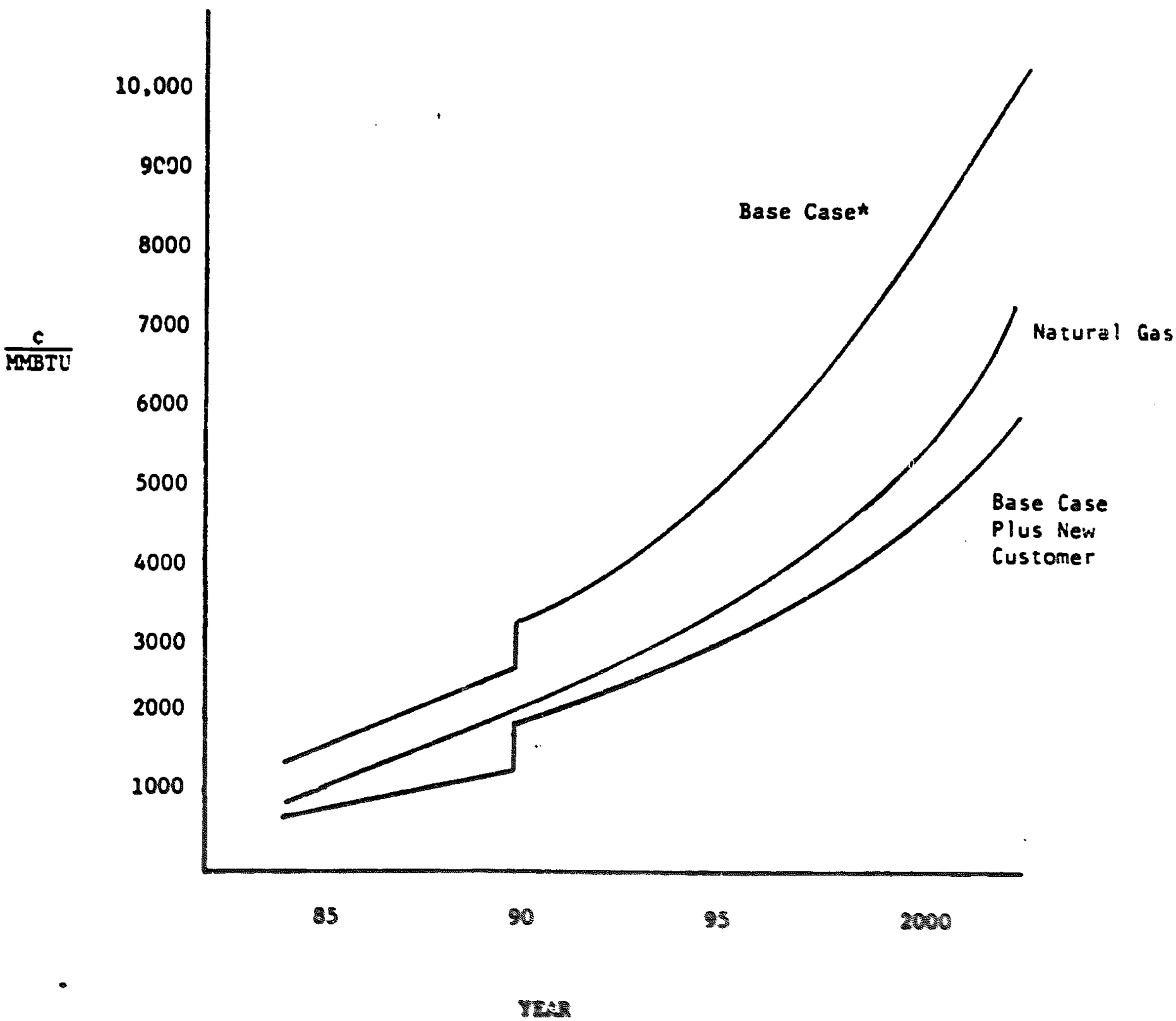
O&M expenses are also in the process of being reduced. It was recently announced that manpower at Grand will be reduced by 30 people resulting in significant labor cost savings. This reduction in force was not factored in to this study until 1990 when electric is retired. In addition, the feasibility of transferring major maintenance to the Central Maintenance Department is being studied.

The most promising scenario included the addition of a large, high load factor customer. Figure VIII-4 compares the cost of downtown steam with a large customer to the Base Case cost and to the cost of natural gas. The natural gas cost does not include fixed charges on the customer capital expenditure necessary for a boiler and auxiliary facilities. With a large high load factor customer added to the system, downtown steam is competitive with natural gas.

The turnaround is achieved because the load factor improvement as shown in Figure VIII-5 permits coal fuel to displace natural gas fuel at Grand Avenue throughout the year. In 1990, fuel cost alone was reduced by 40% with the addition of the new customer. Increased sales from 887,000 Mlbs. to 3,055,000 Mlbs. allows O&M expense to be distributed over more units of output further reducing the cost of steam. The price of steam to the downtown customer in 1990 is reduced from $38/Mlb. to $23/Mlb. with addition of the large customer. Figure VIII-6 shows the change in fuel mix that occurs with the addition of a large customer.

FIGURE VIII-4

DOWNTOWN STEAM PRICE COMPARED TO NATURAL GAS WITH NEW CUSTOMER



*Base Case - Downtown customer steam price with electrical generation retired in 1990.

FIGURE VIII-5

STEAM LOAD DURATION CURVE
WITH LARGE CUSTOMER

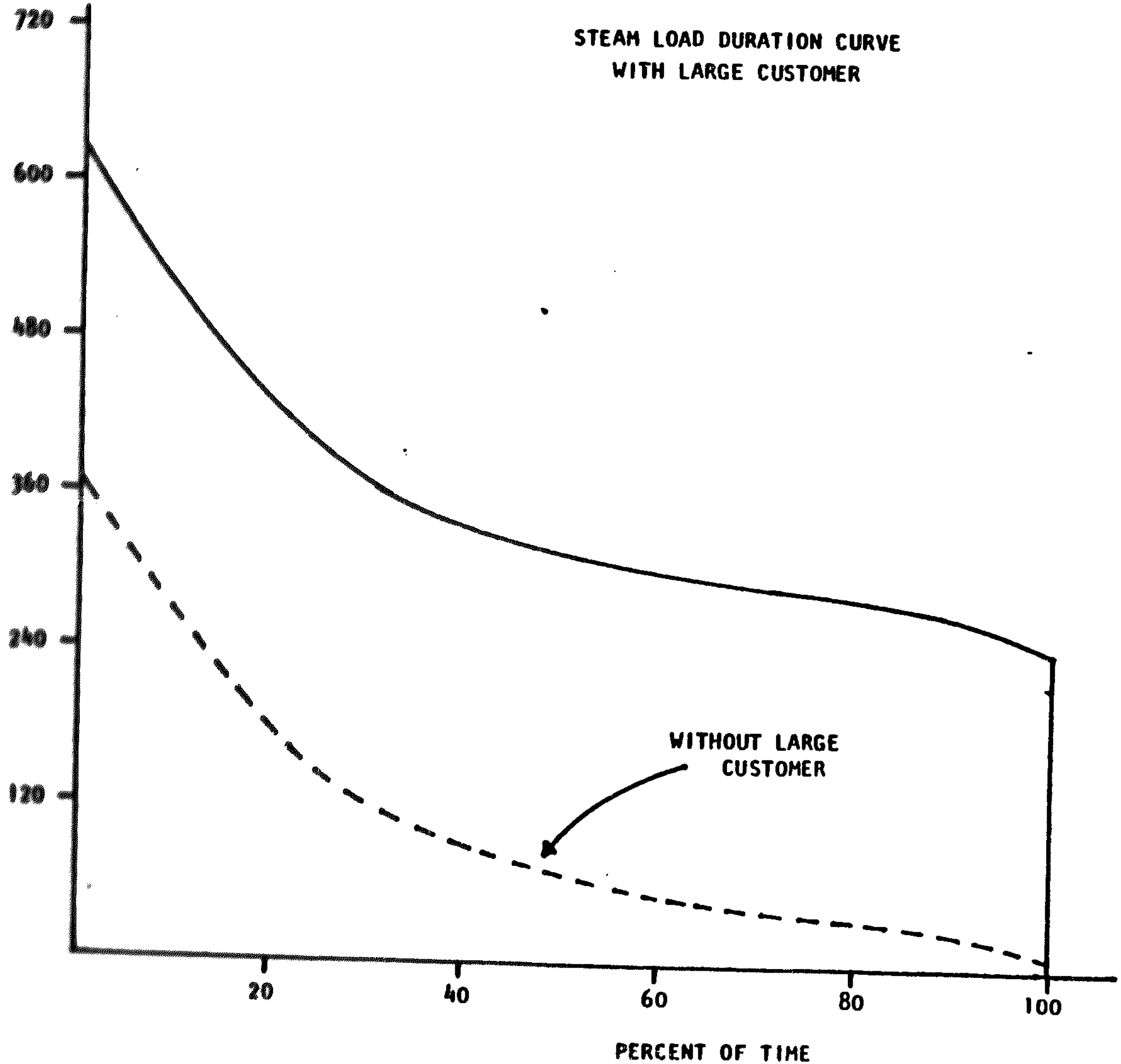
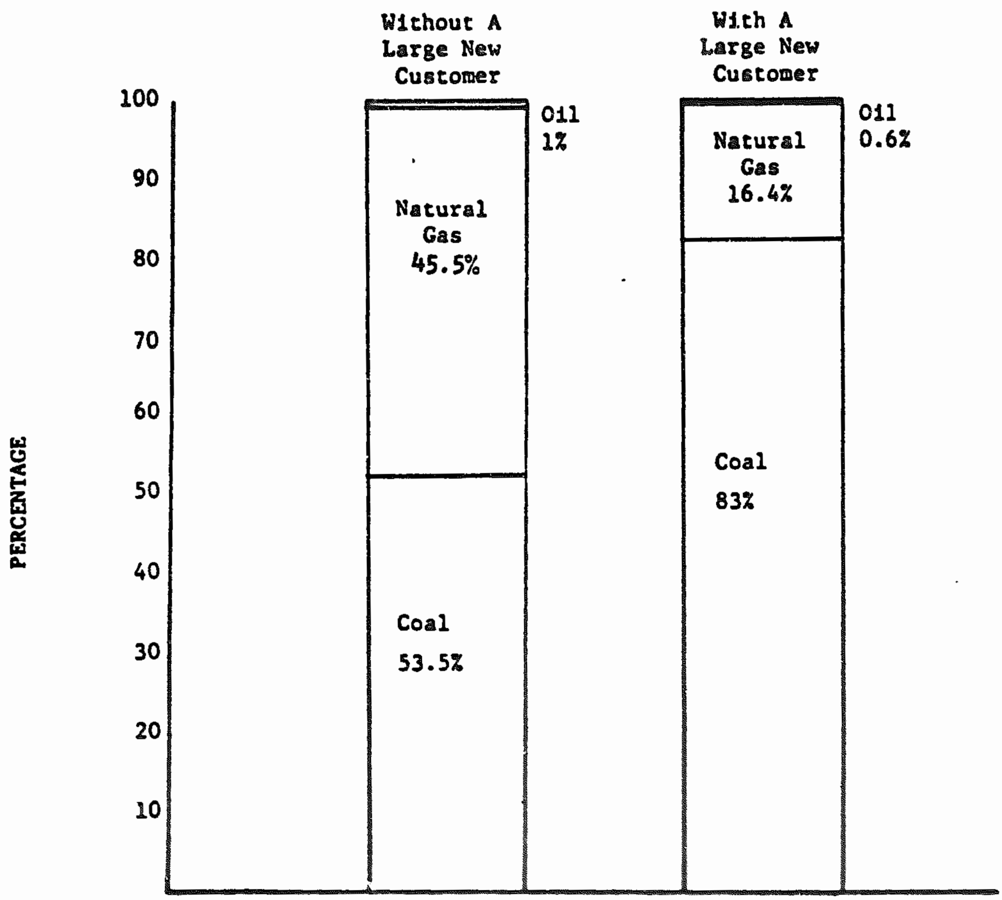


FIGURE VIII-6

% FUEL MIX IN 1990



Negotiations are underway with a major corporation for steam supply to its Kansas City area plant. Acquisition of this customer can maintain downtown steam in competition with natural gas. Only a high load factor customer can improve the situation. The addition of new winter peaking, low load factor customers does not improve the viability of the steam system.

Recommendations

Based on the results of this study, the following long-range plan for the downtown steam system is recommended:

1. Add a new large, high load factor customer as soon as possible but definitely prior to retirement of electric facilities at Grand Avenue Station. The resultant load factor improvement and increased steam sales is the most effective way to reduce the cost of downtown steam to a position that is competitive with natural gas.

2. In the interim period until a large customer can be added, continue to operate Grand Avenue as a joint use facility and improve downtown steam's competitive position through continued implementation of cost saving measures. Specific measures to be investigated include:

    - Reducing natural gas usage for hot standby and under minimum load conditions.
    - Reducing labor expense by shifting major maintenance to Central Maintenance.
    - Reducing coal costs through spot market purchases.

3. Continue to operate the existing boiler facilities to avoid large capital expenditures for new steam generators. Complete changeover to a new steam supply system would result in steam costs well in excess of natural gas cost until late in the study period.

4. If there is no prospect for the addition of a large high load factor customer, the following course of action should be considered:

   - By year end 1985, "freeze" the steam rate to prevent new customer entry on the system. This does not mean that the price is frozen, only new customer entry.
   - In 1990, when eletric generation is retired, consider providing only winter season steam service to reduce fuel and O&M expense.
   - Continue to aggressively pursue expense cutbacks at Grand Avenue. As the customer base is reduced through attrition, the cost of steam will increase due to decreased sales so that it is essential to cut costs as sales drop.
   - Promote customer conversion to electric heat with incentive rates and possibly leased electrode boilers where applicable.

5. Update the study of downtown steam at least every two years. Continue to investigate and implement measures designed to reduce fuel and O&M expense.

APPENDIX A - STUDY PARAMETERS

- O&M Expense Escalation: 10% per year thru 1983
  8.5% per year 1984-2003

  source: KCPLAN

- 1984 Base Fuel Prices (¢/MMBTU):

  Coal - 192
  Oil - 1074
  Gas - 476

  source: KCPL Fuel Budget 10/22/81

  Gas (Customer Cost) - see Case Runs

- Fuel Price Escalation:

	1984-86	1987-2003
Coal	11.6%	9.6%
Oil	11.7%	10.9%
Gas	28.5%	10.6%

  source: KCPL Fuel Budget 10/22/81

  Gas (Customer Cost) - see Case Runs

- Grand Avenue Accounts:

  Plant & Distribution Account Increase - 1% per year
  Plant & Distribution Depreciation Rate - 3.67% per year

- Tax Rates:

  Franchise Tax - 11.2%
  Composite Income Tax - 47.5%

- Load Model Selection - see Table 1 (attached).

TABLE 1

HEATING DEGREE DAYS
MONTH & YEAR SELECTED
FOR HOURLY LOAD DATA

Month	Year Selected	Heating Degree Days	43 Year Ave.*
Jan	1982	1311	1116
Feb	1981	798	866
Mar	1982	591	664
Apr	1982	364	286
May	1981	83	86
Oct	1981	192	199
Nov	1980	557	600
Dec	1980	931	949
TOTAL:		4827	4768

* Table B-2, KCPLAN, Page B-21

APPENDIX B

Case Runs

09/07/82

OLIGSCHLAEGER

CASE 1: DOWNTOWN STEAM ONLY - RETIRE ELECTRIC IN 1990 - (BASE)
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	11,560,310	13,205,674	15,209,650	16,847,653	18,284,686	19,991,253	27,082,077	29,399,902	31,910,986	34,768,755
FUEL	5,368,000	6,551,000	8,025,000	9,144,000	10,052,000	11,164,000	12,334,000	13,626,000	15,015,000	16,633,000
PROD O&M	2,190,000	2,376,150	2,578,123	2,797,263	3,035,030	3,293,008	8,330,000	9,038,600	9,807,000	10,640,000
DIST OPER	231,708	251,403	272,772	295,958	321,115	348,409	378,024	410,156	445,019	482,846
DIST MAINT	558,040	605,473	656,939	712,778	773,365	839,101	910,424	987,810	1,071,774	1,162,875
CUST ACCTS	51,954	56,370	61,162	66,360	72,001	78,121	84,761	91,966	99,783	108,265
A&G	431,000	467,635	507,384	550,512	597,305	648,076	670,892	727,918	789,791	856,923
DEPRECIATION	308,720	311,808	314,926	318,075	321,256	324,468	679,073	685,864	692,723	699,650
GEN TAXES	1,294,755	1,479,028	1,703,481	1,886,937	2,047,885	2,239,020	3,033,193	3,292,789	3,574,030	3,899,100
INCOME TAXES	332,493	306,086	279,415	252,478	225,271	197,792	314,246	236,161	197,495	138,242
INTERDEPT RENT	426,000	462,210	501,498	544,125	590,376	640,559	0	0	0	0
TOTAL OPERATING EXP	11,192,670	12,867,162	14,900,698	16,568,486	18,035,602	19,772,553	26,734,613	29,116,663	31,692,615	34,615,899
OPERATING INCOME	367,640	338,442	308,952	279,167	249,084	218,700	347,464	283,239	218,372	152,856
NET CASH FLOW	676,360	650,249	623,877	597,241	570,339	543,168	1,026,537	969,103	911,094	852,505
CUM NET CASH FLOW	676,360	1,326,609	1,950,487	2,547,728	3,118,067	3,661,236	8,360,429	9,329,532	10,240,626	11,093,131
GROSS PLANT GRAND	3,950,000	3,989,500	4,029,395	4,069,689	4,110,386	4,151,489	13,766,254	13,904,522	14,043,567	14,184,003
GROSS DIST	4,462,000	4,506,620	4,551,686	4,597,203	4,643,175	4,689,607	4,736,503	4,783,867	4,831,706	4,880,023
TOTAL NET PLANT	2,828,000	2,603,400	2,376,553	2,147,438	1,916,032	1,682,312	2,672,804	2,178,764	1,679,784	1,175,834
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPERHR CAPACITY	910	910	910	910	910	910	910	910	910	910
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	378.97	452.73	554.69	631.93	694.68	771.53	852.38	941.67	1037.66	1149.48
CENTS PER MMBTU STM	1483.83	1609.17	1843.07	2041.48	2215.61	2422.40	3281.62	3562.48	3866.76	4213.04
CENTS PER MMBTU GAS	747.26	960.77	1273.93	1441.15	1593.43	1762.98	1949.79	2155.45	2384.65	2637.40
DOL PER MLB SOLD OLD	16.29	18.61	21.43	23.74	25.77	28.17	38.17	41.43	44.97	49.00
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE		14.23	15.18	12.77	8.53	9.33	35.50	8.56	8.54	8.96

SCHEDULE 2-61

CASE 1: DOWNTOWN STEAM ONLY - RETIRE ELECTRIC IN 1990 - (BASE)
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	37,866,624	41,270,431	45,058,258	49,406,232	54,097,125	59,237,954	64,780,177	71,085,742	77,092,961	85,352,551
FUEL	18,376,003	20,297,000	22,365,007	24,775,000	27,378,000	30,242,003	33,318,000	36,916,000	40,790,000	45,060,000
PROD O&M	11,545,000	12,526,000	13,591,000	14,746,000	15,999,000	17,359,000	18,835,000	20,436,000	22,173,000	24,057,000
DIST OPER	523,888	568,418	616,734	669,156	726,035	787,747	854,706	927,356	1,006,181	1,091,707
DIST MAINT	1,261,719	1,368,965	1,485,327	1,611,580	1,748,564	1,897,192	2,058,453	2,233,422	2,423,263	2,629,240
CUST ACCTS	117,467	127,452	138,285	150,039	162,793	176,630	191,644	207,933	225,608	244,785
A&G	929,761	1,008,791	1,094,538	1,187,574	1,288,518	1,399,042	1,516,876	1,645,810	1,785,704	1,937,489
DEPRECIATION	706,646	713,713	720,850	728,058	735,339	742,692	750,119	757,620	765,197	772,848
GEN TAXES	4,241,062	4,622,288	5,046,525	5,532,826	6,058,878	6,634,651	7,255,380	7,961,603	8,724,011	9,559,484
INCOME TAXES	78,397	17,953	0	0	0	0	0	0	0	0
INTERDEPT RENT	0	0	0	0	0	0	0	0	0	0
TOTAL OPERATING EXP	37,779,939	41,250,579	45,058,258	49,400,232	54,097,125	59,237,954	64,780,177	71,085,742	77,092,961	85,352,551
OPERATING INCOME	86,685	19,852	0	0	0	0	0	0	0	0
NET CASH FLOW	793,331	733,564	720,850	728,058	735,339	742,692	750,119	757,620	765,197	772,848
CUM NET CASH FLOW	11,886,462	12,620,026	13,340,876	14,068,934	14,804,273	15,546,965	16,297,084	17,054,704	17,819,901	18,592,749
GROSS PLANT GRAND	14,325,843	14,469,101	14,613,792	14,759,929	14,907,528	15,056,604	15,207,169	15,359,241	15,512,833	15,667,961
GROSS DIST	4,928,823	4,978,111	5,027,892	5,078,171	5,128,953	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	666,804	152,705	0	0	0	0	0	0	0	0
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLB SOLD NEW	0	0	0	0	0	0	0	0	0	0
MLB SOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLB LOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLB PER HR CAPACITY	910	910	910	910	910	910	910	910	910	910
LOSSES	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	1269.94	1402.70	1545.61	1712.16	1892.05	2059.98	2302.56	2551.21	2818.94	31_4.03
CENTS PER MMBTU STM	4588.42	5000.87	5459.85	5985.99	6555.12	7178.05	7849.62	8613.69	9438.54	.0342
CENTS PER MMBTU GAS	2911.84	3226.11	3562.34	3946.68	4364.27	4827.39	5339.17	5905.90	6530.71	7223.03
DOL PER MLB SOLD OLD	53.36	58.16	63.50	69.62	76.24	83.48	91.29	100.18	109.77	120.28
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE	8.91	8.99	9.18	9.64	9.51	9.50	9.36	9.73	9.58	9.58

99/27/86

CASE 2: DOWNTOWN STEAM ONLY - SEASONAL SERVICE
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988
OPERATING REVENUES	10,968,467	11,944,510	13,171,302	14,254,345	15,214,943
FUEL	3,335,000	3,937,000	4,731,060	5,364,000	5,852,000
PROD O&M	3,339,000	3,622,815	3,930,754	4,264,868	4,627,382
DIST OPER	231,708	251,403	272,772	295,958	321,115
DIST MAINT	558,049	605,473	656,939	712,778	773,365
CUST ACCTS	25,977	28,185	30,581	33,180	36,000
A&G	240,000	260,406	282,534	306,549	332,606
DEPRECIATION	639,718	646,115	652,576	659,102	665,693
OTH TAXES	1,228,468	1,337,785	1,475,166	1,596,487	1,704,074
INCOME TAXES	650,877	596,158	540,893	485,074	428,697
TOTAL OPERATING EXP	10,248,728	11,285,334	12,573,234	13,717,996	14,740,930
OPERATING INCOME	719,679	659,176	598,068	536,349	474,013
NET CASH FLOW	1,359,397	1,305,291	1,250,644	1,195,451	1,139,706
CUM NET CASH FLOW	1,359,397	2,664,698	3,915,332	5,110,793	6,250,489
GROSS PLANT GRAND	12,969,000	13,098,696	13,229,677	13,361,973	13,495,593
GROSS DIST	4,462,000	4,536,620	4,551,686	4,597,203	4,643,175
TOTAL NET PLANT	5,536,063	5,070,592	4,600,530	4,125,768	3,646,259
RETURN ON NET PLANT	.13	.13	.13	.13	.13

	1989	1990	1991	1992	1993
OPERATING REVENUES	16,424,906	17,689,903	19,086,206	20,578,959	22,535,739
FUEL	6,522,000	7,196,000	7,944,600	8,725,000	9,863,000
PROD O&M	5,020,709	5,447,470	5,910,505	6,412,897	6,957,999
DIST OPER	348,409	378,024	410,156	445,019	482,846
DIST MAINT	839,101	910,424	987,810	1,071,774	1,162,875
CUST ACCTS	39,060	42,381	45,983	49,892	54,132
A&G	360,878	391,552	424,834	460,945	500,125
DEPRECIATION	672,350	679,073	685,864	692,723	699,650
OTH TAXES	1,839,589	1,981,269	2,137,655	2,304,843	2,524,000
INCOME TAXES	371,756	314,246	256,161	197,495	138,242
TOTAL OPERATING EXP	16,013,852	17,342,439	18,802,967	20,360,588	22,382,863
OPERATING INCOME	411,053	347,464	283,239	218,372	152,856
NET CASH FLOW	1,083,403	1,026,537	969,103	911,094	852,505
CUM NET CASH FLOW	7,333,892	8,360,429	9,329,532	10,240,626	11,093,131
GROSS PLANT GRAND	13,630,549	13,766,854	13,904,522	14,043,567	14,184,003
GROSS DIST	4,689,607	4,736,503	4,783,867	4,831,706	4,880,023
TOTAL NET PLANT	3,161,952	2,672,204	2,172,764	1,679,784	1,175,814
RETURN ON NET PLANT	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988
MLBSOLD NEW	0	0	0	0	0
MLBSOLD	552,800	552,800	552,800	552,800	552,800
MLBLOSSES	138,200	138,200	138,200	138,200	138,200
MLB PRODUCED	691,000	691,000	691,000	691,000	691,000
MLBPERHR CAPACITY	910	910	910	910	910
LOSSES	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	297.24	359.89	421.66	478.07	521.57
CENTS PER MMBTU STM	1706.08	1857.89	2048.71	2217.17	2366.59
CENTS PER MMBTU GAS	747.26	960.77	1233.93	1441.15	1593.43
DOL PER MLB SOLD OLD	19.84	21.61	23.83	25.79	27.52
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00
STEAM RATE INCREASE		8.90	10.27	8.22	6.74

	1989	1990	1991	1992	1993
MLBSOLD NEW	0	0	0	0	0
MLBSOLD	552,800	552,800	552,800	552,800	552,800
MLBLOSSES	138,200	138,200	138,200	138,200	138,200
MLB PRODUCED	691,000	691,000	691,000	691,000	691,000
MLBPERHR CAPACITY	910	910	910	910	910
LOSSES	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	591.25	641.53	708.02	777.63	879.06
CENTS PER MMBTU STM	2554.79	2751.55	2968.74	3200.93	3505.29
CENTS PER MMBTU GAS	1762.98	1949.79	2155.45	2384.65	2637.40
DOL PER MLB SOLD OLD	29.71	32.00	34.53	37.23	40.77
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00
STEAM RATE INCREASE	7.95	7.70	7.89	7.82	9.51

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OLIGSCHLAEGER

CASE 2: DOWNTOWN STEAM ONLY - SEASONAL SERVICE
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1994-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	24,232,845	26,267,466	29,567,823	31,298,099	34,200,206	37,382,459	40,751,159	44,689,704	48,873,969	53,468,318
FUEL	10,684,000	11,793,000	12,950,000	14,373,000	15,864,000	17,512,000	19,226,000	21,338,000	23,551,000	26,001,000
PROD O&M	7,549,423	8,191,124	8,887,369	9,642,795	10,462,433	11,351,740	12,316,637	13,363,551	14,499,453	15,731,906
DIST OPER	523,869	568,418	616,734	669,156	726,035	787,747	854,706	927,356	1,006,181	1,091,707
DIST MAINT	1,261,729	1,368,965	1,485,327	1,611,580	1,748,564	1,897,192	2,058,453	2,233,422	2,423,263	2,629,240
CUST ACCTS	58,734	63,726	69,143	75,020	81,396	88,315	95,822	103,967	112,804	122,392
A&G	542,636	586,760	638,665	693,103	752,017	815,938	885,293	960,543	1,042,189	1,130,775
DEPRECIATION	706,646	713,713	720,950	728,058	735,339	742,692	750,119	757,620	765,197	772,848
GEN TAXES	2,710,719	2,941,956	3,199,596	3,575,387	3,839,423	4,180,835	4,564,130	5,005,247	5,473,884	5,986,452
INCOME TAXES	78,397	17,953	0	0	0	0	0	0	0	0
TOTAL OPERATING EXP	24,116,160	26,247,615	29,567,823	31,298,099	34,200,206	37,382,459	40,751,159	44,689,704	48,873,969	53,468,339
OPERATING INCOME	86,685	19,852	0	0	0	0	0	0	0	0
NET CASH FLOW	793,331	733,564	720,850	728,058	735,339	742,692	750,119	757,620	765,197	772,848
CUM NET CASH FLOW	11,886,462	12,620,026	13,340,875	14,068,934	14,804,272	15,546,965	16,297,084	17,054,704	17,819,900	18,592,748
GROSS PLANT GRAND	14,325,843	14,469,101	14,613,792	14,759,929	14,907,529	15,056,604	15,207,169	15,359,241	15,512,833	15,667,961
GROSS DIST	4,928,823	4,978,111	5,027,892	5,078,171	5,128,953	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	666,804	152,705	0	0	0	0	0	0	0	0
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLPSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLPSOLD	552,800	552,800	552,800	552,800	552,800	552,800	552,800	552,800	552,800	552,800
MLPLOSSES	138,200	138,200	138,200	138,200	138,200	138,200	138,200	138,200	138,200	138,200
MLP PRODUCED	691,000	691,000	691,000	691,000	691,000	691,000	691,000	691,000	691,000	691,000
MLPPFORM CAPACITY	910	910	910	910	910	910	910	910	910	910
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	952.23	1051.07	1154.19	1281.02	1413.99	1560.75	1713.55	1901.78	2099.02	2317.38
CENTS PER MMBTU STM	3764.60	4085.74	4443.54	4868.22	5319.62	5814.60	6338.58	6951.20	7602.03	8316.66
CENTS PER MMBTU GAS	2916.84	3226.11	3568.34	3946.60	4364.27	4827.39	5339.17	5905.90	6530.71	7223.03
DOL PER MLP SOLD OLD	43.78	47.52	51.68	56.62	61.87	67.62	73.72	80.84	88.41	96.72
DOL PER MLP SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE	7.40	8.53	8.76	9.56	9.27	9.30	9.01	9.66	9.36	9.40

CASE 3: ELECTRODE BOILERS FOR STANDBY IN 1984
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	14,286,642	15,735,317	17,495,955	19,002,965	20,412,685	22,056,076	23,804,731	25,782,582	27,947,005	30,243,093
FUEL	4,653,000	5,567,000	6,722,000	7,012,000	8,359,000	9,279,000	10,224,000	11,316,000	12,527,000	13,767,000
PROD O&M	4,309,030	4,678,000	5,075,000	5,503,000	5,978,000	6,477,000	7,033,000	7,633,000	8,266,000	8,972,000
DIST OPER	231,738	251,493	272,772	295,958	321,115	349,409	378,024	410,156	445,019	482,846
DIST MAINT	558,040	605,473	656,939	712,778	773,365	839,101	910,424	987,810	1,071,774	1,162,875
CUST ACCTS	51,954	56,370	61,162	66,360	72,001	78,121	84,761	91,966	99,783	108,265
A&G	411,220	446,174	484,098	525,247	569,893	618,334	673,892	727,918	789,791	856,923
DEPRECIATION	635,917	611,976	612,096	624,277	630,520	636,825	643,193	649,625	656,121	662,682
GEN TAXES	1,606,164	1,762,356	1,959,547	2,128,332	2,286,221	2,473,281	2,666,130	2,887,649	3,130,064	3,387,226
INCOME TAXES	886,021	834,193	781,847	728,978	675,579	621,647	567,176	512,160	456,594	400,472
TOTAL OPERATING EXP	13,306,963	14,812,945	16,631,461	18,196,930	19,665,692	21,369,717	23,177,600	25,216,283	27,442,146	29,800,288
OPERATING INCOME	979,679	922,373	864,494	806,036	746,993	687,360	627,131	566,299	504,859	442,805
NET CASH FLOW	1,585,596	1,534,349	1,482,590	1,430,312	1,377,512	1,324,185	1,270,324	1,215,924	1,160,980	1,105,487
CUM NET CASH FLOW	1,585,596	3,119,945	4,602,534	6,032,847	7,410,359	8,734,543	10,004,867	11,220,791	12,381,771	13,487,258
GROSS PLANT GRAND	12,048,000	12,168,480	12,299,165	12,413,066	12,537,197	12,662,568	12,789,194	12,917,086	13,046,256	13,176,719
GROSS DIST	4,462,000	4,506,620	4,551,686	4,597,203	4,643,175	4,689,607	4,736,503	4,783,867	4,831,706	4,880,023
TOTAL NET PLANT	7,536,000	7,095,183	6,649,958	6,200,280	5,746,106	5,287,390	4,824,087	4,356,150	3,883,534	3,406,193
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPERHR CAPACITY	895	895	895	895	895	895	895	895	895	895
LOSSES	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	322.68	366.06	466.48	528.24	579.62	644.37	709.51	784.74	870.54	956.04
CENTS PER MMBTU STM	1731.16	1906.70	2120.04	2302.65	2473.47	2672.61	2884.50	3124.16	3386.43	3664.65
CENTS PER MMBTU GAS	747.26	963.77	1233.97	1441.15	1593.43	1762.98	1949.79	2155.45	2384.65	2637.40
DOL PER MLB SOLD OLD	23.13	22.17	24.66	26.78	28.77	31.08	33.55	36.33	39.38	42.62
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
RATE INCREASE		10.14	11.19	8.61	7.42	8.05	7.93	6.31	8.39	8.22

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CASE 3: ELECTRODE BOILERS FOR STANDBY IN 1984
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	32,866,061	35,740,985	38,892,180	42,338,483	46,132,684	50,330,005	54,961,895	60,166,790	65,909,369	72,037,424
FUEL	15,218,000	16,877,000	18,570,000	20,480,000	22,610,000	24,965,000	27,584,000	30,443,000	33,637,000	37,045,000
PROD O&M	9,741,000	10,578,000	11,467,000	12,450,000	13,498,000	14,650,000	15,890,000	17,253,600	18,725,000	20,289,000
DIST OPER	523,585	564,418	616,734	669,156	726,035	787,747	854,706	927,356	1,006,181	1,091,707
DIST MAINT	1,261,719	1,368,965	1,485,327	1,611,590	1,748,564	1,897,192	2,058,453	2,233,422	2,423,263	2,629,240
CUST ACCTS	117,467	127,452	138,285	150,039	162,793	176,630	191,644	207,933	225,608	244,785
A&G	929,761	1,008,791	1,094,538	1,187,574	1,288,518	1,399,042	1,516,876	1,645,810	1,785,704	1,937,489
DEPRECIATION	669,339	676,072	682,762	689,590	696,486	703,451	710,485	717,590	724,766	732,014
GEN TAXES	3,660,999	4,002,990	4,355,924	4,741,913	5,166,861	5,630,960	6,155,732	6,738,680	7,381,849	8,068,191
INCOME TAXES	343,789	286,539	228,716	170,316	111,331	56,756	0	0	0	0
TOTAL OPERATING EXP	32,485,932	35,424,157	38,639,286	42,150,163	46,009,585	50,272,778	54,961,895	60,166,790	65,909,369	72,037,424
OPERATING INCOME	380,130	316,828	252,894	188,320	123,099	57,228	0	0	0	0
NET CASH FLOW	1,049,439	992,830	935,656	877,909	819,585	760,678	710,485	717,590	724,766	732,014
CUM NET CASH FLOW	14,536,696	15,529,527	16,465,182	17,343,092	18,162,677	18,923,355	19,633,840	20,351,429	21,076,195	21,808,209
GROSS PLANT GRAND	13,308,486	13,441,570	13,575,986	13,711,745	13,848,863	13,987,351	14,127,224	14,268,496	14,411,181	14,555,293
GROSS DIST	4,928,827	4,978,111	5,027,892	5,078,171	5,128,953	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	2,924,377	2,437,141	1,945,336	1,448,612	946,921	443,213	0	0	0	0
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLB SOLD NEW	0	0	0	0	0	0	0	0	0	0
MLB SOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLB LOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLB OPERATING CAPACITY	895	895	895	895	895	895	895	895	895	895
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	1056.07	1166.34	1288.69	1421.24	1569.05	1732.49	1915.56	2112.63	2332.66	2572.57
CENTS PER MMBTU STM	3982.49	4333.45	4712.69	5130.29	5590.05	6094.65	6659.91	7290.60	7986.45	8729.01
CENTS PER MMBTU GAS	2916.84	3226.11	3568.34	3946.68	4364.27	4827.39	5339.17	5905.90	6530.71	7223.03
DOL PER MLB SOLD OLD	46.32	50.37	54.81	59.67	65.01	70.93	77.45	84.79	92.88	101.52
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE	9.67	8.75	8.82	8.86	8.96	9.10	9.20	9.47	9.54	9.30

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CASE 4: ELECTRODE BOILERS FOR MINIMUM LOAD - OEM TO HAWTHORN
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	12,552,408	13,441,621	14,521,440	15,566,356	16,547,221	17,801,066	19,097,390	20,523,687	22,021,887	23,812,374
FUEL	4,947,000	5,523,300	6,242,067	6,902,000	7,475,000	8,250,000	9,039,000	9,898,000	10,778,000	11,871,000
PROD O&M	2,475,000	2,695,375	2,913,632	3,161,290	3,430,000	3,721,550	4,037,282	4,381,102	4,753,495	5,157,542
DIST OPER	231,704	251,493	272,772	295,938	321,115	345,409	378,024	410,156	445,019	482,846
DIST MAINT	558,040	605,473	656,939	712,778	773,365	839,101	910,424	987,810	1,071,774	1,162,875
CUST ACCTS	51,954	56,370	61,162	66,360	72,001	78,121	84,761	91,966	99,783	108,265
A&G	411,220	446,174	484,098	525,247	569,893	618,334	670,892	727,918	789,791	856,923
DEPRECIATION	605,917	611,976	618,096	624,277	630,520	636,825	643,193	649,625	656,121	662,682
GEN TAXES	1,405,870	1,505,484	1,626,401	1,743,432	1,853,356	1,993,719	2,138,968	2,298,653	2,466,451	2,666,988
INCOME TAXES	886,021	834,193	781,847	728,978	675,580	621,648	567,176	512,160	456,594	400,472
TOTAL OPERATING EXP	11,572,729	12,519,448	13,656,947	14,760,320	15,800,828	17,113,706	18,470,259	19,957,388	21,517,028	23,369,593
OPERATING INCOME	979,679	922,373	864,493	806,036	746,393	687,360	627,130	566,299	504,859	442,805
NET CASH FLOW	1,585,596	1,534,349	1,482,589	1,430,313	1,377,513	1,324,185	1,270,323	1,215,923	1,160,980	1,105,487
CUM NET CASH FLOW	1,585,596	3,119,945	4,602,534	6,032,847	7,410,359	8,734,544	10,004,867	11,220,791	12,381,770	13,487,258
GROSS PLANT GRAND	12,048,000	12,168,480	12,290,165	12,413,066	12,537,197	12,662,568	12,789,194	12,917,086	13,046,256	13,176,719
GROSS DIST	4,462,000	4,506,623	4,551,686	4,597,203	4,643,175	4,689,607	4,736,503	4,783,867	4,831,706	4,880,023
TOTAL NET PLANT	7,536,000	7,095,183	6,649,958	6,200,280	5,746,106	5,287,390	4,824,087	4,356,150	3,883,534	3,406,393
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPERHR CAPACITY	895	895	895	895	895	895	895	895	895	895
LOSSES	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	366.72	409.72	463.06	512.02	554.53	612.46	670.55	734.27	799.55	880.64
CENTS PER MMBTU STM	1521.02	1628.79	1759.61	1886.23	2005.15	2157.01	2314.09	2466.92	2668.46	2885.43
CENTS PER MMBTU GAS	747.26	960.77	1223.93	1441.15	1593.43	1702.98	1949.79	2155.45	2384.65	2637.40
DOL PER MLB SOLD OLD	17.69	19.94	20.46	21.94	23.32	25.09	26.93	28.92	31.03	33.56
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE		7.09	8.07	7.20	6.31	7.57	7.28	7.47	7.39	8.13

CASE 4: ELECTRODE BOILERS FOR MINIMUM LOAD - O&M TO HAWTHORN
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	25,702,698	27,777,683	29,946,991	32,548,647	35,287,159	38,284,242	41,436,651	45,343,138	49,437,042	53,908,051
FUEL	13,062,000	14,242,000	15,506,000	17,099,000	18,723,000	20,510,000	22,334,000	24,627,000	26,987,000	29,574,000
PROD O&M	5,595,933	6,071,588	6,587,677	7,147,625	7,755,173	8,414,362	9,129,583	9,905,598	10,747,573	11,661,117
DIST OPER	523,888	568,418	616,734	669,156	726,035	787,747	854,706	927,356	1,006,181	1,091,707
DIST MAINT	1,261,719	1,368,965	1,485,327	1,611,580	1,748,564	1,897,192	2,058,453	2,233,422	2,423,263	2,629,240
CUST ACCTS	117,467	127,452	138,285	150,039	162,793	176,630	191,644	207,933	225,608	244,785
A&G	929,761	1,008,791	1,094,538	1,187,574	1,288,518	1,398,042	1,516,876	1,645,810	1,785,704	1,937,489
DEPRECIATION	669,309	676,392	682,762	699,590	696,426	703,451	710,485	717,590	724,766	732,014
OTH TAXES	2,878,702	3,111,100	3,354,063	3,645,448	3,952,162	4,287,835	4,640,905	5,078,431	5,536,949	6,037,702
INCOME TAXES	343,789	286,539	229,716	170,316	111,331	51,756	0	0	0	0
TOTAL OPERATING EXP	25,322,568	27,460,855	29,694,098	32,360,328	35,164,050	38,227,015	41,436,651	45,393,138	49,437,042	53,908,051
OPERATING INCOME	380,130	316,828	252,893	188,320	123,109	57,227	0	0	0	0
NET CASH FLOW	1,049,439	992,830	935,656	877,909	819,585	763,678	710,485	717,590	724,766	732,014
CUM NET CASH FLOW	14,536,697	15,529,527	16,465,182	17,343,092	18,162,677	18,923,355	19,633,840	20,351,429	21,076,195	21,808,209
GROSS PLANT GRAND	13,302,986	13,441,570	13,575,986	13,711,745	13,848,863	13,987,351	14,127,224	14,268,496	14,411,181	14,555,293
GROSS DIST	4,928,823	4,978,111	5,027,892	5,078,171	5,128,953	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	2,924,077	2,437,141	1,945,336	1,448,612	946,921	440,213	0	0	0	0
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPERHR CAPACITY	895	895	895	895	895	895	895	895	895	895
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	964.54	1056.53	1150.30	1267.73	1388.95	1521.51	1656.82	1826.93	2002.00	2193.92
CENTS PER MMBTU STM	3614.49	3965.91	3628.77	3944.92	4275.86	4639.03	5021.01	5494.37	5990.45	6532.21
CENTS PER MMBTU GAS	2916.24	3226.11	3568.34	3946.68	4364.27	4827.39	5339.17	5905.90	6530.71	7223.03
DOL PER MLB SOLD OLD	36.22	39.15	42.20	45.87	49.73	53.95	58.39	63.90	69.67	75.97
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE	7.94	8.07	7.81	8.69	8.41	8.49	8.23	9.43	9.03	9.04

09/07

CASE 5: DOWNTOWN STEAM ONLY - RETIRE ELECTRIC IN 1984 - ALL COAL
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	13,649,996	14,704,808	15,936,382	17,185,663	18,490,737	19,904,418	21,458,203	23,369,646	25,056,256	27,117,855
FUEL	3,752,000	4,257,000	4,874,000	5,458,000	6,039,000	6,658,000	7,340,000	8,093,000	8,928,000	9,839,000
PROD O&M	5,106,000	5,540,000	6,311,000	6,522,000	7,076,009	7,679,030	8,330,000	9,038,600	9,807,000	10,640,000
DIST OPER	231,708	251,493	272,772	295,958	321,115	348,409	378,924	416,156	445,019	482,646
DIST MAINT	558,040	605,473	656,939	712,778	777,365	839,101	910,424	987,810	1,071,774	1,162,875
CUST ACCTS	51,954	56,370	61,162	66,360	72,001	78,121	84,761	91,966	99,783	106,265
A&G	411,220	446,174	484,098	525,247	569,893	619,334	670,892	727,918	789,791	856,923
DEPRECIATION	639,718	646,115	652,576	659,102	665,697	672,350	679,073	685,864	692,723	699,650
OTH TAXES	1,528,800	1,646,938	1,784,875	1,924,794	2,079,963	2,229,295	2,403,319	2,594,933	2,806,301	3,037,200
INCOME TAXES	650,877	596,158	540,892	485,074	428,697	371,756	314,246	256,363	197,495	138,242
TOTAL OPERATING EXP	12,930,316	14,045,632	15,338,314	16,649,313	18,016,724	19,493,365	21,110,739	22,885,807	24,837,885	26,964,999
OPERATING INCOME	719,679	659,176	598,068	536,350	474,013	411,053	- 347,464	283,239	218,372	152,856
NET CASH FLOW	1,359,397	1,305,291	1,250,644	1,195,451	1,139,706	1,083,403	1,026,537	969,103	911,094	852,505
CUM NET CASH FLOW	1,359,397	2,664,688	3,915,333	5,110,784	6,250,490	7,333,892	8,360,430	9,329,533	10,240,627	11,093,132
GROSS PLANT PROD	12,969,909	13,098,690	13,229,677	13,361,973	13,495,593	13,633,549	13,766,854	13,904,522	14,043,567	14,184,803
GROSS DIST	4,462,000	4,506,620	4,551,656	4,597,203	4,643,175	4,689,607	4,736,503	4,783,867	4,831,706	4,880,023
TOTAL NET PLANT	5,536,000	5,070,592	4,600,530	4,125,768	3,646,258	3,161,952	2,672,804	2,178,764	1,679,784	1,375,814
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPERHR CAPACITY	910	910	910	910	910	910	910	910	910	910
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	259.39	294.19	336.83	377.19	417.35	460.12	507.26	559.30	617.00	679.96
CENTS PER MMBTU STM	1654.01	1781.93	1931.66	2082.44	2240.58	2411.88	2600.16	2807.47	3036.15	3285.96
CENTS PER MMBTU GAS	747.26	960.77	1223.97	1441.15	1593.43	1762.98	1949.79	2155.45	2384.65	2637.40
DOL PER MLB SOLD OLD	19.24	20.72	22.46	24.22	26.06	28.05	30.24	32.65	35.31	38.22
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE		7.73	8.39	7.84	7.59	7.65	7.81	7.97	8.15	8.23

ASM/9/82

CASE 5: DOWNTOWN STEAM ONLY - RETIRE ELECTRIC IN 1984 - ALL COAL
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	29,389,147	31,875,161	34,721,547	37,863,071	41,317,846	45,073,539	49,196,843	53,697,230	58,626,071	64,006,633
FUEL	10,848,000	11,954,000	13,156,000	14,530,000	16,039,000	17,664,000	19,480,000	21,475,000	23,681,000	26,105,000
PROD O&M	11,545,000	12,526,000	13,591,000	14,746,000	15,999,000	17,359,000	18,835,000	20,436,000	22,173,000	24,057,000
DIST OPER	523,888	568,418	616,734	669,156	726,035	787,747	854,706	927,356	1,006,181	1,091,707
DIST MAINT	1,211,719	1,366,965	1,485,327	1,611,580	1,748,564	1,897,192	2,058,453	2,233,422	2,423,263	2,629,240
CUST ACCTS	117,467	127,452	138,265	150,039	162,793	176,630	191,644	207,933	225,608	244,785
A&G	929,761	1,078,791	1,094,538	1,187,574	1,288,518	1,395,042	1,516,876	1,645,810	1,785,704	1,937,489
DEPRECIATION	706,646	713,713	720,850	728,058	735,339	742,692	750,119	757,620	765,197	772,848
GEN TAXES	3,291,584	3,570,018	3,889,813	4,240,664	4,627,599	5,049,236	5,510,046	6,014,090	6,566,120	7,168,765
INCOME TAXES	78,397	17,953	0	0	0	0	0	0	0	0
TOTAL OPERATING EXP	29,302,462	31,855,310	34,721,547	37,863,071	41,317,846	45,073,539	49,196,843	53,697,230	58,626,071	64,006,633
OPERATING INCOME	86,685	19,852	0	0	0	0	0	0	0	0
NET CASH FLOW	793,331	733,564	720,850	728,058	735,339	742,692	750,119	757,620	765,197	772,848
CUM NET CASH FLOW	11,886,462	12,620,027	13,340,876	14,068,935	14,804,273	15,546,965	16,297,085	17,054,705	17,819,903	18,592,750
GROSS PLANT GRAND	14,325,843	14,469,101	14,613,792	14,759,929	14,907,528	15,056,604	15,207,169	15,359,241	15,512,833	15,667,961
GROSS DIST	4,928,823	4,978,111	5,027,892	5,078,171	5,128,953	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	666,004	152,705	0	0	0	0	0	0	0	0
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
ML OPTIMUM CAPACITY	910	910	910	910	910	910	910	910	910	910
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	749.69	826.12	911.26	1004.15	1107.81	1220.73	1346.23	1484.13	1636.56	1804.08
CENTS PER MMBTU STM	3566.18	3862.42	4207.32	4587.99	5006.62	5461.71	5961.34	6506.67	7103.91	7755.93
CENTS PER MMBTU GAS	2916.84	3226.11	3562.34	3946.68	4364.27	4837.39	5339.17	5915.90	6530.71	7223.03
DOL PER MLB SOLD OLD	41.42	44.92	46.93	53.36	58.23	63.52	69.33	75.67	82.62	90.20
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE	1-3.38	1-4.46	8.93	1-9.05	9.12	9.09	9.15	9.15	9.18	9.18

CASE 6: ELECTRODE BOILERS - TOTAL REPLACEMENT IN 1988
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	14,293,399	15,738,696	17,498,267	19,000,713	20,817,062	22,131,587	23,592,003	25,181,486	26,917,088	28,808,096
	4,659,000	5,570,000	6,724,000	7,610,000	11,709,000	12,683,000	13,764,000	14,934,000	16,204,000	17,581,000
PROD O&M?	4,309,000	4,678,000	5,075,000	5,503,000	1,700,000	1,845,000	2,001,000	2,170,000	2,355,000	2,556,000
DIST OPER	231,708	251,403	272,772	295,958	321,115	348,409	378,024	410,156	445,019	482,846
DIST MAINT	558,040	605,473	656,939	712,778	773,365	839,101	910,424	987,810	1,071,774	1,162,875
CUST ACCTS	51,954	56,370	61,162	66,360	72,001	78,121	84,761	91,966	99,783	108,265
A&G	411,220	446,174	484,095	525,247	569,893	618,334	670,892	727,918	789,791	856,923
DEPRECIATION	605,917	611,976	618,096	624,277	583,690	589,527	595,423	601,377	607,391	613,464
GEN TAXES	1,600,661	1,762,734	1,959,799	2,128,080	2,331,511	2,479,738	2,642,304	2,820,326	3,014,714	3,226,507
INCOME TAXES	886,021	834,193	781,847	728,978	1,309,256	1,259,130	1,208,704	1,157,774	1,106,335	1,054,381
TOTAL OPERATING EXP	13,313,720	14,816,323	16,633,713	18,194,678	19,369,630	20,739,359	22,255,532	23,901,327	25,693,806	27,642,260
OPERATING INCOME	979,679	922,373	864,494	806,036	1,447,432	1,392,228	1,336,472	1,280,159	1,223,282	1,165,836
NET CASH FLOW	1,585,596	1,534,349	1,482,590	1,430,312	2,031,122	1,981,755	1,931,894	1,881,536	1,830,673	1,779,301
CUM NET CASH FLOW	1,585,596	3,119,945	4,602,534	6,032,847	8,063,969	10,045,724	11,977,619	13,859,154	15,689,827	17,469,127
GROSS PLANT GRAND?	12,048,000	12,168,480	12,290,165	12,413,066	11,261,197	11,373,908	11,487,546	11,602,421	11,718,445	11,835,630
GROSS DIST?	4,462,000	4,506,620	4,551,686	4,597,203	4,643,175	4,689,607	4,736,503	4,783,867	4,831,706	4,880,023
TOTAL NET PLANT	7,586,000	7,095,183	6,649,958	6,200,280	11,134,106	10,709,459	10,280,565	9,847,383	9,409,869	8,967,979
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPERHR CAPACITY	895	895	895	895	540	540	540	540	540	540
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	323.09	386.27	466.94	528.84	1064.45	1155.10	1252.41	1358.87	1474.43	1599.73
CENTS PER MMBTU STM	1731.98	1907.11	2126.31	2302.38	2522.47	2681.76	2858.72	3051.32	3261.63	3490.77
CENTS PER MMBTU GAS	747.26	960.77	1233.93	1441.15	1593.43	1772.95	1949.79	2155.45	2384.65	2637.43
DOL PER MLB SOLD OLD	20.14	22.18	24.66	26.78	29.34	31.19	33.25	35.49	37.93	40.60
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE		10.11	11.18	8.59	9.56	6.31	6.60	6.74	6.89	7.03

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OLIGSCHLAEGER

CASE 6: ELECTRODE BOILERS - TOTAL REPLACEMENT IN 1998
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1994-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	30,962,790	33,112,173	35,501,518	38,215,420	41,110,649	44,263,446	47,668,698	51,437,252	55,470,437	59,880,739
FUEL	19,071,000	20,697,000	22,409,000	24,365,000	26,436,000	28,683,000	31,121,000	33,766,000	36,636,000	39,751,000
PROD O&M	2,773,000	3,009,000	3,264,000	3,542,000	3,843,000	4,169,003	4,524,000	4,909,000	5,325,000	5,778,000
DIST OPER	523,888	568,418	616,734	669,156	726,035	787,747	854,706	927,356	1,006,181	1,091,707
DIST MAINT	1,261,719	1,368,965	1,485,327	1,611,580	1,748,564	1,897,192	2,058,453	2,233,422	2,423,263	2,629,240
CUST ACCTS	117,467	127,452	138,285	150,039	162,793	176,630	191,644	207,933	225,608	244,785
A&G	929,761	1,008,791	1,094,538	1,187,574	1,288,518	1,399,042	1,516,876	1,645,810	1,785,704	1,937,489
DEPRECIATION	619,599	625,795	632,053	638,374	644,757	651,205	657,717	664,294	670,937	677,646
GEN TAXES	3,456,632	3,708,555	3,976,170	4,280,127	4,604,393	4,957,170	5,341,134	5,758,732	6,212,689	6,706,640
INCOME TAXES	1,001,908	948,910	895,387	841,319	786,715	731,565	675,863	619,605	562,784	505,395
TOTAL OPERATING EXP	29,754,974	32,062,887	34,511,488	37,285,168	40,249,773	43,451,550	46,941,391	50,732,151	54,848,163	59,321,900
OPERATING INCOME	1,107,816	1,049,216	990,030	930,252	869,876	809,896	747,307	685,102	622,274	558,839
NET CASH FLOW	1,727,415	1,675,011	1,622,083	1,568,625	1,514,637	1,461,101	1,405,023	1,349,396	1,293,211	1,236,465
CUM NET CASH FLOW	19,196,542	20,871,554	22,493,636	24,062,261	25,576,894	27,036,995	28,442,018	29,791,413	31,084,624	32,321,089
GROSS PLANT GRAND	11,953,986	12,073,525	12,194,261	12,316,203	12,439,365	12,563,759	12,689,396	12,816,289	12,944,452	13,073,897
GROSS DIST	4,928,823	4,978,111	5,027,892	5,078,171	5,128,953	5,183,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	8,521,671	8,070,900	7,615,621	7,155,790	6,691,360	6,222,285	5,748,520	5,270,018	4,786,730	4,298,609
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPERHR CAPACITY	540	540	540	540	540	540	540	540	540	540
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	1736.89	1883.26	2039.04	2217.02	2405.46	2609.92	2831.76	3072.43	3333.58	3617.02
CENTS PER MMBTU STM	3739.74	4012.30	4371.83	4637.69	4983.51	5363.18	5778.59	6230.39	6721.53	7255.94
CENTS PER MMBTU GAS	2916.84	3226.11	3568.34	3946.68	4364.27	4827.39	5339.17	5905.90	6530.71	7223.03
DOL PER MLB SOLD OLD	43.49	46.66	50.03	53.85	57.93	62.37	67.21	72.46	78.17	84.39
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE	7.13	7.29	7.22	7.64	7.58	7.66	7.75	7.82	7.89	7.95

CASE 7: PACKAGE BOILERS IN 1988 & 1990
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	14,179,290	15,616,705	17,343,551	18,632,536	28,434,473	29,023,584	46,168,064	46,641,531	47,170,095	47,845,182
FUEL	4,680,000	5,587,000	6,723,000	7,082,000	4,065,000	4,408,000	4,470,000	4,924,000	5,367,000	5,890,000
PROD O&M	4,303,000	4,669,073	5,055,069	5,478,000	4,831,900	5,231,000	5,684,000	6,161,000	6,690,000	7,260,000
DIST OPER	231,708	251,403	272,772	295,958	321,115	348,409	378,024	410,156	445,019	482,846
DIST MAINT	558,040	605,473	656,939	712,778	773,365	839,101	910,424	987,810	1,071,774	1,162,875
CUST ACCTS	51,954	56,373	61,162	66,360	72,001	78,121	84,763	91,966	99,783	108,265
A&G	411,220	446,174	484,098	525,247	569,893	619,334	670,892	727,918	789,791	856,923
DEPRECIATION	605,954	612,013	619,133	624,315	2,170,526	2,192,232	4,022,657	4,062,683	4,103,512	4,144,547
GEN TAXES	1,588,081	1,749,071	1,942,478	2,109,244	3,184,661	3,250,417	5,170,623	5,223,851	5,283,051	5,358,640
INCOME TAXES	830,762	778,932	726,582	673,709	5,911,039	5,725,381	11,766,352	11,422,270	11,074,747	10,723,748
TOTAL OPERATING EXP	13,260,719	14,755,436	16,540,164	16,887,611	21,898,599	22,690,994	33,157,933	34,011,853	34,924,676	35,987,864
OPERATING INCOME	918,579	861,270	803,387	744,925	6,535,874	6,333,590	13,010,132	12,629,678	12,245,419	11,857,318
NET CASH FLOW	1,524,533	1,473,283	1,421,520	1,369,240	8,706,400	8,522,822	17,032,788	16,692,561	16,348,931	16,001,865
CUM NET CASH FLOW	1,524,533	2,997,816	4,419,336	5,788,575	14,494,976	23,017,798	40,050,586	56,743,146	73,092,076	89,093,940
GROSS PLANT ADDND	12,049,000	12,169,490	12,291,185	12,414,096	54,499,237	55,044,229	104,872,670	105,921,395	106,980,607	108,050,412
GROSS DIST	4,462,000	4,506,620	4,551,686	4,597,203	4,643,175	4,689,607	4,736,503	4,783,867	4,831,706	4,880,023
TOTAL NET PLANT	7,066,000	6,625,156	6,179,934	5,730,199	50,275,997	48,690,594	100,078,000	97,151,433	94,195,601	91,210,212
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLB PPHR CAPACITY	895	895	895	895	880	880	810	810	810	810
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	324.77	387.72	467.52	529.02	319.59	348.18	357.60	394.55	429.70	471.58
CENTS PER MMBTU STM	1719.15	1892.33	2101.57	2282.00	3445.59	3516.64	5594.33	5651.70	5715.75	5797.55
CENTS PER MMBTU GAS	747.26	963.77	1233.93	1441.15	1593.43	1702.95	1949.79	2155.45	2384.65	2637.40
DOL PER MLB SOLD OLD	19.98	22.01	24.44	26.54	40.07	40.90	65.06	65.73	66.47	67.43
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE		10.14	11.06	8.59	50.99	2.06	59.08	1.03	1.13	1.43

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CASE 7: PACKAGE BOILERS IN 1989 & 1990
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1994-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	48,637,842	49,553,040	50,628,537	51,907,881	53,283,879	54,937,824	56,663,779	58,824,746	61,100,390	63,622,200
FUEL	6,460,000	7,073,000	7,761,000	8,561,000	9,346,000	10,305,000	11,200,000	12,413,000	13,582,000	14,832,000
PROD O&M	7,877,000	8,548,000	9,273,000	10,052,000	10,915,000	11,832,000	12,856,000	13,925,000	15,114,000	16,412,000
DIST OPER	523,888	568,418	616,734	669,156	726,035	787,747	854,706	927,356	1,006,181	1,091,707
DIST MAINT	1,261,719	1,368,965	1,485,327	1,611,580	1,748,564	1,897,192	2,058,453	2,233,422	2,423,263	2,629,240
CUST ACCTS	117,467	127,452	138,285	150,039	162,793	176,630	191,644	207,933	225,608	244,785
A&G	929,761	1,008,791	1,094,538	1,187,574	1,288,518	1,399,042	1,516,876	1,645,810	1,785,704	1,937,489
DEPRECIATION	4,185,992	4,227,952	4,270,131	4,312,832	4,355,960	4,399,520	4,443,515	4,487,950	4,532,829	4,578,158
GEN TAXES	5,447,438	5,549,940	5,670,396	5,813,683	5,967,794	6,153,036	6,346,343	6,588,371	6,843,244	7,125,686
INCOME TAXES	10,369,240	10,011,187	9,649,553	9,284,303	8,915,400	8,542,813	8,166,496	7,786,415	7,402,533	7,014,813
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TOTAL OPERATING EXP	37,172,506	38,483,605	39,958,964	41,642,167	43,426,063	45,491,980	47,634,032	50,215,256	52,915,361	55,865,876
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OPERATING INCOME	11,465,337	11,069,435	10,669,574	10,265,714	9,857,816	9,445,844	9,029,748	8,609,490	8,185,029	7,756,324
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NET CASH FLOW	15,651,329	15,297,287	14,939,704	14,578,546	14,213,776	13,845,364	13,473,262	13,097,439	12,717,858	12,334,482
CUM NET CASH FLOW	104,745,268	120,042,554	134,982,258	149,560,802	163,774,576	177,619,939	191,093,200	204,390,638	216,908,496	229,242,976
GROSS PLANT GRAND	109,130,915	110,222,223	111,324,444	112,437,687	113,562,062	114,697,681	115,844,656	117,003,101	118,173,130	119,354,860
GROSS DIST	4,928,023	4,978,111	5,027,892	5,078,171	5,128,953	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	88,394,968	85,149,572	82,073,722	78,967,113	75,829,437	72,660,387	69,459,644	66,226,896	62,961,838	59,664,093
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
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BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPEAK CAPACITY	810	810	810	810	810	810	810	810	810	810
LOSSES	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	517.21	566.29	621.38	685.98	748.28	825.72	896.72	994.63	1088.30	1187.51
CENTS PER MMBTU STM	5893.60	6034.50	6134.82	6289.85	6456.58	6656.99	6866.13	7127.98	7403.73	7709.31
CENTS PER MMBTU GAS	2916.84	3226.11	3568.34	3946.68	4364.27	4827.39	5339.17	5905.90	6530.71	7223.03
DOL PER MLB SOLD OLD	68.54	69.83	71.35	73.15	75.09	77.42	79.85	82.90	86.11	89.66
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE	3.66	1.88	2.17	2.53	2.65	3.10	3.14	3.81	3.87	4.33

CASE 8: FLUIDIZED BED BOILERS IN 1988 & 1990
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	14,179,298	15,616,795	17,347,551	18,832,536	27,240,276	28,253,856	45,482,865	46,924,483	48,499,950	50,288,314
FUEL	4,680,000	5,587,090	6,723,900	7,602,000	4,158,900	4,513,000	4,599,000	5,064,000	5,521,000	6,058,000
PROD O&M	4,703,000	4,669,090	5,055,060	5,478,000	7,671,000	8,350,000	13,465,000	14,598,000	15,848,000	17,194,000
DIST OPER	231,708	251,433	272,772	295,958	321,115	348,409	378,024	410,156	445,019	482,846
DIST MAINT	558,043	605,473	656,939	712,778	773,365	839,101	910,424	987,810	1,071,774	1,162,875
CUST ACCTS	51,954	56,370	61,162	66,360	72,001	78,121	84,761	91,966	99,783	108,265
A&G	411,220	446,174	484,098	525,247	569,893	618,334	670,892	727,918	789,791	856,923
DEPRECIATION	635,954	612,013	619,133	624,315	1,654,965	1,671,515	2,889,788	2,918,685	2,947,872	2,977,351
GEN TAXES	1,560,081	1,749,071	1,942,478	2,109,244	3,050,911	3,164,432	5,094,081	5,255,542	5,431,994	5,632,291
INCOME TAXES	830,762	778,932	726,582	673,709	4,259,391	4,117,832	8,258,936	8,011,755	7,762,106	7,509,957
TOTAL OPERATING EXP	13,260,719	14,755,436	16,540,164	18,087,611	22,530,639	23,700,743	36,350,906	38,065,833	39,917,339	41,984,506
OPERATING INCOME	918,579	861,270	807,387	744,925	4,709,637	4,553,114	9,131,960	8,858,650	8,582,611	8,303,808
NET CASH FLOW	1,524,533	1,473,283	1,421,520	1,369,240	6,364,601	6,224,628	12,021,747	11,777,335	11,530,483	11,281,159
CUM NET CASH FLOW	1,524,533	2,997,816	4,419,336	5,788,575	12,153,177	18,377,805	30,399,552	42,176,886	53,707,369	64,988,528
GROSS PLANT GRAND	12,049,300	12,169,490	12,291,185	12,414,096	40,451,237	40,855,749	74,004,305	74,744,347	75,491,789	76,246,706
GROSS DIST	4,462,003	4,506,620	4,551,686	4,597,203	4,643,175	4,689,607	4,736,503	4,783,867	4,831,706	4,880,023
TOTAL NET PLANT	7,066,200	6,625,156	6,179,904	5,730,179	36,227,997	35,023,976	70,245,914	68,143,533	66,020,129	63,875,491
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPEAK CAPACITY	895	895	895	895	880	880	810	810	810	810
LOSSES	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	384.77	387.72	467.52	529.02	318.87	347.42	357.34	394.09	429.65	473.07
CENTS PER MMBTU STM	1759.15	1892.33	2101.57	2282.60	3390.79	3423.63	5511.31	5685.99	5876.90	6093.60
CENTS PER MMBTU GAS	747.26	969.77	1233.93	1441.15	1543.43	1762.98	1949.79	2155.45	2384.65	2637.40
DOL PER MLB SOLD OLD	19.98	22.01	24.44	26.54	38.39	39.82	64.10	66.13	68.35	70.87
DOL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE		10.14	11.06	8.59	44.64	3.72	60.98	3.17	3.36	3.69

CASE 8: FLUIDIZED BED BOILERS IN 1988 & 1990
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	52,275,294	54,469,255	56,914,737	59,654,185	62,616,464	65,953,609	69,516,270	73,610,406	78,009,932	82,804,442
FUEL	6,645,000	7,276,000	7,954,000	8,605,000	9,613,000	10,597,000	11,522,000	12,764,000	13,967,000	15,256,000
PROD O&M	18,656,000	20,246,000	21,965,000	23,615,000	25,857,000	28,035,000	30,451,000	32,993,000	35,619,000	38,679,000
DIST OPER	523,888	568,418	616,734	669,156	726,035	787,747	854,766	927,356	1,006,183	1,091,707
DIST MAINT	1,261,719	1,368,965	1,485,327	1,611,580	1,748,564	1,897,192	2,058,453	2,233,422	2,423,263	2,629,240
CUST ACCTS	117,467	127,452	139,285	150,039	162,793	176,630	191,644	207,933	225,608	244,785
A&G	929,761	1,008,791	1,094,538	1,187,574	1,288,518	1,395,042	1,516,876	1,645,810	1,785,704	1,937,489
DEPRECIATION	3,007,124	3,037,196	3,067,567	3,098,243	3,129,225	3,160,518	3,192,123	3,224,044	3,256,284	3,288,847
GEN TAXES	5,854,833	6,103,556	6,374,450	6,681,269	7,013,044	7,386,804	7,786,046	8,244,365	8,737,132	9,274,097
INCOME TAXES	7,255,286	6,998,368	6,739,278	6,475,890	6,210,878	5,943,220	5,672,882	5,399,840	5,124,067	4,845,537
TOTAL OPERATING EXP	44,253,078	46,731,445	49,464,179	52,493,751	55,749,055	59,382,152	63,245,728	67,639,768	72,344,217	77,446,700
OPERATING INCOME	8,022,217	7,737,810	7,450,558	7,160,434	6,867,409	6,571,457	6,272,542	5,970,638	5,665,715	5,357,742
NET CASH FLOW	11,029,341	10,775,005	10,519,125	10,258,677	9,996,634	9,731,975	9,464,665	9,194,682	8,923,999	8,646,589
CUM NET CASH FLOW	76,017,868	86,792,873	97,310,998	107,569,675	117,566,309	127,298,283	136,762,946	145,957,628	154,879,624	163,526,212
GROSS PLANT GRAND	77,009,172	77,779,262	78,557,053	79,342,622	80,136,047	80,937,406	81,746,779	82,564,246	83,389,887	84,223,785
GROSS DIST	4,928,823	4,978,111	5,027,892	5,078,171	5,128,953	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	61,709,406	59,521,659	57,312,037	55,080,317	52,826,280	50,549,704	48,250,361	45,928,027	43,582,467	41,213,453
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLBSOLD NEW	0	0	0	0	0	0	0	0	0	0
MLBSOLD	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000	887,000
MLBPERHR CAPACITY	810	810	810	810	810	810	810	810	810	810
LOSSES	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU FUEL	536.72	565.79	620.64	685.21	747.51	824.67	895.96	993.31	1086.93	1186.31
CENTS PER MMBTU STM	6334.37	6600.22	6896.54	7228.49	7587.44	7991.81	8423.75	8919.61	9452.71	10034
CENTS PER MMBTU GAS	2936.84	3226.16	3568.34	3946.68	4364.27	4927.39	5331.17	5905.90	6530.71	7223.03
TOTAL PER MLB SOLD OLD	73.67	76.76	80.21	84.07	88.24	92.94	97.97	103.74	109.94	116.69
TOTAL PER MLB SOLD NEW	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
STEAM RATE INCREASE	3.95	4.20	4.49	4.81	4.97	5.33	5.40	5.89	5.98	6.15

CASE 9: DOWNTOWN STEAM WITH NEW CUSTOMER - RETIRE ELECTRIC IN 1990
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-1993

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	23,633,269	23,079,454	25,970,455	28,628,125	31,193,397	34,076,029	43,857,147	47,740,425	52,050,222	56,737,279
FUEL	12,176,000	14,053,000	16,364,007	18,355,000	20,209,000	22,307,000	24,566,000	27,334,600	29,937,030	33,004,090
PROD O&M	4,415,970	4,790,275	5,197,448	5,639,231	6,119,566	6,638,644	13,287,822	14,525,786	15,760,478	17,100,118
DIST OPER	231,798	251,473	272,772	295,959	321,115	348,409	378,024	416,156	445,019	482,846
DIST MAINT	558,040	605,473	656,939	712,778	777,265	839,101	910,424	987,610	1,071,774	1,162,875
CUST ACCTS	51,954	56,370	61,162	66,360	72,011	75,121	84,761	91,966	99,783	108,265
A&G	634,070	647,890	746,361	809,821	878,634	953,318	1,034,350	1,122,270	1,217,663	1,321,164
DEPRECIATION	337,456	340,831	344,239	347,692	351,159	354,670	726,524	733,789	741,127	748,538
GEN TAXES	666,130	727,737	967,476	975,316	936,808	1,011,990	1,835,922	1,971,785	2,126,681	2,292,264
INCOME TAXES	424,551	395,687	361,537	337,089	307,349	277,313	433,926	371,782	369,017	245,624
INTERDEPT RENTS	639,700	693,315	757,247	616,188	885,564	960,837	0	0	0	0
TOTAL OPERATING EXP	23,163,839	22,641,940	25,565,177	28,255,403	30,853,559	33,769,402	43,377,352	47,329,343	51,708,540	56,465,692
OPERATING INCOME	469,430	437,514	405,279	372,722	339,838	306,627	479,795	411,082	341,683	271,586
NET CASH FLOW	806,886	778,345	749,518	720,453	690,997	661,297	1,266,319	1,144,871	1,082,809	1,020,126
CUM NET CASH FLOW	936,886	1,545,231	2,334,748	3,055,152	3,746,148	4,407,446	9,761,110	10,845,981	11,928,791	12,948,916
GROSS PLANT GRAND	4,733,333	4,783,330	4,828,133	4,876,414	4,925,179	4,974,430	15,059,785	15,236,383	15,362,486	15,516,111
GROSS DIST	4,462,993	4,506,620	4,551,666	4,597,033	4,647,175	4,689,607	4,736,503	4,783,867	4,831,736	4,880,623
TOTAL NET PLANT	3,611,000	3,365,494	3,117,532	2,867,690	2,614,145	2,358,670	3,690,737	3,162,175	2,628,329	2,089,144
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBS SOLD NEW CUSTOMER	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000
MLBS SOLD DOWNTOWN	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLB LOSSES DOWNTOWN	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000
MLB/PEAK CAPACITY	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110
LOSSES	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU										
FUEL	245.03	283.73	373.79	379.58	478.51	450.46	496.99	548.09	604.92	666.48
BASE	1400.80	1469.17	1843.60	2041.48	2215.61	2422.40	3281.62	3562.48	3866.76	4213.09
NEW CUSTOMER	554.13	625.41	710.66	786.89	863.13	946.72	1038.52	1139.34	1250.00	1371.31
DOWNTOWN	720.69	787.34	869.28	947.01	1013.54	1094.88	1985.26	2137.28	2300.86	2486.01
GAS	747.26	960.77	1270.43	1441.15	1593.43	1762.98	1949.79	2155.45	2384.65	2637.40
DOL PER MLB SOLD										
DOWNTOWN	8.38	9.16	10.21	11.01	11.79	12.73	23.10	24.81	26.76	28.84
NEW CUSTOMER	6.76	7.63	8.67	9.60	10.57	11.55	12.67	13.90	15.25	16.73
BASE	16.29	19.61	21.43	23.74	25.77	28.17	38.17	41.43	44.97	49.00
RATE INCREASES %										
BASE		14.74	15.25	10.78	8.59	9.31	35.56	8.54	8.54	8.56
NEW CUSTOMER		12.87	13.67	10.73	9.69	9.69	9.73	9.71	9.71	9.70
DOWNTOWN		9.23	10.48	8.94	7.13	8.03	81.46	7.62	7.86	7.78

CASE 3: DOWNTOWN STEAM WITH NEW CUSTOMER - RETIRE ELECTRIC IN 1990
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1994-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	61,974,442	67,552,156	73,348,131	80,075,348	88,447,767	96,822,322	106,141,182	116,249,510	127,393,042	139,707,646
FUEL	36,416,[illegible]	40,316,000	44,244,[illegible]	48,289,[illegible]	53,374,900	59,316,099	65,523,000	72,215,630	79,644,000	87,913,000
PROD O&M	18,353,178	20,17[illegible],646	21,741,794	[illegible]	25,727,704	27,898,685	30,269,439	32,842,558	35,634,175	38,663,080
DIST OPER	523,[illegible]	562,419	634,734	[illegible]	725,735	787,747	854,704	927,256	1,006,181	1,091,787
DIST MAINT	1,261,719	1,362,965	1,485,727	1,[illegible]	1,748,564	1,887,192	2,058,453	2,233,422	2,423,263	2,629,243
CUST ACCTS	117,467	127,452	138,265	[illegible]	162,792	176,630	191,644	207,933	225,608	244,785
A&G	1,433,463	1,555,302	1,657,[illegible]	1,070,947	1,956,578	2,155,437	2,338,649	2,537,434	2,753,116	2,987,131
DEPRECIATION	756,723	742,534	771,[illegible]	778,932	766,721	794,558	802,534	810,559	818,665	826,852
OTH TAXES	2,479,[illegible]	2,675,577	2,[illegible]	[illegible],147,251	[illegible],444,367	3,751,445	4,105,560	4,475,250	4,868,039	5,351,858
INCOME TAXES	181,597	116,929	51,625	0	0	0	0	0	0	-1
INTERDEPT RENTS	0	0	0	0	0	0	0	0	0	0
TOTAL OPERATING EXP	61,723,649	67,422,856	73,791,258	80,075,348	88,447,767	96,822,322	106,141,182	116,249,510	127,393,042	139,707,646
OPERATING INCOME	250,794	129,290	57,[illegible]	0	0	0	0	0	0	0
NET CASH FLOW	956,[illegible]	872,974	828,292	778,932	786,721	794,558	802,534	810,558	818,665	826,850
CUM NET CASH FLOW	13,[illegible],733	14,798,637	15,626,898	16,405,830	17,192,551	17,987,139	18,789,673	19,600,231	20,418,896	21,245,745
GROSS PLANT [illegible]	15,673,272	15,827,984	15,966,[illegible]	16,146,126	16,[illegible],587	16,470,663	16,635,369	16,801,723	16,969,740	17,139,437
ACCUM DEPR	4,928,923	4,978,111	5,[illegible]	5,072,171	5,128,952	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	1,544,567	994,544	437,[illegible]	0	0	0	0	0	0	0
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
M LBS SOLD NEW CUSTOMER	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000
M LBS [illegible] DOWNTOWN	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
M LOSSES DOWNTOWN	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
M LB PRODUCED	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000
[illegible] CAPACITY	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110
LOSS	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
RATE PER [illegible]										
FUEL	735.23	811.76	894.28	986.23	1087.74	1200.18	1322.83	1459.77	1609.95	1775.30
[illegible]	[illegible]	[illegible]	[illegible]	5085.79	6555.12	7178.35	7849.62	8613.67	9438.54	10342
NEW CUSTOMER	1574.30	1650.82	1611.49	[illegible]	2181.15	2394.26	2627.05	2884.43	3161.39	3475.41
DOWNTOWN	1482.97	[illegible]	3182.67	3025.17	2776.47	4058.73	4441.82	4841.79	5286.35	5790.20
GAS	[illegible]	2726.16	[illegible]	[illegible]	4364.27	4827.39	5339.17	5865.90	6530.71	7223.03
REV PER M LB SOLD										
DOWNTOWN	[illegible]	33.66	[illegible]	39.62	43.34	47.20	51.66	56.31	61.50	67.34
NEW CUSTOMER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	32.05	35.19	38.63	42.40
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	83.48	91.29	100.18	109.77	120.28
RATE INCREASES %										
[illegible]	[illegible]	[illegible]	[illegible]	9.64	9.51	9.50	9.36	9.74	9.57	9.57
NEW CUSTOMER	[illegible]	[illegible]	9.77	9.73	9.77	9.77	9.72	9.93	9.78	9.76
DOWNTOWN	[illegible]	[illegible]	[illegible]	[illegible]	9.40	8.92	9.44	[illegible]	9.22	9.49

OLIGSCHLAEGER

CASE 12: DOWNTOWN STEAM WITH NEW CUSTOMER - ALL ELECTRODE IN 1993
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1984-2003

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
OPERATING REVENUES	25,417,884	28,087,586	31,309,332	34,020,375	37,147,567	46,553,412	62,718,784	67,186,737	72,134,782	77,510,345
FUEL	12,181,020	14,056,070	16,395,200	18,056,070	20,749,010	28,193,000	47,229,000	53,174,000	55,525,000	60,245,000
PROD O&M	6,250,000	8,298,070	9,654,000	10,475,030	11,367,000	8,779,000	3,932,000	4,266,000	4,629,000	5,022,000
DIST OPER	231,000	251,635	271,930	295,354	320,132	347,345	376,869	408,503	443,660	481,371
DIST MAINT	558,000	635,433	656,997	712,777	773,309	839,040	910,359	987,739	1,071,697	1,162,791
CUST ACCTS	52,001	56,420	61,216	66,419	72,065	78,190	84,836	92,047	99,871	108,360
A&G	634,000	687,890	746,361	809,821	878,634	953,318	1,034,350	1,122,270	1,217,663	1,321,164
DEPRECIATION	624,418	691,262	698,175	705,157	712,208	935,493	1,049,223	1,059,735	1,070,333	1,081,116
GEN TAXES	1,205,367	1,293,124	1,401,431	1,581,648	1,683,177	2,409,458	2,228,888	2,391,785	2,584,170	2,788,015
INCOME TAXES	794,080	735,537	676,420	616,690	556,774	1,909,843	2,729,211	2,699,465	2,628,820	2,517,273
INTERCEPT RENTS	0	0	0	0	0	0	0	0	0	0
TOTAL OPERATING EXP	24,539,865	27,274,297	30,561,421	33,538,497	36,532,400	44,441,686	59,634,735	64,201,922	69,250,192	74,726,983
OPERATING INCOME	878,019	813,289	747,911	481,879	615,167	2,111,727	3,084,050	2,984,815	2,884,590	2,783,362
NET CASH FLOW	1,562,438	1,504,551	1,446,786	1,387,635	1,327,395	3,047,220	4,133,273	4,044,536	3,954,903	3,864,378
CUM NET CASH FLOW	1,562,438	3,066,989	4,513,775	5,900,410	7,227,805	10,274,725	14,407,997	18,452,528	22,407,430	26,271,808
GROSS PLANT GRAND	14,187,000	14,328,870	14,472,159	14,616,880	14,763,048	20,833,679	23,852,685	24,091,212	24,332,123	24,575,444
RESERVE DIST	4,462,703	4,576,670	4,551,666	4,507,223	4,643,175	4,689,607	4,736,503	4,783,867	4,831,706	4,880,623
TOTAL NET PLANT	6,754,903	6,256,178	5,753,164	5,245,227	4,732,231	16,244,065	23,723,474	22,960,142	22,189,177	21,410,583
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
MLBSOLD NEW CUSTOMER	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000
MLBSOLD DOWNTOWN	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLBLOSSES DOWNTOWN	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000
MLBPERHR CAPACITY	1,110	1,110	1,110	1,110	1,110	1,080	945	945	945	945
LOSSES	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU										
FUEL	246.08	283.96	321.01	370.02	408.74	607.81	1253.09	1359.56	1475.36	1600.56
BASE	1470.80	1620.17	1843.07	2041.48	2215.61	2422.40	3281.62	3562.48	3866.76	4213.04
NEW CUSTOMER	554.10	625.41	715.66	786.29	863.11	946.72	1618.85	1732.79	1854.92	1989.34
DOWNTOWN	1374.09	1399.74	1516.21	1624.64	1775.02	2636.80	2413.44	2587.68	2795.82	3016.36
GAS	747.26	967.77	1073.43	1441.15	1593.43	1762.98	1949.79	2155.45	2384.65	2637.40
REV PER MLB SOLD										
DOWNTOWN	15.17	16.27	17.63	19.89	20.18	30.32	28.05	30.09	32.52	35.08
NEW CUSTOMER	6.76	7.63	8.67	9.66	10.57	11.55	19.75	21.14	22.63	24.27
BASE	16.29	18.61	21.43	23.74	25.77	28.17	38.17	41.43	44.97	49.00
RATE INCREASE: %										
BASE		14.24	15.65	13.78	8.55	9.31	35.50	8.50	8.54	8.96
NEW CUSTOMER		17.47	13.67	10.73	9.69	9.69	71.00	7.04	7.05	7.25
DOWNTOWN		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SCHEDULE 2-79

CASE 1: DOWNTOWN STEAM WITH NEW CUSTOMER - ALL ELECTRODE IN 1996
KANSAS CITY POWER & LIGHT COMPANY
STEAM HEAT OPERATING RESULTS
1994-2003

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
OPERATING REVENUES	83,397,257	89,766,580	96,715,487	104,294,312	112,513,737	121,474,756	131,220,894	141,987,594	153,697,244	166,477,946
FUEL	65,264,000	70,973,000	76,740,707	83,491,000	90,587,000	98,285,000	106,642,000	115,706,000	125,540,000	136,213,000
PROD O&M	5,449,000	5,932,000	6,415,000	6,980,000	7,552,000	8,194,000	8,890,000	9,646,000	10,466,000	11,356,000
DIST OPER	522,787	566,682	614,849	667,112	723,816	785,340	852,094	924,522	1,003,107	1,088,373
DIST MAINT	1,261,629	1,362,867	1,485,221	1,611,464	1,748,439	1,897,056	2,058,306	2,233,262	2,423,089	2,629,052
CUST ACCTS	117,571	127,565	138,408	150,172	162,937	176,787	191,813	208,118	225,808	245,001
A&G	1,433,463	1,555,308	1,687,509	1,830,947	1,986,578	2,155,437	2,338,649	2,537,434	2,753,116	2,987,131
DEPRECIATION	1,091,826	1,102,744	1,113,771	1,124,909	1,136,158	1,147,520	1,158,995	1,170,585	1,182,291	1,194,114
GEN TAXES	3,051,559	3,371,144	3,661,774	3,048,660	4,309,772	4,727,820	5,192,922	5,874,310	6,627,314	7,502,704
INCOME TAXES	2,424,834	2,331,414	2,237,797	2,141,873	2,045,602	1,949,420	1,850,266	1,751,131	1,651,003	1,549,875
INTERDEPT RENTS	0	0	0	0	0	0	0	0	0	0
TOTAL OPERATING EXP	80,716,135	87,188,770	94,241,921	101,926,084	110,251,897	119,320,375	129,175,042	140,051,356	151,871,718	164,764,238
OPERATING INCOME	2,681,122	2,577,840	2,473,565	2,368,228	2,261,836	2,154,381	2,045,852	1,936,238	1,825,526	1,713,708
NET CASH FLOW	3,772,948	3,680,604	3,587,336	3,493,137	3,397,994	3,301,901	3,204,847	3,106,823	3,007,817	2,907,822
CUM NET CASH FLOW	29,044,755	33,725,359	37,312,695	40,805,832	44,203,826	47,505,727	50,710,573	53,817,396	56,825,212	59,733,034
GROSS PLANT GRAND	24,821,399	25,069,410	25,320,104	25,573,304	25,829,037	26,087,327	26,348,200	26,611,682	26,877,798	27,146,576
GROSS DIST	4,928,823	4,978,111	5,027,497	5,076,171	5,128,057	5,180,242	5,232,045	5,284,365	5,337,209	5,390,581
TOTAL NET PLANT	20,624,943	19,829,715	19,027,446	18,217,154	17,398,759	16,572,181	15,737,336	14,894,143	14,042,519	13,182,377
RETURN ON NET PLANT	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13

BASIC OPERATING ASSUMPTIONS

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MLB SOLD NEW CUSTOMER	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000	2,168,000
MLB SOLD DOWNTOWN	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600	709,600
MLB LOSSES DOWNTOWN	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400	177,400
MLB PRODUCED	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000	3,055,000
MLB PEAK CAPACITY	945	945	945	945	945	945	945	945	945	945
LOSS%	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
CENTS PER MMBTU										
FUEL	1736.56	1884.25	2044.34	2218.55	2406.67	2611.26	2833.21	3074.02	3335.28	3618.84
BASE	4588.42	5017.47	5459.65	5985.79	6555.12	7178.05	7849.62	8613.69	9436.54	10342
NEW CUSTOMER	2182.45	2279.51	2443.99	2647.16	2799.18	2996.72	3208.20	3385.25	3573.77	3761.48
DOWNTOWN	3301.49	3471.52	3806.02	4163.28	4662.37	5115.35	5618.24	6355.44	7176.12	8137.20
GAS	2916.84	3226.11	3546.34	3944.68	4364.27	4827.39	5339.17	5905.90	6530.71	7223.03
DOL PER MLB SOLD										
DOWNTOWN	38.43	41.54	45.31	49.43	54.27	59.49	65.34	73.91	83.39	94.40
NEW CUSTOMER	25.97	27.81	[illegible]	32.21	34.15	36.56	39.14	41.30	43.60	45.89
BASE	53.36	58.16	63.57	69.62	76.24	83.45	91.29	100.18	109.77	120.28
RATE INCREASES %										
BASE	[illegible]	[illegible]	9.30	9.64	9.51	9.50	9.36	9.74	9.57	9.57
NEW CUSTOMER	6.72	7.97	[illegible]	8.34	6.02	7.06	7.06	5.52	5.57	5.25
DOWNTOWN	7.45	9.12	9.07	6.98	11.97	9.71	9.24	13.12	12.82	13.21